



**“Design, Development and Implementation Framework for  
a Postgraduate Non-Surgical Aesthetics Curriculum”**

**By**

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*This work is dedicated to my wife Renu Pandey*

*And son Aditya Pandey*

## **Declaration**

I, Narendra Kumar, affirm that the work presented in this dissertation is my own. I confirm that this has been indicated in the thesis, where information has been derived from other sources.

Narendra Kumar

June 2021

## **Abstract**

Non-surgical aesthetics (NSA) procedures are primarily performed in private clinics away from traditional teaching hospital settings, establishing structured training and education in these procedures during residency training has been challenging. The objective of this study was to design and develop an evidence-based postgraduate curriculum in non-surgical aesthetics. It necessitated determining the current state of training and education for NSA procedures in postgraduate clinical education.

Following a design-based research approach, a subsequent systematic literature review and a cross-sectional global-needs assessment study established the need for such a curriculum. Subsequent literature reviews and series of global Delphi studies have informed and guided the design and development of the conceptual framework, core curriculum content and finally, the implementation framework to facilitate the smooth delivery of the programme. The research also incorporated pilot studies for teaching methodology, assessment strategies like “objective structured practical examination (OSPE) and objective structured clinical examination (OSCE)”, which has shown to be very effective.

The conceptual framework for curriculum design and development in NSA emerged from the global Delphi study. The conceptual framework is anchored on critical thinking and uses enquiry-based learning to develop information mastery, skills, and values and attitude.

Moreover, relevant threshold concepts guided the construction of learning outcomes mapped against the core curriculum. The finding of this study is

a crucial first step in bringing an evidence-based structure to training and education in NSA. This thesis will act as a 'blueprint' for the policymakers and program directors while curating a postgraduate programme in NSA.

## **Impact statement**

Socrates once said, “Let the question be the curriculum”. This newly proposed curriculum on non-surgical aesthetics has placed this at the heart of the design. From laying down the first brick as design-based research to series of global Delphi consensus, critical thinking to enquiry-based learning, every component followed a 2500-year-old dictum, yet in line with the evidence-based practice in modern medicine.

It is everything a physician should attain, as well as everything an educator must have. The process looks at various student characteristics, such as learning abilities, motivations, dispositions, and experiences. From learning tools, teaching methods to assessment strategies are all included. This is the first evidence-based, comprehensive, transformative curriculum following Professor Bruce Keogh’s mandate to promote a postgraduate programme in non-surgical aesthetics with academic rigour.

This can be used as a template for course design and implementation by academic and clinical programme directors. This curriculum will make students more curious, creative, open-minded, lateral thinkers, flexible and reflective. Learning and research skills would enable students to tackle new obstacles throughout their lives and thus help them reach new levels of professional success in their learning, patient satisfaction to safety, and professional identity formation.

For the Health regulators and professional statutory regulatory bodies, this is evidence to consider and argument for creating a new specialist training pathway in non-surgical aesthetics, a step which is long overdue to mitigate

the growing concern of patient safety. Moreover, creating a specialist training pathway will add to the supply of adequately trained competent physicians to meet the growing demand.

For those clinicians and academics involved in designing the faculty development programme, this work promotes educational attainment among medical educators. Such effort encourages the creation of new information in medical education while also encouraging evidence-based approaches in training and career advancement. This work supports faculty development efforts to produce the scholarship productivity for medical education of its faculty.

Finally, this research fosters and promotes industry partnership in delivering clinical education. Academics will enjoy several benefits when they work in an interdisciplinary environment. These benefits include the ability to address challenging research problems with real-world applications, seeing their study have concrete consequences, and will acquire new skills, data, or equipment. Moreover, the academia-industry collaboration will foster the co-creation of research, innovation, and knowledge development, promoting the culture of open science.

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## Explanation of Acronyms and Abbreviations

ACGME	Accreditation Council of Graduate Medical Education
AACS	American Academy of Cosmetic Surgery
AoME	Academy of Medical Educators
ASDS	American Society of Dermatological Surgery
ASAPS	American Society of Aesthetic Plastic Surgery
BCE	Before Common Era
BL	Bayesian-Laplacian
CAGR	Compound annual growth rate
CE	Common Era
CoP	Community of Practice
GMC	Graduate Medical Council
NSA	Non-Surgical Aesthetics
NSFA	Non-Surgical Facial Aesthetics
HEE	Higher Education England
USFDA	United State Federal Drug Agency
mOFC	Medial orbital frontal cortex
RF	Radiofrequency
IPL	Intense Pulse Light
HIFU	High-intensity focused ultrasound
MFU	Micro-focused ultrasound
PRP	Platelet Rich Plasma
PDFG	Platelet-derived growth factor

TGF	Transforming growth factor
VEGF	Vascular endothelial growth factor
ADSC	Adipose-derived stem cell
ISAPS	International Society of Aesthetic Plastic Surgery
OSPE	Objective Structured Practical Examination
OSCE	Objective Structured Clinical Examination
SDM	Shared Decision Making
PIF	Professional Identity Formation
PSRB	Professional Statutory Regulatory Body
WHR	Waist Hip Ratio
ZPD	Zone of Proximal Development

## Publications

1. A Novel Three-Dimensional Interactive Virtual Face to Facilitate Facial Anatomy Teaching Using Microsoft HoloLens; **Narendra Kumar**, Shubham Pandey, Eqram Rahman; Aesthetic Plastic Surgery doi.10.1007/s00266-020-02110-5
2. Global needs-assessment for a postgraduate program in non-surgical facial aesthetics; **Narendra Kumar**, Eqram Rahman; Aesthetic Surgery Journal doi.org/10.1093/asj/sjaa054
3. An effective and novel method for teaching applied facial anatomy and related procedural skills to esthetic physicians; **Narendra Kumar**, Eqram Rahman, Philip J Adds Adv Med Educ Pract. 2018; 9: 905–913. Published online 2018 Dec 6. doi: 10.2147/AMEP.S181874, PMID: PMC6292229
4. Development of “Core Syllabus” for Facial Anatomy Teaching to Aesthetic Physicians: A Delphi Consensus; **Narendra Kumar**, Arthur Swift, Eqram Rahman Plast Reconstr Surg Glob Open. 2018 Mar; 6(3): e1687. Published online 2018 Mar 6. doi:10.1097/GOX.0000000000001687, PMID: PMC5908490

5. Effectiveness of teaching facial anatomy through cadaver dissection on aesthetic physicians' knowledge; **Narendra Kumar**, Eqram Rahman  
Adv Med Educ Pract. 2017; 8: 475–480. Published online 2017 Jul 17.  
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## **Beauty From the Soul**

Beauty cannot be defined by words; words originate from the beauty!

Beauty cannot be seen by eyes; it is where the vision originates!

Beauty cannot be heard by ear; it is where the sound originates!

Beauty cannot be inhaled; it is where breathing originates!

Beauty cannot be created; it is where creation originates!

Beauty is not life; life originates from Beauty!

Beauty is far from being understood, far away from being understood!

Beauty is incomprehensible; it is mystical; it is limitless!

Beauty moves the unmovable; its power is enormous!

Beauty is in the act; Beauty is in kindness!

Beauty is in me; Beauty is in you!

Beauty is real; Beauty is ultimate!

Beauty is actuality; Beauty is truth; Beauty is God!

## **Chapter 1: Background**

Throughout human history, people have tried various ways to enhance their attractiveness. The ultimate desire for beauty and attractiveness has led to the development of various ways to enhance physical beauty. These aesthetic ideas were developed and synthesized by scientists and led to a new field termed aesthetic medicine; this is a branch of medicine which studies ways of protecting against impairment, enhancing the beauty of the human body and recreating or modifying its appearance and structure. It is science-based and aims to eliminate blemishes and reconstruct as nearly a perfect individual beauty with the help of various surgical and non-surgical measures.

Improving human vitality and sense of beauty is the aim of aesthetic medicine. Most people aspire to have both beauty and everlasting youth. Generation X (1965-1979), and generation Y or millennials (1980-1994), who are not satisfied with their external beauty or appearance, want above all to change their facial features. This leads them to seek cosmetic surgeries. Aesthetic Medicine was a breakthrough development in the field of medicine, which allowed the application of medical cosmetic techniques to maintain or create external human beauty. These medical cosmetic procedures are perceived directly through the senses and are readily accepted by society (Qingxing, Xue and Jiaye, 1995).

Medicine, which has in the past only dealt with biomedical models, has expanded to encompass the psychological and social aspects of human needs and has thus transformed into the biopsychosocial model, thereby

reminding us how to recognize the general goal of medical studies and practices (Engel, 1977; Grönblom Lundström *et al.*, 2019). In the biomedical model, the human biological character meets human physiological needs. This revolves around the need for preserving human existence from disease and illness or averting people from dying. On the other hand, the novel medical model meets other human requirements and needs by approaching biological, psychological, and social aspects. This model aims to enhance complete physical and psychological well-being, improve human vitality, and achieve perfection in health and beauty (Pörn, 1984; Engel, 1997).

There has been incredible growth in non-surgical aesthetics (NSA) procedures, and a burgeoning number of people are opting to undergo these procedures globally due to their effectiveness and safety in reducing the signs and symptoms of facial ageing (De Aquino, Haddad and Ferreira, 2013). The ageing population's desire to stay longer in the workforce, along with increased awareness and interest in aesthetic procedures, a robust local economy and decreased taboos, maybe playing an essential role in the heightened demand for surgical and non-surgical cosmetic procedures.

The sales of physician-dispensed aesthetic products exceeded US\$11.2 billion in 2018, and the current trend indicates that the aesthetic market will continue to expand and will reach US\$18.4 billion by 2023 (Medical Insight Inc, 2019). Body shaping/sculpting, skin quality/tightening, as well as an increase in neurotoxin and dermal filler procedures will keep the market growing. To treat submental fullness, the first of its kind, body shaping injectable Kybella®/Belkyra® (deoxycholic acid) by Allergan Plc. was



introduced, which was anticipated to further add to the growth of the non-surgical aesthetic procedure segment. Energy-based device companies are continuously innovating, improving technologies, and introducing new treatment options, which are expanding indications. The introduction of the first US Food and Drug Administration (USFDA) approved laser treatment for non-invasive lipolysis, body sculpting, and several new devices for feminine rejuvenation (women's health) could potentially become a significant market segment. This will further boost procedural growth with brands such as Viveve<sup>®</sup>, MonaLisa Touche<sup>®</sup>, and ThermiVa<sup>®</sup>.

Energy-based devices and physician-dispensed topical cream and lotion markets will also experience consistent annual gains of 6.6% and 8.7%, respectively, as demand for these products will result in increased sales. Globally, there were 83 million aesthetic procedures performed in 2018, with a compound annual growth rate (CAGR) of 6% estimated through 2023. The total expenditure on this was US\$40 billion in 2018. Furthermore, the expenditure will continue to increase with growth in the number of procedures in leading segments such as neurotoxins, soft tissue fillers, body shaping, skin tightening and energy-based feminine rejuvenation (Medical Insight Inc, 2019). Fee per procedure will grow most vigorously in Asia and particularly in China. Companies are continuously looking for disruptive innovation to fuel market growth which can offer minimal discomfort during the procedure and post-procedure downtime to improve the quality of care. The introduction of innovation and a trans epidermal drug delivery system to facilitate the delivery of toxin topically to treat lines and wrinkles will soon occur (Kelly Scientific, 2016). In addition, a completely

new Botulinum toxin Type E (a new serotype) is on the horizon for cosmetic use and has shown promising results in randomized, placebo-controlled phase-two clinical trials (Yoelin *et al.*, 2018).

The pharmaceutical products, device and consumer goods companies are displaying an ongoing interest in the aesthetics markets' promising growth opportunity to enter the cash pay and highly profitable sector. This will play a substantial role in the aesthetics market and will witness continued consolidation with many new players entering the arena through mergers and acquisitions. Companies like Allergan, Galderma, and Merz are at the forefront and driving technological innovation, market consolidation and market growth.

Like any other pharmaceutical product, North America accounts for about 45% of the overall aesthetics market. However, in recent years supremacy of the US has been shifting towards Asia, specifically with respect to energy-based devices. The new growth for aesthetics will mainly come from market expansions in Asia (Kelly Scientific, 2016). There is a steady growth in the number of physicians and clinics offering aesthetics procedures in countries like China, India, Indonesia, Japan, and Thailand. Rapid market expansion has created many job opportunities for both clinical and non-clinical staff, but the talent pool is limited and insufficient.

There are very few medical schools that at present run minimally structured courses for restricted aesthetics procedures. This situation has created an opportunity for many non-qualified people to enter the aesthetics field and offer their services, which mainly compromises the quality of care (David,

2017; Parker, 2019; Cunningham, 2020) and poses severe risks to patrons. Shortage of trained and qualified workforce warrants immediate attention from the policymakers in governments and academic institutions to offer a structured and customized course in NSA with full academic rigour in order to prepare young medical students and support staff (aesthetic nurses) who can offer these procedures safely (Kumar, Rahman and Adds, 2018). In many countries, practices of non-surgical cosmetics procedures are relatively unregulated, and practitioners are not limited to only core specialities such as aesthetic plastic surgery, facial plastic surgery, maxillofacial surgery, and or cosmetic dermatology.

The non-surgical aesthetics practices are adopted by family physicians, general physicians, general surgeons, dentists, ophthalmologists, gynaecologists, registered nurses (Australia, Canada, Denmark, Norway, Sweden, United Kingdom, and the United States) and many other specialities as well. In 2013, the British government formed a committee under the leadership of Professor Sir Bruce Keogh to review the current regulatory framework in the United Kingdom for surgical and non-surgical cosmetic procedures. Sir Bruce Keogh's committee reported that the present regulatory framework in the United Kingdom does not put any restrictions on who could perform non-surgical aesthetics procedures. There are no specific qualifications needed to offer aesthetics procedures, and in the absence of recognized training with academic rigour, anyone can set up a training program claiming to provide a qualification. The committee was alarmed that many self-ascribed training organizations have sprung up all across the United Kingdom (The Government of UK, 2013).

Aesthetic procedures are elective and often decisions by people choosing to undergo these procedures, and their subsequent outcomes can significantly impact their emotional and social well-being. It is, therefore, essential that practitioners have the appropriate training and education to develop the required knowledge and skillset for achieving desired clinical and aesthetic outcomes consistently. In addition, aesthetic procedures get significant media attention, which puts enormous pressure on the clinicians and industry to ensure the quality of care, safety, and patient outcome. It also offers an exciting opportunity for innovation in the field of non-surgical aesthetic medical education to build the physician's competence for meeting the growing demand.

NSA as a discipline in medical science is relatively new; there is a dearth of standardised quality medical education and training for practitioners. Physicians are learning aesthetic procedures by observing other colleagues during scientific meetings organized by societies, medical communications, pharmaceuticals, and devices companies (Kumar, Rahman, and Adds, 2018). Such training primarily revolves around trainers' individual perspectives and focuses mainly on demonstrating a technique to increase the user and injector base.

Medical Education in aesthetics is different in comparison to other specialities as it is a combination of Art & Science. Bulwer-Lytton said that "Art & Science have their meeting point in the method", and this applies in particular to plastic surgery (Davis, 1926). As a speciality, NSA is a combination of "Art and Science" and falls between Plastic Surgery and Dermatology. Physicians' clinical and aesthetic acumen plays a vital role in

determining the patient outcome and overall satisfaction. Aesthetic physicians are Renaissance artists working on a living canvas (patient's face) to enhance everyone's natural facial beauty. Physicians must develop a sense of what is aesthetically normal and master the art of aesthetic appreciation in various cultures, gender, race, and ethnic groups. The objective of this chapter was to present an overview of non-surgical aesthetics and its astronomical demand.

The philosophical concept of Beauty is explored in the next chapter.

## Chapter 2: Philosophical Concepts of Beauty

### 2.1 Introduction

The Vedic aphorism of *Satyam, Shivam, Sundaram* (Truth-Godliness-Beauty) is the personification of beauty as the ultimate truth and the highest good. As a trinity, all three are the hallmark of God and represent fundamental human values, although, even as the attribute of God, their intent is varied. Beauty alone is personified into a Form, while truth and good are unveiled in the act and act intrinsically is the ultimate attribution of the Form. The formal expression of truth and good is in beauty. Thus, beauty, the reflection of truth, is also the manifestation of God. This concept of beauty is not vastly different from the Western and the Islamic Sufi attitude, thus emphasising that it is a pancultural trait. Beauty is the paramount truth and limitless cradle for creativity. English Romantic poet Keats was influenced by the Indian Philosophy of Beauty and Truth (Roy, 2013). It is evident in his writings:

“Beauty is truth; truth is beauty -that is all,  
ye know on earth, and all ye need to know”

Beauty has been well represented in Art, Science, Philosophy, Psychology, Metaphysics, Theology as well as Literature and sought after in Mathematics. Beauty is real; its authority is enormous and not limited to only our facial structure or physical monuments. Concepts of beauty are some of the most debated subjects in philosophy and have been written

about by many ancient thinkers, theorists, and philosophers. It has always been a principal theme amongst Greek, Hellenistic, Indian and Medieval theorists and was dominant into eighteenth and nineteenth century thought. Beauty has been exemplified in discussions by scholars such as Burke, Kant, Hegel, Hume, Hutcheson, Shaftesbury, Schiller, Schopenhauer, Hanslick, and Santayana (Sartwell, 2017). Conventionally, beauty has been regarded amongst the ultimate guide to morality, along with goodness, veracity, and fairness. Beauty is also glorified and has been associated with attributes such as 'good' as it is evident from Plato's affirmations stating, "goodness is beautiful", and Montaigne (1533-1592 CE) stated the converse that "beauty is (almost) goodness". Later, Immanuel Kant professed, "the beautiful is morally good" (Kant, 1914). Emerson argued, "Beauty is the virtue of the body; virtue is the beauty of the soul" (Waldo, 1871). Confucius (551-479 BCE) had once said: "Everything has its beauty, but not everyone sees it". Sufi thinker Rumi had said, "The only lasting beauty is the beauty of heart". The phrase 'beauty is skin deep' suggests that beauty is superficial or a quality that satisfies the senses; instead, it is deeply rooted in our inner vision and goes beyond sensual and sensory pleasure.

Let us have a more comprehensive look at the literature to understand Beauty and critique the views of different philosophers and thinkers.

## **2.2 What is Beauty?**

Although this is just a three-word question, it is profound in that the likely answer to it may lie in its ability to unravel several other questions. Is it a function of definite opinions or, is there a difference of opinion that allows

varying perceptions of beauty; is beauty a composite characteristic or does the perception of beauty relate to acquired notions, or feelings, and ethos?

The *Merriam-Webster dictionary* notes that the word beauty was first used in the 14<sup>th</sup> century and delineated as “The quality or aggregate of qualities in a person or thing that as a whole gives pleasure to the senses or pleasurably exalts the mind or spirit” (Merriam-Webster Dictionary, 2018).

Several definitions of beauty can be found in the literature, but none of them is precise enough to bring any satisfaction and universal acceptance. According to Abhinavagupta (950-1016 CE), an aesthetician, mystic, and philosopher, aesthetic experience is the innate concepts and dispositions of the self, such as love and sorrow by self (Bender and Gnoli, 1970; Roberts, 2015). Bhatta Nayaka (850-900 CE) and Abhinavagupta, both equated beauty with Rasa, while Acharya Vamana (latter half of the 8<sup>th</sup>-early 9<sup>th</sup> century CE) in his *Kavyalankara Sutra* equated beauty with *ALANKARA* (अलंकार) or “ornamentation” or “embellishment” (Rajendran, 2001). Kalidasa (4<sup>th</sup>-5<sup>th</sup> century CE), the ancient Indian thinker, equated beauty with perfection but did not propose any formal definition (Rajendran, 2001). The Greek poet Theognis (570-485 BCE) stated: “that which is beautiful is pleasant, that which is ugly is unpleasant” (Tatarkiewicz, 1970). David Hume, the Scottish philosopher and naturalist, said, “Beauty in things exists in the mind which contemplates them” (Hume, 1758), while in the late 19<sup>th</sup> century, the Irish novelist Margaret Wolf Hungerford (1878) stated the famous proverb “Beauty is in the eye of the beholder” (Hungerford, 1890). Guided by their respective



ideologies, it appears that both statements are relating beauty to “senses”, however, making it more of a subjective consideration.

Edmund Burke defines “Beauty is, for the greater part, some quality in bodies acting mechanically upon the human mind by the intervention of the senses” in his book titled *Philosophical Enquiry into the Origin of Our Ideas of the Sublime and Beautiful* (Burke, 1757). While he did not elaborate the meaning of “some quality” in the body while defining beauty, he later suggested that the quality is not to be sought in the perfection or proportion irrespective of biological beauty in human or artefactual beauty in buildings (Zeki, 2019). Francis Hutcheson (1726) opined that “Aesthetic judgements are perceptual and take their authority from a sense that is common to all who make them”, and “The origin of our perceptions of beauty and harmony is justly called a ‘sense’ because it involves no intellectual element, no reflection on principles and causes” (Hutcheson, 2004). Immanuel Kant (1792), in his book *Critique of Judgement*, reiterated his opinion by stating, “The beautiful is that which pleases universally without a concept” (Kant, 1914).

Clive Bell, in his book *Art*, tried to define beauty as the “common factor” that arouses the “aesthetic emotion”. According to Bell’s theory, “there is a particular kind of emotion provoked by works of visual arts ‘the aesthetic emotion’; the same emotion is provoked by every kind of visual art” (Bell, 1914). While Bell restricted his position to visual arts, I agree with Zeki (2013) and believe that his concept of “aesthetic emotion” can be adapted to all kinds of visual arts, whether created by Nature or by humans. According to him, “if we can discover some quality common and peculiar to

all the objects that provoke the aesthetic emotion, we shall have solved what I take to be the central problem of aesthetics". One can infer this as he is not referring to only visual art but almost everything that can invoke "aesthetic emotion". That may be the reason why similar "aesthetic emotions" are invoked by looking at a beautiful face or an artefact. The cave paintings of Ajanta and Ellora, sculptures in South Indian temples, a Persian bowl, St Sophia and the windows at Chartres, the masterpieces of Poussin, and the art of Raja Ravi Varma, Picasso, or Leonardo Da Vinci, all these works of visual art have a "common quality" and arouse the aesthetic emotion (Zeki, 2013).

Although, such aesthetic emotions are driven by the priors, as aptly argued by Zeki and Chen in their article '*The Bayesian-Laplacian brain*'. Applying the Bayesian-Laplacian (BL) concept, they elaborated the role of biological prior and artefactual prior to the appreciation of beauty. The biological prior is inherent, guides us in recognising a beautiful human body or face, irrespective of its race, gender, geography and gives a neurobiological explanation to the idea of universal beauty. Whereas our acquired experience and learning drive artefactual prior, therefore, aesthetic appreciation of such objects varies between individuals, geography such as a building or a particular design of a car can be attractive for certain individuals and does not conform to universality (Zeki and Chén, 2020).

### **2.3 Is Beauty Subjective or Objective?**

Since antiquity, several Eastern and Western, prominent thinkers have expounded the concept of beauty and argued whether it is subjective or an

objective attribute of the object. Indian theorists avoided the discussion on whether beauty is “subjective”, i.e., in “the eye of the beholder” or “objective”, i.e., ‘property of the beautiful object itself’. For them, this dispute was not worthy of discussion. This could be the reason why Indian philosophers did not engage in a theoretical argument over the ontological status of beauty (Chaudhury, 1965; Rajendran, 2001). The poets and dramatists were intrigued by such debates, whereas thinkers in other forms of arts such as music or painting rarely engaged in theoretical arguments.

Plato (427-347 BCE) was among the earliest philosophers who had an idealist conception of beauty and was an avid admirer of both physical and metaphysical beauty. Plato’s contribution to classical aesthetics is very well exemplified in *The Symposium*, where Diotima spoke about the experience of beauty as being related to the erotic impulses and necessary for procreation, which in turn related to a desire for immortality or eternity (Plato, 1961). Interestingly, Plato and Aristotle disagree in their treatment to define beauty; however, both agree that beauty is objective. The classical conception is that beauty encompasses the prearrangement of essential parts into a harmonious whole, conferring symmetry, harmony, proportion, and other similar ideas. This can be attributed to Aristotle, who said that “to be beautiful, a living creature, and every whole made up of parts, must present a certain order in its arrangement of parts” (Barnes, 1984). This perspective, as elaborated by Aristotle, hints at a mathematical formula, such as the golden section. This idea is further illustrated in the architectures such as Parthenon (Figure 2-1), and later in the *Kanon* of the

Polykleitos, which was the perfect treaty of the harmony and proportion of the human body.



Figure 2-1: Exterior of Parthenon temple in Acropolis, Athens, Greece  
(Shutterstock)

The classical conception of beauty is an early Western concept and is seen to be reflected in architecture, sculpture, literature, and music of the time. St. Thomas Aquinas, the Catholic Church philosopher in the 13<sup>th</sup> century, also known as an angelic doctor, defines beauty as “*INTEGRAS, PROPOTIO, and et CLARITAS*”: harmony, proportion, and clarity (Aquinas, 1920). The Hedonist concept, espoused by the theorists of the early 18<sup>th</sup> century, characterised beauty in terms of the pleasure attained from the experience of beauty. Italian historian, Ludovico Antonio Muratori, says that

“by beautiful we generally understand whatever, when seen, heard, or understood, delights, pleases, and ravishes us by causing within us agreeable sensations” (Carritt, 1931; Sartwell, 2017). In contrast, thinkers like Kant described beauty in terms of dispassionate gratification, which has apparent elements of hedonism (Miall, 1980).

It is inconceivable to think of an exact position on subjectivity or objectivity of beauty, although many attempts were made to understand the differences. It is evident from the varied positions held by different philosophers and thinkers throughout history that ‘beauty’ was construed in several different ways, some of which had starkly opposing viewpoints.

To conclude, in Ancient India, theorists did not define beauty as an objective element without using a subjective reference. In contrast, their European colleagues related beauty with Symmetry and Mathematics; the Indian theorists did not try to search for objectivity but instead referred to the feeling generated by the beauty.

## **2.4 Beauty and the God**

The relationship of Beauty to God and spiritual experiences is widely observed in Eastern and Western Philosophy. Beauty has always been exemplified as goodness, divine, and elegance. To Indian philosophers, beauty has been expressed as “SATYAM-SHIVAM-SUNDARAM” (Truth-Godliness-Beauty). In contrast, their Western counterparts have regarded beauty as one of the ultimate manifestations of idealism, along with goodness, veracity, and fairness. Similarly, in Sufism, beauty has been equated to God and believed that “God is beautiful and loves beauty”

(Zaragr, 2011). Also, only God can create beautiful things, so by contemplating beauty, one comes closer to God.

God and his conceivable creations have been considered beautiful in every religion. In Hinduism, beauty has been personified as truth, and the truth is embodied in The Brahman: the absolute reality. Further, the fundamental purpose of human existence is to ascertain the identity of self or truest, incorporeal quintessence, *Atman* (Soul) with the Brahman. The Brahman is omnipresent, limitless, infinite, and one who experiences him by bhakti (devotion) attains Sat-Chit-Ananda (reality, consciousness, and bliss). This bhakti or devotion means the one-pointed consciousness; seekers put their entire energy, emotion including the physical body, in one direction to love Brahman. It is believed that the realization of ultimate beauty occurs in the form of 'PARAMANANDA' (supreme delight) while experiencing the oneness with the Brahman and attain liberation. As per Vedanta, to appreciate the beauty of Brahman, a devotee should raise himself to the supreme level of consciousness. Moreover, the concept of oneness is elaborated very aptly in the hymn as “शिवो भूत्वा शिवं यजेत्” means to worship Lord Shiva, one should become Lord Shiva Himself.

The love between God and his devotee has been represented in the form of several human relationships such as father-son, mother-son, lover-beloved, friends-friends, and master-servant. The relationship with God as master-servant is evident in male saints of Bhakti tradition (8<sup>th</sup>-17<sup>th</sup> century CE). Several sages of Bhakti traditions such as Kabir Das (1440-1518 CE), Surdas (1478-1561 CE), Goswami Tulsidas (1497-1623 CE), Ravidas

(1450-1520 CE), Haridas (1512-1573 CE), Ramdas (1608-1681CE); they all used 'Das' as a suffix to their name, personifying them as the servant for their deity, Krishna or Rama. At the same time, female devotees considered themselves as beloved of Krishna. The fundamental principle of Bhakti tradition was to surrender himself, relinquish self-will, offer unconditional love and devotion to God in order to attain liberation. One of the famous literary works of Surdas is '*Sursagar*', which is dedicated to the love of Radha and Krishna. Chaitanya Mahaprabhu (1485-1533 CE), an accomplished devotee of Krishna, travelled across India and popularised the 'SANKRITAN'; public singing of Krishna's name and Gopi's exclusive devotion to him. Similarly, Guru Nanak (1469-1539 CE), another sage from Bhakti tradition and founder of Sikhism, roamed across Asia and went up to Mecca and Medina singing God's name; '*Ek Onkar, Satnam, Karta Purukh, Nirbhau*' (एक ओंकार सतनाम करता पुरुख निरभौ) ; there is only one God, his name is true, the only eternal truth (Schelling, 2011; Sankar, 2016; Okita, 2018; Suryawanshi, 2020).

Historically, classical Buddhist literature is silent on the concept of beauty. Moreover, these classical texts have viewed beauty with suspicion and animosity. Physical attraction, specifically that of a female body, is indicated as causing 'attachment' and 'craving' (Bodhi, 2000). Further, Bhikkhu Bodhi elaborated that 'inner beauty, the beauty of mind' is central to Buddhist teachings rather than physical beauty. Inner beauty is expanded as the beauty of character or moral beauty, including restraint, right conduct, and perfection in habits. One Sri Lankan Buddhist scholar puts it as "The

Buddhist does not avoid objects of beauty but refrains from making them the basis for likes and dislikes” (Cooper, 2017).

Sufism conceptualises beauty by assimilating it with God and establishing the thought that only God creates beauty. Sheikh Akbar Ibn Arabi (1165-1245 CE), in his book *al-Futuhāt al-Makkiyah*, propounded that “love is caused by beauty (al-Jamal)” and “beauty is beloved by its very essence”. Ibn Arabi believes that love and beauty are interdependent, and it is beautiful “which causes love” (Zaragr, 2011). Maulana Jalal-ud-Din Muhammad, later known as Maulana-i-Rum or famously Rumi (1207-1273 CE), was an accomplished Sufi philosopher, jurist, thinker, poet, and a profoundly religious man, who experienced the euphoria and related to love of beauty to God as lover-beloved (*Ashiq-Ma’ashooq*). He moved away from the concept of duality and towards oneness (Muhammad, 2010; Qamber, 2016). Similar assimilation, admiration and devotion were practised by mystic Hindu poet Meera Bai (1498-1556 CE). She considered Krishna as her husband, like Rumi’s concepts of (lover-beloved). She wrote and sang several passionate poems in the admiration of Krishna. Zain al-Din al-Iraqi (1325-1404 CE), was straight in depicting human appreciation of beauty as a way for appreciation of God himself: when the famous poet-lover Majnun, gazes upon his beloved Leila’s beauty, Iraqi writes, the Real “*beholds his own beauty through the eye of Majnun*”. It is interesting to note that when Iraqi elaborated lover (ashiq) and beloved (ma’shuq), he did not specify their nature. Instead of leaving it open for the participation of human-to-divine love, human-to-human love and any object that has felt love for any other object. He spoke about shared identity between lover



and beloved and of the view that the humans have access to the pinnacle of love-

*“Love displayed a face from beyond the veil;  
When I looked at it, the face was my own.  
I relegated myself, withdrawn to the side,  
Once it opened up its embrace to me.  
Before my own countenance, I prostrated,  
at the instant when it exhibited beauty”*

Getting closer to God is the central theme in Sufism, and one of the quickest ways of getting close to Him is to admire the beauty that He has created because only God can create beauty. It justifies the practice of gazing upon beautiful humans (*shahidbazi*) since such gaping/gazing arouses the heart to the beauty of the Real (Zaragr, 2011).

Similarly, in Christianity, beauty has been seen as celestial and signifying grace. However, nothing significant is mentioned about the concept of beauty in Hebrew philosophy or the New Testament (Gerhard, 1962; Viladesau, 2008). Despite this, a biblical impression of God’s glory contains the spiritually relevant content on the perception of beauty (Bromiley, 1964), and it can also be seen in the Platonic and Neoplatonic system too. In the process of development of Christian thoughts, a significant contribution was made by the Platonic and Neoplatonic scholars about beauty being referred to as godly, over the stages of moral, somatic, and lastly spiritual beauty. A Syrian monk named Pseudo-Dionysius perceived God as absolute beauty and an originator of everything. He wrote, *“The super essential Beautiful is*

*called 'Beauty' because of that quality which it imparts to all things severally according to their Nature, and because it is the Cause of the harmony and splendour in all things, flashing forth upon them all, like light, the beautifying communications of its originating ray"* (Eco, 1986; Rolt, 2000).

Augustine, a Western theologian, highlighted the exquisiteness of divinity and a yearning for the beautiful as playing a role in navigating humanity towards God. Moreover, he warns us that the possibility of beauty at its lower stages may drift us from the primary goal. He questions whether objects are beautiful because they make us content or otherwise. In his opinion, the Almighty is the symbol of love, and one cannot love whatsoever unless it is beautiful and is the cradle of delight (Augustine of Hippo, 1977). Nonetheless, God is magnificent and is an ultimate bliss to humanity because God is embodied in the ultimate Rectitude and Actuality, which humankind unavoidably wishes.

Nevertheless, as cautioned by Plato, one may unconsciously halt before reaching this aspirational desire (Viladesau, 2008). The theory of Augustine and Pseudo-Dionysius significantly influenced spirituality in the Middle Ages. The truth-seekers established a concept of beauty as the inspirational excellence of God, eventually inseparable from his virtue and verity. Beauty has its distinguished paradigm in God, and everyone partakes in it. Consequently, there are varying levels of goodness, which can be ascribed to a varying level of beauty. Ultimate beauty is not bodily but divine and gets expressed through knowledge and love. Humankind has received the mystical ability of elegance, an advanced form of knowing and loving. Thomas Aquinas distinguishes elegance as "divinisation"

(*deiformitas or deificatio*) and overtly relates to it as the appreciation of God's grace as per the individual's ability (Coomaraswamy, 1938; Bauerschmidt, 2013).

The interconnections between God and beauty, love and God, morality and godly, leads us towards the ontological status of beauty. The ultimate truth is that by appreciating God's creation, we appreciate God himself and get connected to him to be able to experience the ultimate truth, which is nothing less than spiritual beauty.

## 2.5 **Beauty and the Brain**

Lately, it has been observed that neuroscientists have adopted the use of technologies such as digital face morphing and functional magnetic resonance imaging (fMRI) to assist in identifying the myriad qualities and the elaborate cortical networks in the brain that are designed for beautiful features. Newer knowledge promises to undo the neural relations that exist between evaluations of beauty and other social attributes such as trustworthiness. It also provides an understanding of our appreciation of artworks, such as the bust of Queen Nefertiti, which means "Perfect One" (Wald, 2015).

The study of the neurobiological experience of beauty falls into a young branch of science within Cognitive Neurosciences known as Neuroaesthetics, which focuses on the studies of neural correlates while experiencing beauty (Zeki, 1998; Cinzia and Gallese, 2009). The feeling of beauty is ingrained in our inner senses and encoded in Biology. It is part of our instinctive behaviour, and studies have shown that even infants can

differentiate between attractive and not so attractive faces. In research, 2- to 3- months and 6- to 8- month old babies looked longer at attractive faces, and their gaze was generalised across gender, race, and age (Rubenstein, Kalakanis and Langlois, 1999). This experiment proved that beauty is inherently present in the human brain as biological prior and not acquired through experience. Beauty and even its remembrance correlate with the emotional part of the brain known as A1 of the medial orbitofrontal cortex (A1mOFC). Figure 2-2

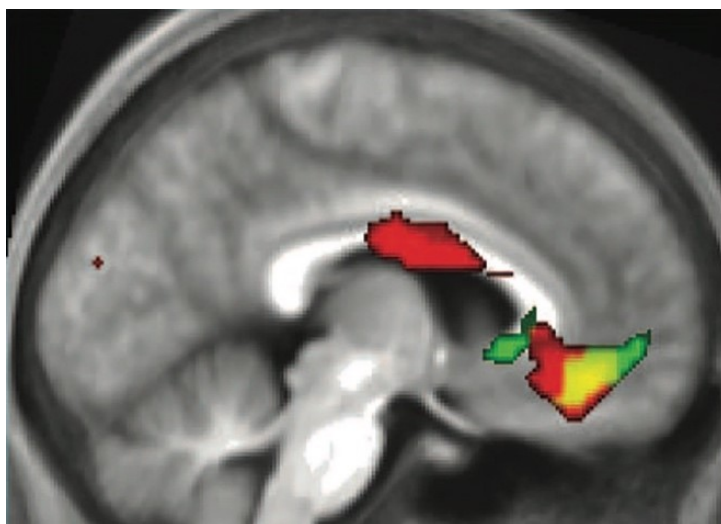


Figure 2-2: Mid-sagittal section through the human brain to show the brain activity in field A1 of the medial orbitofrontal cortex (A1mOFC) (Ishizu and Zeki, 2011)

According to Chatterjee (2009), in the human brain, perhaps there are three constituents of neural response to beauty. These constituents are the perceptual processing of the object, the passionate response to the object and when necessary, a definite decision about the objects' beauty (Chatterjee *et al.*, 2009). Many theorists have proposed that the individual's aesthetic perception depends on their basic emotional state of desire and pain (Ginsborg, 2003; Guyer, 2003, 2008). Research suggests that the

experience of a face as attractive correlates with activities in the orbitofrontal cortex, the accumbens nucleus (NAc) and the ventral striatum (Aharon *et al.*, 2001; Kranz and Ishai, 2006). These regional activations of the nervous system are elucidated as reflecting the emotive valence engaged to beautiful faces within a neural circuit board devoted to the reward and pleasure system (Senior, 2003).

Further, the neurobiological definition of beauty was given by Zeki as *“Beauty is an experience that correlates quantitatively with neural activity in a specific part of the emotional brain, namely, in the field A1mOFC; the more intense the declared experience of beauty, the more intense the neural activity there”* (Zeki, 2019).

Neurobiological evidence suggests that the experience of beauty correlates with a particular pattern of neuronal activity in the brain; hence, I firmly believe that *“Beauty is neural, and it can be traced back to neural activities.”*

## **2.6 Physical and Moral Beauty**

The thirst for physical beauty is inherent in humans, although perceptions of beauty and standards vary across communities, ethnicities, and geographies. Physical beauty is valued and considered as representative of the “beauty of the self”. Although aesthetic perceptions are driven by intrinsic likings such as harmony, proportion, and symmetry (Swami and Furnham, 2008), sociocultural surroundings can also guide the perception of beauty (Cafri, 2005). Nevertheless, the influence of beauty is pervasive and plays a vital role in several facets of life and living (Ishizu and Zeki, 2017). It adds to our social currency and can help individuals in building

relationships, careers, fortunes, as well as inspires admiration and desire. The contrary applies to unattractiveness, which drives both men and women to invest time, money and experience pain in the quest for enhancing their beauty (Synnott, 2006).

Several forms of physical beauty which have attracted users and invited their admiration are seen in antiquity. Classical Indian literature, the Kavya (Poetry), has taken female beauty to its pinnacle. It is believed that *SOUNDARYA LAHARI सौंदर्य लहरी* (in Sanskrit) meaning “*Waves of Beauty*” is the oldest literary work by ADI SHANKARA (788 CE) and sages PUSHPDANTA describing the physical beauty of Goddess Parvati, consort of Shiva (Sankaracharya and Brown, 1958; Pavan K. Varma, 2018). Aesthetics in ancient Indian art and literature is probably best understood from the body of work by Kalidasa (4<sup>th</sup>-5<sup>th</sup> Century CE), the renowned writer and poet. His maxim, “*प्रियेशु सौभाग्यफला हि कर्ता - Priyesu Saubhagyaphala Hi Caruta*” (the very purpose of beauty is to create desirability in dear ones) concludes his thoughts on beauty and life. He perceived beauty in every aspect of the universe and delineated it in his peerless style.

Further, in his exquisite poetry, physical attributes of flawless beauty are described with utmost care. As per his texts, to command respect in society, women were expected to possess immaculate physical features along with intellect. Women had to be endowed with extreme beauty such as a perfect form, symmetry, proportionate limbs, and attractive features. Further, he describes seamless limbs from foot to head with precise established measurements. A woman should have black, curly, long hair,

which should move in the air like a flowing river. Face should be like the moon, and her eyes like a lotus petal, with eyeball moving like that of a gazelle. Her body should be like a creeper, too tender to get tired even in a mild breeze, lips should be red just like the colour of a *BIMBA* fruit (*Coccinia grandis*), commonly known as ivy gourd. Her waistline should be narrow, which should bend while walking. The hip should be heavy, and broad and the nails should be shining to reflect light rays on the entire body. Kalidasa considered beauty to be the ultimate creation of the Almighty (Ram Gopal, 1984).

In ancient Greece, the appreciation of physical beauty was widespread, and a gorgeous male body was deliberated as a direct indication of a beautiful mind. The Greek philosophers used *Kalon* to describe physical and moral beauty and used the term '*Kalos kagathos*' or '*Kalokagathos*' to describe it, which meant being attractive to look at, and hence being a noble and decent person. Sappho (630-570 BCE), the accomplished Archaic Greek poet, in one of her poems, wrote: "A beautiful man is only so in appearance, while a good man will be beautiful as well" (Tatarkiewicz, 1970). She also wrote, "He who is fair to look upon is good, and he who is good will soon be fair also". Unfortunately, the deformed (lacking proportion) and the ugly did not fit into the category of *Kalokagathos* (Durrigl, 2002). Her aphorism demonstrated the Greeks association of beauty and goodness. Ironically, this whole idea of beauty and goodness was limited to men only, and women were not considered as part of this conception.

It is believed that the gorgeous statues from the 5<sup>th</sup> to the 3<sup>rd</sup> centuries BCE had been cast based on living and real people. Accounts from the 8<sup>th</sup> and

7<sup>th</sup> century BCE indicate that physical beauty was highly regarded and, in many instances, was a competitive sport. *The Westmacott Athlete* (Figure 2-3) is a perfect example of *Kalon*, which signifies physical and moral beauty qualities such as muscular physique, humility, and modesty. Evidence suggests that we tend to personify attractiveness with positive attributes such as honesty and intelligence (Lorenzo, Biesanz and Human, 2010); in other words, “what is beautiful is good” stereotype (Dion, Berscheid and Walster, 1972).



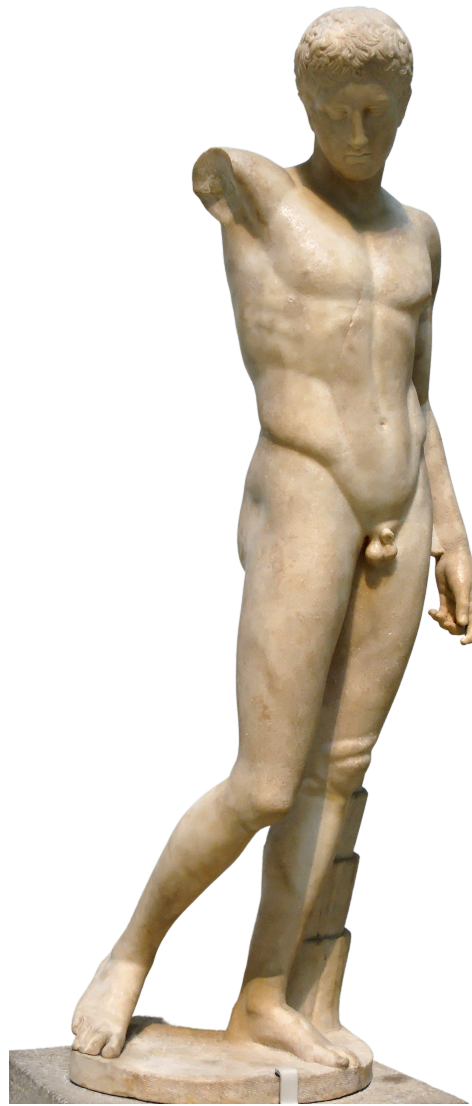


Figure 2-3: Westmacott Athlete, a statue of a victorious athlete crowning himself (British Museum)

Greek Mythology abounds with descriptions of physical beauty and the privileges conferred on the characters who were considered beautiful. Big eyes, bulbous nose, and men's hairy back were deemed attractive as described by the great thinker and philosopher Socrates. Beauty was deeply rooted in Greek culture and is evident by the number of mirrors found in the graves (Figure 2-4).



Figure 2-4: Greek mirror with Aphrodite and Eros c. 350 BCE; Wikipedia Commons

While ancient Greeks were mesmerised with the ‘ideal’ muscular male body, in converse, Indian artists, philosophers, and thinkers were charmed with the female body, particularly on the sensuous and reproductive side. Evidence from ancient Indian sculptures of *Bharhut* (mid 2<sup>nd</sup> century BCE) and *Sanchi* (2<sup>nd</sup>-1<sup>st</sup> century BCE) suggests such fascination towards the beauty of female Form. The sculptures of Yakshinis (earth spirits) and Shalbhanjikas (tree spirits) carved with features such as showing the voluptuous form such as curvature of the body, wide hip, fuller breasts, and lips. Moreover, they also decorated the body and hair with jewellery (Figure 2-5,2-6).



Figure 2-5: The Yakshini (Earth Spirits) at Bharhut, India; Wikipedia Commons



Figure 2-6: Salbhanjika Yakshi; Wikipedia Commons

The debate over whether physical beauty is a quality of some things or is a character attributed to the observer has raged for very long, and different observers stood on either side of the argument. Beauty is an intricate construct; however, it is commonly understood as a property of objects which arouses several emotions in those perceiving it (Etcoff, 2000). Of these emotions, pleasure is in the ubiquity (Etcoff, 2000; Reber, Schwarz and Winkielman, 2004). Although pleasure evoked by the cognisance of attractiveness is not instantly attributed to an anticipated benefit (Santayana, 1955), both beauty and its pleasurable sequel in the opposite sex are pertinent to the desirability of a potential mate (Rhodes, 2006; Puts, 2010). Interestingly, it is worthy of mention that, irrespective of sexual preferences, both sexes perceive male and female facial beauty similarly (Mathes *et al.*, 1985; Kranz and Ishai, 2006).

Evolutionary biologists often link beauty with reproductive success; according to them, facial symmetry and secondary sexual physiognomies have been posited as a necessity for sexual choice and reproduction. In his book *The Descent of Man*, Charles Darwin stated that beauty plays a critical role in human evolution. An individual's physical characteristics can give cues to fertility and health. It increases the chance for procreation and advancing one's gene pool in the population (Darwin, 1871; Martin, 1964). Later, Freud suggested that "there is to my mind no doubt that the concept of 'beautiful' has its root in sexual excitation and its original meaning was sexually stimulating" (Freud, 1905). Physical beauty is associated with several anthropometric markers, and the most critical indicator of attraction is facial beauty. It has a significant impact on peoples' lives as the face

plays a vital role in social interactions. Facial attributes are important factors of overall beauty (Muñoz-Reyes *et al.*, 2015). Generally, men are charmed towards women with a symmetrical face, fuller lips, fuller breast, and low waist-hip ratio (WHR), youthful appearance, and shorter than them.

In contrast, women are allured towards men with a V-shaped torso, narrow waist, broad shoulders, masculine facial dimorphism with symmetry and taller than them (Muñoz-Reyes *et al.*, 2015). Attractive faces are preferred by people, including babies broadly within and across cultures. A meta-analysis by Langlois and colleagues shows that facial attractiveness is universal across different cultures (Langlois *et al.*, 2000).

It is believed that being beautiful is favourable in every arena of life, including work. Due to a bias towards beauty, judges grant lenient sentences to attractive defendants (Mazzella and Feingold, 1994; Gunnell and Ceci, 2010). Teachers promote better-looking students over average-looking ones (Benzeval, Green and Macintyre, 2013), and decent looking applicants have an edge in the employment selection process over other equally qualified applicants (Baudouin and Tiberghien, 2004; Lynn, 2009; Sierminska and Liu, 2015). Social psychologists also observed a similar preference for attractive political candidates. They attributed these phenomena to the “halo” effect of beautiful features, which guides one to conclude that good-looking people are more confident, competent and skilful than not so good looking ones (Etcoff, 2000; Schubert, Curran and Strungaru, 2011). Physical beauty has been perpetually the most revered facet of human beauty.

## 2.7 Theories about the origin of Beauty

While the cognition of beauty is perpetual, incorporeal, metaphysical, it is Plato who first tried to put a theoretical perspective by introducing the idea of harmony and proportion, contemporary to Greek Pythagorean. Later Aristotle stressed balance. The perfect representation of this concept was noticed in the work of Leonardo DaVinci's Vitruvian man (1487 CE). The famous architect Vitruvius accentuated the balance "triad" of attributes of good architecture -utility, durability, and beauty. Based on the work of Greek philosophers, there are three prevailing theories providing insight into the origin of beauty, including the theory of proportion, the theory of functions and the theory of Form.

### 2.7.1 Theory of Proportion

Aristotle described symmetry or *symmetria* as an essential component of beauty along with orderliness in arrangement and definiteness. However, he opined that beauty could not be explained or described by *symmetria* alone and added the concepts of size, which were also necessary for the manifestation of beauty (Barnes, 1984). *Symmetria* meaning good, appropriate or of fitting proportionality and not of bilateral symmetry, is a standard term used to describe beauty in terms of proportion to the parts of that object. The Pythagorean philosophers claimed that numbers and proportions could indeed explain the presence of beauty. Philosophers such as Philolaus and Archytas, who were active during the 5th and 4th centuries BCE, believed that numbers and the concepts of proportion would also explain existential, epistemological, and ontological concepts that determine

the structure of the world. Pythagorean thinkers carried out an in-depth study on the relationship of mathematics to beauty and used it to support their theory of beauty. According to them, beauty could be wholly elucidated in terms of numbers or, more precisely, on harmony and proportion, articulated in a mathematical relationship (Mason, 2016).

The idea of Pythagorean geometry was described in Euclid's (ca 325-265 BCE) work titled '*The Elements*' in his thesis on Mathematics, where he also discussed the relevance of numbers in aesthetic appreciation. This gives a relatively clear idea of the conception of the 5th-century sculptor Polykleitos's number theory, which resulted in his dissertation titled '*KANON*', in which he described the precise proportions that underlie the expression of beauty. His concept was based on the dimension of thirds or distal phalange of the little finger. He conceptualised it as a geometrical number, specifically a rectangle. After determining the length and the width of the distal phalange "from nature", he applied a square root to that number (whose side is equal to the number's long side, i.e., the phalange length). The diagonal of the new square root number becomes the new geometrical number, the length of the middle phalange.

Further, the new number is "squared root" and results in the little finger's length of the long phalange. He established a correct proportion by determining the ratio between the first and the second phalange, the same as the ratio between the second and the third phalange, which happens to be approximately 1:1.4142 (Tobin, 1975). He illustrated his concepts in the statue of Doryphoros, which is an accomplished example of harmony and balance in a sculpted human body. Later, the Greek physician Galen (2<sup>nd</sup>

century BCE) stated that the Doryphoros (Figure 2-7) was a precise visual expression of a philosophers' quest for harmony and beauty, translated in an exquisitely proportioned male nude. Further, Galen stated that the beauty nests "in the proportions... of the parts, that is to say, of finger to finger and of all the fingers to the palm and wrist, and of these to the forearm, and of the forearm to the upper arm, and all the parts to each other, as outlined in the *Kanon* of Polykleitos" (Tatarkiewicz, 1970).





Figure 2-7: The Doryphoros (Shutterstock)

This concept was further explored by Vitruvius, a Roman architect in *De ARCHITECTURA*. However, the idea of proportions that generated beauty was described in numerical ratios. Vitruvius, in his book 2, Chapter 2, defines symmetry as “A proper agreement between the members of the

*work itself and the relation between the different parts and the whole general scheme by a certain part selected as standard*". Thus there is a form of symmetrical harmony in the human body. . . and therefore it is with perfect buildings" as defined by Vitruvius (Granger, 1929).

Further, Vitruvius derived his concept from the human body and implored that the human body has several constructs such as in a human face, the distance from the summit of the head to the chin is one-eighth part of the total height of the person, the length of the foot is one-sixth part of the total height of the body, and the forearm is one-fourth part of the body. The concept of *Kanon* was derived from nature rather than art as it measured the existing proportions in nature, in particular a well-built man, rather than the desired proportion of a statute. In his article on proportion, Panofsky referred to it as "anthropometric" *Kanon* (Panofsky, 1921). However, the accord between bilateral facial symmetry and attractiveness remains to be further analysed (Rhodes, Sumich and Byatt, 1999), as evidence indicates that a mild facial asymmetry is compatible with facial attractiveness (Zaidel and Cohen, 2005). Vitruvius also described the three distinct regions of the face and emphasised that these can be used to define an '*ideal face*'. This concept has withstood time and held true across different observers and is used while planning for facial surgery even today (Naini, Moss and Gill, 2006; Bottino and Laurentini, 2010; Naini and Gill, 2016).

The Golden Proportion is an often-cited concept which talks about symmetry and proportions. Though the origin of the Golden Proportion is not yet known, the concept was used later by other prominent scientists and thinkers as well. Another mathematician Luca Pacioli described it in

1509 CE. However, he renamed the Golden Proportion as the “*Divine Proportion*” based on his opinion that the existence of beauty as described in the Golden Proportion could not be explained rationally. His work titled “*De Divina Proportione*”, which can be translated as ‘*On Divine Proportion*’ had contributions from Leonardo da Vinci and included his illustrations of symmetrical and proportional (Figure 2-8) human faces and bodies (Naini, Moss and Gill, 2006).

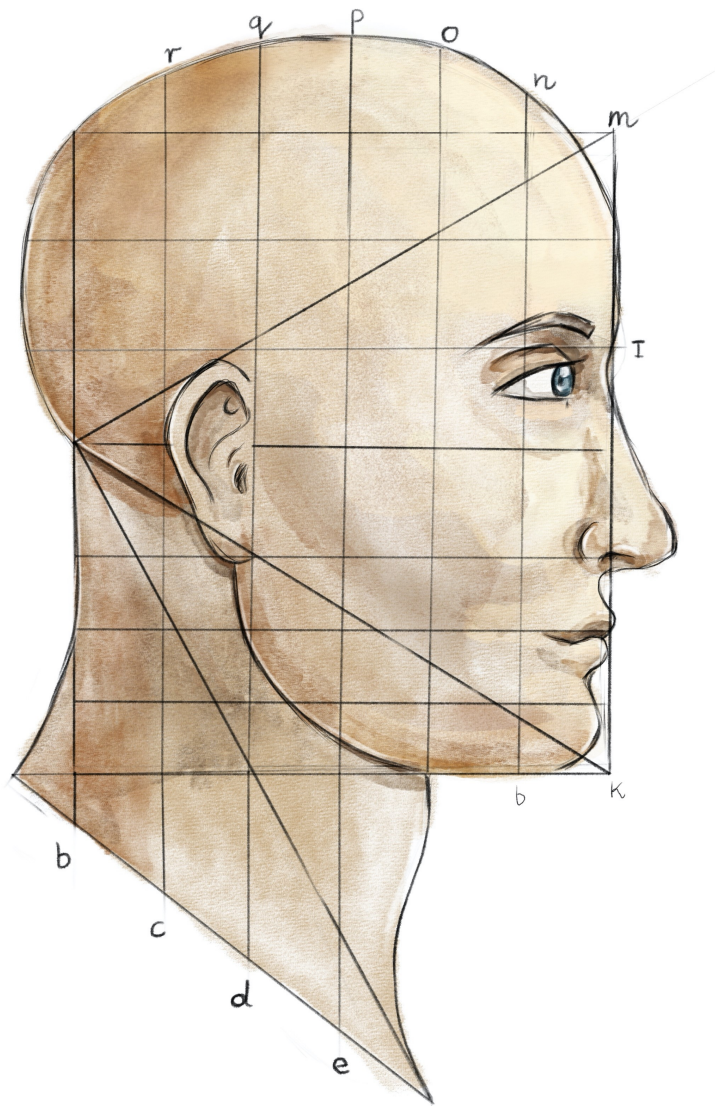


Figure 2-8: Proportion of the head by Leonardo Da Vinci

Maestlin ascribed a calculated value of 0.618 to the Golden Proportion in 1597 in a letter that he wrote to his disciple Kepler. He divided a line of the length of 1 unit by the Golden Proportion and arrived at the number 0.618 (Figure 2-9). The ratio of the smaller unit to the more extended unit of the line was equivalent to the ratio of the more extended unit to the entire line. The architecture of Notre Dame de Paris (Figure 2-10) fits the idea of the golden ratio. Similarly, the famous sculpture from the Hellenistic period Venus de Milo (Figure 2-11), whose ideal physical proportions is a perfect representation of the Golden Section. The idea of  $\phi$  (phi), which was deduced from the name of Greek sculptor Phidias, represented the point at which the line is divided and known as the golden section. Parthenon's architectural design is a perfect example of the use of the concept of Phi by Phidias (Ricketts, 1982; Herz-Fischler, 1998; Livio, 2003). A California based Oral and Maxillofacial surgeon, Dr Stephen Marquardt, used the concept of  $\phi$  (phi) in studying human facial attractiveness. He introduced the Golden Mask, based on the golden ratio, which was the mathematical construction of the facial form, which led to many debates (Holland, 2008). Later, Dr Arthur Swift (Plastic Surgeon) and Dr Kent Remington (Dermatologist) from Canada extensively studied the concept of a golden ratio and applied it to their nonsurgical facial aesthetic work (Swift and Remington, 2011).

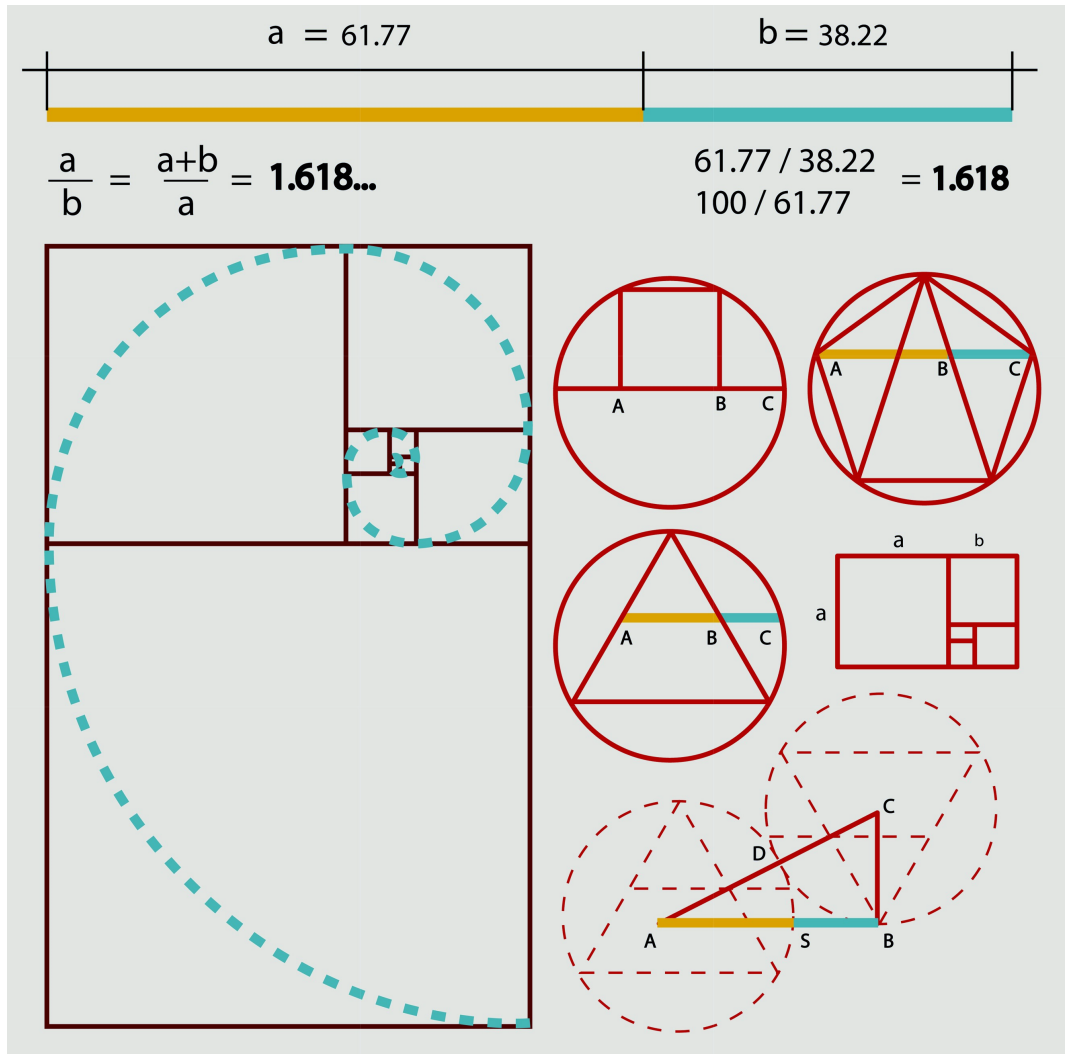


Figure 2-9: Golden Ratio  $a+b$  is to  $a$  as  $a$  is to  $b$  (Shutterstock)





Figure 2-10: Notre Dame de Paris (Shutterstock)

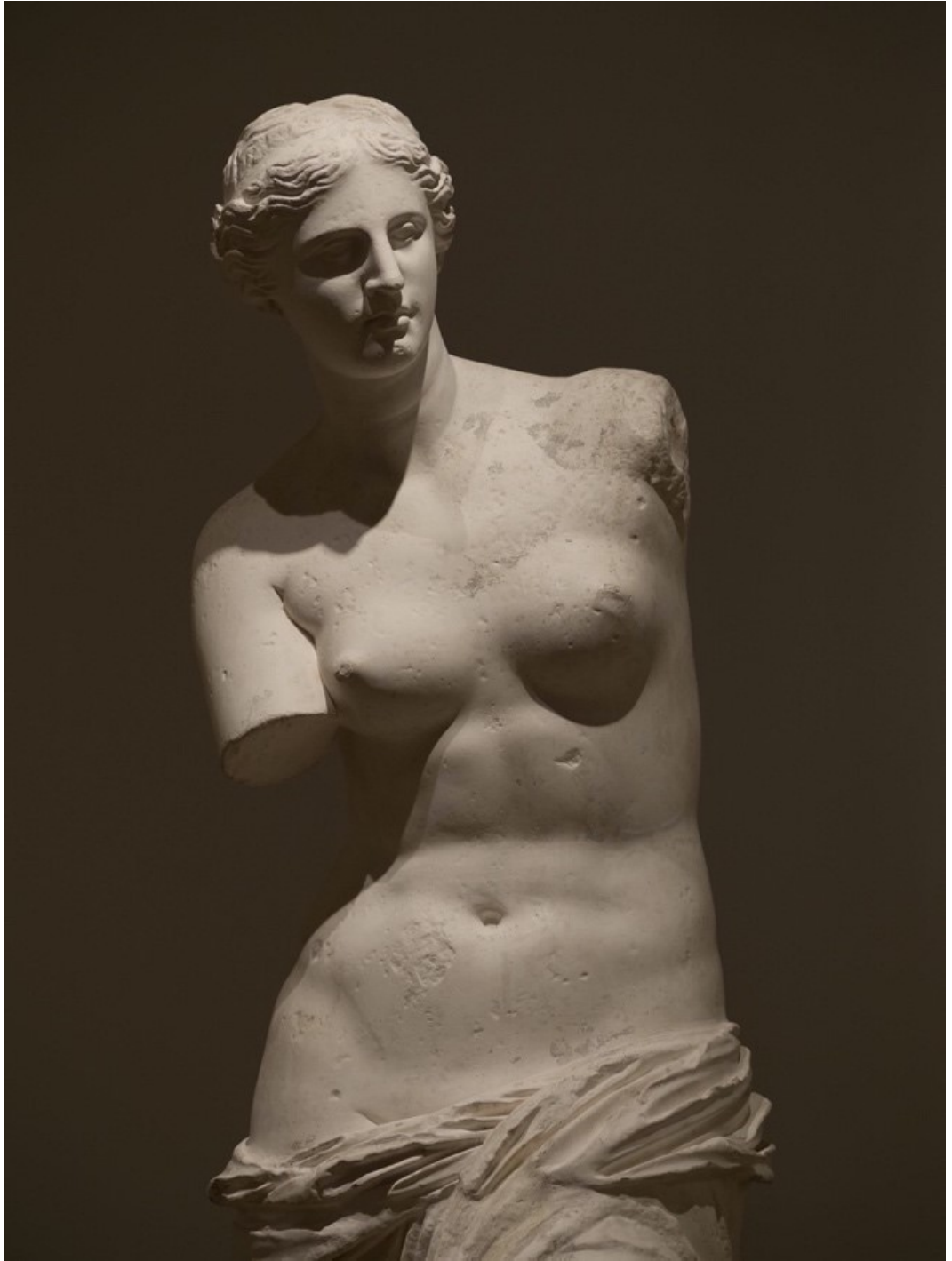


Figure 2-11: Venus de Milo; Wikipedia Commons

Another school of thought that built further upon the concept of symmetry was called '*The Stoics*'. According to their perspective of beauty, the harmony of various parts with each other and their congruity with the whole formed the foundation or origin of beauty. This concept can be applied to the understanding of the physical as well as the beauty of the soul. Naini and colleagues surmised that this perspective of aesthetics merged the theories that defined beauty based on functional constructs and those that considered proportion to be the origin of beauty (Naini, Moss and Gill, 2006).

Renaissance began with the end of the Middle Ages, often marked by Dante Alighieri's death in 1321CE. One remarkable feature of the Middle Ages was the widespread practice of devout Catholicism and the accompanying dogmas of servitude to the divine. However, corruption in the Catholic Church and a renewed atmosphere of economic resurgence in Europe, particularly in Italy, spurred the adoption of a newfound appreciation of the human form. The Renaissance also brought a volte-face in perspectives about human potential and promoted a focus on aspects that influenced human progress. Furthermore, the translation of Arabic texts in Latin by many returning intellectuals from Alexandria served as a new-found knowledge and fuelled the booming scientific innovations across the disciplines. Johannes Gutenberg (1440 CE) invented the printing press, bringing the revolution in swift dissemination of knowledge on innovations and discoveries coming out of the universities and centres of higher learning across Europe.

This Renaissance or "*rebirth*" restored interest in the Liberal Arts and celebrated the beauty of the human form, which is evident from the works



of art from the period, both in Italy and Northern Europe. The new-found Greco-Roman culture with a humanistic approach towards the universe inspired a new “secular and scientific understanding of the physical world”. This renewed faith in humanistic reasoning aspired to gratify scientific discoveries and further established “intellectual culture” anchored on the “ideal of spiritual freedom and autonomy of the personality” (Otto Benesch, 1947; Zisser, 2005).

It can be determined that the perceptions and expressions of the concept of beauty in Renaissance Europe varied from one country to another. Moreover, distinct differences can be seen in the art of the Late Gothic period and Italy (Murray and Murray, 1963). Indeed, a closer look at works of art (Figure 2-12,2-13) will also reveal that these differences existed even between cities (Haughton, 2004).



Figure 2-12: Girl with Cherries by Giovanni Ambrogio de Predis (1491-1495); Wikipedia Commons



Figure 2-13: La Bella (Portrait of a Woman) by Palma il Vecchio (1518-1520); Wikipedia Commons

Leonardo da Vinci gave significant consideration to the importance of harmony and defined the characteristics of the '*Vitruvian man*' (Figure 2-14), which was one of the well-recognised icons of the Renaissance period. Leonardo's '*Vitruvian man*' was based on Vitruvius' concepts of proportion "*cosmografia del minor mondo*", is among the more recognised elements in the exhibits of the importance of proportions in the human form (Clark, 1972). Leonardo's outstanding findings regarding the human body is well appreciated in literature. Both Michelangelo and Leonardo portrayed the human form very well through their artistic works. Unlike the Greek philosophers, Leonardo and his contemporaries employed rigorous mathematical modules in their effort to define the concept of ideal proportions of the body. The notion of proportion adopted in the Renaissance period was similar to the one embodied by *Kanon* of the Polykleitos (Eco, 2004).



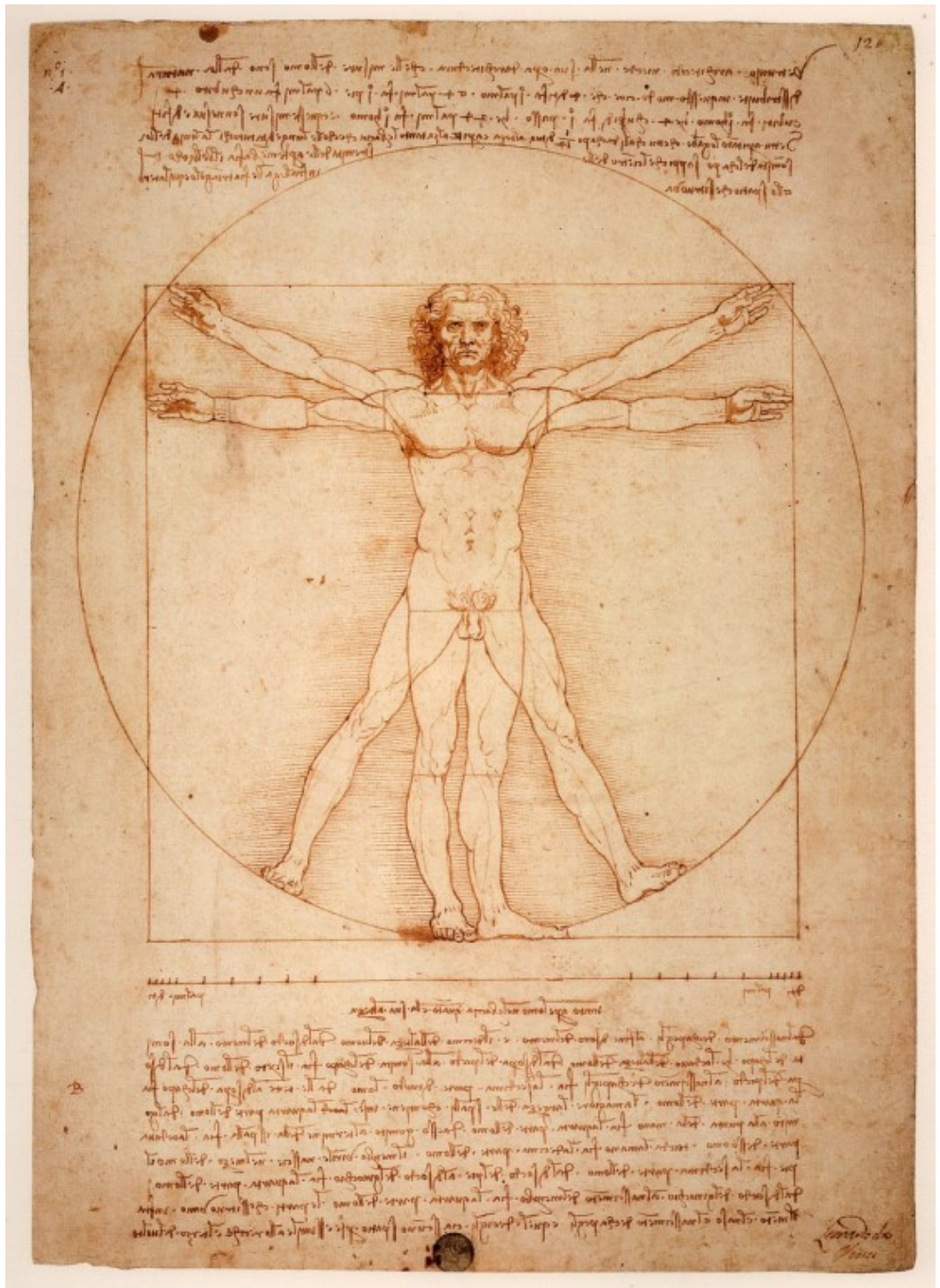


Figure 2-14: The Vitruvian man; Wikipedia Commons

Michelangelo, the great artist, philosopher, and anatomist, was passionate to represent not only physical but spiritual beauty and divine love in his work. It was quite difficult to separate physical and spiritual beauty as both were intertwined in his Neo-Platonic culture. After the fourth century Greeks, no man developed such a profound feeling for a male body as Michelangelo. He firmly believed that artistic concepts are generated through sensory input guided by divine power. His most celebrated creation, the ceiling of the Sistine Chapel (Figure 2-15), is a perfect example of the execution of his divine concept. His indifferent approach towards mathematical measurement did not hinder his creativity. He firmly believed that the higher measurements are hidden in his brain as synthetic concepts. Giorgio Vasari quotes Michelangelo as saying that "it is necessary to once compass in one's eyes and not in hand, for the hands execute but the eyes judge"(Clements, 1961). His creations may lack perfect mathematical harmonies, proportions and symmetries, but his work possesses *terribilita*, which has moved many simply because of the perfect reproduction of his concept (Zeki, 2009). Renaissance artists accepted this notion as an excellent perspectival representation regarding precision, beauty, and it is pleasing to the eye. Other remarkable works that took shape during the Renaissance era focusing on human beauty include Giorgione's Sleeping Venus (Figure 2-16), which portrays the nude human being, which can be admired in soft light and is considered to represent the full perfection of human beauty.





Figure 2-15: The Creation of Adam at the ceiling of Sistine Chapel by Michelangelo (1509); Wikipedia Commons





Figure 2-16: Giorgione's Sleeping Venus (By Giorgione - Google Art Project); Wikipedia Commons



## 2.7.2 Theory of Functionality

The theory of functional beauty may be understood better in the context of the Greek language by the term '*Kalon*' used to describe aesthetics in functional fulfilment. *Kalon* is a concept based on the impression that *"Beauty originates in an object when that object performs its functions, achieves its end or fits its purpose"*. Xenophon's *Memorabilia*, which is a compendium of discourses by Socrates and later collated by his pupil, describes the musings of Socrates related to the functional theory of beauty. In this, Socrates describes beauty by saying, *"a beautiful wrestler is unlike a beautiful runner, a shield beautiful for defence is utterly unlike a javelin, beautiful for swift and powerful hurling"*. He further added to this statement that *"It is in relation to the same things that men's body look attractive and good, and that all other things men use are thought beautiful and good, namely, in relation to those things for which they are useful"* (Mason, 2016). Aristotle firmly believed in the theory of functionality; beauty is firmly grounded in the real world and has a definite objective. According to him, beauty is interrelated to the objects' ability to perform its function, such as for humans; beauty leads to procreation (Aristotle, 1984).

Some works by the Stoics, such as Panaetius, included descriptions of beauty in the vernacular of function. The use of the term '*Prepon*', which translates to '*fitting*,' '*becoming*,' or '*appropriate*' in English, indicates that his perceptions of beauty were also related to functional fulfilment. An elaborate discussion on *Prepon* can be seen in the book '*On Duties*' by Cicero, which also mirrors the thoughts expressed by Panaetius regarding the functional aspect of the definition of beauty. Aristotle contended that

fitting a function and Kalon may be synonymous and that the term Kalon may be used in the context of discourse on aesthetics and also in issues not related to aesthetics (Newton, 2016).

### 2.7.3 Theory of Forms

Theory of Forms postulates that Forms are incorporeal, unchanging ideal paradigms, which plays a significant and causal role in the world. This theory has been marked as Plato's best-known argument and is associated with aesthetics in numerous ways. Plato's views on Forms to define beauty suggests that even though the form of beauty and form of goodness are disparate, there is an inextricable connection between the two. On sighting an attractive individual, that perceptivity awakens our neuronal correlates and arouses the emotion of love for that individual; Plato used the euphemism of sprouting wings to fly back to the divine realm of Form. However, one should remember that Plato was referring to a beautiful male and not a female (Aristotle, 1984; Plato, 2003).

A self-proclaimed disciple of Plato, Plotinus [Neoplatonist], contributed by elaborating further on this theory. Plotinus added, "*Object becomes beautiful by virtue of its participating in the form*". "*Intellect is the cause of beauty*". In his *Enneads* (270 CE), he stated that "Statues and hand-wrought things cannot be realised out of their materials until the Intellect-Principle imparts the particular Idea from its own content". His thought was very similar to modern neurobiology as the "form is in the artists long before it enters the stone" (Zeki, 2009). He explains that intellect enforces forms into positivity which in turn enhances beauty. However, ugliness arises when

entities are unable to impose into form. Intelligence acts as an instrument that allows chaotic matter to transform into beauty. Plotinus assumes that beauty brings divinity in us and can lead to an *'aesthetic paradise'*. Kant stipulated that beauty is not limited to or defined by sensitivities and that imagination can shape some sensitivities (Parret, 2011).

Ancient Greeks displayed educational aspects on forms of beauty in *The Symposium*. Through a play titled *'Ladder of love'*, Plato showcased the importance of physical appearance. This showed a young man initially falling in love with an individual body, later noticing similar qualities in all beautiful bodies. In this way, this young man becomes an admirer of the human form, followed by an appreciation of the beauty of mind, establishments, and rules. The last step in the *'Ladder of Love'* is denoted by the love of wisdom and knowledge, which would ultimately let the lover perceive beauty as everlasting and stable (Blondell, 2006).

The experience of beauty, notions of value and cultivating opinions about beauty is a subjective reaction, as is evident from several subject-oriented perspectives. However, *Gemuth* describes beauty as an experience that is predicated on the state of mind of the individual. This subject-oriented perspective can be contemplated in the *"Copernican Revolution"* in the history of theories about beauty, which Immanuel Kant introduced in his *Critique of Judgment* (1790). Kant proposed that the *"Aesthetic experience, the intensity of the gratification, including the feeling of bliss* (Kant speaks of *Wohlgefallen*, a feeling of pleasure) *in contact with the natural beauty or with the beauty of artwork become the theme of philosophical aesthetics"*. He asserted that the perception of aesthetic experience or beauty could not

exist in isolation and be independent of the subjective feeling of gratification and intimacy. He proposed that the sense of beauty was indeed divorced from the idea of desire, but that beauty granted freedom from desire. Kant also stated that *“no moral or political engagement, no interests or any other desires may disturb the experience of beauty”*. The German word *“Rührung”* denotes the emotion of being touched, which is an essential element in a subject-oriented approach: beauty moves us to tears, the most profound “self” lies in beauty, and it also helps to discover oneself. Beauty can portray the fusion of our present self and the possibilities of what we can be in the future. Since the time of Schiller, beauty is considered to provide a wish for perfection. This concept became the foundation for aestheticism, where the desire for beauty completes the whole existence (Parret, 2011).

## **2.8 Conclusion**

The search for beauty has always been in fashion throughout human history. Physical and moral beauty became the deep-rooted norm in society. As a result, people started experimenting with various ways of enhancing their physical attractiveness. This led to the development of several topical lotions, potions, aesthetic plastic surgery, aesthetic dermatology, and aesthetic dentistry. These are further discussed in chapters 3 and 4.

## **Chapter 3: Historical Perspective of Aesthetic Practices**

### **3.1 Introduction**

The pursuit of ideal beauty has been a central theme in every civilization, as evident from the body of work in art and literature. Physical beauty has played a pivotal role in mate selection as well as procreation. From the time of antiquity, inherently, both men and women knew the authority of physical beauty in charming the opposite sex for reproductive success. With time, the increase in population resulted in the formation of various tribes, which brought desire, admiration, self-esteem, and conflicts. As a result, the thirst to outclass others played a decisive role in elaborating a beautiful male body and feminine beautification. However, women equip their relatively weak physique by employing the charm, fostered by innovative beautification and creative use of cosmetics and ornamentation.

Physical beauty plays an essential role in the development of a social relationship, which can also be affected by the cultural norms in modern days. Most likely, the influence of social or cultural norms might have been less critical in the early part of evolution, and possibly physical beauty played a significant role in human evolution (Strzalko and Kaszycka, 1992). While standards of physical beauty are universal and depend on the underline anatomy and morphology, its manifestation is affected by local customs and traditions (Darwin, 1859; Hunt, Fate and Dodds, 2011). Moreover, evidence suggests that specific features related to

attractiveness vary slightly, and accord is most significant between ethnicities (Wagatsuma and Kleinke, 1979; Zebrowitz, Montepare and Lee, 1993; Perrett, May and Yoshikawa, 1994; Alam and Dover, 2001).

Moreover, a wide variation is often seen in the attributes for being aesthetically meaningful and consistently driven by the communities' social, economic, and political ideology (Ortner and Whitehead, 1981; Shilling, 1993). This diverseness in the perception of physical beauty within the communities might be predominantly driven by the visible body parts to comply with the hardwired theory of sexual attraction within our brain (Diamond, 1992; L. Miller, 2006). Across civilizations, societies, and cultures, physical beauty has been tied to the female body. Moreover, evidence suggests that women of all periods, including the present, have done everything possible searching for beauty, in many cases, surrendered themselves to pain and torture. Historical records suggest that some famous and powerful women had a strict aesthetic regime and routinely employed cosmetics routinely.

Retrieval of the enormous quantity of red ochre at an archaeological site in a South African cave, estimated to be 100 to 125000 years old, suggests that the cave people were possibly familiar with the art of body and face painting. It could have been used for camouflage or any religious or social ritual. Since archaeologists could not find any cave painting or other painted artefacts at the site, they concluded it as "prehistoric cosmetics". The use of colours on the face and body to show loyalty to the clan and frighten enemies has long been practised. With time, the creative use of colours on the face became part of aesthetic rituals for beautification as well as

youthfulness. Whatsoever motivation might have been behind wearing it, makeup in antiquity was profuse with colours; an outburst of powders, paints, pastes, pigments similar to present-day palettes in vigorousness (Eldridge, 2015).

Cosmetics have played an essential part in gratifying the human desire of having beautiful skin free from blemish, right skin tone and texture. The word “cosmetic” has its origin in Roman baths, which were an exquisite system for physical cleanliness as well as socialization. *Aliptes* (masseuses) use to apply skin and facial care to men during the bath. While female slaves used to provide manicures, pedicures, hair dye, as well as facial makeup to the women patrons during the bath (Johnston, 2018), these female slaves were called *cosmetae*, which originated from the Greek word *cosmetikos* (to order or to arrange) and finally transformed into present English word “cosmetic”, which means “beauty of the body” (Feliciano, 2000).

Potions, lotions, creams, and powders were used to hide imperfections, upgrade features, hide signs of ageing, and create expressions. The use of cosmetics was an indication of accomplishment and a sign of someone being an elite. Evidence suggests using several inorganic and organic compounds as cosmetics in many civilizations’ dates to the pre-classical period of the eastern Mediterranean region. It was a common practice to combine antimony, zinc, mercury, bismuth, lead, arsenic to prepare the compounds. Often, this pursuit of beauty resulted in several systemic, cutaneous toxicity, blindness, and death (Witkowski and Parish, 2001). Evidence from Indus Valley Civilization and Ayurvedic texts suggests using several plant oils as a beautification agent. Similarly, during Medieval and

Elizabethan times, a variety of methods were employed for enhancing personal beauty (Parish and Crissey, 1988; Witkowski and Parish, 2001).

Historians and archaeologists have recorded the use of various salt, pumice, ground grains, animal bone and horns for skin resurfacing which is now known as dermabrasion. Moreover, ancients were performing procedures such as chemical peels by using plant extracts, animal fats, acids (sulfuric acid in oil of vitriol and acetic acid in vinegar), hydroxy acids such as tartaric acid from aged wine, glycolic acid from sugar cane, malic acid from apple pomades (Scott and Yu, 1989; Tung *et al.*, 2000), metals such as mercury and lead (Woodforde, 1992). The Turks used fire to scorch the skin for light exfoliation (Brody *et al.*, 2000).

Across cultures and civilizations, humans paid significant attention to skin colour, tone, and texture. Records suggest that the ancient Egyptians used burnt ochre and shells of the beetle to beautify the face, and Native Americans adorn their bodies with pigments (Draelos, 2002; Phelan, 2002). Evidence suggests that skin colour often perceived as a form of social currency, which men and women strive to darken or lighten to remain socially relevant (Glenn, 2008). In Asian countries, women with white, flawless skin and radiance are considered beautiful, and it affects their prospects for a job, income, and matrimony. White skin is considered an indication of cleanliness, health, purity, happiness, and a sign of authority and entitlements.

In contrast, the darker skin with pigmentation and wrinkles is considered an underprivileged labourer working outdoor under the sun. The desire to have



white skin in Asian countries, including the Indian subcontinent, is predated colonisation. Chinese women loved 'milky white' skin and used to swallow pearl powder in the hope to become whiter. Korean women used several ways to attain whiter skins. Japanese women used white powder in the face to look whiter. Married women in south India took a bath after applying turmeric paste; due to its anti-inflammatory effect and skin lightening property (Russel, Wilson and Hall, 1992; Li *et al.*, 2008). Women in Europe and Persia used white lead to whiten the colour of their skin. Queen Elizabeth I (1533-1603 CE) used white lead paint routinely on her face and popularized a look at 'the Mask of Youth' (Chaudhri and Jain, 2009). Women used veils, gloves and parasols while walking outdoors to prevent the sun and protect the skin from tanning.

Historically, women avoided the sun to maintain their fair skin and used it as a symbol of their status in society. Interestingly, in Europe after industrialisation, women started working indoors with almost no time for outdoor recreational activities, and their skin turns pale; as a result, skin tanning became popular during holidays in a sunny location. Sun-bathing and tanning continue to remain popular in both men and women, even after linked with a known risk of skin cancer and premature skin ageing (Draelos, 2002). Nevertheless, with cultural variations, the desire for altering the skin colour is universal, whether lightening or tanning.

Since the time of antiquity, humans paid particular attention to the health and beautification of scalp hair. The use of henna as hair dye by Arabs, Egyptians, Indians, and Persians was a common practice. In contrast, Greeks did not like the red hair dyes, and evidence suggests that they

were fond of saffron yellow or blond hair colour. Similarly, in ancient Rome, hair colouring was in fashion. Application of walnut extracts was in practice to darken the hair whereas germander for colouring the hair red. Affluent Romans used the bone marrow of deer for their hairdressing. Across the cultures, women preferred straight, longer, and thicker hair. Ancient texts such as The *Ebers Papyrus* devoted a particular chapter on hair, and the Ayurvedic texts, *Charaka Samhita* (900 BCE) and *Ashtanga Hridaya* (700 CE) have several formulations for hair growth as well as care. It is quite surprising to note that from the time of ancient Egyptians till now, hair problems such as baldness and greying of the hair are of interest to physicians across the globe. It is noteworthy to mention that the current quasi-scientific interest in hair loss started at a barbershop in London during the year 1860 and resulted in the foundation of the Institute of Trichologists (Trüeb *et al.*, 2018).

Eyes and lips play an important role in determining female physical attractiveness. The desire to have bigger eyes exists since the time of antiquity and never went out of fashion. Almost every civilization used kohl for the beautification of eyes. However, ancient Egyptians had mastered the art of eye makeup which is still in vogue. Lips are the most sensual part of the human face and play an integral role in overall attractiveness. Fuller and pink lips never went out of style. Women used plant and metallic colours to accentuate the shape and size of their lips across cultures and society. Body piercing such as the nose, lips, ear for ornaments, and skin tattoo for creating beauty symbols were popular ancient cosmetic practices (Blanco-Dávila and Vásconez, 1994; Feliciano, 2000). Historical evidence

suggests a direct relationship between women's autonomy, freedom, and status in society to beauty rituals and the application of makeup. When women enjoyed independence and equal rights, they used makeup freely and adorn their faces and body, whereas the use of makeup was not permitted during the periods and societies when and where women were not treated equally and oppressed.

The demand for cosmetic procedures and aesthetic rituals ignited creativity, and professionals such as barbers, perfumers, gentlewomen, and cosmetologists led the innovation in cosmetic practices. Ancients were fascinated with their aesthetic appearance, similar to modern times. Many ancient aesthetic rituals are still in practice, although much more sophisticated and backed by scientific data for safety and efficacy. Let us explore the literature to learn various aesthetic rituals and the use of cosmetics across major civilizations and cultures in detail and its relation to the development of modern aesthetic practices.

### **3.2 Ancient Egypt**

As discussed earlier, ancient Egyptians of both sexes equally loved their physical appearance, cleanliness and were worried about getting facial rhytids and hair loss. Egyptian women enjoyed equal rights in society, own businesses, inherit the land, and start legal proceedings against men if needed. Both men and women equally participated in beauty rituals. Women had the autonomy to perform physical labour and work in the field (Casson, 2001). Ancient Egyptians were one of the first users of makeup and bold enough to experiment with their looks. With their advanced

chemistry knowledge and love for makeup, Ancient Egyptians experimented with various ingredients to formulate cosmetics, kohl, cheek and lip rouge, moisturiser, and nail paint.

Interestingly, the first formulation for hair growth was compounded by using a combination of toes of a dog, refuse of dates and hoof of an ass for the mother of the King of upper and lower Egypt (Bryan, 1930; Stüttgen, 1996). Hair dyeing was trendy, and several formulations were suggested, such as the use of dried tadpoles from the canal after crushing them in the oil; the womb of a cat in warm oil with an egg of the gabgu bird and shell of a tortoise along with the neck of the gabgu bird boiled in oil. Not sure whether they were using the bird's neck for its thyroid content (Lerner, 1932). It was standard to use animal fat in hair growth formulations (Bryan, 1930).

Records reveal that the Egyptians also used face masks made by combining incense cake, wax, extra virgin olive oil and cypress, packed into fresh milk to prevent wrinkles. They also believed that one's skin colour could be enhanced by polishing it with a mixture of sea salt with honey and sodium carbonate (Parish and Crissey, 1988). They were very obsessed with eye beauty and used several forms of eye paint to enhance it. They started using malachite (green copper ore) and later galena, a dark grey lead mixed with antimony and other metals. Galena was found in the small leather pouches recovered from a 3000 BCE old Egyptian tomb (Witkowski and Parish, 2001). Kohl, the eyeshadow, was an antimony compound used by women to paint their eyelid's upper margin. The lower eyelid was painted green, and the area between the upper eyelid and the eyebrow was often painted grey or blue to enhance periorbital beauty (Lucas, 1930). It is safe

to assume that present-day makeup artists might have taken a clue for smoky eye makeup from the ancient Egyptians. Evidence suggests that Babylonians (2000 BCE) subsequently used the Egyptians Kohl or parched antimony to enhance their periorbital beauty by making the eyes appear larger and more lucid. Like Egyptians, Mesopotamia's habitants also applied galena to embellish their eyelids (Witkowski and Parish, 2001).

Women from ancient Egypt and Mesopotamia were fond of wearing lipsticks made up of powder from gemstones mixed with plants and fish scale extracts (Brown, 2013; Gao *et al.*, 2015). Other adornments such as earrings have also been found, dating back to 2500 BCE (Sands and Adamson, 2014). Egyptians used a mix of salts, animal oils, alabaster, and sour milk to ameliorate the tone and texture of their skin. Lactic acid and alpha-hydroxy acid in sour milk worked as a natural peeling agent to improve skin quality. The Egyptian Queen Cleopatra (51 BCE) was famous for taking a bath in sour milk, additionally enjoying the cosmetic boon of the lactic acid. She also used honey, mud and Dead sea salt for exfoliation (Oumeish, 2001). The herbal and mineral-based colour was an integral constituent of Egyptian makeup. Henna (*Lawsonia-inermis*), extracted from the leaves of the blossoming green plant, was used to dye hair, colour finger and toenails. Much before Romans, the public bath was part of Egyptian culture where they engaged themselves in manicure, pedicure, hairdressing, and facial makeup, especially to the eyes. Tattoos on the bodies of mummies suggest that it was the standard cosmetic practice (Cotrell, 1960). Persians entered Babylon after their triumph and learned

the art of cosmetic practices; later, they spread it across the Mediterranean region, particularly to Greeks, Arabs, and Hebrews.

The Hebrews from the Biblical times used oils and ointments extracted from almonds, olives, sesame seeds, gourds, together with fatty ingredients from fish and animals for a better appearance of their skin and protection from the sun. They also used ochre, an oxide of iron blended in oil for the lips and coloured their nails with blending ash and honeycomb. Jews took the bathing habits from Egypt and loved to use cinnamon and aloe to fragrant their beds. They loved perfumes and used myrrh as an ingredient to prepare the most expensive fragrances. The use of ornaments was regular by Jewish women, and they practised nose and ear piercing; however, Jews' were forbidden to practice the art of body tattoos (Buncke and Conway, 1957). It is interesting to note that Jews' husbands were obligated to provide an allowance of ten dinars to their wives so that they fulfil their cosmetics needs (Parish and Crissey, 1988).

### **3.3 Ancient Greece**

Greek women strongly believed in a daily routine of aesthetic rituals to halt or slow the effect of ageing. It was a standard practice to use a mixture of bread and milk as face masks during the night and remove it in the morning with a combination of beans cooked in butter (Parish and Crissey, 1988). This entire process was quite smelly and used to put off the men; women used to minimize the smell by using a potion made up of donkey's milk or wool fat. Women used rouge to give a youthful appearance to their lips and cheeks and rubbed it as modern-day blushers on the cheek. Greeks used

a variety of natural ingredients for making the rouge, such as paederos, seaweed, a root similar to alkanet and a red colour vermilion.

Archaeological evidence from the Archaic period suggests that the Greek women were the first to employ face cream consisting of white lead to clear the skin pigmentation and enhance colour and texture. Archaeological findings from the Mycenaean tomb (1350-1100 BCE) proves the use of lead-based cosmetics in Greece. Lead-based face masks were customary during the Classical and the Hellenistic period (700-300 BCE). Later the application of face masks propagated from Greece to the neighbouring civilization across the Mediterranean sea (Diamandopoulos, Kolonas and Grapsa-Kotrotsou, 1994). Predominantly, these face masks were used for skin tightening and removal of facial wrinkles.

Though Greek women were allowed to wear makeup, anything ostentatious was frowned upon by the male elites, for whom women were supposed to stay inside the house and look after it. In his book *Politics*, Aristotle stated that “As between the sexes, the male is by nature superior and the female inferior, one rules and other is ruled; this principle of necessity extends to mankind” (Femenias, 1994). Regrettably, with this affirmation, Aristotle leaves no suspicion regarding the subordinate role of women in Greek society.

### **3.4 Ancient Rome**

The Romans routinely practised personal grooming and beautification. They incorporated many of the Egyptians and the Greeks beauty customs and rituals in their daily life. Their attitudes toward personal cleanliness and beauty became an example of civilized elegance for centuries (Hunt, Fate

and Dodds, 2011). In pursuit of unblemished skin and pale complexion, Roman women used a variety of products. The Romans also employed white lead known as cerussa to whiten their faces, and red lead called minimum as rouge. Both Greeks and Romans used materials sourced from various animals, vegetables, and minerals in their vanity box. In all kinds of makeup, lead was the main ingredient. Roman satirist, Martial (40-104 CE) illustrated the importance of white lead as, "*Blackberry hued Lycoris feels delight knowing that cerussa makes skin light*" (Wilner, 1931).

Interestingly, the commonly used "Cold Cream" or *unctum refrgerans*, prepared with rose water essence, was conceived by the Greek-Roman physician Galen (130-201 CE)(Coxe, 1846; Gulick, 1902). Greeks and Romans used poultices containing mustard, sulfur, corrosive sublimate of limestone to improve their skin tone. Tree resins, pumice, frankincense, and myrrh were used to alleviate skin colour and eliminate freckles, furrows, and wrinkles.

Ancient Roman women were not supposed to have visible body hairs and wrinkles. They used *lomentun* for wrinkle removal. Hair removal was widely practised and not restricted to only facial hairs but also included the arms, armpits, legs and other body parts. Hair plucking, clipping, shaving, and sometimes rubbing with pumice and unguent (*psilothrum*) were employed. Physicians such as Pliny the Elder (*Historia Naturalis xxxii, 135f; xxiv, 58 and 79; xxxvi, 154; and vii, 21*) elaborated several formulations of *psilothrom*, which included blood, gall, liver of frogs, leeches and sea fish mixed with vinegar or oil. However, these preparations were not very useful for hair removal; he categorically mentioned plucking the hair first before



applying these *psilothroms*. Romans women and young girls were using bands to enhance the size and shape of their breasts and used full and thick dresses to cover the unattractive slenderness (Wilner, 1931).

It is interesting to note that men did almost all ancient writing on cosmetics, and they penned down their ideal of femininity, such as glowing complexion with fair skin. Ovid, the famous Roman poet, wrote the following in his book *The Art of Love* in support of beauty rituals of (as translated by Humphries 1960):

*“You know what to apply to acquire a brighter complexion—nature’s pallidest rose blushes with suitable art. Art supplies the means for patching an incomplete eyebrow. Art, or a beauty spot, aids cheeks that never have a flaw. There is nothing amiss in darkening eyes with mascara, ash, or the saffron that comes out of Silician soil. I wrote a book about this; The Art of Beauty, I called it. Not a big book, I must say; still, it took labor and time. Read it, and find the cure for any defect in your beauty”* (Ovid and Humphries, 1960; Direkx, 1980).

Moreover, he also wrote the recipe for skin lightening as:

*“Now, when you have had your full sleep, and your delicate limbs are refreshed, come learn from me how to impart a dazzling whiteness to your skin. Strip of its straw and husk the barley which our vessels bring to our shores from the field of Libya. Take two pounds of peeled barley and an equal quantity of vetches moistened with ten eggs. Dry the mixture in the air, and let the whole be ground beneath the millstone worked by patient ass. Pound the first horns that drop from the head of a lusty Stag. Of this*

*take one-sixth of a pound. Crush and pound the whole to a fine powder and pound the whole together vigorously in a marble mortar. There should also be added two ounces of gum and Tuscan spelt, and nine times as much honey. Any woman who smears her face with this cosmetic will make it brighter than her mirror”* (Ovid and Humphries, 1960).

Ovid's suggestion was reasonable; however, other writers also wrote about various formulations, many of which were toxic and not based on any evidence. Aesthetic rituals of the present day have been supplemented by the spas and beauty parlours and replaced the slaves who serviced Roman ladies.

The surge of Christianity in Europe brought changes to social as well as aesthetic rituals. The Church started playing a vital role in human faith, healing, and desire; as a result, science and rational thinking took a back seat. The study of medicine and dissection were prohibited (Schweisheimer, 1970; Daglio, 1982). Greco-Roman medicine received a major setback due to the fall of the Roman Empire and paved the way for Islamic medicine. Paul Aegineta (625-690 CE) built a link between the Western and Eastern schools of medicine and became instrumental in spreading it across Europe. He used ivory powder, crushed jellyfish with aromatic oil for the dermabrasion (Gurunluoglu and Gurunluoglu, 2001).

The quality of life was poor during Medieval time, which slowed the innovation and uses of cosmetics. However, in the latter part, a revival was seen when western Europeans started imitating the aesthetic ritual of their eastern Mediterranean counterparts.

### 3.5 Ancient Arabs and Persia

Alexandria became the centre of education by 332 BCE, and it attracted several Arabs, Egyptians, Greeks, and Jews, who showed a keen interest in learning medicine (Majno, 1975). Innovation accomplished in the field of anatomy, physiology, nutrition, as well as body care in Alexandria benefited the world. During the 9<sup>th</sup> to 12<sup>th</sup> centuries, Arabs played a crucial role in consolidating a civilization. Several Arab physicians who studied alchemy and medicine in Alexandria had a thorough understanding of cosmetology and aesthetic rituals. They created a facial mask using powder of ground lentils, rice, seashells, marble, crystal, limes, and beans. This mixture was used on the face as superficial dermabrasion (Feliciano, 2000).

Moreover, they also made skin cleansers using almond oil and named *hemsia* (Woodforde, 1992). Use of henna treated with clove oil and other aromatic herbs were commonly used as hair dye. The process for rosewater distillation was developed by Avicenna (980-1037 CE), commonly known as Ibn Sina, born in Persia, and widely recognised in the Arab and Spanish world. Arabs used his distillation process and used rose water, honey, and Arabic gum to prepare a skin lotion. Avicenna recommended taking a bath daily and use aromatic oil to massage the body (Gruner, 1970). Medical encyclopaedia, *al-Tasfif liman 'Ajiza 'an al-Talif*, written by physician-pharmacist Abu al-Qasim al-Zahrawi (936-1013 CE) was having a particular chapter on cosmetology and art of beautification during the 10<sup>th</sup> century. He treated cosmetics as a domain of medicine and named it as *Adwiyat al-Zinah* or Medicine of Beauty (Elía, 2009; González-Minero and Bravo-Díaz, 2018).

Persia was one of the thriving ancient civilisations where women played a significant role in society. There were many accomplished women rulers and military commanders in Persia. In contrast to the Greeks, gender equality was an established norm in Persia. Both men and women used makeup to beautify their facial features. Evidence suggests that women in Persia used white powder and rouge in their beauty rituals, similar to the Greeks and Romans. Retrieval of vessels with white powder and bowls painted with red colour from the graves at the archaeological sites of Shahdad, Kerman supports the idea of makeup in ancient Persia. It is believed that both men and women were using the white powder as a foundation while females used rouge to add a youthful flush to their cheek and lips.

In ancient Persia, married women were supposed to carry *haft qalam arayish* or *haftvand* (seven items) for their beautification rituals. Unmarried girls were not allowed to use cosmetics. The *Burhani-i-Qati*, a Persian language dictionary composed in India, defines the seven items as *surmah* (kohl), *nigar* (heena), *safidab* (white water), *ghazah* (surkhab or surkhi or rouge), *wasma* (thick eye makeup), *zarak* (gold dust) and *khal* (beauty spot).

Moreover, women were supposed to wear nine ornaments routinely: *aviz* (hair ornaments), *bazuband* (armlet), *halqa-i-bini* (nose-ring), *galuband* (choker), *dast-birinjan* (bracelet), *Khalkhal* (anklet), *angushatari* (ring). Historical evidence suggests that the use of cosmetics and scent in Persia is as old as the art of seduction and goes back to antiquity. The archaeological finding of polished bronze mirrors across China and Egypt as early as the third millennium BCE is evidence of the artisan's desire to

attract the eyes of men and women (Farmanfarmaian, 2000). Historical evidence suggests the adaptation of Persian beauty rituals in Greece by the courtesan ladies; however, imitation of such “barbarian luxury” was frowned upon. Due to political and cultural reasons, the beauty rituals of Persian women did not get the approval of the elite of Athens (Miller, 2004). China was the biggest importer of Persian cosmetics until the battle of Taraz between the Tang dynasty and Arabs.

### **3.6 Ancient India**

Evidence suggests that ancient Indians were quite advanced in their thoughts, understandings, and aesthetic rituals for beautification. Indians’ more profound understanding of Ayurvedic cosmeceuticals goes to Indus Valley Civilization over 5000 years back. There are several formulations mentioned in the Ayurveda for age-related problems, rejuvenation and beautification (McNab, 1999; Lal, 2002; Datta and Paramesh, 2010). Both men and women had equally participated in the aesthetic rituals, which were purely driven by the seasons and life events. Same as Egypt and Persia, women enjoyed autonomy throughout ancient times and equally participated in education as well as religious debates. Body shower or bath was highly placed in Indians aesthetic rituals. It was recommended to take three times a bath, which is still common practice in several parts of rural India. Ruins of the Indus Valley civilization indicates the bathing culture in this part of the world from antiquity (Prasad *et al.*, 2008).

Ancient Indians used predominantly plant-based or herbal cosmetics from the time of antiquity. Women used kohl (kajal) to brighten their eyes and a

plant-based dye to colour their lips, palms, fingers, soles, and toenails. *Asthanga Hridaya*, a 1500-year-old Ayurveda text written by Vagbhata of Sindh, offers six different formulations for the masks (*lepa*) used during a different season of the year. Ancient Indians were using distinct ways to remove visible body hairs as it was a significant stigma to have hair on the arms, legs, as well as pubic area. It was suggested to soak the powder of *Phyllanthus emblica* along with *Piper longum* in the milky latex of *Euphorbia nivulia* and apply it in the desired area as a depilatory agent for the hair removal (Serfoji and Krishnaswamy, 1952; Patkar and Bole, 1997; Patkar, 2008).

Historically, Indians loved fair skin; as a result, lightening and exfoliation of the skin were everyday aesthetic rituals with plant-based agents. For skin whitening, it was suggested to use the paste from the root of Kosta (*Saussurea lappa* Clark), Sesame Seeds, leaves of Lebeck (*Albizia lebbek* Benth), leaves of Pongam (*Pongamia pinnata* Pierr.), the bark of Cedar (*Cedrus deodara* Roxb), and the wood of Indian Barberry (*Berberis aristata* DC.) for three days on the desired body parts. Use of precious oils and clarified butter, honey, and lentils (*Lens culinaris* Medic) were suggested as a face pack to enhance facial beauty.

As mentioned in chapter 2, Indian artists and poets paid particular attention to the female reproductive side in art and literature, and physicians did not forget it. They suggested to collect *Aswagandha* root (*Withania somnifera* Dunal.), fruits of *Gajapimpali* (*Scindapsus officinalis* Schott.), the root of Kosta (*Saussurea lappa* Clarke.) and the rhizomes of sweet flag (*Acorus calamus* Linn.) and grind them together. Later, mix it in clarified butter and

regularly massage the breast to improve the firmness, shape as well as size. Further, Ancient Indian practised a very holistic aesthetic ritual comparable to modern-day spas called *Kyakalpa*, which means complete rejuvenation of the body, both internally as well as externally. The process of *Kayakalpa* involves detoxification and a series of massages of different body parts, including the head, using specially prepared oils enriched with herbs (Lal, 2002; Patkar, 2008).

The origin of aesthetic surgery goes back to ancient India, where the forehead flap method was used to reconstruct the mutilated noses during the war and judicial punishment (Freshwater, 2012; Krueger *et al.*, 2013). The first aesthetic surgery is credited to SUSHRUTA (600 BCE), who lived nearly a century and a half before Hippocrates and is viewed as the “*Father of Plastic Surgery*”. In his book “*SUSHRUTA SAMHITA*”, originally written in Sanskrit and translated into English as “*SUSHRUTA’s COMPENDIUM*”, he describes the method of nasal reconstruction using leaf-shaped cheek flap and otoplasty (Saraf and Parihar, 2007; Champaneria, Workman and Gupta, 2015). Caliph Mansur (753-774 CE) ordered the translation of *Sushruta Samhita* into Arabic, which came to be known as *Kitab-Shaw Shoon-Hindi* and *Kitab-i-Susrud*. The Arabic version reached Europe and translated into German and Latin by Muller and Hessler respectively during the early 19<sup>th</sup> century and later in English by Kaviraj Kunja Lal Bhishagratna in 1907.

The *Bower Manuscript* is one of the oldest documents describing Ancient Indian medicine found in Kuchar (Eastern Turkistan) dated 450 CE and preserved in the library of Oxford University. The knowledge and methods

of plastic surgery from India spread to Egypt, as mentioned in the *Ebers Papyrus*. It then spread to Europe through Greece and Italy and finally reached Asia (Loukas *et al.*, 2010; Sharma, Sharma and Sharma, 2012). Ackernecht believes “*that plastic surgery in Europe which flourished in Medieval Italy is a direct descendant of classical Indian surgery*” (Champaneria, Workman and Gupta, 2015).

It emerges that the ancient Indians conceptualized a comprehensive range of present-day aesthetic practices which are still in regular use.

### **3.7 Ancient East Asia**

Traditionally, Confucian philosophy shaped the position of women in East Asian countries. Like the Greeks, the Confucian system emphasised women’s submission and subordination to men and granted them very little authority beyond the home (Zheng, 2005). Historically, in East Asian countries, women’s physical beauty has been of utmost importance and has emphasised body ideals such as a slightly plump body with a round face (Han, 2003). However, facial beauty features were more emphasised compared to body shape (Jung, 2006). These beauty standards were dynamic and kept changing between dynasties; however, love for white skin remained a constant desire.

Chinese women were incredibly passionate about preserving their youth. To slow the sign of ageing, such as wrinkles and lines, they were applying face masks of rice powder and tea oil overnight. After removing the mask, they used to apply a special preparation known as *meen-fu* to the face. Comparable to the Greeks, ancient Chinese women used white lead to



lighten their skin colour. It is surprising to see that two completely unconnected cultures were using similar lead-based products for improving the skin tone and texture.

They used red dye to highlight their cheekbone, colour the lips and the tip of the tongue, and finally apply a rice powder to further whiten their facial complexion. Lips were attributed as the most sensual part of East Asian women. During the Han Dynasty (206 BCE-220 CE), women became fascinated with rouge and started using it to create innovative shapes and designs on their lips, such as circles, hearts, and flowers. In contrast, women from the Tang dynasty (618-907 CE) used black dye to decorate their lips. Evidence suggests that the women during the Tang dynasty were applying ceruse powder on their breasts and the face. Women used to carry a small vanity box with a little mirror, as well as rouge. Tang dynasty is considered a golden age in Chinese history; trade helped the dynasty become rich and powerful and positively impacted women's aesthetic rituals. Chinese women became creative in the art of makeup, and they shaped their eyebrows like silkworms, mountains, eye-shaped like almond and cherry shaped lips (González-Minero and Bravo-Díaz, 2018).

As discussed earlier, Koreans have a unique liking towards unblemished skin comparable to white jade and free from lines and wrinkles. Their desire for white skin goes back to the era of *Gojoseon* Dynasty (2333-108 BCE). They have applied various methods to lighten their colour, such as using dregs of honey and *miansoo* lotions (Li *et al.*, 2008).

Japanese society witnessed notable changes in its beauty ideology during the Heian era (794-1185 CE). Historical evidence such as paintings and other literary works gives a glimpse of a desired physical attributes such as pale skin colour, round plump (*tsubutsubu to fuetaru*) face with elongated eyes. Moreover, they plucked and painted their eyebrows slightly above the periorbital rim and blackened the teeth. Japanese women in the imperial courts during the Heian period grew their hair and wore it as a shining black sheet over their back, known as *kurokami* (L. Miller, 2006).

During the Edo period (1603-1868 CE), Japanese women applied white powder to their faces (Ashikari, 2003). Moreover, during the Tang dynasty period application of ceruse spread to Japan from China, where till the 16th-century, women were using it (Schafer, 1956). Japanese women were using a facial cream to remove their facial rhytids made up of wax and oil known as *nioiabra*. Japanese women used crushed Safflower petals (*Carthamus tinctorius* L) to colour their lips, eyebrows and the edge of their eyes (González-Minero and Bravo-Díaz, 2018).

### **3.8 Ancient Mayans**

The Classic Maya civilization (250-950 CE) prevailed in central America, and they were recognized for their advanced understanding of science and agriculture. Maya has practised alternation of their body and face for cosmetic reasons. It was a common aesthetic practice of Mayans to pierce their nose, lips, ears for ornamentation. Mayans loved to cover their entire body, including genitals, as well as a face with tattoos and paint for the sake of beautification (Obermayer, 1974). Moreover, they developed a cranium

modification technique and practised it widely to shape the head and eyes of their kids. These alterations were done for the “sake of elegance” and beauty and to frighten their enemies. Both males and females had adopted the practice of head shaping as well as dental decoration. Anatomical observation suggests two types of head shaping, erect and oblique, depending on the inclination on the occipital area on the Frankfort plane (Comas, 1960; Gill, 1986; Saul and Mather, 2001; Duncan and Hofling, 2011).

Like ancient Egyptians and Indians, The Aztecs had an evolved understanding of plant-based medicines. Their steam bath system was well designed with hot water and drainage system alike Romans. Both men and women were keeping long hair and used *chtalhuic* seeds or oil of tzopilotl (*Swietenia mahagoni*). Aztec and Mayan females were having their aesthetic rituals and paid particular attention to their hair and skin. They used to apply *trautlahpalli* to colour their lips, cheek, neck, and chest in red and avocado and sugar cane as a face mask (Feliciano, 2000).

### **3.9 Conclusion**

From East to West, the aesthetic sense for physical beauty equally prevailed across the cultures and civilisations. The clever use of natural colours by the ancients to accentuate their facial features demonstrates their aesthetic intelligence. The use of rouge to highlight the apple of the cheek, colouring the lips, painting the periorbital area or the nasal dorsum speaks about their exceptional understanding of aesthetic zones. This ability might have allowed them to strengthen their anatomically weaker beauty spots. The desire for unblemished skin and physical beauty has

survived wars, financial depression, as well as economic resurgence. The trend suggests that cosmetology is coming closer to medicine with similar scientific sophistication in innovation and manufacturing. It is apt for dermatologists and plastic surgeons to actively involve themselves in research and training of cosmetology and apply it to complement their aesthetic work.

The next chapter reviews the development of modern aesthetic practices, including surgical, non-surgical, and emerging aesthetic procedures.

## Chapter 4: Modern Aesthetic Practices

### 4.1 Introduction

As discussed in Chapter 3, since antiquity, humans have embraced the art of altering their physical attributes, be it to enhance their opportunity in the community for love or during conflicts, in other words, to increase their self-esteem. Both men and women rejoice the boon of colours, cosmetics, ornaments, tattoos, piercing of body parts, and surgical means to refine or alter their appearance in the quest for the 'ideal beauty', which is ever-changing depending on the ethnicity, sociocultural, economic, and environmental condition. In history, the use of rings by Padaund women to outstretch their neck (Figure 4-1), foot binding by Chinese women, and corsets to compress waistline by Victorian women (Figure 4-2) are a few of the examples for body alternation (Blair and Shalmon, 2005).



Figure 4-1: Long neck women from Kayan tribe wearing neck rings. Inle Lake, Myanmar, 2018 By Linedwell; Wikipedia Commons

A significant number of psychological studies suggest that physical beauty touches every facet of life, such as interpersonal relationships, self-confidence, body image, and employment opportunities (Sarwer, Crerand and Magee, 2011; Sobanko *et al.*, 2015). The desire for physical attractiveness and youthfulness has become an essential priority in society and charms men and women across the ages around the world. Appreciation of physical beauty has several considerations extending from anatomical, evolutionary, or physiological discretions to the authority of community, culture, and individual differences.



Figure 4-2: Corset in the Victorian era

There is an increase in life expectancy due to advancements in the healthcare system, enhanced hygiene, financial security, immunisation, and socio-economic development across the globe (Stončikaitė, 2019). It has resulted in the blurring of the age-related social norms due to changing work environment, relationships and the availability of anti-ageing procedures and medicine (Marshall and Katz, 2012). It is commonly thought that “we are as young or old, as we feel since age is bygone as the only way to measure living in time” (Katz and Gish, 2015). Evidence suggests the importance of psychological and physical well-being as a factor for ageing well. The desire to retain youthfulness is inherent in humans as it is reflected in the writing of William Shakespeare:

*“Do you set down your name in the scroll of youth, that are written down old with all the characters of age? Have you not a moist eye, a dry hand, a yellow cheek, a white beard, a decreasing leg, an increasing belly? Is not your voice broken, your wind short, your chin double, your wit single, and every part about you blasted with antiquity? And will you yet call yourself young?”* William Shakespeare, Henry IV, Part II, 2, 204(62)

Ageing is a complex, multifactorial biological process triggered by both external and internal factors. The sign and symptoms of ageing are a sum total of physiological and structural changes together with alteration in the integrity of soft tissue layers. Further, these changes are augmented by the altered bony support, muscle tone, volume depletion and result in facial sagginess, change of contour and proportion (Ganceviciene *et al.*, 2012). The concept of ageing created the narrative for the rejuvenation and reshaping of an ageing body and laid significant emphasis on aiming for

youthfulness and beauty (Smirnova, 2012). Moreover, the term ageing body was perceived as unfavourable; hence it has been replaced with a more positive term, 'mature body'.

Lately, a surge in cosmetic procedures has been witnessed in younger populations across the world due to increases in disposable incomes, relatively low procedure fees, increased exposure to social media and coverage by main-stream media (Tiggemann, 2003; Edmonds, 2007; Sarwer, Crerand and Gibbons, 2017; Aldosari *et al.*, 2019; Hopkins, Moreno and Secrest, 2020). Moreover, reality television shows on aesthetic surgery have a considerable influence on viewers decision making for trying cosmetic procedures (Crockett, Pruzinsky and Persing, 2007). Evidence suggests that young women have constant peer pressure to maintain an ideal body proportion (McKinley and Hyde, 1996; Markey and Markey, 2009). Traditionally, research on body dissatisfaction was focused only on females; however, a recent study reported that 43% of men were dissatisfied with their bodies in one way or another (Frederick *et al.*, 2007; Grogan, 2017).

Moreover, emerging trends suggest that both men and women are critical about their body and facial shape, and therefore opt for both surgical and non-surgical aesthetic procedures to attain their desired facial and body shape (Abbas and Karadavut, 2017). Studies suggest that the desired body image is influenced by an array of factors such as community, peer, profession, socio-economical, cultural, and political. The population at large is overexposed through print, electronic and social media with images of models displaying the so-called ideal body. Instagram and facial filters are



driving more young men and women to the aesthetic clinics (Petrie, Faasse and Fuhrmann, 2008; Hodgkinson, 2009; Swami, 2009; Alghonaim *et al.*, 2019; Arab *et al.*, 2019). The disparity between the perceived ideal body and one's real physique causes dissatisfaction and motivates them for aesthetic procedures.

Each face contains its unique ethnic characteristics, superimposed on underlying anatomy. Due to the natural ageing process, the face becomes less attractive and show their distinct ethnic characteristics (Liew *et al.*, 2016). Anthropometric and anatomical studies have documented apparent differences in the facial features between Asian and European ethnicity. Europeans have narrower and longer faces and a strong chin; in contrast, Asians have broader and shorter faces due to increased bi-gonial, bi-zygomatic, bi-temporal width along with masseter muscle hypertrophy and a retruded chin. Europeans have well defined anterior projection of the nose, maxilla as well as brow, while Asians have flat nasal radix, broad nasal base and low tip projection, and retruded maxilla (Dawei *et al.*, 1997; Sim, Smith and Chan, 2000; Le *et al.*, 2002; Farkas, Katic and Forrest, 2005; Gu *et al.*, 2011; Jayaratne *et al.*, 2012; Liew, 2015; Liew *et al.*, 2016).

In comparison with Europeans, the Asians have epicanthal folds, wider intercanthal distance, narrower eye fissures. Asian eyelids lack supratarsal crease and have conspicuous subcutaneous fat, thicker eyelid skin (Sun *et al.*, 2020). The Europeans have thinner upper lips and thicker lower ones, often satisfying the golden ratio; in contrast, Asians have thicker (fuller), with more prominent upper lips. Physicians need to consider these inherent

ethnic characteristics while performing any intervention so that they can produce a natural beauty, maintaining their ethnic identity.

Historically, people consulted and took the help of physicians to improve the appearance of a particular body part or the face. Quite often, these desires were driven by emotional and psychosocial well-being. A recent global study with over 54000 participants investigated the primary motivation for aesthetic treatment and segmented the participants into four archetypes: Beautification, Positive Ageing, Transformation and Correction. Further, the study defines the motivation for each archetype to guide the physicians with appropriate clues to plan the treatment and manage their desire (Liew, Silberberg and Chantrey, 2020).

Let us explore the literature to understand the evolution of surgical, non-surgical and emerging aesthetic practices.

## **4.2 Evolution of Aesthetic Surgery**

The most prominent feature in a human face, which determines the overall attractiveness, is the nose due to its central position. The nose is vulnerable to injury because of its protrusion and weak chondrocutaneous support structure. Since antiquity, the nose has been regarded as the “organ of reputation”; therefore, judicial mutilation of the nose was viewed as depriving an offender of honour- the ultimate disgrace (McDowell, 1977; Tiranic, 2003; Whitaker *et al.*, 2007). Moreover, the shape and size of the nose was an exciting subject for physiognomists to narrate a persons' attributes. Physiognomists classified noses into five types based on their distinct characteristics. Celestial (weakness and snoopy) Greek

(amelioration), Jewish (trade), Pug (asthenia and lack of development), Roman (vigour).

The nose plays a vital role in defining facial attractiveness as well as the development of aesthetic surgery. The first aesthetic surgery for nasal reconstruction is credited to the Indian surgeon Sushruta (600 BCE). With the Islamic invasion of India during the 10<sup>th</sup> century, his technique reached Europe. Unfortunately, it was unheard of in Europe until Branca de' Branca of Sicily applied the "Indian Method" of forehead flap and his son Antonio Branca reconstructed a lost nose by using a cutaneous flap from the arm. The genesis of rhinoplasty took place in India, which later got refined by Italian surgeons (Keil, 1978; Mazzola, 1987; Patterson, 1990; Micali, 1993; Prochno, 1994; Whitaker *et al.*, 2007; Pecanac, 2015).

The origin of modern-day aesthetic plastic surgery may be traced back to German surgeon John Friedrich Dieffenbach (1792-1847), who started performing rhinoplasty and skin transplantation at the University of Berlin. He was the most skilful plastic surgeon of the mid 19<sup>th</sup> century who conducted surgeries for reshaping nostrils and decreased the size of an extremely broad nose. Another otolaryngologist from Rochester, New York, John Orlando Roe, described the intranasal procedure restricted to the tip of a '*pug nose*' in the year 1887. Later, he also reported his intranasal, subcutaneous access to cosmetic rhinoplasty. Roe used local cocaine anaesthesia for performing his operations. In 1891, the first '*before and after*' rhinoplasty photograph was published.

Japan opened its door to the world after 250 years of isolation in the year 1850. Exposure to the Western world brought several social changes in Japanese society, including the role of women. Traditionally, the role of Japanese women was restricted to being housewives and wise mothers raising kids. The influence of western culture encouraged women to step out and take up the roles at the workplace, such as schools, hospitals, and factories. As women gained importance in society beyond the home, their outlook towards physical beauty changed and created a favourable environment for the Western practice of aesthetic surgery. This newfound desire for beauty in women influenced Dr M. Mikamo (1896) to further study beauty ideals. He proposed the Japanese standard of beautiful eyes and suggested a surgical way to accomplish it. Later, he reported the first double eyelid surgery, which became a norm and most widely performed aesthetic surgery in Asian countries (Shirakabe *et al.*, 1985; Sergile and Obata, 1997; Lam, 2002).

In the year 1919, Julien Bourguet elaborated the use of small incisions to correct forehead lines and crescent-shaped cuts to correct crow's feet and angular or gendarme-hat-shaped incisions to correct neck wrinkles. Bourguet described excisional techniques for the correction of a protruding eye bag (peri-orbital fat) in the year 1924. Erich Lexer, in the year 1931, described efforts at conducting the '*facelift*'. He was possibly the first to describe an attempt at addressing the "*double chin*" problem in Literature (Rogers, 1976; Crumley, 2003).

The role of breasts is vital in defining physical attractiveness, female sexuality, maternity, emotional well-being, and self-esteem. Any

deformation in the breasts' shape and size due to ageing or underlying pathologies contributes negatively towards psychological health. Therefore, the primary motivation for mammoplasty is the enhancement of self-esteem and sexuality (Solvi *et al.*, 2010; Guimarães *et al.*, 2015).

Hair loss and baldness was a subject of interest in ancient civilizations. Historical evidence from various ancient texts such as *Ebers Papyrus*, *Charak Samhita*, *Ashtanga Hridaya* confirms the quest of Egyptians and Indians to find a formidable remedy to treat hair fall and baldness. The foundation of modern-day hair transplantation is built on the work of Japanese physician Shoji Okuda (1930), who experimented with the punch graft technique in burn victims. Twenty-two years later, Norman Orentreich treated a patient using a punch graft technique for androgenic alopecia. Moreover, he also proposed the physiological basis for the use of punch graft (Orentreich, 1970; Inui and Itami, 2009; Choudhry, Sood and Steinweg, 2017).

Although aesthetic procedures were initiated in the late 1880s, most modern surgical procedures still employ these antique methods. Plastic surgery has two components, reconstructive and aesthetic; this combination enables the surgeon to achieve natural results while correcting a deformity. In recent times, the emergence of non-surgical aesthetic procedures has added a new armament to the plastic surgeon's repertoire.

## **4.3 Evolution of Non-surgical Aesthetic Practices**

### **4.3.1 Injectable treatments**

Franz Neuber delineated the first tissue augmentation procedure using autologous fat as filling material in 1893 (Bircoll, 1987; Spiekman *et al.*,

2017). Later, Eckstein in 1902, suggested the injection of low-melting paraffin as filling material. The use of paraffin was popularized for several years. However, it fell out of favour due to the formation of local paraffinoma, granulomas and other complications such as infarction, thrombosis, phlebitis, and pulmonary embolism. Robert Gersuny described the use of Vaseline injections to correct facial defects, but these injections were discarded due to unfavourable results and complications in the form of severe local tissue reactions and fatal pulmonary embolism (Rogers, 1976; Krueger *et al.*, 2013).

The last three decades have seen extraordinary developments in facial rejuvenation following the introduction of non-surgical treatments, which helped relax facial wrinkles and restore the lost volume. Interestingly, in 1989, the US FDA approved the use of onabotulinumtoxin type A; BOTOX® for the treatment of ocular muscle spasms such as hemifacial spasm, strabismus and blepharospasm. It was observed that patients treated with onabotulinumtoxin type A for blepharospasm started to lose their frown lines, which led to the subsequent prospective clinical trials and approval of onabotulinumtoxin type A for cosmetic use to smoothen the glabellar frown lines in 2002 (Ting and Freiman, 2004; França *et al.*, 2017).

It is noteworthy to mention that the innovative work by Jean and Alastair Carruthers with Botulinum Toxin Type A has changed the public perception of aesthetic procedures in the 20<sup>th</sup> century. Their manuscript for the treatment of glabellar frown line was published in the Journal of Dermatological Surgery and Oncology (Carruthers and Carruthers, 1992) and can be credited for the rapid growth of non-surgical aesthetics

procedures. Later in 2002 and 2003, two large, double-blind, placebo-controlled, randomised, multicentre clinical trials cemented the position of BOTOX® (onabotulinumtoxin type A) as a safer and efficient procedure for the correction of glabellar frown lines and paved the path for the USFDA approvals and future aesthetic use. Subsequently, treatment of crow's feet lines or lateral canthal lines with BOTOX® was approved in 2013 and horizontal forehead lines in the year 2017. Botulinum Toxin Type A is currently used to treat many other indications such as migraine, hyperhidrosis of axilla, movement disorders, cervical dystonia, facial shaping, and many more conditions. Lately, other toxins such as DYSPORT® (abobotulinumtoxin A; Ipsen), XEOMIN® (incobotulinumtoxin A; Merz), JEUVEAU® (prabotulinumtoxin A; Evolus) also received the USFDA approval, respectively (Nigam and Nigam, 2010; Wu, 2010; Loyo and Kontis, 2013; de Maio *et al.*, 2017; Almukhtar and Fabi, 2019).

In the year 1998, Michael Olenius presented another clinical innovation by using Hyaluronic Acid (HA) for the correction of folds and facial volume deficit. HA became the soft tissue filler of choice over collagen due to its low risk of allergic reaction as well as the availability of hyaluronidase, an antidote that can reverse the undesirable effect of HA (Olenius, 1998; Lupo, 2006; Monheit and Coleman, 2006; Tezel and Fredrickson, 2008; Cho *et al.*, 2018). Poly Methyl Meta Acrylate (PMMA) beads are permanent fillers approved by the USFDA in 2006, used in conjunction with bovine collagen as a vehicle and lidocaine for pain relief. Collagen being biodegradable, will resorb, leaving PMMA spheres encapsulated in the fibrotic tissue (De Boulle, 2010; Lemperle *et al.*, 2010).

Calcium Hydroxylapatite (CaHA) is produced from non-animal, synthetic calcium phosphate pearls and includes the ionic bonding of calcium and phosphate ions through the bioceramics process. After injection, it forms a layer within the dermal matrix that stimulates fibroblast cells. CaHA should not be injected superficially as it will result in visible lumps and therefore contraindicated for lip augmentation (Emer and Sundaram, 2013; Pavicic, 2013; Lorenc *et al.*, 2018). Poly-L-Lactic Acid (PLLA), a synthetic biodegradable material with collagen-stimulating characteristics approved by the USFDA in the year 2004 for the restoration of facial lipoatrophy (Woerle, Hanke and Sattler, 2004; Ezzat and Keller, 2011).

#### **4.3.2 Energy-based skin and tissue rejuvenation**

Theory of selective photothermolysis proposed by Rox Anderson and John Paris in the year 1981 paved the future for lasers in aesthetic medicine. They successfully tested their theory by treating a vascular lesion using pulsed dye laser and fueled the laser-based innovations (Rox Anderson and Parrish, 1981). William H Reid introduced a Q-switched ruby laser for tattoo removal (Reid *et al.*, 1983), and Lawrence M David introduced a pulsed CO<sub>2</sub> laser for ablative resurfacing in the year 1989 (Houk and Humphreys, 2007). Light-based devices such as Laser and Intense Pulsed Light (IPL) became popular in the 90s. Q-Switched Nd: YAG laser with 1064nm was introduced in 1991 for tattoo removals. Mitch Goldman reported to the USFDA a reduction in hair growth as an adverse effect of IPL in 1996. Later, this led to the birth of IPL as a hair reduction device. In 1997, Michael Gold published the first article showing the efficacy of IPL for hair reduction (Gold *et al.*, 1997).



Non-ablative lasers, also known as fractional photothermolysis, are critical advances in laser therapy and have revolutionised skin resurfacing (Manstein *et al.*, 2004). The second generation of ablative lasers are a combination of 10,600 nm CO<sub>2</sub> with the Er: YAG lasers to produce ablative fractional photothermolysis (Hantash and Mahmood, 2007).

The use of IPL has been popularised as an alternative to laser systems across the globe. It is useful in treating several therapy-resistant dermatological conditions such as venous malformation, port-wine stain, as well as aesthetic concerns such as hypertrophic scars, keloid (Erol *et al.*, 2008), hair removal, melasma, hyperpigmentation and removal of tattoos (Raulin, Greve and Grema, 2003). IPL devices are fitted with a flashlamp, and the capacitor is controlled by a computer to generate the high intensity pulsed photochromatic light. The emission of bright light is possible as the electrical energy from the capacitor passes through the xenon gas within a gas-discharging lamp and gets converted in optical energy. IPL devices can emit the polychromatic light in the range of 500 to 1300 nm, which can be adjusted at the required wavelength range by using a convertible cut-off filter. There are many advances in IPL technology since its introduction. The use of water filters in the infrared part has significantly reduced the risk of adverse incidents. Since IPL devices emit a range of wavelengths, they can activate all the three chromophores of the human skin (haemoglobin, melanin, water) in one exposure. Depending on the skin type and condition, the cut-off filter determined to get the desired pulse duration and wavelength (Babilas *et al.*, 2010).

Radiofrequency (RF) is the most employed tool in dermatology clinics around the world. Mainly, it is used to improve tissue firmness, decrease skin laxity, body contouring by inducing collagen remodelling, and stimulate the apoptosis of the adipocytes. It works at deep layers without causing any ablation in dermal layers at operates at a frequency range of 3KHz-24KHz. Evidence suggests that the RF induces micro inflammatory stimulation of the fibroblast cells to facilitate the production of elastin and collagen, which result in skin tightening (Hantash *et al.*, 2009). RF is suitable for all types of skins as it works by heating the tissue water; its biological effect can vary depending on the depth of the targeted tissue, frequency of use and post-procedure cooling of the skin. RF is also known for inducing lipolysis by facilitating the lipase-mediated degradation of triglycerides into free fatty acids and glycerol. It also helps in smoothing the appearance of cellulite by breaking the fat cells trapped between the fibrous septa of the dermis. There are several devices for RF, such as monopolar, bipolar, unipolar, and dynamic. Monopolar RF is more power full for offering deep heating as compared to bipolar and unipolar radiofrequency. Monopolar devices (THERMAGE®) were the first to get USFDA approval for skin tightening in the year 2002 and later periocular rejuvenation in the year 2004 (Dierickx, 2006; Beasley and Weiss, 2014). Further, USFDA approved the use of THARMAGE® for body countering in the year 2006.

Lately, several ultrasound-based devices have been approved by the regulatory authorities worldwide. The most widely used ultrasound technology in aesthetic clinics is high intensity focused ultrasound (HIFU) and micro-focused ultrasound (MFU) (Fabi, 2015). As the name suggests,

HIFU operates as a high-energy ultrasound (Zhang *et al.*, 2010) and used for body contouring by employing the energy of 47-59 J/cm<sup>2</sup> at 2MHz and a focal depth of 1.1-1.8 cm (Gadsden *et al.*, 2011) for ablating the subcutaneous fat to achieve a reduction in body circumference (Fatemi and Kane, 2010; Robinson *et al.*, 2014). In contrast, MFU releases lower ultrasound energy of 0.4-1.2J/mm<sup>2</sup> at 4-10 MHz, and a focal length of 1.5-4.5mm and helps in the treatment of the superficial skin layer (Alam *et al.*, 2010).

#### **4.3.3 Thread Lifts**

Thread-Lift is a minimally invasive procedure which can be performed in a physician's clinic under local infiltrative anaesthesia. It helps to lift flabby skin and can be combined with botulinum toxin, soft tissue fillers or other aesthetic procedures. These are exclusive threads with barbs on their surface to ease the procedure and increase the probability to combine with other rejuvenation procedures. A quick procedural and shorter healing time have increased its popularity. However, like all new procedures, it requires further clinical studies with rigorous protocols for proper evaluation and evidence generation (Abraham, DeFatta and Williams, 2009).

#### **4.3.4 Emerging treatments**

Obesity, a metabolic disorder, is a growing concern globally and is becoming a significant cause of economic burden (Tremmel *et al.*, 2017). The management of weight and obesity is highly complex and requires a multimodal approach. Various surgical and non-surgical alternatives such as liposuction, laser liposuction, radiofrequency and cryolipolysis are available today to help individuals to achieve their desired body shape and

contouring. The idea behind cryolipolysis is rooted in the clinical observation of cold-induced panniculitis. In the year 1970, Dr Ervin Epstein and Dr Mark Oren came up with the term “*Popsicle Panniculitis*” after observing a red indurated nodule followed by temporary fat necrosis in the cheek of a new-born from sucking a popsicle. This phenomenon has also been observed in adults. These observations led to the conception that lipid-rich tissues are more vulnerable to cold injury than the adjacent water-rich tissues and led to a non-invasive process for fat reduction with freezing in 2007, termed cryolipolysis (Ingargiola *et al.*, 2015). In 2009, Sydney R. Coleman published his work on localised fat reduction by inducing apoptosis in adipocytes by cryolipolysis (Coleman *et al.*, 2009). This technique received US FDA approval as it shows the efficacy in reducing fat at the flanks (2010) and abdomen (2012) inner thighs, arms, submental fat and is commercially available as CoolSculpting® from Allergan (erstwhile Zeltique®). CoolSculpting® works on the principle of extracting energy via cooling to decrease the bulk of subcutaneous fat. The system only targets the adipocytes while protecting surrounding nerves, muscles, and blood vessels (Grants, Pietrzak and Spring, 2013; Krueger *et al.*, 2014).

Submental fat or double chin, as it is commonly called, is perceived as an unattractive sign of ageing and low self-esteem (Palm *et al.*, 2019). The presence of submental fat superiorly and inferiorly to the platysma muscle is considered a sign of an aged face. The mainstay treatment for the double chin has been surgery; however, patients do not prefer it due to complications. Deoxycholic acid, a bile salt found in the liver, is known for its adipocytolysis property (Rotunda *et al.*, 2004; Wollina and Goldman,

2015). Literature suggests that deoxycholic acid selectively targets fat cells while sparing neighbouring tissues like skin and muscles (Thuangtong *et al.*, 2010). After extensive clinical trial, the US FDA approved its use for non-surgical treatment of submental fat under the brand name KYBELLA®/BELKYRA® (Humphrey, Beleznyay and Beleznyay, 2016).

#### 4.3.5 Feminine Rejuvenation

Recently, non-surgical feminine rejuvenation is witnessing increasing demand for the revivification of youthful female genitalia. Over time, the female body undergoes many external and internal changes which are influenced by physiology and life events. Ageing, motherhood, hormonal changes, obesity, menopause, and several other factors lead to vulvovaginal laxity and vaginal mucosal atrophy, which adversely affect the women's quality of life. Furthermore, genitourinary syndrome post menopause triggers several issues such as vaginal dryness, dysuria, recurrent urinary tract infections, impaired function and many more problems. Unfortunately, women do not feel comfortable discussing such matters with physicians and suffer from compromised genital self-image, sexual distress and depression (Berman *et al.*, 2003; Vanaman *et al.*, 2016; Rowen *et al.*, 2018). Lately, several devices employing radiofrequency and laser technology have been introduced for non-surgical vulvovaginal rejuvenation. These devices are helping in managing both aesthetic and functional issues of the female urinary tract and genitalia. Unfortunately, these devices are not approved by the USFDA instead issued a warning to alert patients on the paucity of safety and efficacy data; however, physicians are using them based on anecdotal evidence only (Hashim *et*

*al.*, 2018; Qureshi, Tenenbaum and Myckatyn, 2018; US Food and Drug Administration, 2018).

#### **4.3.6 Platelet-Rich-Plasma and Stem Cells**

PRP is rich with growth factors such as platelet-derived growth factor (PDGF), transforming growth factor (TGF), and vascular endothelial growth factor (VEGF), known for promoting dermal health. In the literature, the positive effect of PRP in improving skin texture, elasticity and treating wrinkles are reported (Redaelli, Romano and Marcianó, 2010). Moreover, PRP is also getting used for the treatment of hair loss and transplantation (Badran and Sand, 2018; Kramer and Keaney, 2018). Lately, extraction and use of adipose-derived stem cells (ADSC) from the fat after liposuction is getting attention and sounds promising (Wolf *et al.*, 2018; Suh *et al.*, 2019). However, both PRP and Stem Cells therapy are still in infancy needs to be critically assessed for their efficacy in a randomized, double-blind control trial before it can be widely offered to patients.

#### **4.4 Conclusion**

The aesthetic procedures have evolved and have undergone several technological innovations to further enhance the procedures' safety and efficacy. The recent development of non-surgical aesthetics procedures has emerged as the new armamentarium in the dermatologists and plastic surgeon's repertoire. Like any other field of Medicine, quality medical education is paramount in the field of non-surgical aesthetics to ensure that evidence-based knowledge is deep-rooted and practised by physicians routinely.

The next chapter explores the problem statement, aim and research questions.

## **Chapter 5: Problem Statement, Aim, Research Question**

### **5.1 Problem Statement**

Non-surgical aesthetics is a young discipline in medical science and continues to be at the cutting edge of scientific innovation and development. Since most of the medical education for NSA is happening outside the formal medical school curriculum, it lacks structure, proper evaluation, and a feedback mechanism. Realizing the need for education, many healthcare professionals, devices, and pharmaceutical companies have established short training courses to teach procedural skills such as injection techniques to aspiring practitioners. However, to the researcher's best knowledge, no empirical, evidence-based educational curriculum and teaching and assessment methodology are being used in designing these programs.

Several public concerns about the safety and regulation in aesthetic medicine have invoked reactions from regulatory bodies, including the Department of Health and Royal Colleges in the United Kingdom. As a result, Health Education England (HEE) has published a series of documents setting the standards for medical education in non-surgical aesthetics. A large number of practitioners with varied clinical training is entering the NSA workforce. Therefore, it is appropriate to review the current training position and relevance of existing knowledge within the core (aesthetic dermatology, aesthetic plastic surgery, maxillofacial surgery, ear, nose, and throat surgery) and non-core specialisations (family medicine, dentistry, nursing) in the context of the HEE standards. Given the



emergence and growth of such a sizable multi-disciplinary workforce, it would be prudent to determine standards for the medical education in NSA which should be reflected in the appropriate postgraduate curriculum.

## **5.2 Aim**

The proposed study aims to develop an evidence-based postgraduate curriculum in NSA. It is envisaged that the research will help to establish the first comprehensive curriculum, which will serve as a core document for program directors in medical schools to plan and deliver a postgraduate course in NSA across the globe.

Taking the above into consideration, the research will also evaluate the current status of NSA education and the development of the curriculum to enhance the quality of care by addressing the following overarching research question for this thesis.

## **5.3 Research Question**

How would a newly designed postgraduate curriculum in non-surgical aesthetics help clinicians to attain the necessary skills?

The supplementary questions to address the above would be as follows:

- I. Is there a need for a clinical curriculum in non-surgical aesthetics?
- II. What would be the conceptual framework for curriculum design?
- III. What would be an evidence-based implementation framework?

## 5.4 **Conclusion**

The objective of this chapter was to establish a logical approach for research by formulating the problem statement, setting the aims and objectives of the study, and introducing the primary research question.

The next chapter describes the research design, methods, and the methodology.

# Chapter 6: Research Design, Methods, and Methodology

## 6.1 Introduction

*“Scientific research is a chaotic business, stumbling along amidst red herrings, errors and truly, creative insights”-Gerald Milburn*

In the previous chapters, I have elaborated on the background of the research concerning the problem statement and the literature review focussing on philosophical views on Beauty and non-surgical aesthetics’ historical perspective. The current chapter aims to discuss the methodology and research design details with a justification for choosing mixed methods research for this thesis.

Mixed method research has always been the central methodological principle in educational, healthcare and social research (Bryman, 2006); and mostly exhibits a positive paradigm; hence most researchers suggest using multiple methods to explore the same phenomenon (Cassell *et al.*, 2005; Modell, 2010; Penciner *et al.*, 2011). Inspired and motivated by this observation, the gap in the literature and the need analysis as described in the subsequent chapters, the thesis utilized mixed methods research with a dominant quantitative component. Thereby it allows to integrate both qualitative and quantitative data, enhances evidence triangulation, complementarity and increases the validity of the project (Johnson, Onwuegbuzie and Turner, 2007).

The chapter will initially discuss the general characteristics of mixed methods and then justify the need for adopting such. When adopted in

pedagogical and curriculum development, this type of research method is often termed Design-Based Research (DBR) (McKenney and Reeves, 2018; Ryu, 2020).

In this thesis, the term design-based research and mixed-method have been used interchangeably.

## 6.2 **Mixed-Method Research**

Research methodologies can be described as the blueprint used in classifying, choosing, processing, and examining or scrutinizing information about a research question or subject. Research is conducted by making use of study, experiment, observation, analysis, comparison, and reasoning. Scientifically executing a research study is one of the factors playing a significant role in planning a study.

As suggested by various authors, a mixed-method study integrates or combines quantitative and qualitative methodologies at any point of executing a research project (Teddlie and Tashakkori, 2009; Ponce and Pagán-Maldonado, 2015; Creswell and Plano Clark, 2017). Johnson et al. defined mixed methods research as,

*“The type of research in which a researcher combines elements of qualitative and quantitative research approaches (e.g., use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purpose of breadth and depth of understanding and corroboration”.*

Together with qualitative and quantitative research, mixed-method design is the third major research paradigm (Johnson, Onwuegbuzie and Turner, 2007; Stefurak *et al.*, 2018). The essential step in designing a mixed-method study is to approach the integration of qualitative and quantitative data at an appropriate stage during the execution of the study plan. Timely and appropriate data integration enables a generic view of the fundamental research question incorporating different perspectives and different research methodologies (Shorten and Smith, 2017).

Mixed-method research designs comprise various categories such as explanatory, exploratory, parallel, and nested or embedded designs. Table 6-1 provides a list of different mixed method designs with the respective research process involved in each.

Table 6-1: Classification and description of mixed methods design

MIXED METHOD TYPE	RESEARCH PROCESS
Explanatory Sequential	Gathering and scrutiny of quantitative data, followed by the gathering and scrutiny of qualitative data; The results of qualitative research outcomes are also used to justify and explain that of the quantitative data.  QUANT → QUAL
Exploratory sequential	Gathering and study of qualitative data are tailed up with the gathering and study of quantitative data, which is then used to test the findings empirically.  QUAL. → QUANT
Parallel	Gathering and study of data obtained from qualitative and quantitative research co-occur.  QUAL+QUANT
Nested (Embedded)	Either the qualitative or quantitative data can be collected, and critical design with the other paradigm can be fixed within the research, to resolve a complementary research query.  QUAL + QUAN or QUAN + QUAL

National Collaborating Centre for Methods and Tools has suggested that researchers should try to answer the six questions provided below before designing their research study (For *et al.*, 2015):

- i. Is the use of mixed methods most appropriate for answering the research question?
- ii. Are the steps of the research process explained clearly, rationally, and well supported by the research objectives?
- iii. Does the research process systematically and explicitly describe the collection and analysis of results in sync with the aims and objectives of the study?
- iv. Is any method superior to the other, or are they equally central to the research process?
- v. Are both the research methods aligned with each other without limiting or confounding the other method?
- vi. What are the plan and methodology, and who is the resource person for integrating the data?

### **6.2.1 Quantitative Research Criteria**

Quantitative research follows an organized, inflexible, pre-set design with prescribed methods.

#### **6.2.1.1 Validity and Reliability**

Validity is demarcated as the amount to which an idea is precisely determined in quantifiable research. Reliability is the second factor that is used to measure the quality of a quantitative study. The degree to which a research tool consistently reproduces outcomes when utilised in simulated

situations several times is referred to as reproducibility. It is of utmost importance to give significance to both the validity and reliability of a research instrument used in data collection and analysis. Validity is of three types (Heale and Twycross, 2015):

#### **6.2.1.2 Content Validity**

The content validity checks whether the tool sufficiently gives attention to all the information or objectives that it should, concerning the variable or the research question. Face validity is a subcategory of content validity in which the experts evaluate whether the research tool can investigate the research hypothesis in question.

#### **6.2.1.3 Construct Validity**

It is described as the process where inferences can be drawn on test scores associated with the research question under study. Evidence is used to show whether a research tool has construct validity (Heale and Twycross, 2015).

#### **6.2.1.4 Criterion Validity**

This instrument refers to any research instrument which also examines the same research variable. Associations are used to measure the degree to which various tools measure the same research variable (Heale and Twycross, 2015):

#### **6.2.1.5 Reliability**

As previously mentioned, reliability refers to the consistency of a measure. Even though reliability cannot be measured precisely, various measures

can be used to achieve a measure of reliability. The three features of reliability can be enumerated as (Heale and Twycross, 2015).

#### **6.2.1.5.1 Homogeneity or internal consistency**

In this case, reliability is evaluated using a measurement of the reliability of the multi-item scale, split-half consistency, Kuder-Richardson coefficient, and Cronbach's  $\alpha$ . If the association is high, it shows higher reliability, while a poor association reflects weak reliability and unreliable research tools (Duprez et al., 2016).

#### **6.2.1.5.2 Stability**

It is a measure of reliability attained by administering the same test twice over some time to a group of individuals. It is also known as alternate-form reliability testing.

#### **6.2.1.5.3 Equivalence**

It is described as getting consistent responses even after using a research tool many times or using substitute forms. Inter-rater reliability is used for assessments. This test includes a method for the qualitative assessment of the degree to which two or more observers agree (Heale and Twycross, 2015).

#### **6.2.1.6 Representativeness**

A representative sample is representative of the study population and has high external validity. The representativeness of a sample may be affected by various factors; however, the emphasis is on the sample design and coverage. There are various characteristics of the representative data (Ramsey and Hewitt, 2005):



1. The field/research sample should be representative of the target sample.
2. The simulated model in the laboratory should be an archetype of the field (target) sample.
3. Did the research preparation steps ensure the representativeness and integrity of the field sample?
4. The chemical analysis done in the lab on sub-sampled material should get representative results.

### **6.3 Qualitative Research**

#### **6.3.1 Transparency**

Qualitative research designs should incorporate a broad array of different perceptions so that the findings from one group, does not look as if it can be adapted to any situation or population group. Similarly, alternative exploratory data should also be collected to maintain transparency, and the contradictory data should be discussed in light of inferences drawn from the research hypothesis under question. This is referred to as “deviant case analysis”, which helps refine the analysis (Mays and Pope, 2000).

#### **6.3.2 Rigour**

The rigour of qualitative research refers to the reliability and validity of concepts and whether all of these are essential mechanisms of research quality. One of the most significant features of a qualitative study is its reliability and validity. It is essential because, in a qualitative study, the subjectivity of the investigator can mask the explanation of data, and the

research results are often seen with scepticism by the scientific community (Mays and Pope, 2000).

### **6.3.3 Reflexivity**

Reflexivity refers to sensitivity to the methods used by the researchers and the research process involved in the development of data collection tools and data collection, which can affect even the most frankly inductive investigations. The proposed biases should be taken care of at the beginning of the research to safeguard the credibility of the information collected. The study method should also account for the effect of individual factors such as age, sex, social class and professional status on the information collected and on the “distance” amongst the investigator and the research participants (Mays and Pope, 2000).

### **6.3.4 Transferability**

Any research can be relevant only if it addresses the research question and enhances the existing knowledge. The ability to generalise qualitative research findings in a setting other than how the research was done is critical. This can be ensured by developing a detailed research report so that the readers can decide whether the findings can be generalised. Further, use of probability sampling to safeguard the representation of a broader population. For transferability in qualitative research, theoretical sampling will ensure that the initially selected sample ensures the representativeness of all the variable factors affecting the behaviour and that this may then be stretched as per the need (Mays and Pope, 2000).

## 6.4 Justification

Mixed methods research is best suited for finding solutions to research queries that are not subject to exclusive responses by qualitative or quantitative research methods. The data obtained from mixed methods offer a more specific perspective of any causal relationships, correlations, or contradictions between qualitative and quantitative data. Through this, the participants can share their opinions and experiences throughout the research process. This process enriches the evidence base, tackles and identifies solutions to research questions in detail (Shorten and Smith, 2017).

It has been seen that many factors contribute to the combination of qualitative and quantitative methods by researchers. Some of these are (Tariq and Woodman, 2013):

1. Complementarity: The data obtained from one research technique is used to describe the results obtained from another.
2. Development: Results obtained from one research style may also be used to guide the development or use of the other method.
3. Initiation: Mixed methods also allow the researcher to use outcomes from various studies, especially to look for areas that do not fit to create new perceptions.
4. Expansion: In mixed methods, the researcher can study various sides of the same problem where each aspect requires a different research method.
5. Triangulation: The data from both methods can be triangulated to corroborate the findings.

## **6.5 Qualitative and Quantitative tools for analysis**

This study used various design methodologies; it became clear that the method of analysis would differ. Data from focus groups, interviews and observations were classified as a qualitative paradigm, which was then further categorised to undergo a narrative analysis. However, questionnaires that were labelled under the quantitative paradigm underwent further numerical processing and statistical analysis. Nonetheless, qualitative and quantitative perspectives to each method were utilised, such as the exact mixed methods design (Cresswell, 2003).

## **6.6 Statistical analysis**

The SPSS version 27 for Mac was used to aid in the analysis of acquired data. Non-parametric tests were selected as suitable statistical tests. This is because they did not rely on past assumptions when considering the variable spread measured in the same study population. The use of a non-parametric test was also identified to recognise differences between groups on an outcome measure (Munro, 2001).

## **6.7 Focus Group**

Focus groups are described as casual interviews with a small number of people, along with a leader, who would talk and discuss with each other (Bowling, 1997). The idea is that they would “focus” on particular topics; this has become more popular recently to help gather mainly qualitative data (Sim and Snell, 1996). By not questioning on a 1:1 theme, the study’s explorative moment was rapidly and pragmatically done. Here, behaviours

and perspectives were enthusiastically given in comparison to the surveys. This also made it easier to find certain trends and patterns, along with considering topics that were not firstly investigated.

It is a challenge to investigate further how the researcher could have influenced the group dynamics because of being personally involved. Clarke mentioned that the facilitator should not have any underlying interest in the session's results (Clarke, 1999). However, when the researcher acts as the facilitator, he needs to facilitate the session as per the research plan. When describing the facilitator's roles, Nyamathi and Shuler (1990) utilized the terms “mild, unobtrusive control” when it came to the group dynamics. This was the role with which I could identify most (Nyamathi and Shuler, 1990).

## **6.8 The Delphi Method**

“Delphi operates on the principle that several heads are better than one in making subjective conjectures about the future...and that experts will make conjectures based upon rational judgment rather than merely guessing” (Weaver, 1971).

The Delphi Method is a well-established process for consensus building in social sciences, health, medicine, and medical education (Dalkey and Helmer, 1963). It is a well-recognised method for accomplishing the confluence of views pertinent to real-life understanding generated from experts within a particular subject area (Hsu and Sandford, 2007). The Delphi process was blueprinted as a group communication method to conduct a thorough assessment and deliberation of a topic for the

pretension of policy research, forecasting future events or goal setting. Delphi technique endeavours to find the answers for “what could/should be”, while typical surveys aim to investigate “what is” (L. E. Miller, 2006). The Delphi method uses multiple repeated rounds devised to develop a consensus regarding a particular topic. The Delphi method combines a qualitative and quantitative approach exploring the future, a perfect example of mixed-method research.

Linstone and Turoff (1975) introduced the Delphi method to researchers at large, and as a result, their work is widely cited in the literature. They described it as a way of organising communication within a group so that the process is efficient in facilitating a muster of individuals, as a whole, to overcome the challenging issue (Linstone and Murray Turoff, 1975). Surprisingly, the popularisation of the method did not lead to a universal usage of the original idea. Instead, in literature, there are many references mentioned about ‘real-time Delphi’ (Beretta, 1996), ‘modified Delphi’ technique (McKenna, 1994), and the ‘policy Delphi’ (Crisp *et al.*, 1997). Some investigators now affirm to use the method in its ‘original’ form (Green *et al.*, 1999).

Various researchers’ varied approaches indicate no single template available to guide those thinking of a Delphi Study. However, in literature, the Delphi method has been employed in different fields such as resource and program planning, needs assessment and policy determination. Delphi’s use for curriculum design and competency framework development is very well documented in medical education literature (Williams and Webb, 1994; Flynn and Verma, 2008; Penciner *et al.*, 2011).

The Delphi technique is premised on the idea that individuals who are well-versed in the topic would utilise their unique insights, previous experience and be better positioned to predict the future than using theoretical ideas or extrapolate any existing trends. The idea is that a Delphi study comprises several rounds of a questionnaire, including feedback given to the respondents. This feedback is in the format of statistical summaries of answers, allowing them the chance to look at their answers based on what other group members considered while simultaneously ensuring the anonymity of the respondents. Responses received in the surveys are anonymised, while participants are also given a brief description of previously expressed perspectives before they respond to the next poll. By doing this, the procedure of a generalised agreement would further unite the group in identifying the “best” answer.

The median of responses is statistically ordered through the median score. Through the subsequent surveys delivered, the breadth of answers would expectedly decrease, and it is further inferred that the median would shift towards what is considered the “appropriate” response choice.

### **6.8.1 Expert Panel**

For a successful Delphi study, it is vital to recruiting appropriate experts as the study outcome is directly related to the quality of participants. It is crucial to have an explicit inclusion and exclusion criterion to select a homogenous and representative expert panel. The importance of participant selection is aptly described by Goodman, where he states that “If the panellists participating in the study can be shown to be representative of the group or

area of knowledge understudy, then content validity can be assumed” (Goodman, 1987).

There are no strict guidelines for selecting study participants; instead, it is ambiguous (Dalkey, 1972). The best method suggested for selecting potential participants is to look for people in leadership positions in relevant societies or organisations, authors who have published on the subject and are established as thought leaders in the subject area. Moreover, the willingness to participate and modify their earlier decision for reaching an agreement is an essential attribute of study participants.

Similar to the panel members’ criteria, the literature is silent on the ideal number of participants in the Delphi method. Participants in most Delphi studies range from 12-20; however, in some studies, this number has gone up to 50. Having a large sample may lead to a low response rate, ultimately compromising the study’s quality. It is essential to have a reasonable sample size to represent the group (Debecq, A.H. and Gustafson, 1975). Evidence suggests that the reliability of a study increases with the increasing group size, with a group size of 13, the correlation coefficient of 0.9 was reported (Dalkey, N.C.; Rourke, D.L.; Lewis, R.; Snyder, 1972).

### **6.8.2 Development of Questionnaires**

Since the Delphi method is designed to allow several repeated rounds until the consensus is achieved, the development and the administration of the questionnaire is interlinked (Hsu and Sandford, 2007). Generally, three rounds of review are adequate to gather data and to arrive at an agreement. In the classical Delphi method, the first round is triggered by one or two



open-ended questions to gain a more comprehensive understanding of the issue and develop the content. The second questionnaire is developed based on the information obtained during the first round. Similarly, the third round of the survey is based on the outcome of the second round. However, the modified Delphi method starts with a structured questionnaire from the first round itself, based on an in-depth literature review that negates the need for open-ended questions for content generation.

### **6.8.3 Data Analysis and Consensus determination**

For data analysis, both qualitative and quantitative methods are employed. Typically, in a classical Delphi technique, qualitative data is generated during the first round, where responses are generated using open-ended questions, and subsequently, in rounds two and three, quantitative data is generated. However, in a modified Delphi approach, both qualitative and quantitative data can be generated during the first round. It is essential to set the parameters for consensus amongst the Delphi participants at the beginning of the study. Multiple approaches are mentioned in the literature regarding the determination of the agreement (Hsu and Sandford, 2007). One of the processes described in the literature suggests selecting items that are ranked as 4 or 5 on a Likert Scale (1-5) by more than 80% of the study participants (Palter, MacRae and Grantcharov, 2011). In contrast, others' suggested to rank the items based on their mean for that particular round of Delphi and then select only the question which falls in the highest tertile for the final ranks (Nathens *et al.*, 2003).

The statistical approach employed in the Delphi methods is the study of central tendency (mean, median, and mode) and the level of dispersion (standard deviation and interquartile range) for each questionnaire item and an internal consistency amongst the Delphi participants. Cronbach's alpha ( $\alpha$ ) is a commonly used statistical tool to measure the degree of homogeneity or consistency of opinion among study participants. It is valued closer to 1.0 is considered highly reliable and consistent. (Graham, Regehr and Wright, 2003).

## **6.9 Research Studies**

The research design for this study was divided into seven stages; the research methods applied to each stage are described below.

### **6.9.1 Need Analysis**

#### **1: Current trend in NSA training for knowledge, skill and professional identity formation**

A detailed systematic literature review was conducted to understand the present state of medical education for non-surgical aesthetics and other cosmetic procedures in medical schools. This study's outcome is presented in chapter 7 and used to conduct focus group discussion and further global needs assessment survey to understand the current training and education gap.

#### **2: Global Needs Assessment**

This study's objective was to understand the current state and the need for aesthetic physicians' medical education. This was cross-sectional mixed-

method research, and data was collected from trainers and trainees across the globe. The summary of the study has been described in chapter 7.

### **6.9.2 Conceptual Framework Design and development**

A detailed literature review was conducted to identify relevant educational theories. A modified Delphi method was used to build consensus on overarching themes, following which a conceptual framework was developed. The outcome of this study has been discussed in Chapter 8.

### **6.9.3 Curriculum Design and development**

This is the most crucial stage of this research, therefore conducted in multiple stages. The details are as:

#### **1: Curricular Content Development**

This stage was initiated with an extensive literature review followed by a focus group discussion to generate content, which was later used in semi-structured interviews. This technique was utilized as this allows the focussed probing of experts in order to ascertain a comprehensive list of required knowledge and skills for non-surgical aesthetic practitioners (Saunders, Lewis and Thornhill, 2015; Cohen, Manion and Morrison, 2018). Further, after the content analysis modified Delphi technique was used to build a global consensus. The outcome of this study has been discussed in Chapter 9.

#### **2: Core Syllabus for anatomy teaching**

An in-depth literature review was conducted to create a questionnaire for building a global consensus on the “Core Syllabus” for anatomy teaching

using the modified Delphi method. This study was repeated in China to build local consensus amongst Chinese plastic surgeons. The result of these studies is presented in Chapter 9.

### **3: Design and Validation of Objective Structured Practical Examination (OSPE)**

This study describes the steps involved in designing, developing, and validating an OSPE instrument for the non-surgical aesthetics postgraduate program. The result of the study has been described in Chapter 10.

### **4: Design and Validation of an integrated Objective Structured Clinical Examination (OSCE)**

This study elaborates the design, development, and application of a novel i-OSCE for NSA practitioners to identify, stratify and evaluate critical thinking and communication skills within clinical settings required for the profession. The details of the study are discussed in Chapter 10.

## **6.10 Ethics in Research**

It is crucial to follow ethical standards throughout the research. Ethics refers to the questions of right and wrong or good and evil (Cohen, Manion and Morrison, 2018). According to the Merriam Webster Dictionary, ethical (behaviour) is defined as “conforming to the standards of conduct of a given profession or group” (*Merriam-Webster Dictionary*, 2018). Ethical problems are often seen during educational research due to oversight, thoughtfulness, or considering things for granted. Often, the self-interest of completing the research for a course or academic research for professional

advancement may blur the researcher to overlook ethical conduct. Ethical research must demonstrate quality and rigour in the study design, methods, analysis, and reporting of the outcome. Therefore, throughout this study, I adhered to the ethical research behaviour prescribed by the University. The study involved interaction with health care professionals who are global thought leaders. The study does not have any physical or emotional risk for the participants, and no such risk arose during the study. “Faculty Research Ethics Panel approved the study (FREP)”, and the approval number is *FMSFREP 16/17 141*. A copy of the approval is presented as Appendix A.

## **6.11 Conclusion**

In this chapter, the researcher has discussed the mixed-methods research methodology emphasising the Delphi method. The methodologies for each study will be elaborated in greater depth within the individual chapters of this thesis.

The next chapter reviews the current Medical Education practices and the global needs assessment in non-surgical aesthetics training and education.

## **Chapter 7: Current Trend in non-surgical aesthetics training for knowledge, skill, and professional identity formation**

### **7.1 Introduction**

The growing demand for non-surgical aesthetics procedures continuously encourages the entry of health care professionals with divergent backgrounds into the aesthetic practice. Evidence suggests that aestheticians offer many NSA procedures in health and medical spa settings without or with only minimum supervision by a qualified physician (Rossi *et al.*, 2019; Worley, Verma and Macdonald, 2019). A 2002 study by the American Society of Dermatological Surgery (ASDS) reported that over 41% of respondents had seen a patient with a severe adverse reaction as an outcome of procedures done by nonphysicians, which includes various degrees of burns after laser procedure (Friedman *et al.*, 2004).

In several countries, including the UK, aesthetic practices are poorly regulated, and health care professionals may have minimal formal training (Lett, 2007). The present situation of training and education in non-surgical aesthetics procedures has been a matter of concern. Many authors have discussed several barriers to training in non-surgical aesthetics procedures and education, particularly in Canada, Europe and in the USA (Freiberg, 1989; Mahabir *et al.*, 2002; Momeni *et al.*, 2013; Hashem *et al.*, 2017; McNichols *et al.*, 2017; Worley, Verma and Macdonald, 2019). Several deficiencies in training on aesthetic procedures were observed in an online survey conducted among plastic surgery residents. The study revealed that

residents lack confidence in performing facial aesthetic and body contouring procedures without supervision (Momeni *et al.*, 2013). While the relation between the number of hands-on procedural training and patient safety has not been established yet, evidence suggests that simulation-based training with increased hands-on training improves patient safety (Aggarwal *et al.*, 2010). Many short courses in non-surgical aesthetics are often attended by the trainee physicians outside the scope of an existing postgraduate training programme to gain factual knowledge and develop procedural skills. However, such courses lack values and interests that shape critical thinking and holistic decision-making, often referred to as professional identity (Trede, Macklin and Bridges, 2012). It is evident in the literature that participants aim to incorporate their behaviours and thoughts into their new culture and adapt to the ways their workplace practise. Professional identity is, therefore, shaped by the interaction between a person and learning cultures that influence one another (Rees, 2010; Sethi *et al.*, 2018).

This chapter aims to comprehensively analyse current trends in medical education to develop knowledge, skills, and graduate identity formation in non-surgical aesthetics.

## **7.2 Materials and Methods**

All applicable items from the PRISMA guidelines for reporting of systematic reviews were included (Shamseer *et al.*, 2015).

### 7.2.1 Literature Search Strategy

A thorough literature search was undertaken in ten databases in the English language (MEDLINE, Scopus, CINAHL, Google Scholar, Embase, PsycINFO, ProQuest, Cochrane Library and Web of Science), from 2008 to 2019 (inclusive), on the current trends on non-surgical aesthetics education and the challenges faced in the design, development, and implementation of such curriculum to attain graduate professional identity, published in peer-reviewed journals.

The Mendeley reference manager was used to generate the bibliographic record of this review. The terms used for the search were cosmetic plastic surgery training, resident training, education, aesthetic plastic surgery residency training, [MeSH Terms: internship and residency; surgery, plastic; cosmetics]; cosmetic dermatology training, resident training, education, residency training; [MeSH Terms: internship and residency; cosmetics]; maxillofacial education; face; aesthetics; surgical procedures, education, non-surgical facial aesthetic [MeSH Terms: education, maxillofacial; face]; graduate professional identity, specialist identity. The selection criterion was intentionally kept broad at every step of the review process to attain the goal to obtain a more comprehensive view of education and training in aesthetic plastic surgery, facial plastic surgery, maxillofacial surgery, and dermatology education programs across heterogeneous literature. The full articles were retrieved per the inclusion criteria after reviewing the title and abstracts and thoroughly examined.



## **Qualitative Assessment**

The studies included were assessed using the validated Medical Education Research Study Quality Instrument (MERSQI), with a highest and lowest possible score of 18 (high quality), and 5 (low quality) respectively (Cook and Reed, 2015).

### **7.3 Results**

Fifty articles were identified through electronic searches, amongst which forty were selected following a review of the abstracts. Seventeen articles were identified as the best evidence for the detailed and iterative review based on their relevance and fit to the inclusion criteria. The detailed search process is depicted in the PRISMA flow diagram (Figure 7-1).

Upon close observation, it was evident that most of the articles belong to the plastic surgery speciality (n=12), a lesser number from dermatology (n=4) and only one from oral and maxillofacial surgery (n=1). None of the included articles apart from one explored the graduate professional identity formation. The selected articles were group themed according to the cognitive, psychomotor, and affective domains, which cumulatively forms the curriculum to address professional specialist identity (Table 7-1).

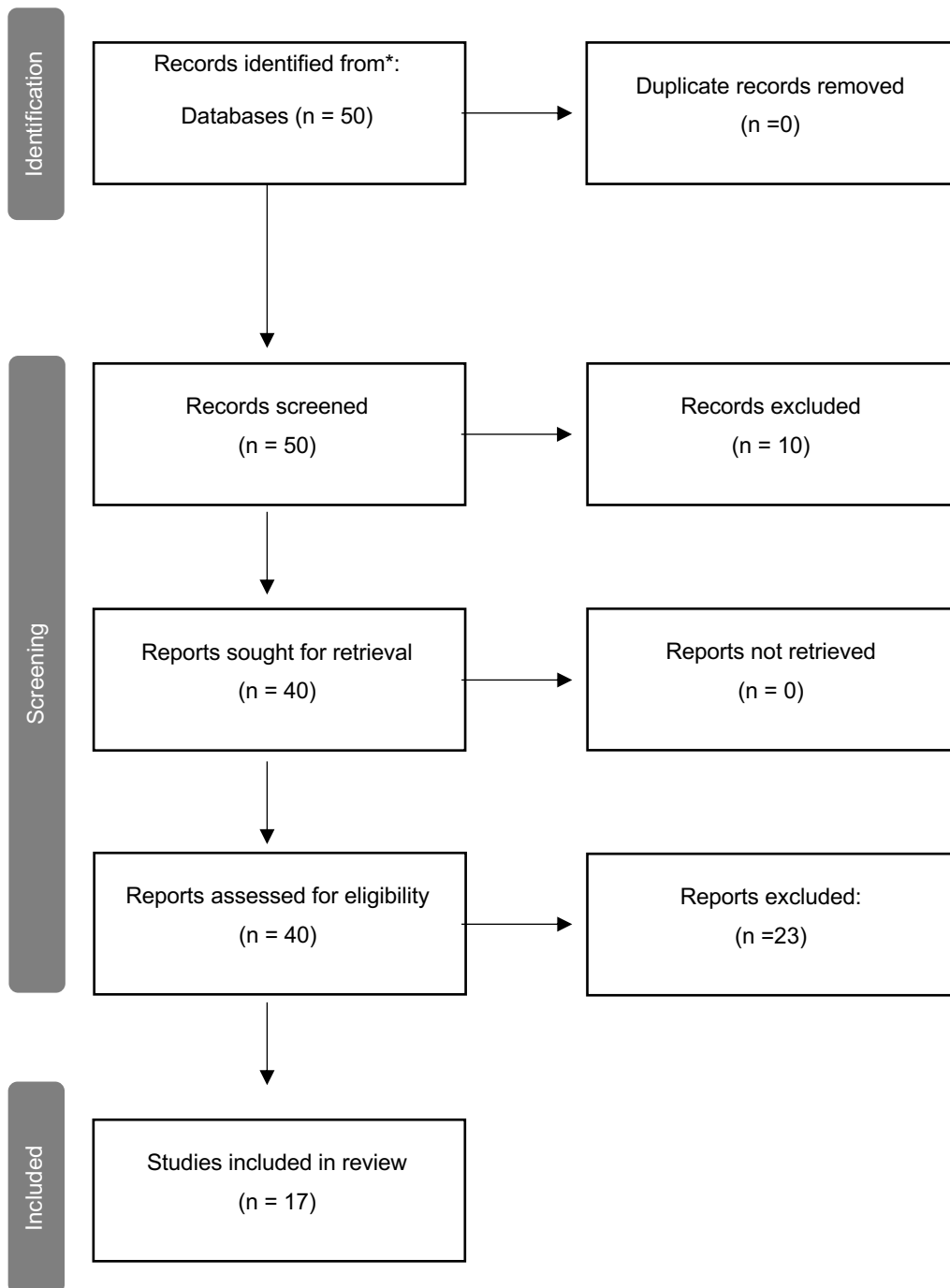


Figure 7-1: Prisma flow diagram for the search strategy

Table 7-1: List of included studies according to the themes

Sl. No.	Author(s)	Year	Speciality	Findings	Qualitative Assessment (Low / Medium/ High)
<b>Theme 1: Cognitive Development</b>					
1	Weissler JM, Carney MJ, Yan C, Percec I	2017	Plastic Surgery	A retrospective study was steered to provide an insider view of the didactic advantages of cosmetic clinics run by residents. The results showed a need for broad training and groundwork for upcoming plastic surgeons, given the continuous evolution of aesthetic surgery.	Medium
2	Qureshi AA, Parikh RP, Sharma K, Myckatyn TM, Tenenbaum MM	2017	Plastic Surgery	The results of a prospective study showed significant improvements in all FACE-Q domains.	Low

3	Group A, Philips R, Kelly E	2012	Dermatology	The findings of a survey conducted among 473 third-year dermatology students (via email) showed that residents are being trained in aesthetic procedures by using a variety of methods. The authors recommend that residency programs should routinely audit the programs to ensure the relevance of training.	Medium
4	Lee EH, Nehal KS, Dusza SW, Hale EK, Levine VJ	2011	Dermatology	A survey conducted among third-year dermatology residents showed that dermatology residents received general training in aesthetic procedures. The results also offer insights into dermatology residency programs and are essential for evaluating, altering, and reinforcing the current educational modules on aesthetic procedures.	Low
5	Reichel JL, Peirson RP, Berg D	2004	Dermatology	Survey was conducted among dermatology residents, and the results showed that most of the training in dermatology is focused on teaching surgical abilities by traditional training methods. In this survey, complicated surgical procedures and the use of lasers were given lesser importance.	Low
6	Khare N, Puri V	2014	Plastic Surgery	Survey was conducted among professionals involved in the training of plastic surgery residents, and its findings indicated that both learners and teachers understand the current training	Medium

				program differently. The authors recommended that continual discussions regarding training programs should take place in national and regional settings.	
7	Momeni A, Goerke SM, Bannasch H, Arkudas A, Stark GB	2013	Plastic Surgery	Survey was conducted among 112 residents to see how the challenge of giving adequate training is taken care of in aesthetic surgery. The results showed that there are certain deficiencies in the methods of teaching plastic surgery among senior plastic surgery residents in Germany.	High
8	Chivers QJ, Ahmad J, Lista F, et al	2013	Plastic Surgery	Survey among graduating Canadian plastic surgery residents were conducted, and its results emphasised the need for residents to get acquainted with both non-surgical and surgical aesthetic procedures.	Medium
9	Oni G, Ahmad J, Zins JE, Kenkel JM	2011	Plastic Surgery	Another survey conducted among 44 program directors and 117 senior residents indicated improved training in aesthetic surgery for plastic surgery residents in the United States, especially the increased training in non-invasive cosmetic treatments.	Low
10	Morrison CM, Rotemberg SC, Moreira-	2008	Plastic Surgery	Survey was conducted among senior plastic surgery residents and program directors. There were significant differences in the views between program directors and senior residents.	Medium

	Gonzalez A, Zins JE			According to senior residents, a lack in facial aesthetic, minimally invasive and emerging body contouring procedural skills was experienced.	
<b>Theme 2: Psychomotor Development</b>					
11	Kraft CT, Harake MS, Janis JE	2019	Plastic Surgery	The results of a survey conducted between 2014 and 2017 among graduating senior residents revealed that the ACGME case log requirement has an encouraging influence on the ease of the residents with cosmetic procedures and their skill to use in their clinical practice.	Medium
12	Ingargiola MJ, Burbano MF, Yao A, Motakef S, Sanati-Nehrzy P, Burish NM, David LR, Taub PJ	2018	Plastic Surgery	In a survey of current practices, the authors found that clinics of aesthetic residents differ significantly in structure. Despite differences, these clinics can improve the skills of plastic surgeons through their training modules and resident autonomy.	Medium
13	Champlain A, Reserva J, Webb K, et al.	2018	Plastic Surgery	A survey was conducted among residents to evaluate the exposure of the resident dermatologist to cosmetic and aesthetic procedures. The results showed that most residents received	Medium

				didactic teaching and hands-on experience on aesthetic surgery during residency.	
14	McNichols CHL, Diaconu S, Alfadil S, Woodall J, Grant M, Lifchez S, Nam A, Rasko Y	2017	Plastic Surgery	Researchers surveyed 83 residents and 11 program directors. The survey results depicted an increase in the cosmetic surgery rotations under-taken by residents, with only a few residents believing in need of a fellowship to practice aesthetic surgery. The low level of comfort in performing facial cosmetic and body contouring procedures was also seen among the residents who were practising independently.	Medium
15	Hashem AM, Waltzman JT, D'Souza GF, Cakmakoglu C, Tadisina KK, Kenkel JM, Zins JE.	2017	Plastic Surgery	A survey was conducted among 424 residents enrolled in the American Society of Aesthetic Plastic Surgery residents' programs and 95 program directors. The results showed that the participating residents were most comfortable with aesthetic procedures such as breast reduction and augmentation-mammoplasty and abdominoplasty, while procedures such as facelift and rhinoplasty were considered challenging.	Medium

16	Brandon Worley, Luvneet Verma, and Jillian Macdonald	2019	Dermatology	Survey was carried out in the Canadian dermatological surgery residency programme. Forty-seven residents and thirty-six faculty members responded to the survey. A high dissatisfaction was observed among the residents, particularly on their hands-on training on the aesthetic procedures, and the faculty was well supportive of providing more aesthetic dermatology education and resident-led clinic.	High
<b>Theme 3: Professional Specialist Identity</b>					
17	Tahim, Arpan	2015	Oral and maxillofacial Surgery (OFMS)	The study attempts to understand the trainee's perception of gradual medical identity in the OMFS. The study is the first to explore that the trainee needs a sense of belongingness in their speciality.	High



## 7.4 Discussion

### 7.4.1 Cognitive and Psychomotor Development for specialist identity

The aesthetic practice is based on sound theoretical knowledge and practical skills. It has been suggested that the acquisition of the skills develops through the process of cognition, association and automation based on the Posner model of human performance (Fitts and Posner, 1979; Hamdorf and Hall, 2000). It is evident that the excess cognitive load may affect learning and performance negatively (Sweller, 1988); hence there should be a balance in the learning process to translate theory and skills into practice (Shaker, 2018).

Results from the three recent surveys show that many residents expressed a lack of self-reliance in carrying out aesthetic surgical and non-surgical procedures and required additional training before offering these procedures in their future practice (Chivers *et al.*, 2013; Hashem *et al.*, 2017; Worley, Verma and Macdonald, 2019) (Figure 7-2).

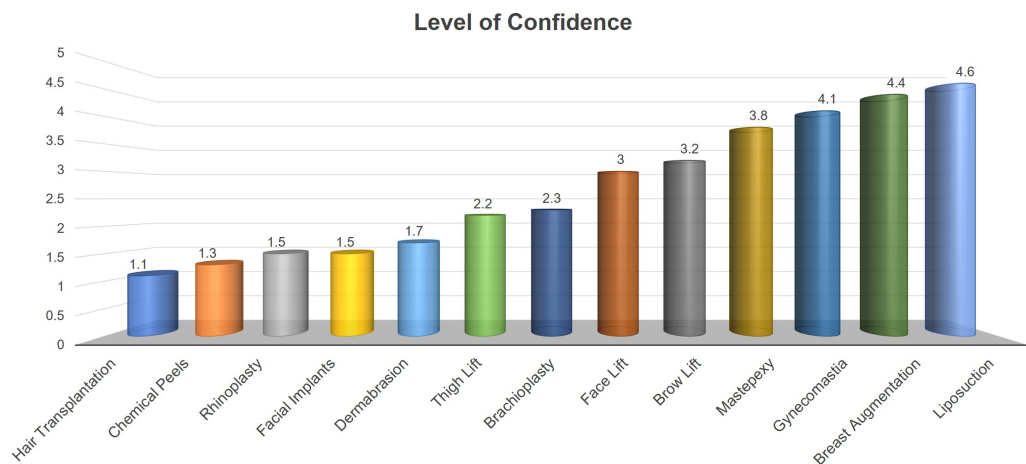


Figure 7-2: Residents' self-reported perceived level of confidence;

adapted from Chivers *et al.*

A very similar situation existed in the North American plastic surgery educational programmes before 2006. While aesthetic surgery is an essential part of the training objective of the “Royal College of Physicians and Surgeons of Canada (RCPSC)” for the Specialist Qualification, little effort is being made to increase the training period or content standardisation of the teaching contents across Canadian plastic surgery residency programmes (Chivers et al., 2013). The data collected from the program directors and senior residents in plastic surgery depicted certain areas of concern in terms of insufficient training such as skin resurfacing, soft tissue fillers and botulinum toxin type A, rhinoplasty, facelifts, and body contouring techniques. The residents felt under-confident in performing these procedures and suggested the need for more exposure and training (Morrison *et al.*, 2008).

The findings of a study conducted in India between September 2011 and June 2012 showed that there was inadequate training experience in microvascular surgery, craniofacial surgery, and cosmetic surgery. Respondents were also of the view that scientific research and publications should be made compulsory for the successful completion of training in plastic surgery (Khare and Puri, 2014). In another survey conducted in the United States amongst plastic surgery residents, 81% (n=75) of the participants expressed their willingness to dedicate a substantial portion of their practice to aesthetic surgery. Despite this interest, 32% of participants said they had received minimal training in aesthetic surgery (Roostaeian, Rough and Edwards, 2014).

“Accreditation Council for Graduate Medical Education (ACGME)” increased the minimum required a number of cosmetic procedure cases for plastic surgery residents from 50 to 150 in the year 2014 for board certification. The impact of this initiative was assessed through a survey in 2017; results showed a surge in the number of programs with resident-run cosmetic clinics by 14% and nominated aesthetic rotations by 33% during 2014 and 2017 (Kraft, Harake and Janis, 2019). A substantial increase in the confidence levels of residents in making cosmetic surgery a part of their clinical practice upon graduation was also observed (36% to 59% in 2017). Hence, the more hands-on practice seems to influence the residents’ confidence with performing cosmetic procedures positively. Similar results were seen in another survey conducted among 1266 dermatology residents who declared (89% of participants) hands-on training to be the most effective for developing efficiency in aesthetic procedures (Champlain *et al.*, 2018). In a study where case logs from American Academy of Cosmetic Surgery (AACS) accredited fellowships were compared with the need to fulfil a certain number of cases for various residencies and fellowships; it was found that no minimums were listed for plastic surgery while the minimum fellowship requirement for the AACS was 300 cases (Handler *et al.*, 2015). Despite an increase in the minimal threshold number for aesthetic dermatology cases for their logbook, a low confidence level regarding facial cosmetic procedures was prominently seen among residents (McNichols *et al.*, 2017). A survey conducted in Germany also emphasised the lags in cosmetic procedure training among plastic surgery residents. Structural modifications in the residency training and inclusion of

appropriate experience and training in the cosmetic procedure were warranted (Momeni *et al.*, 2013).

As a result of this, both surgical and non-surgical aesthetics procedures have been included in the training and the residents' clinic. Although not much evidence is yet available on the standardisation of residents' clinics, study results have shown that these clinics are perceived as one of the valuable training methods for the development of cosmetic surgical and non-surgical skills and self-confidence among residents (Ingargiola *et al.*, 2018). A retrospective review to determine all clinic-based cosmetic procedures performed between 2009 and 2016 highlighted the need for complete training and planning for the residents. The chance to practice in a clinic as a part of the educational curriculum was considered to be a valuable asset for increasing the preparedness and confidence levels of the residents for independent practice (Weissler *et al.*, 2017). Based on the results of their report, the authors proposed the establishment of aesthetic clinics in medical schools that would allow residents to conduct both non-surgical and surgical aesthetics procedures independently under the direct supervision of a faculty member. Lately, much emphasis has been put on training and education in aesthetic procedures for residents to enhance their confidence in independent decision making. However, despite all the efforts, resident clinics are far from global inclusion in all the programs due to various challenges such as lack of budget, low patient volume and liability issues.

Moreover, they also suggested partnering with non-academic plastic surgeons, known for their expertise in aesthetic procedures, as visiting

clinical tutors to facilitate further learning of residents (Oni *et al.*, 2011). The review has also identified fellowship as a solution to overcome the problems of limited training in plastic, reconstructive and aesthetic surgery (Papas, Montemurro and Heden, 2018). Patient-reported outcomes and safety of non-surgical facial rejuvenation techniques performed by trainee physicians in aesthetic clinics were also found to improve the patient's quality of life and satisfaction without compromising safety (Qureshi *et al.*, 2017). It has also been suggested that the aesthetic procedure training needs to be kept up to date with time. The current modules, which predominantly teach reconstructive procedures, should also incorporate aesthetic content (Sharma, 2014).

It is evident that the demand for procedures such as soft tissue fillers and botulinum toxin are increasing exponentially. Patients are visiting dermatology clinics routinely in their quest for achieving their individual aesthetic goals; this warrants adequate training for dermatology residents on aesthetic procedures. "Accreditation Council for Graduate Medical Education for dermatology" (ACGME) has suggested that residents should be given significant experience in aesthetic surgery during their training. However, the word "significant" is quite ambiguous and permits individual course directors to decide what exactly is significant training (Reichel, Peirson and Berg, 2004). As a result of this ambiguity, variability has been observed in training for non-surgical procedures in dermatology residency programs. As is evident, there was variability amongst the residency programs in dedicating time for aesthetic training. A majority of the

respondents (91%) said their program offered ten or fewer hours of lectures on cosmetic procedures (Kirby, Adgerson and Anderson, 2013).

In order to determine training practises, a retrospective survey was carried out among dermatology residents in France between 2005 and 2010. The results emphasised the need for further knowledge, including surgery, laser, and cosmetic dermatology, to gain technical expertise (Plee *et al.*, 2013). A survey conducted among third-year dermatology residents at the ACGME-approved dermatology residency program showed that residents believed that it was enough to have only an understanding of rare or infrequent procedures in dermatology, such as tumescent liposuction, hair transplantation, and ambulatory phlebectomy. In this survey, 55% of residents were delighted with the dermatology training they received (Lee *et al.*, 2011).

A survey with US dermatology residents and program directors highlighted the barriers to attain aesthetic dermatology competency during residency training. The attitude of program directors, the cost of products and procedures, and patient's preferences were the key hurdles for providing sufficient hands-on training to residents. Other reasons were the physician's reluctance to tackle purely cosmetic concerns in an academic clinical setting and a lack of aesthetic dermatology training amongst core faculty members. Despite this, most program directors stated that the residents wanted a more hands-on practice in aesthetic dermatology (Alam, Olson and Asgari, 2012; Bauer, Williams and Stratman, 2014). A similar study in 2011 reported that the residents performed less than ten hands-on procedures with soft-tissue fillers and ten with botulinum toxin during their

three years of residency (Lee *et al.*, 2011). Another study conducted among dermatology residents showed that they were being trained in aesthetic dermatology through a variety of ways. However, there is a need for periodic assessment and adaptation of the medical curriculum to provide adequate training to residents (Philips and Kelly, 2012).

As a result of ever-evolving products and techniques, it is difficult to decide whether residents are sufficiently exposed to the requisite proficiency during their residency training to perform independent aesthetic practises in the future (Bauer, Williams and Stratman, 2014). Moreover, occasional teaching by the guest faculties, availability of various aesthetic dermatology courses, attending conferences would further boost training after residency (Waldman, Sobanko and Alam, 2016).

#### **7.4.2 Affective and Metacognitive Development**

Developing a graduate professional identity is the most important and emerging research domain in medical education (Holden *et al.*, 2012; Cruess, Cruess and Steinert, 2016). Unfortunately, graduate medical schools concentrate so much on education and skills development that metacognitive development left unaddressed and assumed to be covered in the hidden curriculum. A study among the maxillo-facial trainees showed that they lack a sense of belonging in the speciality as they have a dual qualification of a medicine and dentistry degree (Tahim, 2015). A similar problem can easily be equated to non-surgical aesthetics being practised across many medical and surgical specialities. With a deficient structured training program in non-surgical aesthetics and amalgamated among many

specialities, there is no graduate identity formation to motivate trainees and provides a context for their future development. The new definition of Professional Identity Formation (PIF) shifts the focus of viewing professionalism as a continuous developmental process /pathway/ built not only by an individual's beliefs and values but also that of the surrounding environment, including the officially presented 'visible', and unofficially 'concealed' medical education curricula, the healthcare delivery system and a broader social influence (Hafferty and Levinson, 2008). The PIF approach was deduced by years of research in moral psychology to assess the relationship between behaving and knowing (Rest, 1994). The approach helps to understand virtue-based professionalism and affirms the notion that, though people know the right direction to take, they often fall short to act on their judgement (Bebeau, Rest and Narvaez, 1999). By embracing a robust set of core principles and beliefs about professional responsibilities, the PIF can be used to guide professional behaviour even in a high-intensity work setting as well as in a challenging work environment.

## **7.5 Conclusion**

Undoubtedly, the acquisition of skills with the attainment of professional identity facilitates the development of graduate attributes and readiness for clinical practice. Therefore, careful attention should be given to integrating such triggers while developing an evidence-based postgraduate curriculum for clinical competency and graduate professional identity in non-surgical aesthetics.



## **7.6 Global needs-assessment for non-surgical aesthetics postgraduate program (Kumar and Rahman, 2021) (Appendix C)**

The desire to look young and improve one's corporeal features drives people to aesthetic clinics and fuels the demand for non-surgical aesthetic procedures exponentially. This growth has created an opportunity for the clinicians with divergent training background to set up aesthetic practises and offers their services to patrons. However, despite astronomical demand, the clinical education system lacks evidence-based standardised training and education in this field.

It is noteworthy to mention that generally, aesthetic procedures are carried outside the teaching hospitals, therefore makes it difficult to provide hands-on training to residents. Thus, this situation leads residents towards not being confident in performing aesthetic procedures independently. Several authors have voiced their dissatisfaction about the residents training on both surgical and non-surgical aesthetics procedures and recommended many areas for improvements. Similar concerns are expressed in dermatology residency training too, and authors have affirmed a need for appropriate training and education on NSA. In several survey studies, both plastic surgery and dermatology residents have asserted the need for more hands-on training to gain confidence. It is evident from the fact that those pursuing independent practice must invest in additional resources in acquiring adequate skills.

Therefore, thorough research is required to assess the present situation of NSA education and training; its shortcomings must be highlighted so that it can be rectified as soon as possible. This research study explores the current state of medical education and training of physicians on various cosmetic procedures in a formal postgraduate curriculum. Further, it aims at making an informed recommendation and evidence-based decision to refine the existing system.

This mix-method, the cross-sectional study, uses quantitative and qualitative data to analyse the perspective of the faculty and students concerning the subject in question. As the method facilitates the perspectives from both approaches, it provides a broad view of the phenomenon. A focus group discussion was set up with two aesthetic physicians, two plastic surgeons, two dermatologists, and an educationalist. All of them had rich experience in NSA, teaching and research. With the help of the focus group experts, two online surveys consisting of binary questions (Yes/No) were designed for the study. The respondents were provided with a comment box where they could express their thoughts and opinions. The study participants were clinicians, routinely delivering training on NSA at various conferences, societies and courses organised by various pharmaceutical and device companies (trainers) and the delegates who have attended such training programs (trainees). The data was collected anonymously, employing a nonprobability sampling method. The online survey link with [www.surveymonkey.net](http://www.surveymonkey.net) was emailed to participants between July 2018 and December 2018.

The participant trainers and trainees were categorised by their baseline data, including age, gender, speciality, years of practical experience, etc. (Table- 7-2)

Table 7-2: Demographic details of the participants

Demographics		Trainers (n=179)	Trainees (n=496)
Mean Age		45.9 years	39.9 years
Gender	Male	40.20%	41%
	Female	56.40%	57%
	Don't want to disclose	3.40%	2%
Speciality	Dermatologists	33.50%	36%
	Plastic Surgeon	24.70%	19%
	Aesthetic Physicians	42.45%	45%
Experience	<5	0%	23.3%
	<10	21.2%	45.1%
	>10	54.7%	27.8%
	>20	24.0%	4.2%

The researchers calculated these percentages using the Microsoft Excel Microsoft Office 365 version (Microsoft Corp, Redmond, WA). Also, I undertook reliability analysis and expressed it as Cronbach's alpha utilising IBM SPSS statistics for Mac, version 26 (IBM Corporation, Armonk, NY). It is reportedly the most extensively used statistical tool for measuring the internal consistency of multiple questionnaires. The Cronbach's alpha for the

trainers' group was  $\alpha=0.79$  and for trainees  $\alpha=0.81$ . The respondents showed no notable difference between specialities.

As per the results, <92% of the trainers and trainees reported a lack of adequate training and education in their country. Moreover, they stated that none of the medical or postgraduate medical faculty in their respective geographical region offered any standalone educational program for NSA. Also, 92% of the overall respondents reported that the present graduate and postgraduate programs were not enough to train clinicians for potential NSA practice. More than 69% of the trainers and the trainees said that the conferences and courses sponsored by the pharmaceutical companies do not provide enough education for the most satisfactory patient outcome and overall development as an aesthetic clinician. 95% of the trainees and 93.8% of the trainers acknowledged an absolute need for a standard and uniform NSA training program at both graduate and postgraduate levels. They have urged that the formal medical education and training curriculum must be revised, including specialised programs targeting cosmetic procedures' teaching. Around 60% of the overall respondents suggested a 12-month duration for the program. More than 69% indicated that the modules of the NSA curriculum should be instructive, orientated to clinical skills, and focused on research. The modules were said to include work-based learning like that in conventional postgraduate training. Also, 76% of trainee physicians expressed a desire for further training in various topics, such as physician-patient communication skills, facial assessment, treatment planning, and medical emergencies related to NSA. Finally, most trainers

and trainees were completely willing for a formal academic qualification in medical education.

This study is the first of its kind to evaluate the situation of education and training in NSA procedures. As most of the respondents' findings have already demonstrated, there is a critical need for formalised instruction in non-surgical facial aesthetic procedures. The outcomes of this survey analysis showed that the clinicians feel inadequate in performing NSA procedures because they have not been trained so during their residencies. They are primarily learning from variable courses offered at different scientific conferences and meetings. Thus, there is an exclusive need for standardised, evidence-based teaching modalities in NSA.

The study recommends designing a postgraduate NSA curriculum that can provide the clinicians with adequate clinical knowledge and procedural skills relating to non-surgical aesthetics interventions. The program should also aim to develop the physicians' academic and research skills so that they can adopt the best trending practices. Also, special care must be taken in designing the content of the curriculum as it must indicate enquiry-based learning and research for contextualisation.

The study suggests a considerable gap between the current demand and the level of educational training concerning NSA practices. The study recommends bridging the gap by encouraging formal education on the topic to provide high-quality patient care by the clinicians pursuing the field independently.

# Chapter 8: Conceptual Framework for the Curriculum

## 8.1 Introduction

Evidence-based medicine (EBM) is the conscientious, precise, and prudent application of sound science in decision-making for a patient's benefit. The practice of EBM implies combining one's clinical knowledge with concrete scientific evidence from controlled clinical trials and systematic research. Physicians are sensitive to the high standards of medical evidence, which are fundamental to guiding them in developing their speciality. It is most often accomplished by continually monitoring research in peer-reviewed literature, reviewing case series on the latest developments, or attending speciality conferences. Evidence in medicine promotes the growth of an individual's clinical practice, whereby current habits are replaced with new ones if appropriate.

On the contrary, physicians do not uphold the same evidence-based standards for medical teaching and learning. Good science such as peer review, rigour in quality control, and continuous professional development, all of which are evident in clinical practice, scarcely practised in medical education. The typically employed training methods are dominated by intuition and tradition, reflecting how physicians themselves have been taught for decades. Most physicians never read the literature on medical education, nor they are aware that such literature exists (Van Der Vleuten, Dolmans and Scherpbier, 2000).

With the advent of non-surgical aesthetics (NSA) procedures for enhancing ones' physical features, pharmaceutical and device companies have proactively entered the non-surgical aesthetics education. These programs are mostly "show and tell" and driven by the trainers' perspectives 'this is how I do', without employing any teaching and learning principles (Kumar, Rahman and Addis, 2018). Such training programs are based on the conviction that trainees will learn NSA procedures by observing experts. Moreover, most program directors assume that the physicians they enlist as faculty for their programs, who are recognised experts in their field, are equally qualified as teachers because of medical degrees, specialist certifications and demonstrated scientific ability. The assumption is that the better they are as clinicians, the better they are as teachers. However, teaching skills are rarely nurtured in medical schools, even though clinicians are supposed to teach and guide colleagues and trainee physicians.

The issue is not whether the current practice in non-surgical aesthetics education is substandard, but can it be improved. Teaching and learning in non-surgical aesthetics education are too important to be left to chance. A systematic literature review followed by a cross-sectional global needs analysis discussed in chapter seven has established the need for an authentic evidence-based curriculum in non-surgical aesthetic education. Literature suggests that the foundation of an evidence-based curriculum should be on sound educational principles, encompassing how to inspire learners to reflect and actively participate in the learning process. It should be ensured that the curriculum is robust enough yet flexible to meet individual learners' varied needs (Harden, 2016). Non-surgical aesthetics

education can be designed based on educational theories with an ultimate objective to optimise skill development, knowledge mastery and behavioural changes. There is an urgent need to delve, deduce and assimilate the pertinent educational theories into day-to-day teaching and learning to improve the quality of education, leading to optimal patient care.

The present chapter will discuss relevant educational theories important for non-surgical aesthetics (NSA) education and construct the consensus-based Conceptual Framework for the authentic evidence-based curriculum.

## **8.2 Educational Theories**

From curricular content to assessment, from evaluation and practice to performance and action, every aspect of education design is deeply rooted in educational theories and philosophy (Aliakbari *et al.*, 2015). Implementation of educational theories provides a robust foundation for promoting evidence and is critical to driving efficiency in clinical education. It is essential to apply theory to the real world of practice and ensure that trainee physicians are prepared for it (Wilson, 2008; Scully, 2011). Educational philosophers and psychologists have hypothesised several theories to elucidate how learners attain, structure, and employ knowledge and skills. Moreover, individuals may employ various ways to acquire knowledge and skills; therefore, understanding one specific educational theory may not be adequate for educators. It is essential to develop an in-depth understanding of all the relevant educational theories to create an environment that can proliferate the learning in non-surgical aesthetics



education. Let us look at the core educational theories that will act as the foundation for the Conceptual Framework.

### **8.2.1 Community Constructive Theory**

Constructivism is a social theory of education derived from psychology; it describes the way individuals might develop skills and understanding. It has been established that thinking and learning are social activities and very much affected by the environment where learning occurs. The principle of constructivism is anchored on the power of observation and suggests that individuals master their understanding and skills through assimilating information and reflecting on their experiences (Bereiter, 1994; Bada and Olusegun, 2015). Educational psychologist Vygotsky believes that the learner develops new knowledge and understanding based on their existing knowledge (Vygotsky, 1978, 1997; Taylor and Hamdy, 2013). It is believed that the theory of constructivism promotes critical thinking, conceptual growth, teamwork, and enquiry (Driscoll, 2000), which is the desired skill set to be successful as an NSA practitioner.

It is vital to highlight the importance of context and community for social constructivism (Choi and Hannafin, 1995) and essential to have a “Community of Practice” (CoP) for continuously motivating and mentoring the learner (Lave and Wenger, 1991; Wenger, 1998). The theory of constructivism is very relevant for the postgraduate non-surgical aesthetics education and continuing professional development (CPD), where learners enrol with prior knowledge and skillsets. It is noteworthy that these learners will have their challenges, likings as well as experiences. One needs to

remember that learning is built on the principle that cognition is the outcome of “mental construction” and greatly influenced by both context in which a concept is introduced and attitude as well as values of learners. Therefore, it is the responsibility of educationalists to provide such an environment for learners where learning can accelerate.

Social theories of learning involve individuals being in a social setting and continuously communicating with each other. A key concept in social constructivism is the “Zone of Proximal Development” (ZPD), wherein the learner can only attain new knowledge if related to prior knowledge. ZPD can be extended by active communication between the teacher-learner to contextualise new information. In case of any difficulty during problem-solving, the learner can take assistance from peers who may be knowledgeable. Bruner expanded the idea of peer-assisted learning and coined the concept of “scaffolding” or interim learning support by an expert instructor (Bruner, 1966).

### **8.2.2 Situated Learning Theory**

The classical paradigm of clinical and procedural skills mastery wherein trainees learn by shadowing the teachers is now replaced by a more modern internship approach based on “Community of Practice” (Wenger, 1998). Situated learning theory motivates learners to immerse in a contextual learning condition mirroring the actual clinical scenario where newly acquired knowledge and skill will be applied. When considered as situated learning, the principal defining element of learning is the process of “legitimate peripheral participation” (Lave and Wenger, 1991). Learners’

participation in the community of practice is vital as the mastery of the skills does not sit with the master instead with the community of which the master is a part. Situated learning theory and CoP sit with the idea of social constructivism and helps during the skill development in NSA practitioners.

### **8.2.3 Adult Learning Theory (Andragogy and Heutagogy)**

Adult learners want to co-create their learning journey and focus on the immediate gain in their personal and professional life from educational activities (Knowles, 1980, 1984, 1990). Further, adults are interested in finding a solution to the real-world problem they face either at their workplace or in personal life rather than educational content. Some of the main concepts indicate that students have inspiration for knowledge because of awareness of their own desires. Motivation plays a crucial role in an adult's learning journey and can be explained by content and process theory. The content theory focuses on what motivates an adult learner, and the process theory looks at how an individual gets motivated (Morrison, 1998). Maslow's Hierarchy of Needs is the widely discussed content theory (Maslow, 1970); it discusses the fundamental needs of food, physical safety and security, graduating to self-actualisation. However, sometimes Maslow's model appears to be too strict as an individual may be concurrently satisfied and dissatisfied during his learning journey.

Heutagogy or the theory of autonomous learning is a self-determined learning concept that originated from andragogy and entirely concentrated on developing the learners' competence. The learner acts as "the main agent in their learning, which occurs due to personal experience" (Hase and

Kenyon, 2007). The idea of self-determination incorporates several specific concepts or practices considered to resolve current educational challenges and constraints and offer improvement, mainly in an evolving work climate.

The first precept of heutagogy is laid on human agency's novelty, where authority lies in the learners' hands (Ashton and Newman, 2006). Heutagogy recognises the learner's central role and allows extreme flexibility to decide what, when, and how learning will occur (Stoszkowski and Collins, 2017). The second precept of heutagogy is self-efficacy and capability (Stephenson, 1992). With every successful learning experience, learners gain a sense of achievement through inquiry and research, activating inner motivation to develop competence. Over time, the capacity is developed, allowing learners to apply the newly acquired skill in unusual and unknown environments with all achievements and skills acquired. Reflection and metacognition are the third precepts, allowing learners to experience "double-loop learning", reflect upon what they have learned (new knowledge) and the learning process and how this affects their values and beliefs system. This process helps develop metacognitive competence as learners learn to critically evaluate their knowledge and skills through the reflection process and ultimately to transformative learning experiences (Mezirow and Associates, 1990). The fourth and final precept is non-linear learning, which helps create a framework for an open learning environment delineated by the learner.

Moreover, the application of adult learning theory (andragogy and heutagogy) in NSA education demands a change in learners' and educators' attitudes to improve efficiency. Both must actively participate

in the learning process where educator needs to consider themselves as both learner and teacher whereas learners need to become active in the process for knowledge construction by changing their own beliefs and views. It is vital to have mutual respect between the teacher-learner and the learners to reap the full benefit and behavioural change from an active learning environment.

#### **8.2.4 Learning Styles**

Non-surgical aesthetics education's challenge is developing evidence-based clinical expertise and decision-making skills in trainee physicians relatively quickly. Moreover, reduced work hours and increasing responsibility of "documentation and noneducational work" further drifts trainees from gaining enriched clinical experience (Goitein and Ludmerer, 2013). Thus, clinical educators must formulate a strategy to gain insight into trainees' learning styles and adapt their teaching to enhance learning experience effectiveness. Evidence from medical education literature suggests the wide use of Kolb's Experiential Learning Theory across several specialities such as anesthesiology, surgery, paediatrics, plastic surgery and internal medicine (Contessa, Ciardiello and Perlman, 2005; Saldanha et al., 2019) and may be of great advantage to NSA educators.

#### **8.2.5 Experiential Learning**

Experiential learning can be described in very basic terms as 'learning through experience'. Aristotle elaborated his view on learning in *The Nicomachean Ethics* as "for the things we have to learn before we can do them, we learn by doing them" (Aristotle, 2009). The concept of experiential

learning within clinical education for developing clinical skills in trainee physicians is well recognised. In his book *Experience and Education*, John Dewey argued for a “progressive approach” to teaching and emphasised the relevance of experience for effective learning (Dewey, 1997).

Clinical clerkship is an essential and challenging aspect of postgraduate clinical education for learners and clinical educators. Evidence suggests that understanding and learning styles matching as per Kolb’s experiential learning model during the clinical rotations can enhance learning effectiveness in trainee physicians. Further, Kolb has emphasised the power of reflection as a way for learners to create, abstract, and transfer their new knowledge to a newer context (Yardley, Teunissen and Dornan, 2012). NSA education can immensely benefit by employing experiential learning while facilitating the learning during simulations and hands-on sessions.

### **8.2.6 Activity Theory**

Activity Theory (AT) was first discovered in the Soviet Union by Vygotsky, Leontiev, and other colleagues from the cultural, historical psychological studies and Rubenstein et al., on related neurological views. The idea is quite complex, incorporating multiple fields and having a significant impact on education. The work of Yrjö Engeström is particularly relevant to AT's Scandinavian school of thinking, which is the one that has been referenced most in the literature. Engeström took Vygotsky's older notion of mediation and reinterpreted it to embrace learning with others through using and interacting with artefacts (Scandinavian Activity Theory). Engeström's approach focused on explaining human thought processes

by considering how they relate to human behaviours in different contexts and considering the extent to which human activity impacts the environments in which these activities occur (Engestrom, Miettinen and Punamaki, 1999).

When performing an AT task, individuals utilize exterior (e.g., hammer, computer, vehicle) and internal (e.g., planning, cognitive mapping) instruments to accomplish their objectives. In the social realm, many objects have cultural and social importance. Activities should be relevant and iterative to keep students engaged and motivated so that the community of learners may collaborate and collectively increase their knowledge. Equally, educators should know that technology has the ability to both restrict and support social connections; thus, it should be employed judiciously and specifically to help students achieve their maximum potential (Engeström, 2019).

### **8.2.7 Critical Thinking**

Critical thinking is the most sought-after skill across an individual's learning journey and rated as a critical skill for workplace survival in the 21st century. The importance of critical thinking can be seen across the disciplines as we see an increased emphasis on inquiry-based and problem-based learning. Francis Bacon defines it as "Critical thinking is a desire to seek, patience to doubt, fondness to meditate, slowness to assert, readiness to consider, carefulness to dispose and set in order; and hatred for every kind of imposture" (Bacon, 1605). Black defines it as a cognitive dialogue to build arguments based on analysis and evaluation (Black, 2007). Facione

elaborated critical thinking as a determined, self-regulatory injunction that includes construction, diagnosis, and assessment of the decision's context. Further, theorists have argued for strong coordination between pedagogy, curriculum, and assessment strategies to promote critical thinking (Facione, 1990).

### **8.2.8 Clinical Reasoning**

Clinical reasoning is an essential competency required for clinicians to make logical decisions within the clinic while dealing with patients. Clinical reasoning requires a strong understanding of evidence-based medical and scientific knowledge. It involves both logical and metacognitive reasoning (or analysis) and relies on analytical thinking. The Approach of Clinical reasoning delivers an immersive paradigm designed to accurately explain and solve clinical issues, along with a set of well-conceived, focused examples that explore clinical reasoning and help trigger rational thought and provide innovative treatment (Benner, Hughes and Sutphen, 2008). It is noteworthy that clinical reasoning occurs within social settings, often about the patient, caregivers, and healthcare workers. Physicians find themselves operating in the circle of relatives who have concerns regarding the patient and his/her health outcome. (Halpern, 2001; Lapkin *et al.*, 2010). Clinical reasoning skills helps trainees for formulating a proper treatment plan for patients seeking NSA procedures. Therefore, it is essential to have profound clinical reasoning for running a safe clinical practice.



### **8.2.9 Clinical Judgement**

The Royal College of Physicians elaborated the medical profession as “a vocation in which a doctor’s knowledge, clinical skills, and judgement are put in the service of protecting and restoring human wellbeing” (Royal College of Physicians, 2005). Therefore, clinical judgement becomes the core of clinicians’ profession and crucial for performing his/her role. Clinical judgment skills are enriched by insights, deliberate practice, training, understanding, and consistent logical reflection. It applies to all the areas of medical sciences such as investigation, treatment planning, patient-physician communication and decision making (Kienle and Kiene, 2011). A central and strategic philosophy to be remembered is the theory of judgement. This includes clinical logic, judgment and its interaction, and interdependence with other educational philosophies in NSA education practises.

### **8.2.10 Reflective Learning**

“Reflection is a metacognitive process that occurs before, during and after situations with the purpose of developing a greater understanding of both the self and the situation so that future encounters with the situation are informed from previous encounters” (Sandars, 2009). Reflective learning theory considers that one’s critical reflection leads to action and subsequently results in behavioural change. Reflective learning (Schon, 1983, 1987) has a significant role in clinical education (Archer, 2012). Reflective learning enables learners to fill the gap between ideas and obligation, authority and knowledge, thought and action, as well as theory

and practice (Saltmarsh, 1996). Reflection as a way of exploration is key to experiential learning and professional development. It is often challenging to connect classroom learning and real clinical practice without adequately reflecting on one's action. Reflection helps the learners in more in-depth learning and problem-solving and encourages them to take meaningful actions (Eyler, Giles and Schmeida, 1996).

A reflection is an influential tool for the critical appraisal of hypotheses and perceptions of self, fellow clinicians, and patients, helping solve a clinical problem and decision-making. There is a growing consensus amongst medical educationalists to include critical reflection across the graduate and postgraduate curriculum (ABIM Foundation, ACP-ASIM Foundation and European Federation of Internal Medicine, 2002; Frank, 2005; General Medical Council, 2009). In the clinical education literature, it has been very aptly argued that critical reflection is an essential skill for trainee physicians (Maudsley and Strivens, 2000a; Aronson *et al.*, 2011).

Reflection helps learners to consider what they are seeing and how they can better adapt 'learning' for their good. It also allows individuals to change their prior learnings and judgments. Learners create or deconstruct their feelings, perceptions, behaviour, and effects depending on feedback. If one uses realistic theories and methods that are accurate in search of excellent and trustworthy knowledge, then it is rational, empirical, accountable, and responsible. A person who feels that they can honestly ask essential questions, compile relevant information, look through that information accurately and creatively, critically reason from that information, and come to correct and credible conclusions. This schooling philosophy of

experience, behavioural trends, experiential learning theory and critical reasoning theory must be appropriately considered.

Critical Reflective theory perfectly fits into the conceptual framework for NSA education as it allows the learners to think about an event and develop a newer perspective critically.

### 8.2.11 **Shared Decision Making**

Compared to physicians making decisions on behalf of patients, shared decision-making (SDM) is gaining more importance in health care policy (O'Connor *et al.*, 2007). SDM has been described as a method in which the best available data has been shared between the physician-patient while making mutually agreeable decisions and empowering the patient to explore alternative options (Elwyn *et al.*, 2010). SDM strategy includes a massive effort for encouraging patient-centred treatment. It cares about the patients' interest in the decision-making of the clinical aspects and respects patients' ability to make choices regarding their well-being. Further, SDM supports patients in forming an educated and individualised opinion about their care (Madsen and Fraser, 2015). SDM's concepts are well known but implementing them into regular clinical practice is challenging and requires conscious effort from the institutions. It is the physician's responsibility to establish trust during the consultation process so that patients can feel comfortable expressing their desire and concern. A three-step framework is suggested to achieve the SDM objective, anchored on preference, option, and method of decision-making.

## 8.2.12 Professional Identity Formation

Professional identity has been defined as the “stable and enduring constellation of attributes, beliefs, values, motives and experiences in terms of which people define themselves in a professional role” (Ibarra, 1999). The ultimate aim of medical education is to transform a trainee into a qualified medical professional. Based on the idea of “CoP”, Lave and Wenger’s theory defines learning as an enhanced engagement in social and cultural activities in an atmosphere where participants share a common mission. Learners build their identity through the socialisation process with a new social language which involves learning how to walk and talk. In this regard, the driving force behind confirmation of identity is based on the need for social recognition that allows individuals to engage in societies to which they belong (Lingard *et al.*, 2002; Paris, 2017). Since NSA practitioners are coming from varied training backgrounds, PIF can be handy in developing the sense of belongingness and “CoP”.

## 8.3 Methods

### 8.3.1 Study Design

In the earlier sections, twelve educational theories are discussed, touching constructivist, social, cognitive, humanist and behaviourist approaches. Each of these educational theories are very relevant to the construction of the non-surgical aesthetics curriculum. Further, these educational theories have generated several important sub-theories which are informing more than one theory. After careful examination, educational theories and sub-theories were grouped in four overarching themes: Enquiry-Based Learning,

Skills Acquisition, Professional Identity and Shared-Decision Making. Furthermore, overarching themes were analysed and elaborated into overlapping themes such as critical thinking, values and attitude, information mastery, work-based learning, regulations, and ethics.

As discussed in chapter six, a modified Delphi methodology was employed for developing the agreement on the relevant educational theories and overarching themes between NSA education experts.

### **8.3.2 Expert Panel**

Recruitment of an expert panel was done following the steps discussed in chapter six. The expert panel members were globally recognised thought leaders and program directors (n=36) with over 20 years of experience in clinical teaching, curriculum design and delivery across the continents.

### **8.3.3 Questionnaire Development**

Based on the educational theories discussed in the earlier section, a questionnaire was developed. The questionnaire consisted of a short write-up on selected educational theories explaining the main concepts, followed by the corresponding survey question. Survey questions were sent to experts via email using [www.surveymonkey.net](http://www.surveymonkey.net). The experts were asked to express their views by responding to on a 5-point Likert- type Scale (1 = Strongly Disagree; 2 = Disagree; 3 = Neither disagree nor agree; 4 = Agree; 5 = Strongly Agree). Moreover, experts were requested to provide their suggestions, if any, so that they could be included in the subsequent rounds.

### **8.3.4 Determination of Consensus**

As recommended in the literature and discussed in chapter 5, an agreement score of  $\geq 80\%$  (mean=4) and Cronbach's  $\alpha = 0.90$  was set to represent a consensus.

### **8.3.5 Data Collection**

#### **8.3.5.1 Delphi Round 1**

The process for consensus building was triggered by the first email invitation to the expert panel. The panel members were requested to rate the most relevant educational theories and regulations.

#### **8.3.5.2 Delphi Round 2**

During the second round, experts received the items along with the first-round ratings and were asked to revise their judgement or elaborate on the reason for disagreement from the group opinion. This round provides an opportunity for experts to rethink and adjust their feedback.

#### **8.3.5.3 Delphi Round 3**

Since trainee physicians are one of the important stakeholders, the outcome of the second round was presented to them, and they were asked to express their views against each item.

## **8.4 Result**

The overall response rate in the expert group was 89% (n=32). The geographical distribution of the respondent is presented in Figure 8-1. The expert panel members reached an agreement (Mean $\geq 4$ ) to incorporate

proposed educational theories and the overarching themes for the Conceptual Framework. Cronbach's alpha for the first Delphi round was  $\alpha=0.89$  and for the second round  $\alpha=0.93$ , which showed a high internal consistency and reliability level Table 8-1.

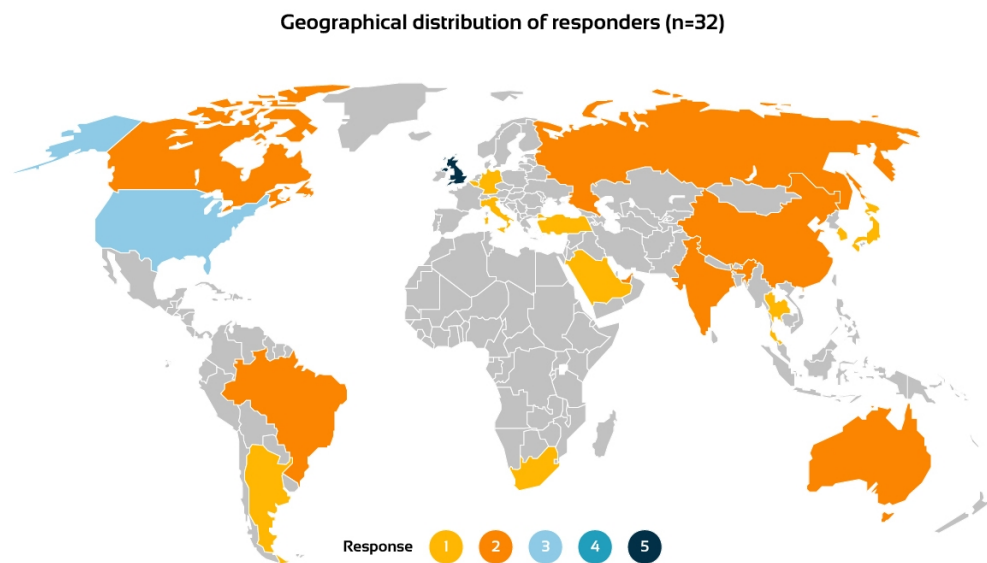


Figure 8-1: Geographical distribution of the expert's panel

Table 8-1: Delphi round 1 and 2 result of the response and agreement to the statements

Sl. No	Items	Mean, (n=32) (round 1) & Cronbach $\alpha= 0.89$ ;	Mean, (n=32) (round 2) & Cronbach $\alpha= 0.93$	Mean, (n=16) (round 3) & Cronbach $\alpha=.91$	Consensus
<b>Educational Theories</b>					
1	There is a need for a good understanding of 'Constructivist theory' to develop knowledge, skills, and attitudes in trainees to enhance learning	4.37	4.56	4.45	Yes
2	The non-surgical aesthetics curriculum should acknowledge and reflect the following principles of Adult Learning Theory				
2a	Adult learners prefer contextual and experiential learning	4.28	4.28	4.22	Yes
2b	Adult learners focus on the immediate gain in their personal and professional life from educational activities	4.06	4.06	4.22	Yes
2c	Adult learners are interested in finding a solution to the real-world problem	4.21	4.21	4.13	Yes
2d	Adult learners are independent, self-directed and take responsibility for their decisions	4.15	4.15	4.23	Yes
2e	Adult learners want extreme flexibility to decide what, when, and how learning will occur	4.43	4.43	4.36	Yes
2f	Adult learners need inner motivation to acquire knowledge and skills that can be utilised immediately	4.28	4.28	4.54	Yes
3	A non-surgical aesthetics curriculum should be designed to promote reflective learning through critical thinking, clinical reasoning, and clinical judgement				
3a	Critical Thinking	4.50	4.50	4.54	Yes
3b	Clinical Judgement	4.53	4.53	4.55	Yes



3c	Clinical Reasoning	4.56	4.56	4.40	Yes
3d	Reflective Learning	4.34	4.34	4.45	Yes
4	The trainee needs to understand the 'Shared decision making' principle to involve patients in making educated choices for the treatment when adequately informed	3.93	4.31	4.5	Yes
5	Clinical education in the postgraduate curriculum must develop a professional identity that will help clinicians to evolve from a generalist to a specialist	3.65	4.15	4.50	Yes
6	Based on the above theories, would you agree that the following overarching themes are the keystones for developing a postgraduate curriculum in non-surgical aesthetics?				
6a	Enquiry-based Learning	4.00	4.10	4.23	Yes
6b	Skills acquisition	4.75	4.75	4.72	Yes
6c	Shared decision Making	4.25	4.50	4.40	Yes
6d	Professional identity	4.28	4.43	4.59	Yes
<b>Regulation</b>					
7	Professional, statutory, and regulatory body (PSRB) has an essential role in developing and delivering a clinical curriculum?	3.25	4.03	4.27	Yes

## 8.5 Conceptual Framework

For curricular growth, the fundamentals on which the content, curriculum design, evaluation and assessment and the expected educational results are designed must be explained (Biggs, 1996). There is not enough technical clarity to support the proposed NSA curriculums in the fundamental resumes (Plastic Surgery, Dermatology, Dentistry), contributing to current practice. To establish such a vision, it was essential to participate in a broad and critical dialogue with the professional community. There is no technically transparent medical curriculum to support the proposed NSA curriculum objectives to encourage current practice.

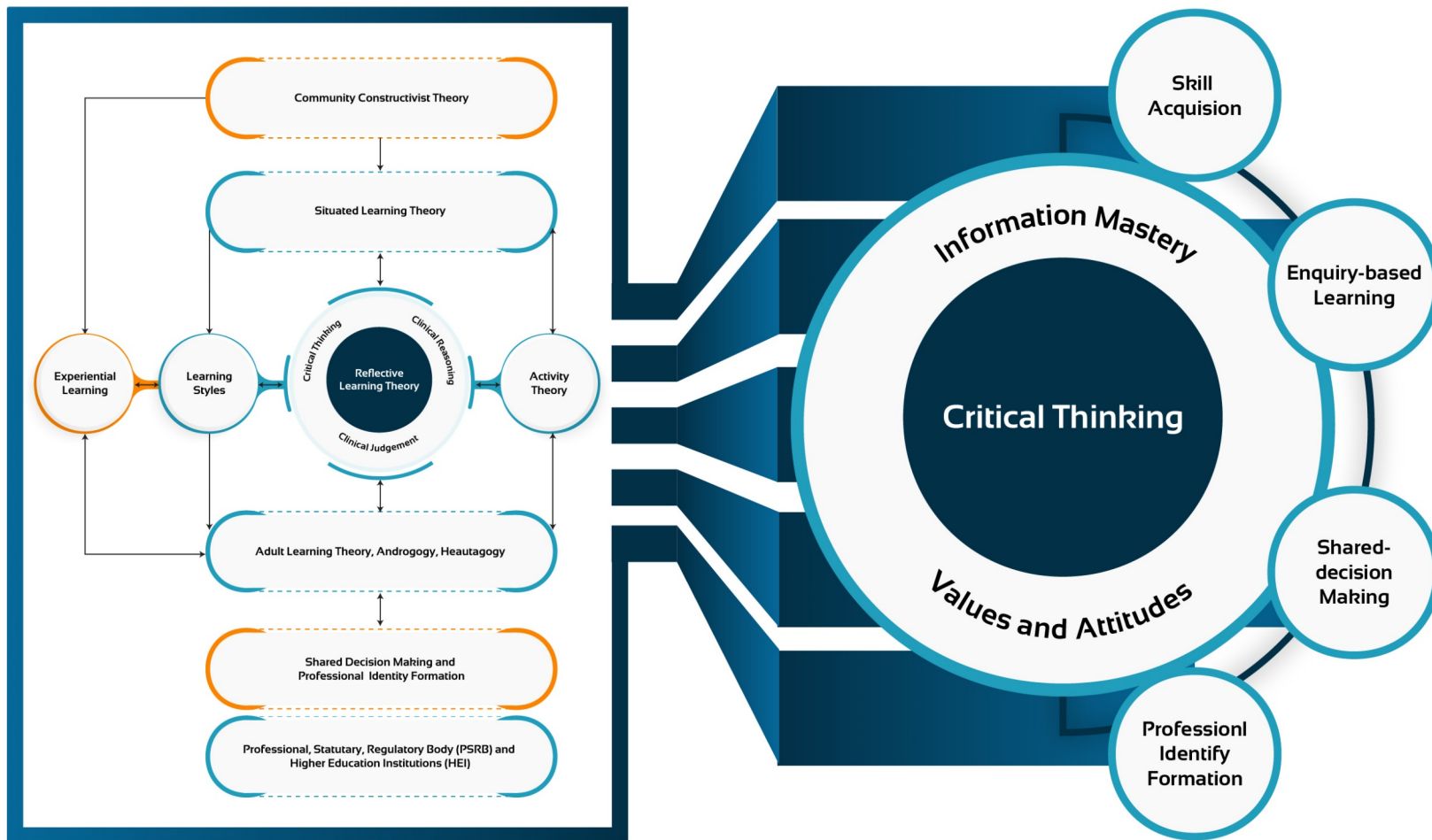


Figure 8-2: Conceptual Framework

The proposed conceptual framework is driven by a specific philosophy of constructivism while linking all the educational theories and overarching themes (Figure 8-2). This conceptual framework is futuristic and covers dynamic societal change, evolving educational environment, and patients' interests. Further, it offers a general overview of each educational theory and template to design, develop, implement, and evaluate the NSA curriculum. It will enable program directors and policymakers to participate in an analytical, regulated and application-oriented process that promotes education fidelity through the theoretical approach.

## 8.6 Discussion

“There is nothing so practical as a good theory” (Lewin, 1951). Theory and practice have complementary and mutually reflective relationships supported by a very robust feedback mechanism. Newer insights generated from the practice helps in refining the theory. Medical educators should ideally be conversant with various learning theories to adopt the most effective method for delivering bespoke teaching to learners (Aliakbari *et al.*, 2015). Moreover, it is unfortunate to see that educational theories are not routinely employed in curriculum design and delivery in medical education (Mukhalalati and Taylor, 2019). This is the first study that has built a consensus to develop an authentic and evidence-based Conceptual Framework for non-surgical aesthetics education anchored on critical educational theories.

The adult learning theories (andragogy and heutagogy) are very relevant in non-surgical aesthetics education and help create the most hospitable

environment for the proliferation of learning. As we know, adult learners are ostensibly independent, self-directed and have inner motivation to acquire knowledge and skills that can be utilised immediately in their clinical practice. With its student-centric approach, heutagogy shifts the epicentre from educator to the learner and the learning process. Therefore, this theory supports the 21st-century learner who takes control of his/her learning by addressing the gap in knowledge and skills by following an enquiry-based learning approach. To be successful, these learners need to be accommodative, flexible and with good communication skills to collaborate with their learning networks. It is evident that heutagogy is anchored in constructivist and humanistic principles and connects with several other educational theories into an integrated collage of learning fit for non-surgical aesthetics education.

Constructivist Theory provides people with new perspectives, judgments, thoughts, knowledge, or behaviour within their position as learners. It begins with the presumption that thoughts can only be constructed according to past experience and what they know (Glaserfeld, 1995). The analysis and reflection that enable individuals to draw new conclusions and add new meanings to their comprehension are included within these activities. During education, both collective and independent learning takes place. This connects to the methods and approaches of education and practice. Building on and interacting with other educational ideas offers a robust learning base. Since constructivist learning resonates strongly with skills-based clinical education, it offers opportunities to deconstruct and recreate previous perspectives and practices and construct new ones.

Therefore, the constructivist learning approach can be of interest for teaching complex skills such as problem-solving or critical thinking skills (Tam, 2000), which is extremely important in non-surgical aesthetics education.

The established system of procedural skill attainment by observing the teacher has been replaced by a more modern approach of clinical clerkship, and mostly learning occurs at the workplace. Work-based learning valuable for non-surgical aesthetics education is based on the heutagogical theory and grants enough autonomy to learners to explore their passion for building new knowledge and skills. Similarly, action learning and action research permit the learners to carry out their experiments with real-world experiences, and subsequently, learning can be evaluated in the next learning cycle. Moreover, a case log or case portfolio commonly used in postgraduate clinical education can be used in non-surgical aesthetics education as an effective reflective and experiential learning tool.

It is evident from the Delphi Consensus that the non-surgical aesthetics curriculum should actively help in building the shared decision-making (SDM) approach in trainee physicians. SDM is one of the crucial pillars of EBM and fits very well within the NSA curriculum due to the availability of several treatment options. Moreover, these procedures are elective and driven by individuals' motivation and desire to improve their corporeal features and affect the final decision-making. Since NSA procedures are self-pay, driven by market economics, it is prone to get compromised. Therefore, the patients' values and perspectives are of high significance in the decision to undertake aesthetic procedures and should be considered in the decision-making process for the treatment planning. It is essential to develop the right

attitude and culture to promote SDM in both present and future physicians to effectively communicate the pros and cons of a procedure. Such practice will encourage patients to get involved in SDM, and once fully informed, patients can make educated choices (Ubbink, Santema and Lapid, 2016). SDM can be actively developed and promoted in trainee physicians through “CoP” and professional identity formation (PIF).

The Delphi panel was in complete agreement to include PIF in the non-surgical curriculum. PIF is a relatively new concept in medical education and focuses on developing professionalism in new physicians. The idea is to develop the right values, attitudes, and characters in trainee physicians through socialisation. Professionalism is an inter-personal mechanism that considers, establishes, and implements a hierarchical relationship with others. Individual characteristics remain crucial; however, they are not set between individuals but mutable and co-created (Hodges *et al.*, 2011). Medical education requires professional discourses for unveiling the hidden curriculum, allowing students to recognise and combat the curriculum’s adverse impact (Hafferty and Levinson, 2008; Martimianakis, Maniate and Hodges, 2009). In the context of NSA education, trainees are supposed to participate in “the community” and adapt an enquiry-based approach to problem-solving to build new knowledge and skills. Moreover, through its participatory sociocultural practices, “CoP” actively promotes the PIF in new learners.

Further, expert panels recognise the critical role of professional, statutory, and regulatory bodies (PSRB) in developing and delivering the NSA curriculum. Since NSA is a new and evolving domain in medical sciences,

trainee physicians must be appropriately trained on ethics and all the existing regulations.

## **8.7 Conclusion**

The chapter gives the collective evidence produced around education theories to guide non-surgical aesthetics educators to standardise the training and education for the next generation of aesthetic physicians. Further, it proposes the Conceptual Framework, which will act as a guiding map for developing the learning objectives, curriculum design, delivery, and assessment strategies in non-surgical aesthetic education. The next chapter discusses the core curriculum, which is the outcome of a global Delphi study.



## **Chapter 9: Study-1A: A Global Delphi Consensus to determine the core curriculum**

### **9.1 Introduction**

The urge for portraying a young, beautiful face and body is driving people to aesthetic clinics and fuelling the exponential growth of NSA procedures globally. According to a 2019 survey by the “International Society of Aesthetic Plastic Surgeons” (ISAPS), NSA procedures grew by 8.6% in 2019, totalling 13.61 million procedures worldwide (ISAPS, 2019). The rising affluence and changing attitude towards life and living in society is driving such phenomenal growth and consequently accelerating the demand for qualified physicians with NSA expertise. Unfortunately, despite such impressive growth, the NSA lacks a formal clinical education program. It is crucial to recognise and address the gaps in training and education to optimise patient outcomes. A global-needs assessment survey of aesthetic physicians has established the need for a standardised curriculum for education and training in NSA procedures. To promote safe and optimal clinical outcomes, the authors recommended urgent attention from the policymakers and academic institutions for designing a bespoke clinical training course in NSA to train future physicians (Kumar and Rahman, 2021).

There are several steps involved in curriculum design and development. The critical step in designing and developing any authentic evidence-based curriculum is assessing the need by identifying the gap between current and desired clinical practice and determining the new curriculum topics.

Subsequently, content mapping is essential to align with the learning outcomes, appropriate teaching and learning methods and assessment strategies. The previous chapters have already established the need and conceptual framework for the NSA curriculum.

The curriculum must be comprehensive in order to address the needs of the patients and practitioners. It is essential to develop such a curriculum that ensures patients' safety without compromising trainees' learning experience. Traditionally, the curriculum in postgraduate medical education and training is designed and developed by the program leads and validated by a few experts from the same institution (Jones and Reid, 2010). Trainee physicians are one of the critical stakeholders and often ignored in the curriculum development process. However, it is recommended to consult stakeholders such as educators, trainees, non-expert members of the society, and other support functions, assuring the development of an equitable, versatile curriculum and following the patients' current needs with the ability to evolve to accommodate future needs of the patients. Additionally, a curriculum must facilitate excellence by providing enough opportunity for continuous assessment and trainers' feedback to trainees.

Therefore, the current study aims to utilise a modified Delphi consensus to identify the content and structure for an authentic evidence-based postgraduate NSA curriculum.

## **9.2 Materials and Methods**

### **9.2.1 Study Design**

The modified Delphi technique is a recognised way for consensus development in medical education settings. The curriculum is the anchor of the educational process. It is vital to consult a group of recognised subject matter experts to gather their opinion and develop a consensus among all the stakeholders, such as program directors, educators, and trainee physicians. As elaborated in chapter five, a modified Delphi technique was used for consensus building among global experts who actively deliver training and education for NSA procedures.

### **9.2.2 Expert Panel**

Following the steps discussed in chapter five, the author constituted a globally recognised expert panel to participate in the consensus-building process. All the invited experts were having over 20 years of experience in NSA practice, training and education, and active members of aesthetic plastic surgery, dermatological and aesthetic medicine societies such as the “American Society of Aesthetic Plastic Surgery (ASAP), American Academy of Dermatology (AAD), American Society of Dermatological Surgery (ASDS), Australian Society of Aesthetic Plastic Surgery (ASAPS), Australian Society of Cosmetic Dermatology (ASCD), British Association of Aesthetic Plastic Surgeons (BAAPS), Brazilian Society of Dermatology, Chinese Association of Plastics and Aesthetics” and several regional scientific forums. Moreover, the selection was further reinforced by their

ongoing contribution to academics, clinical research, and lectures at key scientific congresses.

### 9.2.3 Questionnaire Development

As discussed in chapter five, the questionnaire development process was initiated by organising two facilitated focus group discussions (FGD) with NSA experts (n=6) and trainee physicians (n=6). The focus groups brainstormed the ideas on critical themes for integration in the NSA curriculum. The group had an in-depth discussion on the themes and grouped them under appropriate headings such as Basic Science, Clinical Science, Professionalism, Ethics, Regulations, Research and Critical Thinking, encompassing the broad learning objectives for developing the knowledge, skills, and attitude. After the FGD, the author reached out to each participant and asked if they wanted to suggest any other topic for inclusion in the master list. It is vital to ensure all the FGD members' views are respected and prepare an exhaustive list of topics for the Delphi round.

Subsequently, a survey questionnaire was developed based on the themes and topics generated during FGD. The questionnaire was sent through an e-mail to 30 experts across the globe using an online survey platform [www.surveymonkey.net](http://www.surveymonkey.net) (Palo Alto, CA, USA). The expert members were asked to attribute a rating to each employing a four-point Likert scale, where '1' represents strongly disagree with the integration of the topic in NSA curriculum, and '4' represents strongly agree. Experts were requested to provide suggestions in the comment box which can be included in the subsequent round.

#### **9.2.4 Determination of Consensus**

There is no definite rule regarding the number of cycles for questionnaire administration. However, the process stops after attaining the desired agreement between the experts. Besides, there is no definite recommendation for delineating the agreement during the modified Delphi process. For the present study, a pre-fixed percentage agreement of  $\geq 80\%$  and Cronbach's  $\alpha = 0.90$  was established to represent a consensus.

#### **9.2.5 Data Collection and Analysis**

##### **9.2.5.1 Delphi Round 1**

After questionnaire development, an e-mail invitation was sent to the expert panel members requesting them to rate the appropriate topics for inclusion in the NSA core curriculum. Experts were also requested to suggest any other topic they feel relevant and should be included in subsequent rounds.

##### **9.2.5.2 Delphi Round 2**

Scores from the first round were analysed, and items that  $\geq 80\%$  of experts rated as essential were suitable to be included in the NSA curriculum. Subsequently, the survey questionnaire was modified, and items with substantial consensus were removed to reduce the number of questions. This exercise reduces the 'participants fatigue' (Keeney, Hasson and McKenna, 2006) and increases the response rate. The experts were requested to review their decision or explain the rationale for the difference of opinion. Round two offers the experts another chance for rethinking and modifying their opinion.

### 9.2.5.3 Statistical Analysis

IBM SPSS Statistics for Mac, Version 27.0, was used for statistical analysis (IBM Corp. Armonk, NY, USA). Each topic's relevance was determined by calculating the mean score and percentage agreement between the panel members, and internal reliability was determined by calculating Cronbach's alpha (Diamond et al., 2014).

## 9.3 Results

The first round Delphi had a response rate of 93.3% (n=28 of 30), and the second round had an overall response rate of 89.28% (n= of 28). The experts' panel agreed ( $\geq 80\%$ ) on all the proposed topics and found them essential for the NSA curriculum. The mean score for each topic was  $\geq 3$ , Cronbach's alpha value was 0.95 for the Delphi, which confirmed the internal consistency and reliability. A summary of the final consensus outcome is listed in Tables 9-1, 9-2, 9-3, 9-4).

Table 9-1: Core Curriculum for NSA-Basic Science

Basic Science				
	Topics	Mean Score	% Agreement	Consensus
A01	Anatomy, physiology and ageing of the skin and soft tissue			
	Skin microbiology and its importance to asepsis in non-surgical procedures	3.64	100%	Yes
	Relevant dermatological conditions/diseases such as acne, melasma, rosacea, herpes, dyschromia	3.41	100%	Yes
	Anatomy and physiology of hair	3.35	100%	Yes
	Prevention and treatment options for common skin conditions	3.52	100%	Yes
A02	Clinical Anatomy of the face and other areas of aesthetic interest			

	Topographical features and aesthetic zones	3.11	100%	Yes
	musculoskeletal anatomy	3.17	100%	Yes
	Neurovascular anatomy	3.11	100%	Yes
	Fat morphology	3.11	100%	Yes
	Recognition of the danger zones and related risk areas	3.11	100%	Yes
A03	Pathophysiology of Ageing			
	Biology of ageing and its impact on the progression, prognosis, and prevention	3.21	100%	Yes
	the dynamics of the ageing process	3.21	100%	Yes
	Effect of personal, interpersonal, and societal factors on ageing	3.31	100%	Yes
	Ethnic differences in ageing	3.09	100%	Yes
A04	Concepts, attitudes and changing trends of Beauty			
	Neurobiology of Aesthetic Appreciation	3.12	100%	Yes
	Appreciation of beauty through art	3.06	87%	Yes
	Cultural and regional concepts and preferences of beauty	3.12	100%	Yes
	The motivation for aesthetic procedures	3.12	100%	Yes
A05	Pharmacology of botulinum toxin, soft-tissue fillers, and bio stimulators			
	The science behind the threads	3.18	100%	Yes
	Overview of pivotal-trial data and real-world evidence	3.12	100%	Yes
A06	Principles of energy-based and radiofrequency-based devices			
	Laser	3.25	100%	Yes
	Intense pulsed light (IPL)	3.18	100%	Yes
	The light-emitting diode (LIPLD)	3.06	100%	Yes
	Other Energy-based treatments such as radiofrequency (RF), skin tightening (monopolar, bipolar, tripolar RF, and HIFU)	3.12	100%	Yes
	Body contouring devices (cryolipolysis, radiofrequency)	3.18	100%	Yes
	Overview of pivotal-trial data and real-world evidence	3.12	100%	Yes
A07	Chemical peels and dermabrasion	3.18	90%	Yes
A08	Micro-needling and scar revisions	3.18	90%	Yes
A09	Introduction to cell-based therapy and regenerative aesthetics	3.12	90%	Yes

A10	Dermatological formulations for essential skincare, anti-ageing, stimulation, and lightening	3.18	93%	Yes
A11	Management of high-risk groups such as those with mental health conditions			
	The psychological condition of dysmorphia	3.06	100%	Yes
	Condition of monosymptomatic hyperchondriac psychosis	3.06	100%	Yes
	Psychosexual impacts of body image disorder	3.06	85%	Yes
	Appropriate screening tools to recognise risk group	3.18	100%	Yes
A12	Empathy in Aesthetic Practices			
	Role of empathy in aesthetic practices	3.18	100%	Yes
	Neurobiology of empathy	3.12	82%	Yes
	Empathy as practice	3.12	100%	Yes



Table 9-2:Core Curriculum for NSA-Clinical Science

Clinical Science				
	Topics	Mean Score	% Agreement	Consensus
B01	Non-surgical aesthetics principles including aseptic technique and instrument preparation	3.53	100%	Yes
B02	Patient consultation, Assessment, and Preparation	3.43	100%	Yes
B03	Shared decision making			
	Formulate a management plan for the optimal clinical outcome	3.53	100%	Yes
	Realistic expectation setting	3.53	100%	Yes
	Assessments of risks and benefits of the treatment plan	3.46	100%	Yes
B04	Informed consent to include alternative therapies in case of an emergency	3.53	100%	Yes
B05	Anaesthesia and Pain control management	3.46	100%	Yes
B06	Emergency Preparedness	3.53	100%	Yes
B07	General theory, management, and prevention of complications	3.59	100%	Yes
B08	Non-surgical aesthetics procedures of the face and neck (Knowledge and technical skills)			
	Application of Botulinum toxin	3.40	100%	Yes
	Application of soft-tissue fillers and bio-stimulatory agents	3.40	100%	Yes
	Application of laser for skin resurfacing including fractionated CO2, erbium, NdYAG laser (hair removal), energy-based devices for skin-tightening-HIFU, RF skin-tightening, cryolipolysis for the management of sub-mental fat	3.40	100%	Yes
	Application of Platelet-rich plasma therapy	3.40	100%	Yes
	Use of threads for facial rejuvenation	3.31	92%	Yes
	Chemical peel for facial rejuvenation	3.31	100%	Yes
	Micro-needling for refinement of mature scar	3.31	100%	Yes
	Dermabrasion techniques for aesthetic enhancement	3.31	100%	Yes

B09	Non-surgical aesthetics procedures of the limb and torso (Knowledge and technical skills)			
	Application of soft-tissue fillers and bio-stimulatory agents	3.31	100%	Yes
	Application of botulinum toxin and other treatment modalities for the management of axillary hyperhidrosis	3.46	100%	Yes
	Application of laser for skin resurfacing including fractionated CO2, erbium, NdYAG (hair removal)	3.40	100%	Yes
	Body contouring procedures (cryolipolysis, radiofrequency)	3.40	100%	Yes
B10	Non-surgical aesthetics procedures of the Male and female genitalia (Knowledge and technical skills)			
	Anatomy of Male and female genitalia	3.40	100%	Yes
	Non-surgical vulvovaginal and penile rejuvenation	3.40	100%	Yes

Table 9-3:Core Curriculum for NSA-Professionalism, Regulation and Compliance

<b>Professionalism, Regulations and Compliance</b>				
	Topics	Mean Score	% Agreement	Consensus
C01	Medical records keeping Clinical photography Informed consent and Photographic Reproduction	3.46	100%	Yes
C02	Regulatory Issues including local healthcare compliance requirements	3.40	100%	Yes
C03	Regulation of cell therapies and advanced therapies medicinal products (ATMP)	3.40	100%	Yes
C04	Professional, ethical standards including physician/patient relationship and responsibility	3.46	100%	Yes
C05	<b>Practice Development</b>			
	Leadership and team-based practice	3.46	100%	Yes
	Interpersonal and communication skills	3.40	100%	Yes
	Organisational management	3.59	100%	Yes
	Digital Marketing (websites, blogs, reviews, Search Engine Optimisation)	3.28	100%	Yes
	Social media and e-mail marketing	3.28	100%	Yes
C06	<b>Medical Ethics</b>			
	Respect for patients' autonomy	3.81	100%	Yes
	Nonmaleficence	3.68	100%	Yes
	Principle of beneficence and justice	3.75	100%	Yes

Table 9-4: Core Curriculum for NSA-Research Methods and Critical Thinking

Introduction to Research Methods and Critical Thinking				
	Topics	Mean Score	% Agreement	Consensus
D01	An effective literature search in the knowledge domain	3.40	100%	Yes
D02	Principles of narrative synthesis, systematic reviews, and meta-analysis	3.28	100%	Yes
D03	Ethical issues related to clinical research	3.34	100%	Yes
D04	Epidemiological and statistical concepts related to research	3.00	100%	Yes
D05	Formulate research questions, hypotheses and generate real-world evidence	3.28	100%	Yes
D06	Dissemination of research findings	3.53	100%	Yes

## 9.4 Discussion

As far as I could ascertain, this is the first evidence-based “Core Curriculum” for NSA, based on consensus employing an established research tool. The modified Delphi technique is a proven methodology and frequently employed in medical education research for competency and curriculum development. It attempts to determine “the extent of agreement (consensus measurement) and to resolve disagreement (consensus development)” in the case of inconclusive or inconsistent data on a specific subject (Jones and Hunter, 1995). The Delphi approach is formed as an efficient tool to systematically gather the views of experts to reach a consensus on issues without any prejudice. Moreover, using an online questionnaire offers flexibility to approach experts across large geographies, and the encrypted construct offers panel members the chance to express their views relentlessly. In the current study, the Cronbach alpha value of  $\geq 0.94$  implies that the expert panel had sufficient members to reach an agreement without any significant dispute.

The curriculum is often created in an institutional context by academics who may have some knowledge in the field of study and may not necessarily have sufficient experience in teaching and learning strategies in a clinical setting. The proposed curriculum is based on several global thought leaders’ opinions, consensus and aligned with the conceptual framework for NSA education discussed in chapter seven. The focus group discussion with experts and trainee physicians followed by two rounds of Delphi has provided enough opportunity to survey

respondents for thinking and reflecting to make decisions and achieve consensus.

The expert's panel recommended the inclusion of all the proposed topics in the Delphi round one concerning basic and clinical sciences in the NSA curriculum. In addition to the listed topics, the experts suggested the inclusion of anatomy and physiology of hair in the basic science section, including cell-based therapies (PRP, Stem cell) and the treatment of axillary hyperhidrosis in the clinical science section. Moreover, they also recommended the inclusion of research methods and critical thinking. Evidence-based medicine (EBM) supports the practice of clinical decision-making anchored on the best available scientific evidence. Likewise, asking the right clinical questions, ascertaining the evidence, critically appraising and employing it is an essential skill for future physicians (Haroon and Phillips, 2010). It is crucial to developing future physicians' critical thinking and research skills to promote inquiry-based learning, the practise of EBM, and generate real-world evidence.

The expert panel recognised the importance of shared decision making and the role of empathy in aesthetic practices and recommended including it in the NSA curriculum. The rapid expansion of the internet and smartphones have played an enormous role in empowering patients and minimising the information asymmetry between physicians and patients. Patients are actively willing to participate in the decision-making process concerning their health and wellbeing. Therefore, physicians are required to adjust to the changing environment and must

develop shared decision-making skills. While empathy is one of the crucial behavioural traits for physicians, it is seldom nurtured in medical schools (Pedersen, 2010). Empathy is critical for the harmonious physician-patient relationship, increased patient satisfaction, compliance to treatment plan resulting in improved patient outcomes. A curriculum aimed at reinforcing empathy in trainee physicians is urgently needed (Kelm et al., 2014; Bratek et al., 2015). Literature suggests that empathy and compassion can be improved in physicians through training and education (Patel et al., 2019).

Furthermore, the experts' panel unanimously recommended the inclusion of practice development, professional marketing, interpersonal communication skills in the NSA curriculum. It is expected for physicians to have good communication and interpersonal skills to communicate with patients. Evidence suggests that miscommunication leads to poor patient outcomes. Developing effective communication skills in physicians is now a global priority, and medical schools are putting significant resources behind it (Foronda, MacWilliams and McArthur, 2016). Therefore, the inclusion of communication skills in the NSA curriculum will help trainees develop the skill effectively and improve patient satisfaction.

In recent years, cell-based therapies such as platelet-rich plasma (PRP) and stem cells are gaining popularity as the “next big thing” in the scientific community, public, and mainstream media. A recent survey highlights the ethically unacceptable practice in the cell-therapy advertisement and that aesthetic practitioners should have a thorough

understanding of the principles and procedures of the cell-based practice and underpinning regulations (Nayar et al., 2014). Several over-the-counter cosmetics and anti-ageing products claim to contain stem cells in their scientifically unproven direct-to-consumer marketing messages to allure the public. Most of such claims are unsubstantiated and based on anecdotal evidence. However, early evidence suggests the potential therapeutic benefit of both embryonic and adult stem cells (Rachul, Percec and Caulfield, 2015). The experts' panel recognised its emergence and recommended the inclusion of regulations about cell-based therapies in the NSA curriculum so that trainees can be sensitised around the ethics and need for scientific evidence. Interestingly, the "American Society of Plastic Surgeons (ASPS)" and the "American Society of Aesthetic Plastic Surgeons (ASAPS)" raised their concerns on stem cell-based aesthetic procedures' safety and efficacy ('ASAPS/ASPS Position Statement on Stem Cells and Fat Grafting', 2011).

The present study enables creating an authentic evidence-based curriculum in NSA education to support the development of knowledge, skills, and attitudes in trainee physicians as per predefined learning objectives. The curriculum is comprehensive and encompasses basic and clinical science topics along with practice development, regulatory guidelines, interpersonal skills, and empathy in clinical practice. Moreover, the proposed curriculum is not prescriptive; instead, it can work as a blueprint for the program directors to develop a structured, evidence-based postgraduate course in NSA.



## 9.5 Conclusion

This Delphi study paved the way for the creation of an NSA postgraduate program. This consensus exemplifies a significant step forward in developing an evidence-based curriculum for NSA education, which is critical to support the growing demand for qualified aesthetic physicians.

The next chapter will discuss the implementation framework in detail.

## 9.6 **Study-1B: A “Core Syllabus” for facial anatomy teaching to NSA practitioners: A Delphi Consensus**

### 9.7 **Introduction**

In-depth and accurate knowledge of facial anatomy is essential for safer clinical practice. For example, a thorough understanding of facial vasculature is critical for soft-tissue augmentation. One of the catastrophic adverse events with such a procedure is iatrogenic blindness due to the inadvertent embolization of soft-tissue fillers into the blood vessels. A review article reported 190 cases of such occurrence due to the aetiology mentioned above (Chatrath *et al.*, 2019). Vascular complications are also reported for other areas of the face, such as the cheek (Beleznay *et al.*, 2014, 2015, 2019), lips (Tansatit, Apinuntrum and Phetudom, 2014) and chin (Fang, Rahman and Kapoor, 2018). Throughout the reported literature, the need for a detailed understanding of facial anatomy is well recognized for safer aesthetic outcomes and to avoid unwanted complications (Emer and Levy, 2012; Funt and Pavicic, 2015; Heydenrych *et al.*, 2018). Recently, improvement in educational methods and use of modern teaching and learning tools such as digital technology, simulations, videos, computer-assisted programs, augmented and mixed reality (Kumar, Pandey and Rahman, 2021) combined with traditional methods offer an advantage over conventional methods alone (Sugand, Abrahams and Khurana, 2010; Estai and Bunt, 2016; Kumar, Rahman and Adds, 2018).

One of the significant challenges and a fundamental requirement has been to define the core educational syllabus and to build global consensus

among educators and aesthetic practitioners in ensuring that the acquisition of appropriate facial anatomical knowledge translates to clinical competency.

To avoid complications and improve clinical outcomes of NSA, I have developed and reported a “Core Syllabus’ for teaching facial anatomy to aesthetic physicians” (Appendix D). The intricately designed study used the Delphi method to build consensus among an expert panel comprising globally recognised thought leaders in the field of NSA. This expert panel comprised plastic surgeons, dermatologists, facial plastic surgeons, anatomists and represented a wide geographical area, covering 12 countries, with each of the members averaging more than two decades of clinical and teaching experience in the speciality.

A regional (China) study was designed, employing a modified Delphi method to build consensus on the core syllabus for a single speciality such as the plastic surgeon. China was selected for the current study due to its largest populations, and according to one of the recent estimates, the NSA market incorporating the use of botulinum toxin and soft-tissue filler is expected to grow by 15-20% every year (Annection, 2018). The objective of this study was also to assess the coherence of global study recommendations to that of China and identify any specific anatomical landmarks in the facial anatomy core syllabus.

## **9.8 Materials and Methods**

### **9.8.1 Study Design**

As described in chapter six, a modified Delphi method was employed to build the consensus amongst experts. The inclusion criteria for the expert panel members involved bona fide plastic surgeons who had active involvement in the teaching and practice of NSA and possessed membership of The China Association of Plastics and Aesthetics (CAPA). The experts were individually invited from various geographical areas of China, and their subjective inclusion was further supported by individual professional appearances at major aesthetic meetings.

### **9.8.2 Data collection and analysis**

#### **9.8.2.1 Delphi Round 1**

In the first round, 154 anatomical structures of the face and neck were presented to the expert panel for review. Panel members were required to select the most critical anatomical structures for the non-surgical aesthetics procedures and, consequently, be included in the core document for teaching applied anatomy to aesthetic physicians.

#### **9.8.2.2 Delphi Round 2**

Anatomical structures with an agreement score over  $\geq 80\%$  and  $\leq$  less than 50% were excluded from the further review. As a result, structures with a score between 50%-79% in the first round were circulated for further consideration in round two.

## 9.9 Results

A total of 75 plastic surgeons were approached in round 1 of the survey, and the overall response rate was ~79% (n=59 out of 75), all of whom also responded in round 2 (n=59, response rate 100%). At the end of round two, the expert panel reached an agreement ( $\geq 80\%$ ) on over 151 anatomical structures as crucial knowledge for the safer practice of NSA. At round two, Cronbach's alpha for the modified Delphi process was 0.98, which showed a high level of internal consistency and reliability, negating the need for any additional rounds. In our previous global consensus study (Kumar, Swift and Rahman, 2018), a global expert panel consisting of facial plastic surgeons, dermatologists and anatomists reached a consensus ( $\geq 80\%$ ) over 137 anatomical structures, Cronbach's alpha for the modified Delphi process was 0.94. Overall, the outcomes of the current study in China are in concurrence with those of the global study. Table 9-5 summarises agreement scores and consensus (yes / no) of anatomical layers, topographical landmarks, fold, crease, and grooves of face and neck that experts think should be included in the core syllabus. In contrast, Table 9-2 summarises data on aesthetic zones of the face and neck.

For a greater understanding of the results, the following is a summary of the final consensus among the expert's panel.

### 9.9.1 Anatomical layers of the face

Among 14 anatomical structures that cover the face and neck, the expert panel had complete consensus (termed "very important"; agreement scores  $\geq 80\%$ ) for 13 structures for inclusion in the core syllabus (Table 9-5). The

only exception in the survey was skin histology and thickness (agreement score ~ 77 %). The opinion received in this regional study further substantiated findings in our previous study where a global expert panel comprising various specialities showed consensus over the inclusion of 12 structures to the core syllabus (agreement scores  $\geq$  83%) and excluded two structures viz. false ligaments (fascia-cutaneous ligaments) and skin histology & thickness (agreement scores  $<$  71%).

### **9.9.2 Topographical Landmarks**

A total of 12 topographical landmarks were included in the current Delphi process, and the experts showed consensus (agreement scores  $\geq$  80%) over 11 structures for inclusion in the core syllabus (Table 9-5). There was no consensus for the inclusion of medial and lateral borders of the iris (agreement score ~ 78 %).

### **9.9.3 Facial Grooves, Creases, and Folds**

The experts showed consensus (agreement scores  $\geq$  80%) over eight out of nine facial grooves, creases and folds of the face and neck to be included in the core syllabus (Table 9-5). Consensus could not be achieved over the inclusion of the pre-auricular crease (agreement score ~ 77 %). Findings of this study complemented the earlier global study, where global experts achieved consensus over seven out of nine structures (agreement score  $\geq$  89%) with the exclusion of neck and Pre-auricular crease (agreement scores  $<$  66%).

#### **9.9.4 Fat Compartments**

Considering both superficial and deep fat compartments, the study included a total of 23 anatomical structures to be incorporated into the core syllabus. In contrast to a global study that showed consensus over the inclusion of only 20 out of 23 structures (agreement scores  $\geq 86\%$ ), the current regional survey showed 100 % consensus over the inclusion of all of 23 anatomical structures in the core syllabus (Table 9-5, agreement scores  $\geq 82\%$ ). In the global study, there was no agreement ( $\leq 69\%$ ) on the inclusion of forehead (central, middle, lateral), corrugator (medial, lateral), and periauricular fat compartments in the core syllabus.

#### **9.9.5 Muscles**

For muscles involving mimetic and mastication processes, the Delphi process covered a total of 22 muscles to be included in the core syllabus. Experts showed complete consensus over the inclusion of all of 22 muscles to the core syllabus (Table 9-5, agreement scores  $\geq 80\%$ ). The current regional study results complemented those of global recommendations except malaris muscle, for which there was no consensus (agreement score  $\sim 51\%$ ).

Table 9-5: Summary from Delphi round 1 and 2 by anatomical layers, topographical landmarks, fold, crease, and grooves of face and neck

Anatomical structure	Level of agreement (%)	Consensus
<b>Anatomical layers of the face</b>		
Superficial musculo-aponeurotic system	96.43	Yes
Facial mimetic muscles	96.43	Yes
Facial muscles of mastication (temporalis, masseter, pterygoid)	96.64	Yes
Subcutaneous layer (superficial fat compartments)	96.64	Yes
Deep fat compartments	94.64	Yes
Anatomical spaces (Ristow's space, prezygomatic, premaxillary)	92.86	Yes
Osteo-cutaneous retaining ligaments	92.85	Yes
False ligaments (fascia-cutaneous ligament)	91.07	Yes
Periosteum (bone)	80.36	Yes
Skin histology & thickness	76.79	No
<b>Topographical landmarks of the Face</b>		
Orbital rim	96.42	Yes
Temporal crest	92.86	Yes
Inferior maxillary border	92.85	Yes
Foramina (infraorbital, supraorbital, supratrochlear, mental, zygomaticofacial)	92.85	Yes
Anterior border of the masseter	89.28	Yes
Gonial angle	85.71	Yes
Medial and lateral Iris	78.43	No



<b>Facial Grooves, Creases and Folds</b>		
Nasolabial fold	98.22	Yes
Medial corrugator crease	96.43	Yes
Nasojugal groove	96.64	Yes
Labio-mental crease	92.86	Yes
Neck Crease	92.86	Yes
Forehead-lid crease	91.08	Yes
Alar Crease	87.50	Yes
Supra-tarsal fold	80.36	Yes
Pre-auricular Crease	76.78	No
<b>Superficial Fat Compartments of Face</b>		
Infra-orbital fat compartments	94.64	Yes
The superior, inferior, and lateral orbital fat compartments	89.29	Yes
Nasolabial fat compartments	89.29	Yes
Medial, middle, lateral temporal-cheek fat compartment "malar"	89.29	Yes
The Central, middle, lateral compartment in the forehead	87.50	Yes
Medial and lateral corrugator fat compartment	87.50	Yes
Peri-auricular fat compartment	82.14	Yes
<b>Deep Fat Compartments of Face</b>		
Retro-orbicularis oculi fat (ROOF)	92.86	Yes
Sub-orbicularis occult fat compartment (SOOF)	89.29	Yes
Buccal fat	89.29	Yes
Deep medial cheek fat	83.93	Yes

<b>Muscles</b>		
Zygomaticus major, minor, levator labii superioris, levator labii superioris alaeque nasi	94.64	Yes
Masseter and risorius	92.86	Yes
Glabellar complex (corrugator supercili, depressor supercili, procerus)	91.07	Yes
Temporalis, temporoparietalis muscle	89.29	Yes
Orbicularis oculi	89.29	Yes
Orbicularis oris, depressor anguli oris & depressor labii inferioris	87.50	Yes
Mentalis & Platysma	87.50	Yes
Malaris muscle	82.14	Yes
Nasalis, dilator narse, depressor septi muscle	80.36	Yes

## **9.9.6 Vasculature and Innervation**

### **9.9.6.1 Anatomy of the Forehead**

Of the nine anatomical structures included in the Delphi process, there was complete consensus among experts over the inclusion of all of nine structures to the core syllabus (Table 9-6, agreement scores  $\geq 84\%$ ). Recommendations found in this study showed complete agreement with those of the global study, which too recommended the inclusion of all of 9 anatomical structures to the core syllabus.

### **9.9.6.2 Anatomy of the Temple**

A total of 12 anatomical structures were included in the Delphi process. The expert panel showed complete consensus (Table 9-6) over the inclusion of all 12 structures to the core syllabus (agreement scores  $\geq 86\%$ ). In contrast to these findings, a global study showed consensus over the inclusion of only ten anatomical structures (agreement scores  $\geq 82\%$ ) with the exclusion of zygomaticotemporal and auriculotemporal nerves (agreement scores  $\leq 76\%$ ) to the core syllabus.

### **9.9.6.3 Anatomy of the Periorbital region**

A total of 5 anatomical structures covering the periorbital region were included in the Delphi process. Experts showed complete consensus (Table 9-6) over the inclusion of all of 5 structures to the core syllabus (agreement scores  $\geq 82\%$ ). However, in the global study, experts could achieve consensus over four structures (agreement scores  $\geq 82\%$ ) and excluded inclusion of the medial and lateral canthal tendons to the core syllabus (agreement scores  $\leq 76\%$ ).

#### 9.9.6.4 Anatomy of the Nose

Of the 16 anatomical nasal structures included in the Delphi process, the expert panel showed complete consensus (Table 9-6) over the inclusion of all 16 anatomical structures to the core syllabus (agreement scores  $\geq 82\%$ ). Compared to the findings in this study, the global study showed expert consensus over 13 anatomical structures (agreement scores  $\geq 85\%$ ) to be included in the core syllabus and excluded middle alar compartments and the internal and external nasal valves (agreement scores  $\leq 71\%$ ).

Table 9-6: Summary from Delphi round 1 and 2 by aesthetic zones of face and neck identified

Anatomical structure	Level of agreement (%)	Consensus
<b>Forehead Anatomy</b>		
Supratrochlear artery and vein	98.22	Yes
Central forehead artery	96.43	Yes
Supratrochlear nerve	92.85	Yes
Supraorbital artery, vein and foramen/notch	91.08	Yes
Supraorbital nerve and its deep branch	89.28	Yes
Galea	83.93	Yes
<b>Anatomy of the Temple</b>		
Zygomaticotemporal nerve	94.65	Yes
Superficial temporal artery/vein	94.64	Yes
Temporal branch of the VII <sup>th</sup> nerve	94.64	Yes
Auriculotemporal nerve	94.64	Yes

Middle temporal vein	92.86	Yes
Anterior and posterior deep temporal arteries	92.86	Yes
Frontal branch of the VII <sup>th</sup> nerve	91.07	Yes
Sentinel vein	91.07	Yes
Deep temporal fascia (superficial and deep layers)	87.50	Yes
Superficial temporal fascia	85.71	Yes
<b>Anatomy of the Periorbital region</b>		
Tear trough ligament and it's anatomy	96.24	Yes
Orbicularis retaining ligament	89.28	Yes
Infra-orbital fat compartment	89.28	Yes
Arcus marginalis	87.50	Yes
Lateral canthal tendon	85.71	Yes
Orbital septum	82.14	Yes
<b>Anatomy of the Nose</b>		
Columellar branches of superior labial artery	94.64	Yes
Intercanthal artery and vein	94.64	Yes
Supra tip arterial plexus	94.64	Yes
Lateral nasal artery	94.64	Yes
Dorsal nasal artery	94.64	Yes
Angular artery	89.29	Yes
Philtral arteries	87.50	Yes
Nasal valves (internal and external)	82.15	Yes

#### **9.9.6.5 Anatomy of the Mid and Lower Face**

Of a total of 6 anatomical structures that covered mid and lower face anatomy, the experts showed complete consensus (Table 9-7) over the inclusion of all six structures to the core syllabus (agreement scores  $\geq$  87%). Findings in this study were like the global study, which also recommended all of 6 anatomical structures to the core syllabus (agreement scores  $\geq$  81%).

#### **9.9.6.6 Anatomy of the Lip**

A total of 11 anatomical structures covering lip anatomy were included in the Delphi process. There was a complete consensus among experts (Table 9-7) for the inclusions of all 11 structures to the core syllabus (agreement scores  $\geq$  87%). These recommendations align with those of global study, which too recommended all 11 structures to the core syllabus (agreement scores  $\geq$  90%).

Table 9-7: Summary from Delphi round 1 and 2 by aesthetic zones of face and neck identified as “Very Important” by  $\geq 80\%$  of experts

Anatomical structure	Level of agreement (%)	Consensus
<b>Mid and Lower Face Anatomy</b>		
Facial artery	98.21	Yes
Transverse facial artery	94.64	Yes
Parotid gland and Stensen duct	91.07	Yes
Masseteric cutaneous ligament	91.07	Yes
Zygomatic ligament	87.50	Yes
<b>Anatomy of the Lip</b>		
Superior & inferior labial artery	96.42	Yes
Oral commissure	92.86	Yes
Cupid’s bow, Philtral column	92.86	Yes
Vermilion-cutaneous junction, G-K point, wet-dry junction, tubercle	92.86	Yes
Modiolus, Orbicularis oris	91.08	Yes
Fat compartment of upper & lower lip	87.50	Yes
<b>Anatomy of the Chin</b>		
Mental arteries and nerve	94.64	Yes
Central branch of submental artery	91.07	Yes
Submental arteries (horizontal and vertical)	89.29	Yes
Chin fat compartment	89.27	Yes
Superior and inferior jowl fat compartment	87.50	Yes

<b>Anatomy of the Neck</b>		
Marginal mandibular nerve	91.07	Yes
Submental fat pad (pre-platysmal and post-platysmal)	89.28	Yes
Cervical fat compartment	87.50	Yes
Mandibular ligament	87.50	Yes
Submandibular glands	85.71	Yes
Thyroid gland	82.14	Yes
Hyoid bone	73.21	No
Platysma muscle	87.50	Yes



#### 9.9.6.7 **Anatomy of the chin**

From the chin region, five anatomical structures were considered for the Delphi process. There was a complete consensus among experts (Table 9-7) to include all five structures in the core syllabus (agreement scores  $\geq$  87%). Findings in this study align with those of global study recommendations (all five structures to be included with agreement scores of  $\geq$  80%).

#### 9.9.6.8 **Anatomy of the Neck**

Out of 8 anatomical structures covering neck anatomy, there was a complete consensus (Table 9-7) among experts over the inclusion of 7 out of 8 structures to the core syllabus (agreement scores  $\geq$  82%). No consensus over the inclusion of hyoid bone (agreement score  $\sim$  73%) could be achieved in this study. However, in the global study, there was only a consensus for four of these eight structures to be included in the core syllabus (agreement scores  $\geq$  85%). The global study too excluded hyoid bone (agreement score  $\sim$  76%) along with other structures such as thyroid gland, digastric muscles, and anterior/external jugular vein to be part of the core syllabus.

From the course perspective, it is also crucial to understand what experts feel about how facial anatomy instructions to aesthetic physicians should be organized. The Delphi questionnaire included opinion questions over how best these instructions should be delivered. Among various possibilities, three options viz. (A) Full face by anatomical layers (skin, fat, blood vessels, innervations, etc.). (B) Thirds of the face (upper, mid, lower)

by anatomic layers; superficial to deep and (C) Aesthetic Zones (forehead, temple, eyes, cheek, nose, lips, chin); by anatomic layers superficial to deep. The fourth option, i.e., option D (Other; please specify), was also provided if an expert wants to propose an alternative way. The expert panel in the current study although did not reach a consensus (agreement score  $\geq$  80%). However, the majority (66%) of the experts preferred option C, i.e., instructions should be organized by aesthetic zones. Response for option A was 16%, while it was 13% for option B. Only 5% of the experts opted for option D. Findings in this study were again in line with recommendations in a global study where the majority (49%) of the respondents' opted for option C.

## 9.10 Discussion

The current study aimed to assess regional preferences for facial anatomy education among Chinese plastic surgeons using the modified Delphi process and compare those to that of a global study. Outcomes of such a regional study will further validate preferences inferred by global experts in the field of non-surgical aesthetics.

In the current study, the expert panel achieved a consensus that over 151 out of 154 anatomical structures are recommended to be included in any core anatomical syllabus designed for NSA practitioners. This consensus allowed to develop an atlas of highly relevant anatomical structures that were selected based on genuine evidence and their true relevance to NSA practice. It is further significant to note that there were no differences among global and regional experts over the anatomical structures that should be included in the core syllabus. Rather than, regional experts

advocated the need for an additional 14 structures to be added to the core syllabus. This further establishes the relevance of regional and ethnic preferences on local clinical practices.

The fact that the current study emphasized the inclusion of anatomical structures such as superficial fat compartments (the central, middle, lateral compartment in the forehead, medial and lateral corrugator fat compartment and Peri-auricular fat compartment) indicates the needs of regional aesthetic practitioners and preferred clinical procedures (Liew *et al.*, 2016). Overall, based on the outcomes of the current regional study and its comparison to an earlier reported global study, it can be concluded that proposed anatomical structures are highly relevant in both settings and should be covered when developing syllabi for medical education courses for aesthetic practitioners.

The authors, however, recognize differences in geographical and ethnic perceptions of facial beauty and the need for sound aesthetic judgment. Considerations of ethnic differences in determining the aesthetic outcomes are well-reported and show the importance and relevance of culture-specific beauty standards (Heppt and Vent, 2015; Liew, 2015; Liew *et al.*, 2016; Wu *et al.*, 2016). Appropriate considerations should be given to the development of the facial anatomy educational curriculum based on local needs.

## 9.11 Conclusion

This is the first comprehensive regional consensus that identified highly relevant facial and neck anatomical structures that should be essential components of the “core syllabus” in all anatomical medical education

courses catering to the needs of aesthetic practitioners. In the field of NSA, educationists and curriculum planners must include in their educational programs, core facial anatomy curriculum that equips prospective and current clinical practitioners with necessary anatomical knowledge that allows and ensures the delivery of safer, predictable outcomes for their patients.

## **Chapter 10: Implementation Framework**

### **10.1 Introduction**

The previous chapters have elaborated on the need analysis, conceptual framework, and core content development for teaching and learning in a postgraduate non-surgical aesthetics programme. The present chapter will systematically discuss the implementation framework, assessment mapping, feedback, and faculty development strategy.

Further, the chapter will expand on the theory and principles behind the implementation framework, constructing the learning outcomes anchored on the “master’s degree characteristics statements” of the Higher Education Quality Assurance Framework, United Kingdom (Quality Assurance Agency, 2020).

### **10.2 Principles of the Implementation Framework**

The available literature on the curriculum discusses the principles of design, delivery, and pedagogical theory around it extensively. However, in the absence of a structured implementation framework, the existing postgraduate programmes choose to adopt an ad hoc strategy which significantly affects the students’ satisfaction across the Higher Education Institutions, even between the top-performing universities (Burgess, Senior and Moores, 2018).

It is imperative to discuss the background behind the formation of the Quality Assurance Agency (QAA). Following the Dearing report, the higher education quality council and the quality assessment division unified to form

a single body to assure standards and quality of the undergraduate and postgraduate education across the United Kingdom (Dearing, 1997; King, 2019). It presents a checklist of the principles, including subject-specific benchmark, qualification characteristics statement and the credit framework.

Although it has been stated that the “higher education providers determine the content of a master’s degree in terms of knowledge and understanding, expertise and skills that students are intended to acquire”, neither it sets out how this can be achieved (such as expert discussion, consensus generation) nor delivered in a structured implementation framework. Several academics have applied concepts drawn from the work of Bernstein and Ball to identify the ‘message structures’ of the curriculum. This composite evidence all reveals how problems are interconnected and their relationship to each other. In his book on teaching, Bernstein also described three messages: awareness, pedagogy, society and later, Ball added curriculum dimensions (Bernstein, 1990; Ball, 1998).

The present concept of curriculum implementation begins by defining the aim and learning objectives of the programme. This is followed by mapping the content with learning outcomes, assessment framework, and instructional strategies often referred to as ‘Backward Design’ (Wiggine and McTighe, 2005). The crucial implementation stage is identifying the driving question such as what is comprehensible and beyond being essential? Sometimes, a complex, rigorous course, such as in a clinical postgraduate programme, involves narrowing the spectrum for students to focus on critical ideas and concepts. Once this has been achieved, the principal learning outcomes should be constructed underpinning four

criteria: 1. Distinctive and insightful, 2. Discipline-specific 3. Inquisitive, and 4. Engaging (Emory, 2014).

To successfully achieve the criteria mentioned earlier, one needs to follow the principle of the threshold concepts proposed by Meyer and Land. Threshold concepts are essential for mastering a core concept and helps to develop a diverse understanding of a subject in discussion. It has been delineated as “being like a gateway or portal: opening up a new and previously inaccessible way of thinking about something” (Meyer and Land, 2003). The threshold concept is often called fundamental because it links the field of interest, methods of thought and application intrinsic to the discipline that a student practice. Often referred to as “jewels in the curriculum”, it offers ‘transformative’ learning to the students as to how they perceive their speciality. In addition, it serves as ‘integrative’: likely to act as a bridge linking disparate elements for students (Aha! moment) and ‘discursive’: crossing a threshold will broaden a student’s horizons by allowing them to apply and convey greater control of expression in the field (Meyer and Land, 2005; Neve, Wearn and Collett, 2016). There is emerging evidence that pedagogy once considered “good” can be “bad” when it comes to the acquisition of thresholds (Meyer and Shanahan, 2003). However, the concept is less explored in the present day, not because of its productivity but because oversimplifying elements in the pedagogical design and mastery of threshold concepts almost always require troublesome mappings, and convolutions hinder its useability.

If the learning outcomes have been made explicit, the subsequent inquiry should be “How can students show they have mastered it?” What type of

assessment adequately reflects that student have gained mastery of course content and competency in meeting course objectives?

With the advent of new ideas of authentic models of learning, assessment methods will need to change. It is argued that the current constructivist learning model considers students as “self-builders” rather than as students receiving knowledge from instructors. However, to determine a student’s achievements, curriculum developers need to reflect on how well they apply information to real-life problems. This is indeed complemented by choosing suitable assessment strategies to match the instructional design. Assessment should be approached creatively to involve and empower students in identifying how they are learning.

### **10.3 Aim, threshold concept and intended learning outcome**

The aim, threshold concept and the learning outcome are constructed based on the need analysis and the educational theories underpinning teaching and learning as stated in the previous chapters.

#### **10.3.1 Aim**

A postgraduate programme in NSA provides healthcare professionals with an educational route to acquire the necessary knowledge and skills focusing on contemporary and evidence-based practice. The aim is to

- 1) Comprehend the clinical theories, apply, and justify the methodologies, abilities and address the issues relevant to NSA



- 2) Promoting the application of specialist knowledge, assessment of clinical theories, and study associated with NSA
- 3) Enable an avenue for an independent research project in the specialist field.

### 10.3.2 **Threshold Concepts**

There is a dearth of work undertaken on the threshold concepts in the field of non-surgical aesthetics education. Nevertheless, this is very important for a student's journey through a programme and lays the groundwork for an exciting perspective, as described earlier. Following threshold concepts in non-surgical aesthetics, education was identified from the core curriculum (Figure 10-1).

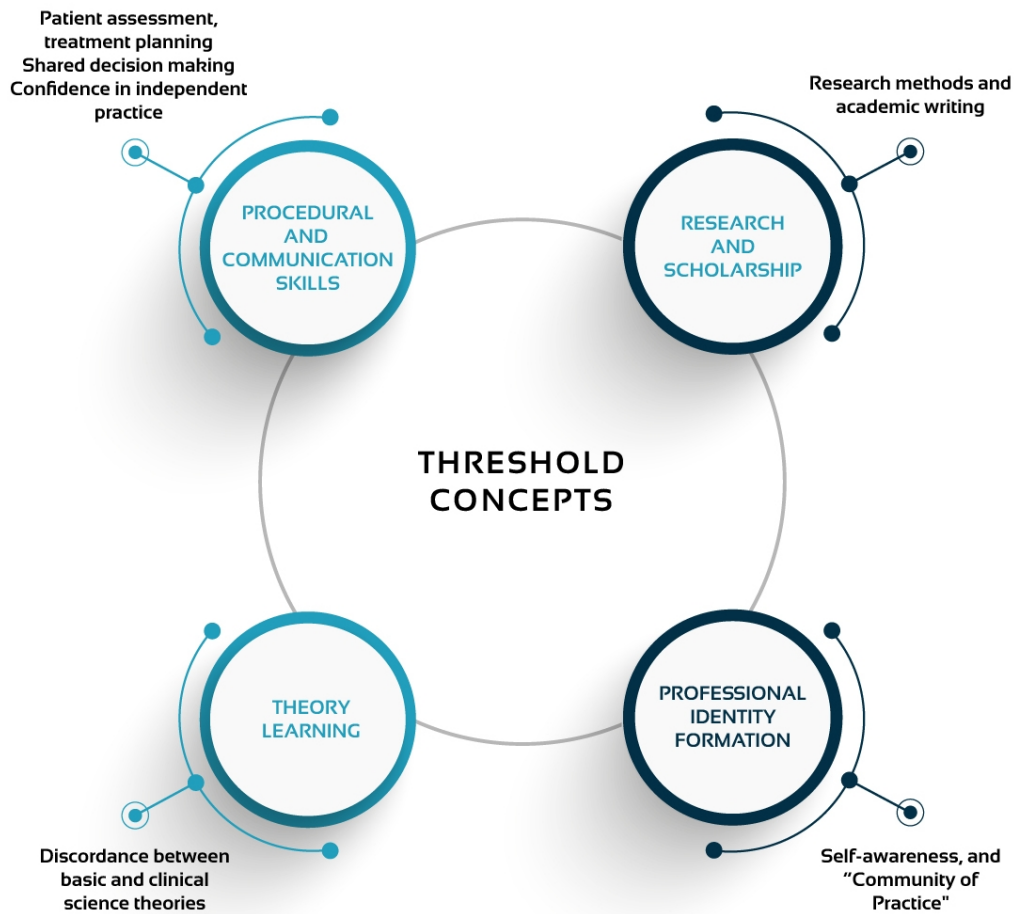


Figure 10-1: Threshold Concepts in NSA

Hence, the programme needs to be developed and designed to predict future learning difficulties perceived by the students and alleviating such problems by implementing threshold concepts to enhance the learning experience. Educators must have patience as learners may take time to develop newer concepts. There is a possibility that students may “oscillate between old and emergent understandings”. In such conditions, educators can facilitate the concept building process by providing a safe “holding

environment” and inspiring the students for looking at the concepts differently (Cousin, 2006).

### 10.3.3 Learning Outcomes

#### W. Knowledge and Understanding

W1. Constructive analysis and application of NSA principles, hypotheses, and contemporary information.

W2. Understand, synthesise, incorporate scientific knowledge in clinical practice.

W3. Assess critically and take advantage of different study methodologies.

W4. Explore, expand, and conduct research related to the field.

#### X. Practical and affective skills

X1. Demonstrate skills in NSA to benefit the patient and the profession.

X2. Demonstrate complementary skills to influence the development and evaluation of evidence-based practice

X3. Adopt modern technology to meet patients’ demands

#### Y. Intellectual Skills

Y1. Conduct, confirm and improve protocol implementation

Y2. Analyse challenges, opportunities and develop evidence-based strategies.

#### Z. Employability and personal development

Z1. Develop a reliable network for professional growth

Z2. Demonstrate critical thinking, reasoning, and interpersonal skills.

#### 10.3.4 **Learning activities to exceed threshold concept aligning with the learning outcome**

As proposed in Chapter 8, critical thinking lies at the heart of the conceptual framework for teaching and learning in postgraduate education. To achieve information mastery, i.e., meeting the threshold concept of grasping the extensive factual data, enquiry-based learning plays a pivotal role in achieving the learning outcomes. This can be achieved by implementing scenario-based teaching and expert forum discussion.

In this learning model, well-structured questions are essential to gauge students' comprehension, assisting them in discovering their skills and cultivating the ability to come up with new ideas. Complex questions stimulate intellectual engagement, lead to new ideas, spark conversation, and encourage thorough analysis of ideas (Tofade, Elsner and Haines, 2013).

Throughout this thesis, dissatisfaction among postgraduate trainees in acquiring NSA procedural skills and low confidence in independent practice has been highlighted. The burning question is how and what form of skills acquisition can be taught to exceed the threshold concept. As clinical training derived from Halsted's apprenticeship model (Rohrich, 2006), having a 'Master Key' modelling neither fit all clinical training nor accurately meet the psychometric need in postgraduate education. Although there have been several improvements over the last decade, one must recognise that it is not a perfect method for handling today's healthcare systems, especially concerning a broad range of demographics and the sophistication of patients (Rassie, 2017).

It turns out that clinicians cannot teach by any other means than exposing the learner to actual clinical environments. These rigorous and progressive roles enable them to exercise autonomy in their work (Rodriguez-Paz *et al.*, 2009). However painful, this approach yields results for the clinical student, who abruptly shifts from theoretical knowledge to the treatment and services into the actual world of clinical practice. Now, physiology on the minute must be relearned, and minutiae must be mastered. Nonetheless, in the modern era, the idea of apprenticeship has been updated and modified to serve the needs. ACGME began implementing the 80-hour job limit in 2003; the result was a transition from training focused on time spent in the wards to competence. Moreover, concerns regarding the patients' safety and the need for teaching new procedures to trainees encouraged educators to develop alternative and safer training methodology such as simulation models (Kotsis and Chung, 2013).

### 10.3.5 **Assessment strategy**

Now that the enquiry-based learning and competency-based training is adopted for the knowledge, understanding, practical and affective skills; choosing the suitable assessment tool is of paramount importance not only to explore whether the trainees have achieved the benchmark but also to feedback and feedforward for them to improve their knowledge, skills and understanding. For a postgraduate programme, testing the factual knowledge via multiple-choice and the extended matching question is not that valuable as they do not test the critical understanding of a topic. In the recent literature, substantial emphasis has been put on reflection and self-assessment (Harden, 2006). A few of them summarised as follows:

#### 10.3.5.1 **Critical Reflective Writing:**

Emerging evidence suggests that critical reflective writing in postgraduate medical education holds immense potential. Reflective writing has been a proven mechanism for facilitating self-reflection and self-directed learning during residency training. Moreover, writing upgrades physicians' reserves of empathy, reflection and courage (Charon, 2004). Reflection is a "meaning-making" process that takes the students from one experience to another, facilitating deeper understanding while linking it to other insights and ideas. Further, reflective writing with proper reflection can be transformative and lead the students for taking action (Wear *et al.*, 2012).

#### 10.3.5.2 **Research Reports:**

A referenced bibliography provides a simple way for students to show their comprehension of course material by noting academic references in writing. Students who have developed greater use of technology to communicate with others may collaborate on Wikis (a collaborative tool) instead.

#### 10.3.5.3 **E-Portfolios:**

The portfolio comprises different case presentations that go along with interpretive comments that express how that content was learned. Students are engaged in deeper learning as they consider their completed work and assess its value for future assignments. An E-portfolio should also contain series of structured procedural assessment forms that can be used as formative assessment (Table 10-1).

#### 10.3.5.4 **Objective assessment of the performance of a task:**

For hands-on skills and problem-solving education, students are expected to complete tasks such as demonstrating facial assessment, performing an accurate injection of neuromodulator, or engaging in a good history taking with real or simulated patients and receiving structured feedback from the supervisors.

Table 10-1: Example of a procedural skills' formative assessment form

Name of the Clinical Skills/Procedure		Facial Assessment & Treatment Planning	Date	
No.	Competency Matrix		Satisfactory	Unsatisfactory
1	Trainee aware of the relationship between the signs of ageing and the underlying anatomy			
2	Overall assessment considering:			
	1. Medical history			
	2. Lifestyle			
	3. Pain tolerance			
	4. Facial shape type			
	5. Age and gender			
3	Assessment of Skin quality:			
	1. Pigmentation			
	2. Surface irregularities			
	3. Tone & Texture			
4	Conduct a full-face assessment to identify treatment needs for optimal results			
	Use the 3-step approach to conduct a full-face assessment:			
	Features, Volume loss and superficial lines			
	<b>Assess:</b>			
	1. Dynamic and static lines			
	2. Any Volume loss			
	3. Changes in the Features			
	4. Position and mobility of brow, eyelid function, and presence of excess skin			
5. Muscle function during a conversation				
5	Develop a treatment plan to deliver:			
	1. Optimal effect and			
	2. Natural results			
6	Clinical Photograph taken			
	1. Frontal, Oblique, lateral			
	2. Evaluate at rest and on animation			



7	Initial consultation:			
	1.Determine for which area(s) is the treatment being sought			
	2.Check to understand the treatments available			
	3.Educate the patient on the change in their skin/bone/muscle anatomy and the need for a long-term treatment plan			
	4.Inform the patient of procedures available			
	5.Create a treatment plan to deliver the best results			
	6.Spend sufficient time with the patient to understand their concern (the first consultation should last around 30-45 minutes)			
8	1.Discuss potential risks and benefits of treatment so that they can make an informed decision			
	2.Under promise, over deliver			
9	Informed Consent Taken			
10	Selection of appropriate treatment option (botulinum toxin/filler)			
11	Appropriate injection technique			
	1.Aseptic precaution			
	2.Reconstitution of medication			
	3. Appropriate needle size			
	4. Area of injection			
	5. Depth			
	6. Dose per site			
7. Total dose				
12	Post-treatment advice given			
<b>Overall Outcome</b> (Please Tick appropriate box)		<b>Satisfactory</b>	<b>Unsatisfactory/ Retake</b>	
<b>TO BE COMPLETED BY THE TRAINER</b>			<b>TO BE COMPLETED BY THE TRAINEE</b>	
<b>Name</b> <b>Current designation</b>			<b>Trainee Signature</b>	
<b>Signed</b>				
<b>Date</b>				
			<b>Date</b>	

## **10.4 Mapping of the Curriculum Content, Learning outcome and assessment framework**

QAA guidelines value the masters' degree program for 180 credits. Further, the guideline also stipulates to allocate 45 to 60 credits on the dedicated research projects. Once learning outcome and curricular content with appropriate assessment strategies are identified, the programme directors divide the content and outcome into small credit volumes, often referred to as modules. A module often represents a generalist or a specialist content and learning outcome. However, it is crucial to map the modules against the learning outcome, curricular content, and assessment strategies. Table 10-2 presents the mapping of the curricular content and the learning outcomes proposed in the present chapter, and an effort has been made to map the teaching and learning strategy to reach threshold concept and assessment load.

Table 10-2: Curricular Mapping

Intended Curricular Content	Learning Outcome											Threshold Concept (TC)				Teaching and Learning Strategy				Assessment				
	Knowledge and Understanding				Practical and Affective Skills			Intellectual Skills		Employability and Personal Development		Theory Learning	Procedural and Communication Skills	Research and Scholarship	Professional Identity Formation	Enquiry based learning	Case-based discussion	Expert forum discussion	Supervised Clinical practice	Reflective writing	Presentation	e-portfolio	OSCOPE	Research project
W1	W2	W3	W4	X1	X 2	X 3	Y 1	Y 2	Z 1	Z 2														
1. Basic Science (A1-12)	*	*	*	*								*				*	*							
2. Clinical Science (B1-B10)					*	*	*						*			*	*	*		*	*	*	*	
3. Professionalism, Regulations and Compliance (C1-C6)								*	*	*	*			*	*	*	*			*	*	*	*	
4. Research and Critical Thinking (D1-D6)							*	*						*		*		*		*	*	*	*	

## 10.5 Faculty development and train the trainers

Postgraduate speciality training programmes have transitioned towards competency-based clinical programmes that evaluate trainees' attainment of demonstrable skills and performance. The faculty and clinical supervisors have a significant role in assisting trainees in achieving skills and promoting professionalism, equality, and diversity and harnessing the desire for lifelong learning. This requires faculty development and appropriate support for continuous professional development (Udemans *et al.*, 2018).

The members of the faculty are selected for their humanity, ability to teach, and commitment to helping students learn. They are to put their effort into training to encourage more academics to help deliver the education (Hernandez, Hopkins and Dudas, 2018). It includes various approaches, focusing on training the teachers to improve their own and others' ability to teach and improve individual and organisational capacity for creative and learning success. At every level, faculty growth involves the ability to read, guide, and manage scholars, in addition to contributions to research and scholarship. Academic faculties face a more significant workload with inadequate plans for time off. It is not only to create a favourable learning environment for the individual but to introduce ideas, but also to design situations in which those ideas are brought to the forefront. A new level of quality assurance has been developed to provide feedback surveys for both trainers and trainees. An increasing number of physicians in the UK are pursuing an additional qualification in medical education to improve their understanding of the

pedagogy and aid faculty development (Morris and Swanwick, 2018). Moreover, faculty growth needs to confront all kinds of initiatives associated with improving the educational environment, strengthening the organisational infrastructure, and modifying educational practices.

Although patient protection continues to drive risk-averse workplace behaviour, opportunities to obtain job experience are diminished. This over-uncontrolled style of working and unwanted side effects lead to skewed activities open to trainees. Due to this, there have been notable shifts in postgraduate training methods and approaches. This broader, workplace-based appraisal should be coupled with coaching and extended over time to include stakeholders to be genuinely relevant (Morris and Swanwick, 2018).

## CURRICULUM DESIGN AND DELIVERY

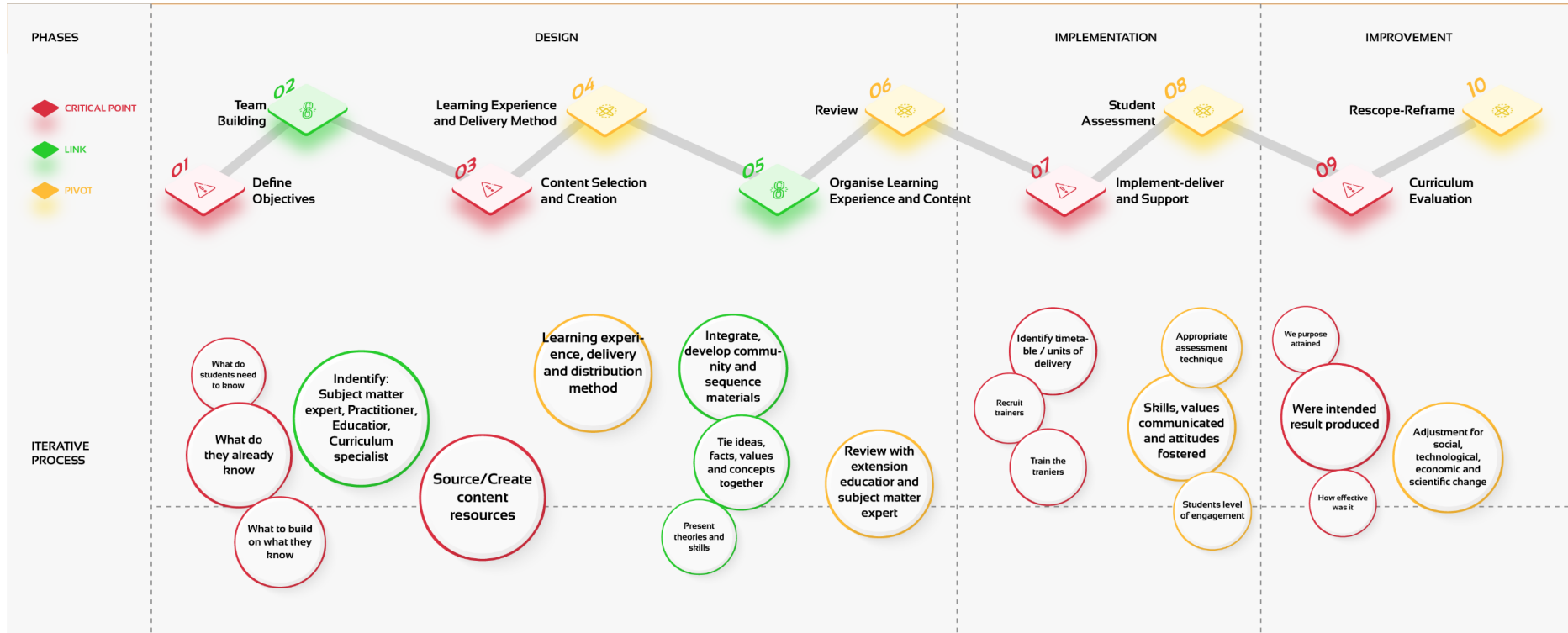


Figure 10-2: Curriculum delivery critical points and pivots

## 10.6 Curriculum delivery critical points and pivots

A famous aphorism by John Dewey (1950) truly reflects such “The self is not something ready-made, but something in continuous formation through choice of action”. Without a transmission vehicle, contents will only remain as ‘tick boxes, and neither ‘professional identity formation as an aesthetic physician nor patient safety can be achieved. Figure 10-2 elaborates the schematic diagram of the implementation framework and describes the pivots, links, and critical points.

## 10.7 Conclusion

Curriculum design is immensely complex, which involves trainers, trainees, and other stakeholders. Nevertheless, the implementation framework is equally multifaceted and acts as a critical point, same as defining objectives, content creation or curriculum maintenance.

## 10.8 **Study 4: Development of a new teaching model, ADDAPT, for aesthetic physicians(Kumar, Rahman and Adds, 2018) (Appendix E)**

With the emergence of “volume” fillers, the role of cosmetic physicians has extended towards utilizing non-surgical facial contouring techniques with minimum discomfort to the individual. However, this is also linked with inevitable downfalls, such as the probability of rare but catastrophic complications such as loss of vision due to unintended soft tissue filler or fat vascular occlusion. In addition, several narratives suggest physicians’ lack of anatomical proficiency. Nevertheless, it is an indisputable fact that knowledge of anatomy and individual variation is of utmost importance for ensuring aesthetic procedures are performed safely and efficiently for the desired outcome.

A review of existing evidence has brought forth the lapses in the training on anatomy. In common practice, anatomy is taught by nonclinical teachers who may not have the relevant clinical insight. Moreover, examination pattern partially influences the study behaviour and retention of the students. Prior knowledge of the evaluation format affects how a student compartmentalizes and retains the knowledge gained through teaching. Iteration and reiteration also positively influence the learning and retention of the knowledge gained by the students; however, time restrictions in anatomy teaching in medical schools do not allow for this.

Furthermore, “Peyton’s four-step approach; demonstrations, deconstruction, comprehension, and execution” is a widely used clinical



skills teaching method inspired by “Bloom’s taxonomy” that was initially created for one-on-one teaching. Dawson expanded it by identifying four separate steps “observation, refining, consolidation, and mastery”. The current study presents a six-step new teaching method named “ADDAPT; **A**ssess & **A**ware, **D**emonstrate, **D**ecode, **A**ct & **A**ccomplish, **p**erform, **T**each & **T**est)” to teach clinical anatomy and related procedural skills for a large cohort (Figure 10-3).

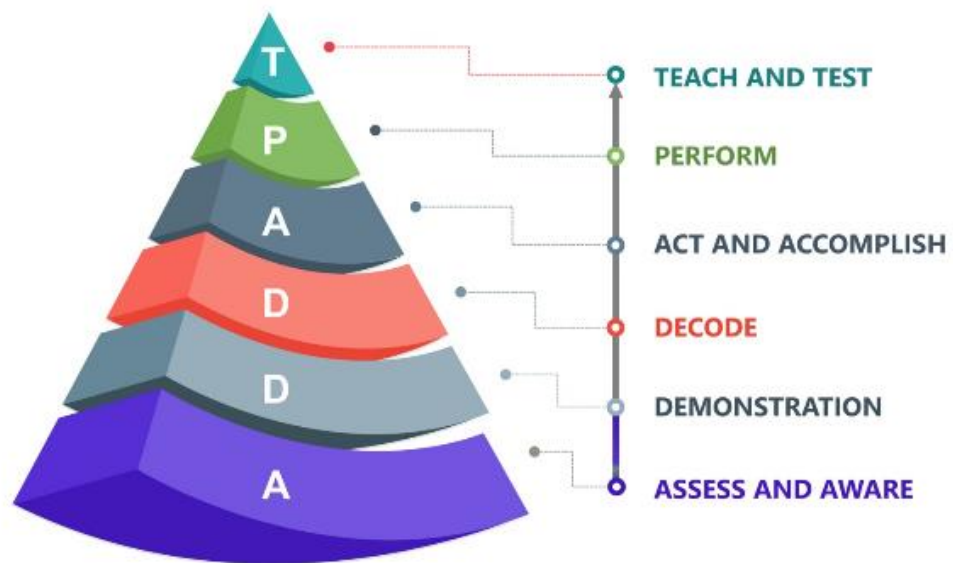


Figure 10-3: ADDAPT six-step teaching model

The research is a quasi-experimental study to assess the effectiveness and practicality of the ADDAPT model in a large group setting. Two cohorts (n=124) of aesthetic physicians were part of the study. The 2-day course delved deep into the curating understanding concerning functional anatomy relevant to NSA procedures on fresh frozen cadavers with particular attention to safer injection techniques. Both pre-and post-assessments were in the form of MCQs and case-based clinical anatomy knowledge.

Independent experts, table demonstrators and participants provided their feedback on the 2-day teaching and learning experience.

As a result of the study, trainees across the specialities demonstrated a significant gain in their anatomy knowledge and relevant procedural skills. The ADDAPT model of training incorporates all the three; cognitive, affective, and psychomotor domains for learning. The adoption of all the three domains in the instructional design offered the learners clearly defined and focused steps in different stages of learning, including conceptualization visualization, verbalization, and actualization. In addition, a combination of visual, auditory, verbal, and kinaesthetic sensory modalities was merged in training to accommodate the diverse learning styles of the trainees. The outcome-based model with assessments and peer feedback has helped in building an interdependent learning network. In addition, conceptualization, iteration, and repetition have provided the base for a successful model which can re-establish theoretical knowledge and refine procedural skills in the learners.

10.9 **Study 5: Effectiveness of teaching facial anatomy through cadaver dissection on aesthetic physicians' knowledge (Kumar and Rahman, 2017) (Appendix F)**

This study evaluates the effectiveness of anatomy training using 'fresh frozen cadaveric dissection' as a practical educational intervention for educating and raising aesthetic physicians' confidence in the knowledge of applied facial anatomy. Cadaveric dissection allows us to understand human tissues' realistic nature, anatomical variations between individual samples, and functional, structural, and clinical relationships. Yet, in recent years, dissection-based anatomy teaching is declining due to the implementation of integrated curricula, difficulty and the rising cost for the procurement and maintenance of the cadaveric tissue. Historically, cadaveric dissection has been the primary method for learning human anatomy. An in-depth understanding of facial anatomy is a prerequisite for safer and optimal clinical outcomes.

Furthermore, expertise in facial anatomy helps in developing aesthetic physicians' understanding of the ageing process. Research has shown that while transitioning from pre-clinical to clinical practice, trainee physicians struggle to recollect a significant portion of evident anatomy knowledge. It is now emphasised that facial anatomy knowledge may help prevent the risk of complications associated with aesthetic procedures attributable to anatomical mistakes.

The present study assessed the anatomy knowledge of 168 aesthetic physicians from different countries (China, India, Indonesia, Taiwan,

Thailand, Singapore, and Turkey) who participated in a two-days of applied facial anatomy workshop. The cohort comprises 64% females and 34% of males with mean experience in the practice of aesthetic medicine post-primary medical degree was 7.6-years (SD 3.8). The cohort was organised into smaller groups of seven members each, headed by a table demonstrator to promote active participation and communication between the trainees. The coursework and the agenda were prepared with the input of globally recognised dermatologists and aesthetic plastic surgeons, focusing on non-surgical facial aesthetic procedures. The workshop's first day was focused on Cadaveric dissection and simulation of non-surgical procedures in a logical sequence. The second day focussed on a live demonstration of the injection technique while correlating it back to anatomy. There is an elaborate discussion on the assessment technique for knowledge gain; however, there is a lack of agreement on a single assessment tool in the literature. Generally, open-ended (recall) and true-false (recognition) questions are used in educational settings. Multiple-choice questions (MCQs) were used to assess the knowledge at the beginning and end of the workshop as it helps assess both recall and recognition. The test questions were randomly selected from a validated question bank to eliminate any bias. The study participants' feedback was recorded anonymously using a 5-point Likert scale about the knowledge, skills, and confidence gained in performing non-surgical aesthetics procedures after the workshop. Statistical analysis was done by calculating frequency, mean, SD and measure of central tendency. Wilcoxon signed-

rank test was applied for the comparison of two similar samples (pre-post test result).

The study showed a significant improvement in anatomy knowledge as reflected by the mean pre-course (4.8 with SD of 1.9) and post-course (7.6 with SD of 1.7); ( $p < 0.001$ ) test scores. The participants found the workshop extremely beneficial and increased their competence and confidence (93.4%;157) for performing non-surgical aesthetics procedures. Further, they indicated an increase in facial anatomy knowledge (96.42%; n=162) and surface marking expertise. The trainees also provided qualitative feedback such as “invaluable experience to learn facial anatomy after a medical school” and “best and much-needed refresher training for every physician”. However, some of the trainees found the program to be intense, with few breaks in between sessions.

This study objectively established that a cadaver-based dissection course is an excellent educational tool that could significantly advance the facial anatomy knowledge of aesthetic physicians’, improve patient outcomes, and reduce the risk of intravascular complications associated with non-surgical aesthetics procedures. Further, it helps the trainees to familiarise themselves with anatomical variations and fully exposed 3-dimensional structures. To conclude, cadaver-based anatomy training is the gold standard in enhancing the aesthetic physicians’ knowledge and skills on complex facial anatomy, improving clinical outcomes and patients’ safety.

## 10.10 Study 6: Design and validation of an Objective Structured Practical Examination (OSPE) for Aesthetic Physicians

### 10.10.1 Introduction

Non-surgical aesthetics (NSA) is a broad therapeutic area encompassing various procedures such as injectables (neurotoxin and dermal fillers), Lasers, energy devices and other treatments. It is not a specific speciality or subspecialty and lacks a systematic education and training framework. I have been developing a systematic training and education pathway for the aesthetic practitioners, in particular, applied facial anatomy specific to injection therapy and published elsewhere (Kumar and Rahman, 2017; Kumar, Rahman and Adds, 2018; Kumar, Swift and Rahman, 2018). Anatomy remains an essential prerequisite for optimal procedural outcomes in medicine. Moreover, for effective and safe clinical practice, physicians are expected to develop a more profound 'understanding' of anatomy rather than just 'knowing' together with critical skills such as diagnosis and inference of clinical condition concerning topographical anatomy (Boon, Meiring and Richards, 2002; Heylings, 2002).

Assessment strategies are one of the vital components of the curriculum and help in accomplishing learning outcomes. It is vital to design and validate proper assessment methods in line with teaching objectives. One cannot be fully assured that students are learning everything that has been covered in the curriculum, but certainly, they learn the topics going to be assessed, as rightly said, "assessment drives learning" (Shimura *et al.*,

2004; Wormald *et al.*, 2009). Once, Thomas Huxley aptly said that “Student work to pass, not to know.....they do pass, and they do not know” (Huxley, 1859; Rangachari, 2019). Therefore, curriculum planners need to pay special attention to planning their teaching, learning and assessment strategies while designing the curriculum.

In the last few decades, anatomy education has gone through a transformation due to the implementation of integrated curricula affecting the knowledge and understanding of medical students (Sugand, Abrahams and Khurana, 2010; Kumar and Rahman, 2017). Several reasons are discussed in the literature for a decline in anatomy knowledge, including a change in the assessment methods. Conventionally, extended matching questions (EMQs) multiple-choice questions (MCQs) and short answer questions (SAQs) were utilised to tests cognitive abilities such as recall and recognition during anatomy teaching (Rowland *et al.*, 2011). “Objective Structured Practical Examination” (OSPE) was introduced to further enhance the learning in a clinical context. OSPE is considered the gold standard as it helps in examining applied, procedural, and theoretical skills simultaneously (Nayar, Malik and Bijlani, 1986; Menezes *et al.*, 2011). It is a timed evaluation tool to examine learners’ understanding of applied clinical anatomy utilising the cadaveric resource. OSPE has been proven to measure higher cognitive skills such as critical thinking, reasoning, interpretation, and relating the clinical conditions to structural or surface anatomy.

OSPE is an appropriate tool for assessing knowledge and skills in inquiry-based learning programs, focusing on developing an in-depth understanding of clinical anatomy. It has recently been seen that curriculum

planners are making genuine efforts to align the content, learning objectives, and assessment strategies. This mapping process is termed “blueprinting” (Crossley, Humphris and Jolly, 2002), where individual questions were mapped with a corresponding learning objective. Generally, the OSPE set-up involves 25 to 30 stations with a set of paired questions based on structural anatomy and a related clinical or procedural vignette (Yaqinuddin *et al.*, 2013).

Evidence suggests the successful use of OSPE in several areas apart from anatomy, such as dentistry, forensic medicine, pharmacology, physiology, and pathology (Dissanayake, Ali and Nayar, 1990; Inuwa *et al.*, 2011). It has been proven as an objective, valid and reliable tool for assessing clinical and practical skills. There is no such validated assessment tool that exists in the field of non-surgical aesthetics education.

Therefore, the present study aims to develop and validate a novel OSPE to assess the clinical anatomy knowledge as an assessment tool for aesthetic physicians' concerning postgraduate curriculum on non-surgical aesthetics.

#### 10.10.2 **Materials and Methods**

The study was undertaken in two phases: development of the OSPE stations and validity examinations. Each of the phases was again divided into two steps, as explained in Figure 10-4:



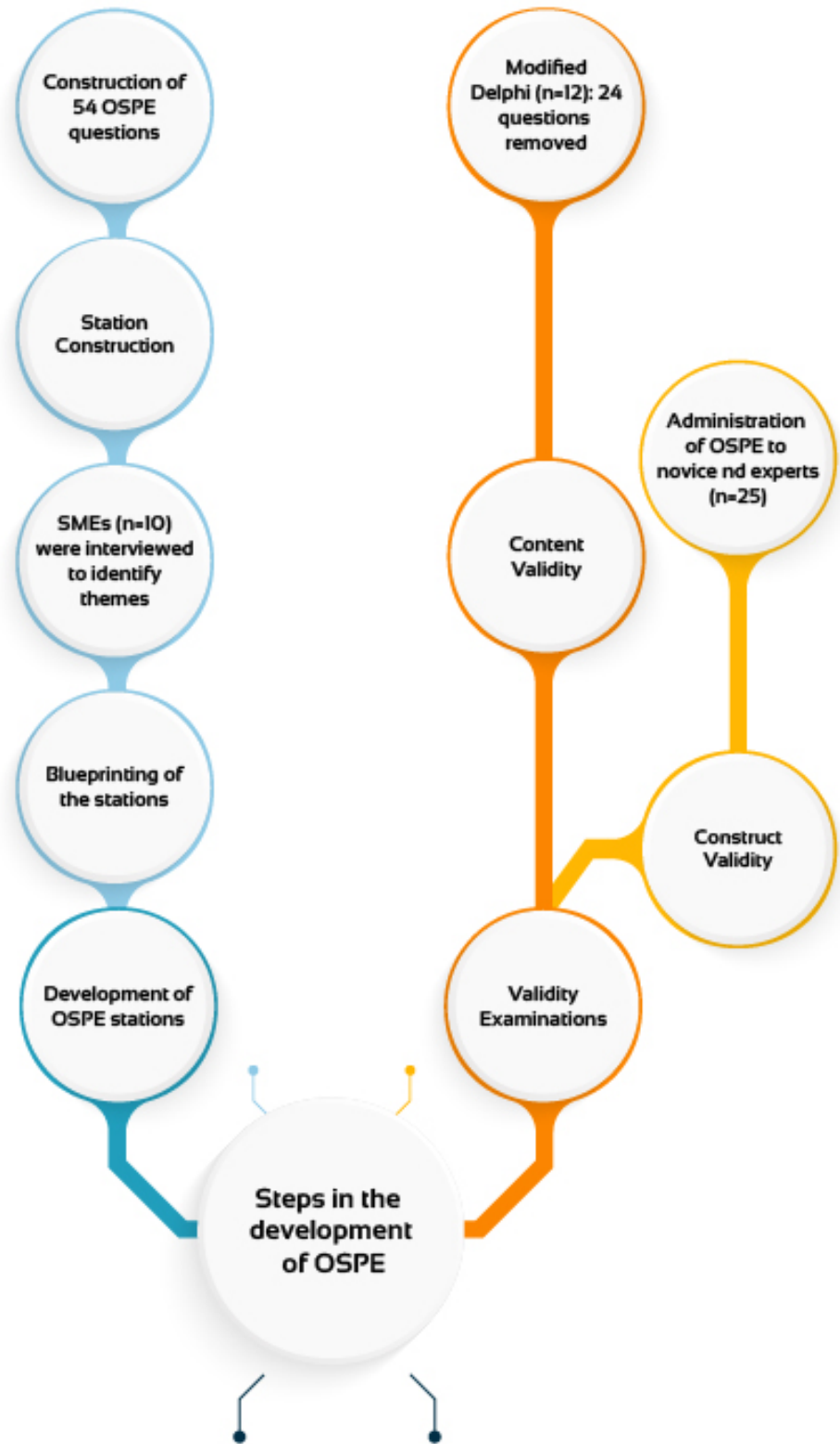


Figure 10-4: Steps in the Development of NSA OSPE

#### 10.10.2.1 **Step 1: Blueprinting of the Stations**

Based on a comprehensive literature review, the author developed a list of relevant learning themes for promoting the understanding of facial anatomy knowledge in NSA practitioners. Subsequently, in March 2018, a guided focus group with subject matter experts (SME) was convened to review, revise, and finalise the proposed themes as the guidelines discussed in chapter 5. To initiate the discussion, SMEs were posed with a question, in your opinion, “what are the most vital anatomical understandings concerning NSA procedures?”. After several rounds of iteration and reiteration, the SMEs agreed on 12 themes for blueprinting the OSPE. The agreed themes followed anatomical landmarks and their clinical significance: facial topographical anatomy, facial layers, SMAS and fat compartments, facial vasculature, facial musculature; specific considerations while treating upper, mid, lower face and management of complications (Table 10-3).

Table 10-3: OSPE Blueprinting

Station/Theme	Clinical significance of the facial topographical landmarks	Facial layers, SMAS and Fat compartments	Clinical significance of facial layers, SMAS and Fat compartments	Facial Vasculatures	Clinical significance of facial vasculatures	Facial Musculatures	Clinical significance of facial musculatures	Specific considerations concerning the treatment of upper face	Specific considerations concerning the treatment of mid-face	Specific considerations concerning the treatment of Lower face	Management of complications in relations to the NSA facial treatment
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
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22											
23											
24											
25											

### 10.10.2.2 **Step 2: Station Construction**

Question writing for individual stations is the most crucial step in designing an assessment tool. Therefore, following the SMEs' agreement and recommendations on 12 themes, the author developed 54 clinical scenarios according to the guidelines on question writing in medical education literature. Each station usually has two parts: (A) recognising anatomical landmarks and (B) a supplementary question concerning clinical anatomy. Further, every question has a single best answer (SBA) with a clinical vignette and a lead-in-question following five choices with four distractors (de Vet *et al.*, 2002; Haladyna, Downing and Rodriguez, 2002; Walsh, Harris and Smith, 2017). Stations were equipped with either a dissected Cephalus or a high resolution laminated A4 picture of a dissected Cephalus or a skull along with a full-face photograph of a patient. Necessary precautions were taken by me while placing a red pin to the relevant anatomical landmark and crosschecked by a senior SME.

For instance, as shown in Figures 10-5, a clinical scenario of a 36-year-old female presented after 35 minutes of hyaluronic acid injection with livedo reticularis on her right malar area extending up to the nasal radix and tip. The OSPE station shows a dissected cadaver showing infraorbital artery indication to "A" and "B" as the angular artery. The first part of the question requires recognising anatomical landmarks "A" and "B", while the second part of the question asks about A's relationship with B and its clinical relevance.



Figure 10-5: Example of a Clinical Scenario from an OSPE Station (Loh *et al.*, 2018)

It is expected from the trainees while answering the question to think about the inadvertent filling of the infraorbital artery with hyaluronic acid gel and further its communication with facial and angular artery. Consequently, the trainees recognise not only the anatomical landmark but also its clinical and functional relevance.

### 10.10.2.3 Step 3: Content Validity

The concept of the validity of assessment tools in the medical education literature is well recognised. All the questions were sent to an expert panel (n=12) employing a modified Delphi technique to get content validity. Experts were asked to rate the construction and alignment of the questions to the themes against two Likert rating scales (1-10), where a score of 10 represented complete alignment and appropriate construction, whereas a score of 1 represented non-alignment and poor construction. Experts were also requested to suggest any revisions in the language to remove the questions' ambiguity. Question receiving a mean score of less than ten were removed from the subsequent Delphi round. With two rounds of iteration and reiterations, a consensus was reached between the experts.

#### 10.10.2.4 **Step 4: Construct Validity**

For construct validity, the questions were evaluated for the Item Difficulty Index (P) and Discrimination Index (D) following the published guidelines (Sim and Rasiah, 2006; Rao *et al.*, 2016). Item difficulty index (from 0 to 1) for each question was measured using the number of the students in the class who answered the question correctly divided by the total number of students who answered the question; Index value closer to 0 indicates difficult question and value closer to 1 reflects an easier one.

The Item discrimination Index was computed by subtracting the number of trainees in the lower scoring group from the number of trainees in the higher-scoring group who answered the question correctly, divided by the total student number. Question with the discrimination index value of  $<0.2$  was subsequently removed from the inventory. The item difficulty and discrimination index were tested against novice ( $n=25$ ;  $<5$  years of experience in NSA) and expert ( $n=25$ ;  $>5$  years of experience in NSA).

#### 10.10.2.5 **Statistical Analysis:**

Statistical analysis was carried out using IBM SPSS Statistics for Mac, Version 27.0 (IBM Corp. Armonk, NY, USA). Internal reliability was measured by calculating Cronbach's alpha. The novice and expert group scores were compared, employing an Independent Sample t-test ( $p < 0.05$ ) was considered statistically significant.

#### 10.10.3 **Results**

The experts rated a total of 54 questions under 12 identified themes. Twenty questions removed in the first Delphi round and four in the second

round due to non-alignment and poor construction. The agreement between the expert rater was very significant, Cronbach alpha 0.90 ( $p < 0.003$ ). The mean item difficulty of the 25 questions was 0.65. While assessing the construct validity, five questions were excluded based on the discrimination index of  $< 0.2$ . The mean discrimination index for the rest 25 question was 0.48 (SD 0.18) with high internal consistency (Cronbach alpha 0.90). The mean item difficulty of the 25 questions was 0.65. An independent sample t-test was used to compare the test scores of novices and expert groups. There was a significant difference in the scores for Experts ( $M = 48.56$ ,  $SD = 1.003$ ) and novices ( $M = 33.60$ ,  $SD = 3.18$ ), conditions;  $t(48) = 22.38$ ,  $p = .000$  (Table 10-4, 10-5; Figure 10-5). These results suggest the construct validity and confirm the robustness of the OSPE set-up to accomplish the learning outcomes.

Table 10-4: Group Statistics- Experts vs Novices

	Group	N	Mean	Std Deviation	Std Error Mean
Scores	Experts	25	48.56	1.00333	0.20067
	Novice	25	33.6	3.18852	0.6377

Table 10-5: Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means				95% Confidence Interval of the Difference		
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Scores	Equal variances assumed	30.409	.000	22.377	48	.000	14.96000	.66853	13.61583	16.30417
	Equal variances not assumed			22.377	28.707	.000	14.96000	.66853	13.59209	16.32791

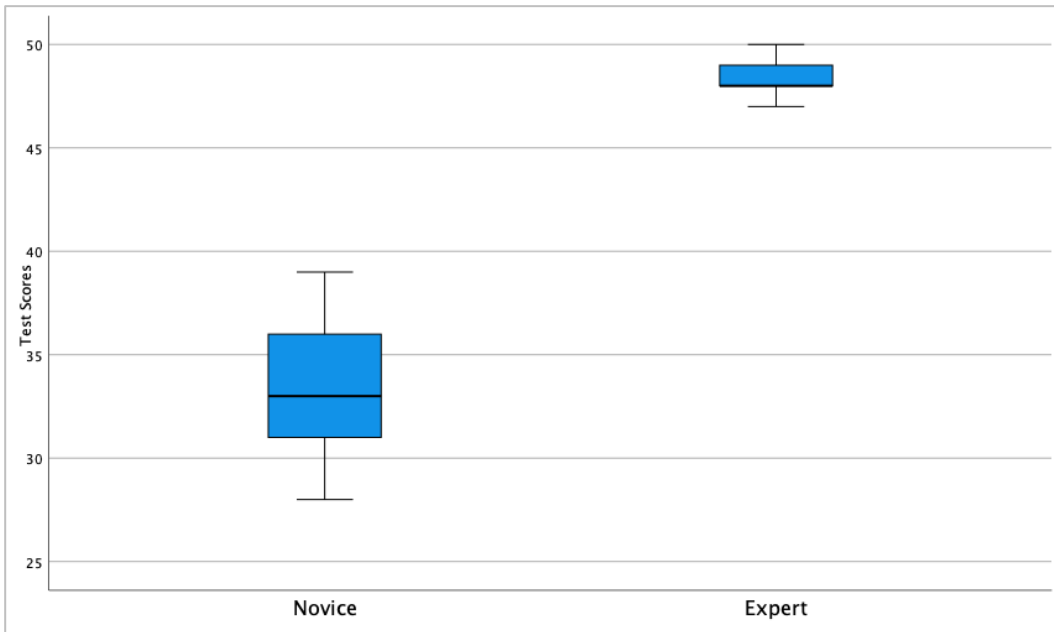


Figure 10-6: Expert vs Novice Test Scores

#### 10.10.4 Discussion

This is the first study to validate OSPE as an evaluation tool for a postgraduate non-surgical aesthetics program to the authors' best knowledge. It is essential to have a valid and reliable assessment tool to ensure the accomplishment of planned learning outcomes. Assessment strategies are a vital yet challenging part of medical education and play a crucial role in knowledge and skill attainment. A carefully planned assessment method followed by constructive feedback supports "deep learning", which translates into "understanding and interpretation" as well as equips trainees to transform into successful clinicians (Entwistle and Entwistle, 1992). Profound anatomy knowledge is necessary for safe, non-surgical aesthetics practices, especially in rapidly evolving treatment modalities. OSPE offers several advantages over other evaluation methods



as it allows the assessment of applied anatomy knowledge for clinical reasoning, judgement and decision making while answering a question related to a clinical condition.

The theory of constructivism in education states that new knowledge and skills are constructed by the learners based on their prior understanding and interaction with the learning environment. OSPE helps by providing contextual cues and activates the trainees' prior knowledge to facilitate the construction of newer understandings. In addition, questions based on clinical scenarios help to promote critical thinking and reasoning in trainees to find the solution. OSPE has been proven as a comprehensive assessment tool that facilitates an integrated learning approach to clinical anatomy and develops a deep understanding of the subject (Rowland *et al.*, 2011).

Evidence suggests that OSPE is a valuable tool for assessing the trainees' clinical anatomy knowledge in an enquiry-based curriculum. Although, OSPE requires a significant amount of resource planning and investment. Faculty members are required to invest significant time in writing learning objectives, subsequently constructing, and validating the questions and clinical scenarios. Despite all these challenges, OSPE is a critical assessment tool for measuring knowledge gain against predefined learning objectives. Therefore, the implementation of OSPE into an enquiry-based NSA curriculum is essential.

#### 10.10.5 **Conclusion**

OSPE has been proven as a valid and reliable assessment tool for examining the trainee aesthetic physicians' higher-order learning. This tool will help objectively evaluate the trainees' critical thinking, clinical reasoning, and practical anatomy knowledge. The program directors should consider the deployment of OSPE as an assessment tool during clinical anatomy teaching in the postgraduate curriculum for non-surgical aesthetics.

## 10.11 Study 7: Development and Validation of an Integrated Objective Structured Clinical Examination (i-OSCE)

### 10.11.1 Introduction

Assessment and evaluation are critical steps in medical education and rely on selecting a proper and robust instrument. Appropriate assessment tool helps to determine the effectiveness of educational programmes and ensures that the future clinicians are competent and suitable for independent clinical practice. However, the currently used assessment tools are insufficient to test the learners' knowledge, skills, behaviour, and critical thinking abilities holistically. In such cases, using the 'test battery' approach becomes more practical to use a mix of assessment tools for measuring an array of learning domains (Tabish, 2008; Khan *et al.*, 2013).

Traditionally, clinical assessment strategies comprise a combination of 'short' and 'long case' evaluations. However, criticism about its low reliability (Tey, Chiavaroli and Ryan, 2020) and modern-day constraints such as increased litigation and student appeals (Pell and Roberts, 2006) have led institutions to focus on exams that produce trustworthy, more easily defensible outcomes. Accordingly, conventional assessment strategy evolved to overcome the challenges of traditional methodologies, such as reliance on the patient's performance, the examiner's bias, the non-standardised grading scheme, and the candidate's actual performance; the assessment strategy went through an evolution process. Consequently, the assessment process became standard, and the number of variable affective students' performance was reduced and paved the path favouring

the introduction of objective structured clinical examination (OSCE), the “gold standard” for clinical assessments globally. It aims to examine the skills and ability to understand that the assessment results will reflect the students’ day-to-day clinical performance in real-life scenarios.

In various research studies, OSCEs have been helpful in terms of reliability and validity. However, the long examination time is a cause of concern for the students and costs to the program directors (Marwaha, 2011). OSCE mainly focuses on assessing affective, cognitive, and psychomotor learning domains. Nonetheless, performance is affected by various other factors such as knowledge to apply in real-life scenarios; non-clinical skills (decision-making, teamwork, resource management, planning, and critical thinking); attitudes; environment; emotional state; physical state; and personality traits. The drawback of OSCE is that it cannot be easily used to measure non-clinical skills (Khan *et al.*, 2013)

In clinical education, critical thinking skills are measured by high-fidelity patient simulations, “California critical thinking skills test, California critical thinking disposition inventory, Del Bueno’s performance-based development system, health science reasoning test”, and Watson-Glaser critical thinking appraisal. However, these are limited in their lack of measuring the particular aspect of health profession-related attributes, inability to evaluate medical professionals’ practical reality, and effectively assess psychometric properties (Nguyen *et al.*, 2017; Majumder *et al.*, 2019).

Critical appraisal is a subcategory of critical thinking, which specifies the ability to make clinical decisions by research evidence. Various studies have

concluded that critical thinking can be refined, and without this essential ability, there can be drastically negative ramifications on students' decisions. There has been evidence of a direct correlation between critical thinking and academic success; unfortunately, many medical students struggle on tests explicitly measuring it (West *et al.*, 2000). While evaluating critical thinking strategies, there is a prominent spotlight on evidence-based practice and its role in education. Numerous systematic reviews have inferred that clinically integrated assessment methods are needed to improve further evidence-based practice skills (Maudsley and Strivens, 2000b). Critical appraisal has been incorporated into some of the high-stake professional and fellowship examinations where physicians are tested to assess their ability to judge a clinical paper in a short time based on its research design, result and whether to consider this to change one's clinical practice.

However, there is no evidence in the literature reporting the development and implementation of an evaluation tool for assessing clinical skills, analytical thinking, and non-clinical skills in the NSA educational program. Therefore, the current study aims to develop and validate an integrated objective structured clinical examination (i-OSCE) by integrating clinical and critical thinking stations for the NSA postgraduate program.

## 10.11.2 **Methods**

### 10.11.2.1 **OSCE Station Blueprinting**

Blueprinting is the standard process of mapping the intended learning outcomes, which comprise knowledge and understanding, intellectual, practical, affective, and psychomotor skills relating to the postgraduate

curriculum on NSA, with the knowledge and skill competencies to be tested in individual stations, an 'expert panel' was formed in September 2017. The panel consisted of five Aesthetic Practitioners and a senior clinical academic with over fifteen years of experience. A consensual and ceaseless approach was adopted to identify the tasks to be tested, which are essential and relevant to the NSA practice, thereby validating the content of i-OSCE (Table 10-6).

Table 10-6: OSCE Station Blueprinting

Matrix	Station 1	Station 2	Station 3	Station 4	Station 5	Station 6	Station 7	Station 8
	Upper Face	Mid / Lower face	Total face					
Consultation skills pertaining to the non-surgical facial aesthetics								
Awareness of the relationship between the signs of ageing and the underlying anatomy								
Assessment of Skin quality								
Conduct a full-face assessment to identify treatment needs for optimal results								
Clinical Photography								
Develop a treatment plan that which will deliver the optimal effect and most natural-looking results with the selection of appropriate product								
Safe Injection technique								
Post-treatment Advice								
Complication Management								
Situational Judgement								
Critical understanding of the research relating to facial assessment								
Critical understanding of the research relating to botulinum toxin								
Critical understanding of the research relating to dermal fillers								
Critical understanding of the research relating to complication management								

### 10.11.2.2 **Content development and Validation**

A 2-day OSCE writing workshop was conducted in January 2018 for 15 aesthetic practitioners and clinical academicians in the presence of 3 expert facilitators, divided into three small groups. After a brief and structured presentation on OSCE, all the groups had a facilitator lead practice session to construct each station's case scenarios. It was followed by critical feedback from the facilitator to the participants. The three working groups met regularly to construct case scenarios, candidate instruction, standardised patient information sheet, and, most importantly, the marking sheet where the entire scenario was deconstructed to make a performance checklist effectively to match the blueprint theme.

Finally, the expert panel was reconvened again to review the constructed cases with the checklists and parity of competencies across the cases. Fifty stations (25 Clinical and 25 Critical thinking) were selected to save in the repository managed by an OSCE administrator. An example of a scenario utilised at the station (now redundant made available to the students) is presented in Table 10-7.



Table 10-7: Scenario and instruction for the candidate

**This is a 15 min station**

**Candidate Instruction**

Your next consult is Miss XY (28Years)

- 1- Her primary concern is a disproportionate face, flat brow, and thinner lips. She has an upcoming event and wants to enhance her overall appearance, including her lips to look more proportionate.
- 2- Past medical history - Nothing significant. No previous hospitalizations or any recent dental work. Currently on vitamin C supplement 500mg OD. Six months back, she took four chemical peels sessions to manage acne.
- 3- Lifestyle – She follows a healthy lifestyle, does Pilates twice weekly.
- 4- Personal History - Patient is recently engaged and getting married in 3 months. She would like all her treatments to be completed a month before her big day.

**TASK:**

Please take a thorough facial assessment. Please describe as you go along to the patient.

**At 10-minute Buzzer**

1. You will be asked to summarise the findings to the examiner at the last 5 min
2. Answer the examiner's question at the end.

### 10.11.2.3 **Clinical Stations**

These stations consisted of a simulated scenario of consultation in facial aesthetics. Here, candidates must take an appropriate history, clinical photography, and facial assessment to reach a specific, accurate diagnosis. Either standardised patients or patient actors were utilised within these stations. Any clinical examination skills relevant to facial aesthetics were subsidised to fit the station's time limit. Candidates were given a brief history and asked to perform (either all or some aspects) a clinical examination and discuss it with the patient. At the end of the station, candidates were subsequently asked to summarise their findings or provide a brief management plan, including its justification, to the examiner. The other stations developed would assess candidates' professionalism and communication skills.

### 10.11.2.4 **Critical Thinking (CT) Stations**

Twenty-five CT stations were created, where candidates were asked to critically appraise its validity and reliability (formulating PICO\*, review methodology and critical analysis of the discussion), whether the article published in a peer-reviewed journal and decide to adopt this into clinical practice (applicability).

### 10.11.2.5 **Marking scheme**

Every separate checklist score was weighed based on the allotted task's significance as the station author deemed, which later reached further agreement from an expert panel in a station review meeting. Each station received an independent standardisation to create the pass marks with the help

of the borderline regression method, which utilised a combination of the checklist score and the examiner's single 3 points global rating (clear pass, borderline, or clear fail) (Table 10-8).

Table 10-8: Example of a checklist/marketing scheme

**Station:** History taking, Facial assessment and formulating a management plan for inpatient

Candidate Number	Circuit	Examiner's Code
------------------	---------	-----------------

(2=does well, 1= adequately, 0=poorly or not done)

Part 1- Initial Approach to the patient			
Introduction	2	1	0
Informed Consent Taken		1	0
Part 2- Information Gathering: Clinical content			
Overall assessment considering medical History, lifestyle	2	1	0
Assessment of the Skin Quality	2	1	0
Full face assessment	2	1	0
Clinical Photography	2	1	0
Part 3 – Information Gathering: communication skills			
Determine for which area(s) is the treatment being sought	2	1	0
Check the candidate's understanding of the treatments available	2	1	0
Educate the patient on the change in their skin/bone/muscle anatomy and the need for a long-term treatment plan	2	1	0
Inform the patient on procedures available		1	0
Create a treatment plan to deliver the best results	2	1	0
Discuss potential risks and benefits of treatment so that they can make an informed decision	2	1	0
Part 4 – Safe procedural practice and Post-treatment Advice			
Selection of appropriate treatment option	2		0
Appropriate injection technique	2	1	0
Post-treatment advice given		1	0
Part 5- Rapport and professionalism			
Polite and courteous and maintain a good rapport throughout	2	1	0
Carries out examination fluently and professionally	2	1	0
SP Mark	2	1	0
Examiner's Comments			
Overall Judgement (Global Scoring)			
Clear Pass		Borderline	
			Clear Fail

#### 10.11.2.6 **Assessor Training**

All the examiners participated in an hour-long orientation program to familiarise themselves with the OSCE setting, competency testing, and scoring guidelines. Further, they were provided with a guide describing the definitions of the competencies, checklist, global ratings.

#### 10.11.2.7 **Standardised Patient (SP) Training**

Healthy volunteers were recruited with the help of a modelling agency to act as 'simulated' patients for all the stations. They went through coaching conducted by professional medical actors and clinical and communication skills experts. SPs were given a task, particularly to the station, and they practised until they played their roles consistently. As they were also responsible for completing their part of the checklist, a calibration video was shown to practice marking and debriefing.

#### 10.11.2.8 **Pilot Study**

A pilot study was conducted with ten aesthetic practitioners in March 2018 to examine the feasibility of i-OSCE with faculty training and candidate briefing. Planned eight stations were run with one examiner and one observer. Finally, the results were reviewed, including the feedback from individual stations to amend i-OSCE documents for the final execution of the same summative examination.

#### 10.11.2.9 **Final i-OSCE**

The final examination was conducted in May 2018, comprised 4 clinical and four critical thinking stations of 15 minutes each and four rest stations. The

exam lasted for 180 minutes of total runtime. It was conducted in India and Singapore over four days, which included 40 students.

#### 10.11.2.10 **Statistical Analysis**

For an assessment tool to be accepted as reliable and valid, the most widely used statistical measurement is Cronbach's alpha (Swanson and Stillman, 1990). Some studies argue that it should not be used for internal reliability as sole measurement, as it is directly proportionate to the examination length; therefore, it indicates the station's stability, not the internal consistency (Cronbach, 1951; Streiner, 2003). However, concurrent use of Pearson correlation coefficient (PCC) or Spearman's rank correlation helps overcome the issue (Graham, 2006). Therefore, PCC was used to investigate the strength of the correlation between utilising the checklist and the global rating (clear pass, borderline, or clear fail), which helped provide a measure of the validity of the marking criteria used. For calculating the interrater reliability (IRR), Cronbach's alpha was used through two-way mixed effects; intra-class correlations (ICC) for consistency and internal reliability. For interpretation of ICCs, Cicchetti's classification (IRR less than 0.40 is poor; 0.40–0.59 is fair; 0.60–0.74 is good; 0.75–1.00 is excellent) was used (Al-Osail *et al.*, 2015). Moreover, content validity was measured with the help of experts. Statistical analysis was carried out by using IBM SPSS Statistics for Mac, Version 27.0 (IBM Corp. Armonk, NY, USA).

#### 10.11.3 **Results**

The Interclass correlation coefficient between the station checklist items was 0.946 (average measure upper bound 0.916, lower bound 0.968;

p<0.00), considered to be significant. (Table 10-9) The Inter-Item Correlation Matrix among the clinical station checklist items and critical thinking checklists also showed statistical significance (Table 10-10). The Pearson correlation coefficient (PCC) used to ascertain the correlation between checklist rating and global rating (Table 10-11), yielding a high correlation (0.80 to 0.934).

Table 10-9: Intraclass Correlation Coefficient

	Intraclass Correlation <sup>b</sup>	95% Confidence Interval		F Test with True ...	
		Lower Bound	Upper Bound	Value	df1
Single Measures	.688 <sup>a</sup>	.578	.793	18.611	38
Average Measures	.946 <sup>c</sup>	.916	.968	18.611	38

Table 10-10: Inter-Item Correlation Matrix of station checklist

Inter-Item Correlation Matrix								
	Station_1	Station_2	Station_3	Station_4	Station_5	Station_6	Station_7	Station_8
Station_1	1	0.722	0.744	0.819	0.629	0.674	0.836	0.656
Station_2	0.722	1	0.81	0.726	0.675	0.601	0.75	0.725
Station_3	0.744	0.81	1	0.837	0.579	0.556	0.674	0.607
Station_4	0.819	0.726	0.837	1	0.43	0.503	0.633	0.446
Station_5	0.629	0.675	0.579	0.43	1	0.84	0.799	0.859
Station_6	0.674	0.601	0.556	0.503	0.84	1	0.874	0.803
Station_7	0.836	0.75	0.674	0.633	0.799	0.874	1	0.86
Station_8	0.656	0.725	0.607	0.446	0.859	0.803	0.86	1

Table 10-11: Checklist Vs Global Assessment Correlation

Station	Pearson Correlation
1	0.865
2	0.82
3	0.934
4	0.8
5	0.856
6	0.848
7	0.891
8	0.875

#### 10.11.4 Discussion

To the best of my knowledge, this is the first integrated OSCE validation study combining clinical and critical thinking skills for a postgraduate NSA education. OSCE is a flexible assessment method use to evaluate competence by direct observation based on objective assessment criteria. It is composed of several “stations” where examinees are required to conduct a range of clinical tasks against required clinical competence displaying the skills and attitudes over a given duration. The OSCE has been used to assess the skills most important to the healthcare professionals’ success, such as data acquisition/interpretation, troubleshooting, engagement, and management of erratic patient behaviour, otherwise difficult to obtain during the classic clinical review (Zayyan, 2011). Miller’s framework for clinical competency development recommended four stages; “knows the facts”; “knows how to elaborate and integrate the understanding”; “shows how” they apply knowledge, skills and attitude for the patient

outcome; and finally “does” employ all the skills in their independent practice to serve the community, proven to work reasonably well in medical education settings (Miller, 1990; Sousa *et al.*, 2011). Evidence suggests that the OSCE helps assess the third stage “shows how” by concentrating on the clinical skills in a safe learning environment.

Critical thinking is considered to be a crucial cognitive method for the creation and utilisation of knowledge. It plays a functional role during problem-solving and decision-making in a social, clinical, or ethical context. Moreover, it is equally valuable for analysing complex data, assessing situations, and implementing the most suitable actions. In a recent article, “critical thinking is described as a cognitive process, purposeful, self-regulatory judgment that has two components of cognitive skills (interpretation, analysis, inference, evaluation, explanation, and self-regulation) and a motivational component (the disposition toward critical thinking)” (Nematbakhsh *et al.*, 2013).

More focus has been put in recent years on improving higher-level thought (critical thinking and clinical reasoning) skills to help physicians retain clinical integrity and medical professionalism. More than two-thirds of the reported mistakes in diagnosis are linked to the physician’s lack of critical thinking ability in the present context. Given the belief that healthcare professionals must be logical thinkers, there is no consensus on the most successful model to teach and evaluate critical thinking and clinical reasoning skills (Majumder *et al.*, 2019). Recent research, which evaluated a wide range of quantitative and qualitative competencies, including behavioural and communication skills, showed that the OSCE was valid and reliable and



essential for positive educational effects. Several authors have advocated that emphasising an aim of OSCEs is to develop affability in critical thinking as a precursor to practising (Krusen and Rollins, 2019).

There is no valid assessment instrument combining clinical and critical appraisal skills to evaluate safe practice in non-surgical aesthetics to my best knowledge. The use of different stations to evaluate clinical skills and critical thinking ability is beneficial in this evaluation. The various clinical skills measured were consultation skills pertaining to the NSA, knowledge of the signs of ageing and the underlying anatomy, assessment of skin quality, full-face assessment to identify treatment needs for optimal results, clinical photography, development of an efficient and optimal treatment plan, safe injection techniques, post-treatment advice, complication management, and situational judgments. During the evaluation, the critical appraisal skills measured included understanding the research relating to facial assessment, botulinum toxin science, rheology of the soft-tissue fillers and complication management.

It has shown that the generalisation coefficients appear to differ significantly from 0.4 to 0.85, while the majority of these coefficients vary from 0.5-0.6 (Marwaha, 2011). In the present study, the average intraclass correlation coefficient measures range between 0.916 to 0.968, which is more than the reliability coefficient threshold of 0.8 or over. The variability in the generalizability coefficients may be attributed to the examinees' variable performance on different OSCE stations (content specificity). i-OSCE is shown to be robust and able to test applicants for their competence to carry out multiple component tasks.

### 10.11.5 **Conclusion**

Integrated OSCE has demonstrated to be a reliable and accurate assessment tool for examining the trainee aesthetic physicians' professional competence. This tool has objectively evaluated trainee physicians critical thinking and clinical skills, including clinical reasoning. The program directors should consider the deployment of i-OSCE along with OSPE as an assessment tool in the postgraduate curriculum for non-surgical aesthetics.

## Chapter 11: Discussion and limitation

*“The seed of great discoveries are constantly floating around us, but they only take root in minds well prepared to receive them”.*

– Joseph Henry, Physicist

### 11.1 The Sense and the Sensibility

One of the first philosophers to think about beauty was Plato, who describes it as a “quality inherent in objects” that could be measured in “purity, integrity, harmony, and perfection” (Grube, 1927). Aesthetic judgment is subject-dependent and emotional compared to cognitive and normative ones since attractiveness only means something to a specific individual. A genuine aesthetic judgment cannot be characterised simply as one’s own preference but requires a fierce insistence on the opinion of consensus (Kneller, 1986).

However, in the 20th century, a general definition of beauty was derived almost exclusively from physical appearance. For example, Arthur Marwick, in his book *Beauty in History*, defines beauty as: “the beautiful are those who excite all of the opposite sex” (Sharpless, 2009). However, Nancy Baker attempted to define beauty in her book *The Beauty Trap* by emphasising women’s personal attribute and wrote, “a truly beautiful woman makes the best of her physical assets but, more importantly, she also radiates a personal quality which is attractive”(Baker, 1984). In other words, a genuinely beautiful woman utilises her natural beauty and her personality in equal measure to create an enticing aura.

Society places tremendous value on physical appearance for all genders. The cosmetics, fashion, and aesthetic industries have flourished in the 20th-century's obsession with looks. It has a pervasive influence on all aspects of human life, whether they want to recognise it or not.

In the early parts of the twentieth century, many of the concepts and ideas of beauty present in the nineteenth century were still in place. For Victorians, femininity was paramount, and it was expected from the woman to make herself pretty. This was combined with the notion of "self-presentation" as pleasurable, passionate, and artistic in the early twentieth century. However, many of the Victorian era's strange and terrible "beauty aids" were still being sold in the early 20<sup>th</sup> century. For example, M. Trielty's Nose Shaper was a "metal devise... held over the nose by straps clasped around the head and adjusted with screws".

However, the concept of beauty in the 20th century has departed from that of previous centuries, favouring cosmetics becoming colourful and attractive. Conventional culture viewed cosmetics as the apparent gift of female promiscuity. Cosmetics became widespread amongst young females. They begin to apply makeup after reaching puberty to appear mature and attractive. Interestingly, on the other hand, mothers employ cosmetics to hide age-related defects and retain a youthful appearance. Moreover, this does not mean that the rise of the cosmetics industry does not come with its share of opponents: many feminists think the marketing of cosmetics and fashion is being used to take advantage of women by powerful male industry tycoons. In addition, some women feel aggrieved because they must apply cosmetics to excel in the workplace. However,

many women view the cosmetics rituals as more of fun rather than work or a necessary evil. Therefore, women apply makeup not just for looking attractive to men instead of for themselves and their peers. Helena Rubenstein and Max Factor started producing professionalised makeup kits and turned them into daily rituals.

In certain respects, the cosmetics and fashion industries are interdependent. While advertising is generally dismissed as having no social or cultural relevance, it is highly effective to reinforce views towards women's appearance and attractiveness. In the advertising industry, the twentieth century's obsession with celebrities has been masterfully exploited by the advertising agencies for running marketing campaigns. When a gorgeous model, or more accurately a gorgeous celebrity, is effectively utilised in a commercial, the characteristics associated with her persona passed to the product.

The growth of the motion picture industry had a significant impact on how this century perceived beauty. For about the first half of the century, movie actresses were the primary symbols of female sexuality and beauty. The distinction between film as being in colour or being in black and white in no way stopped Clara Bow, Bette Davis, and Katherine Turner from being a legend. Therefore, "a traditional and average" was a rule-breaker in the sense that they had a middle-class background. Consequently, vanity became an essential part of the role in Hollywood. This was also the beginning of a long and lasting relationship between the cinema and fashion industry.

With the first decade of the new century well in our past, dress began to abandon the heavy, bell-bottom, and slouchy styles for the draping, flowing fashions. Nevertheless, as it turns out, the wearing of cotés for a long time proved to be common, as they were instituted to keep them in place, creating the “split-calf device” (a corset). Women were applying makeup to hide age-related imperfections as well as draw attention to their natural womanly attributes. A new trend emerged in women’s clothing in which skirts became short, and in contrary to the environment of freedom in fashion, feminine curves went out of fashion. “Flatteners” became popular for reducing the bust size, and waistlines were dropped to hip level.

For the next decade, garment manufacturing was subject to stringent constraints due to World War II. The most popular look in the 1940s was a functional and manly style called “the Utility Lines,” which included padded shoulders and knee-length hemlines. Due to the scarcity of fabric for stockings, women’s trousers became trendy. Christian Dior introduced the “New Look” in the late 1940s to respond to wartime deprivation, with corseted waists, padded hips, and billowing skirts that used considerably more material than most women’s provisions would allow. Though it was only intended for the select few, Dior’s style reinvigorated fashion and impacted the resurgence of overt femininity in decades to come.

Over the last decade, average people’s propensity to get cosmetic treatment has risen dramatically. The most popular procedures being breast augmentation, body contouring, abdominoplasty, liposuctions, botulinum toxin for lines and wrinkles and facial volume restoration through the application of soft tissue fillers.

Here, I will abandon all pretences of objectivity and simply say that external appearance has gotten the upper hand as the attribute that best describes beauty in the century we are in now. Fashion, cosmetics, and aesthetic plastic surgery have risen dramatically in societies over the last few decades as an outward expression of the fascination with physical beauty. Individuals consider physical appearance to be inherently related to successful employment and achievement, and because of this, they will continue to be focused on it through the next century and possibly more.

## **11.2 The need and the needful: More than just theory and educational practices**

*“If we don’t change, we don’t grow. If we don’t grow, we aren’t really living”.*

– Gail Sheehy

It is commonly asserted that nothing stays the same in the world. While evolution has provided humans with an inherent tendency to resist change, it is more critical than ever that the need for transformation. Napoleon once said, “One must change one’s tactics if one wishes to maintain one’s superiority”. With every invention, the rate of change in society is dramatically increasing; teaching and learning are no different.

According to the Accreditation Council of Graduate Medical Education (2002), postgraduate medical students should need to learn basic skills before completing their graduation. Medical schools are liable for delivering a constructive and conducive environment to attain basic and professional skills. Clinical Masters’ degrees are varied and produce diverse and competent professional students. Any Master program is set of three

categories, i.e., research, specialisation, and professionalism in practice. The earlier chapters highlighted the rising demand fuelling astronomical growth in cosmetic procedures in nonsurgical aesthetics and stressed the dearth of structured clinical, educational degree programs. The rapid and extraordinary demands in the aesthetic procedures have transformed the societal dynamics and diminished taboos. However, contemporary education and training programs are mostly “show and tell” in nature. Often trainees do not receive adequate hands-on training to build their competence and confidence for running an independent aesthetic practice. The existing nonsurgical aesthetic courses are unable to prepare clinicians as competent, confident, and professional practitioners in their respective fields. Therefore, multidimensional development in practical skills and competency is required in such programmes. Delivery of medical education and learning is a rigorous process in postgraduate programs to develop practical competencies. Lee et al. described that the positive driver of such training and educational programs are the sound assessment strategy, modification and intensification in existing procedural content and curriculum (Lee *et al.*, 2013).

It has also been established that NSA educational programs must help their students improve critical thinking skills and make the best use of clinical practices to become change agents. As a result, pedagogical principles that emphasise the integration of teaching, learning and professional identity should be regarded as the zenith to professional curriculum. The theory of curricula is primarily about the legitimization of educational awareness. It answers questions like ‘What information is valued?’ ‘Why is this great value



knowledge? ‘How are the curricular content chosen and organised? and who is determining it? (Deng *et al.*, 2008) They are “epistemological (related to different knowledge), philosophical and realistic” problems.

For curricular growth, the fundamentals on which the content, curriculum design, evaluation and assessment and the expected educational results are designed must be explained (Biggs, 1996). There is not enough technical clarity to support the proposed NSA curriculums in the fundamental resumes (Plastic Surgery, Dermatology, Dentistry), contributing to current practice. To establish such a vision, it was essential to participate in a broad and critical dialogue with the professional community. There is no technically transparent medical curriculum to support the proposed NSA curriculum objectives to encourage current practice.

The conventional conception of identity as a collection of human characteristics and mutable attributes is based on the premise that the creation of the identity is first and foremost a process internally dependent (Hodges *et al.*, 2011). This debate remains continuously prevalent in postgraduate medical education with a pedagogical emphasis in tandem with the subsequent need to recognise the weak skills, abilities, beliefs, and attitudes.

However, emphasis on individual accountability can lead to a disciplining approach to clinical practice and thus lacks the chance to establish a curriculum that has the potential to favourably concentrate on increasing clinical learner’s personal and professional growth (O’Sullivan *et al.*, 2012). This debate also overlooks the negative consequences of the hidden

curriculum (Hafferty, 1998; Lawrence *et al.*, 2018), including empathy depletion (Hojat *et al.*, 2009) and growing cynicism in postgraduate medical students (Testerman *et al.*, 1996).

A recent debate in the literature considers clinical professionalism as a social and cultural phenomenon in which professional identity development is the product of socialisation. A programme that includes professionalism must look beyond the individual's perspective and follow a more nuanced professional approach.

In medical education, the inculturation phase of clinical immersion is no longer an option, as is shown by well-known adverse effects of the hidden curriculum (Bloom, 1989; Coulehan and Williams, 2001; Newton *et al.*, 2008). Most physicians, however, remain committed to the conventional pedagogical role model and doubt the introduction of systematic methods of education. The lack of agreement on the structuring of medical curricula to promote the growth of expertise is not completely unfound (Haidet *et al.*, 2002; Hojat *et al.*, 2009; Birden *et al.*, 2013).

This inference has consequences for the pedagogical theories that should shape the basis of curriculum growth. Reliance solely on learning theories focused on specific cognitive processes is inadequate to direct a programme based on an identity as a social mechanism (Swanwick, 2005). The role of socialisation in creating a professional identity is increasingly being highlighted by educators and scientists, such as Lave and Wenger's Communities of Practice (CoP). Although Lave and Wenger's theory exposes the negative branching of the curriculum covered, it does nothing

to threaten the creation of the curriculum (Hay, 1993; Bathmaker and Avis, 2005; Roberts, 2006).

Based on the idea of CoP, Lave and Wenger's theory defines learning as an enhanced engagement in social and cultural activities in an atmosphere where participants share a common mission. Learners build their identity through the socialisation process with a new social language which involves learning how to walk and talk. In this regard, the driving force behind confirmation of identity is based on the need for social recognition that allows individuals to engage in societies to which they belong (Lingard *et al.*, 2002; Paris, 2017).

Nevertheless, the procedures that allow trainees to recognise or handle problem aspects of the community of practice's dominant culture are not clearly defined. Medical educators participating in transformative education face a dilemma; engagement in practice groups is essential for training professional identification but risks being aligned with the mainstreaming discourse. We want a broader pedagogy with a view to social change to overcome this paradox.

Mezirow's transforming learning theory seeks to allow students to use distortive dilemmas by encouraging critical thought and deciphering against the harmful effects of secret curricula if their assumptions are correct in their circles. Mezirow allows students to look at the world from a different viewpoint and not only to concentrate on instrumental learning (Wong, 1989). The goals in groups in practice are taken for granted. It requires a vital reflection. This form of research allows students to objectively analyse

and challenge the reasoning behind tacitly developed viewpoints on their personal meanings to demonstrate epistemic, socio-cultural, or psychological inaccuracies.

Intellectual and emotional difficulties for teachers and students are complex yet transformative learning (Taylor, 1998). This means a methodological dedication to improving educators' learning and a desire to inspire students to explore the different knowledge opportunities (Cranton, 2009). One needs to create an atmosphere of non-judicial, non-hierarchical learning that fosters peer discussion, which is essential to the success of transformative learning (Berger, 2004). Learning ideas from Lave, Wenger and Mezirow were used to help students develop a patient-centric professional image. This theory identifies belonging and social acceptance as essential aspects of developing professional identity, the optimistic and necessary enculturation components.

The postgraduate clinical curriculum must develop a professional identity that will help clinicians to evolve from a generalist to a specialist. However, the transformative theory of Mezirow aims to minimise the adverse effects of inculturation and explore how students need to critically challenge the core values and norms that shape the medical profession for their interest.

To examine the theory for creating the NSA curriculum, the researcher has followed the design-based research (DBR) methodology. The DBR method covers various phases, including assessing, investigating, planning, constructing, evaluating, and reflecting (Barab and Squire, 2004; Anderson and Shattuck, 2012). Further, DBR shares the conventional explanation for

transformative learning theories of Lave and Wenger's CoP and Mezirow. The inference of pedagogical study is such a philosophy and practice that student cannot understand their learning circumstances independently. This theory also supports the goals by focusing on interaction in action to strengthen all measures (McKenney and Reeves, 2014).

The design and execution of a course depend upon its context (Wong *et al.*, 2012) and explain analyses that cover socio-cultural contexts beyond the learner's scope. The Activity Theory (AT), which considers the entire dynamic learning process as an analytical tool, was also used to perform the study. A framework that helps students create an identity and does not merely a mass-specific knowledge and skills, the AT stays in line with empirical methodology and a pedagogical approach. It will help students in the academic environment match their priorities (Blåka and Filstad, 2007).

The cultural mediation of human behaviour is the cornerstone of AT. Education is done by involvement in collective activities by cultural instruments that can influence psychological learning in theory. The AT Triangle demonstrates the dialectical connexion of the subject (student) with the object (purpose) and the conceptual or technical resources (Engeström, 2001). He further expands the AT model to include interactions, interdependent elements of society and the work division that govern and mediate individual and collective action by stating that the individual cannot be regarded as a separate entity from the community to which he belongs. Within activity structures, any field of contradictions and uncertainty is seen as historically accumulating systemic tensions that are aimed at promoting learning within education interventions. Activity theory has been employed

as a method to define and analyse the inconsistencies that lead to negative discussions on identity creation in the NSA in the clinical learning setting.

Clinical curricula are discussed on epistemic and pedagogical grounds for postgraduate students' legitimate struggle (Cruess, Johnston and Cruess, 2004). It is imperative to represent a clear view of a disputed curriculum's results through scholarly research and professional commitment. Intrapersonal and socio-cultural dimensions need to go beyond a narrow perspective of professionalism as an intrapersonal process to make a curriculum significantly contributing to professional identity development. The creation of learning and teaching approaches based upon this dynamic professional framework involves pedagogical theories that account for professional success as a socio-cultural phenomenon. This course's subject matter will be multicurricular and concentrate on epistemologies that are interpretive and not positivistic. A curriculum must be linked to nuanced and interconnected learning objectives that focus on cognitive, metacognitive, affective, and behavioural fields. It is obligatory for students to be transparent about their relevance and purpose and always remain on "message" throughout their learning and assessment experiences to promote a complex and contested curriculum. When they are articulated by learning, educational activities, evaluation, and educational goals are conveyed to students (Biggs, 1996). Developing a programme to encourage students to learn about professionalism must be driven by appropriate pedagogical theory and cannot depend solely on the instructor's implicit knowledge.

Conferring to above all arguments, it is apparent that professional identity is fundamental in creating oneself position and understanding one's role, responsibility, value, reflective practices, and ethical preferences to their respective professions. I believe that the reflective approach is vital for an efficient, professional practice that has an immense effect on practitioner's clinical procedures and practices. Therefore, they require reflective activities with their colleagues, peers, and mentors in practical and evidence-based educational practices.

### **11.3 Curriculum as Vehicle: Owners and Drivers**

The curricula are culturally comprehended and operationally assessed to confirm compliance with requirements and academic quality control strategies. For varied approaches to curriculum, there are different influences, including metaphysical, epistemological, and functional concepts about the role of higher education. In addition, the curriculum is affected by a myriad of forces such as faculty influence, interactions between students, defining personal expectations for students, and making decisions about the latter, and tweaking curricula to meet those conditions (Barnett, Parry and Coate, 2001).

UK higher education is said to have not invested as much effort in its curriculum as it may be warranted by the significance of its role in training its students and faculty. New, better, cutting-edge ideas have provided viewpoints on the curriculum, for example, approaches to class learning, signposting concepts, techniques, and transcribing strategies. Though some of these principles are discussed previously and thought to be

intertwined to form constituting parts of many curriculum models or frameworks, they do not accurately translate or address students' learning experiences (Malcolm, 2010).

This situation is made even more complicated by the claim of 'hidden curriculum' or 'informal' learning principles that are alleged to exist inside the curriculum. Barnett observed that the students who can determine those hidden characteristics benefit the most (Barnett, Parry and Coate, 2001). As this illustrates many important concerns in curriculum co-creation, it is especially critical to keep an open mind when developing such a curriculum. Mann claims that teachers may unintentionally empower or alienate students if attention is not paid well in advance the way a curriculum hinders student engagement (Mann, 2001). Other factors like allocating less time for the programme development and content creation, requirement by the Professional statutory regulatory body (PSRB), and individual pedagogical preferences have severe implications on curriculum co-creation.

However, above all standard of a clinical postgraduate programme and its effective delivery not only depends on the curriculum and curriculum only but very much on the drivers of the curriculum, i.e., the faculty. Moreover, developing such (faculty) is equally challenging, like developing a new programme. Instead, it should be said that 'curriculum for teaching' and 'curriculum for teachers', are intertwined... 'two ventricles in a heart' beat together, influence each other but with a common goal.

Perhaps the definition of faculty development is best described by Steinert as: "a planned program, or set of programs, designed to prepare



institutions and faculty members for their various roles, with the goal of improving instructor's knowledge and skills in the areas of teaching, research and administration" (Steinert *et al.*, 2003).

Higher Education institutes should not only consider faculty development to be just "teaching the teachers how to teach". The notion is that they should strive to professionalise clinical teachers and trainees as part of a program with the long term and diverse objective of elevating educational capacity and educational infrastructure. Even more importantly, faculty training should include the option of continued professional growth.

As unfortunate as it is, there is not much evidence in existence to indicate that good teaching will necessarily yield better trainees. The available evidence consists of Griffith and Stern's work, though much of it originates from the US. Assignment tasks with a more positive effect on student performance are more frequently done with good clinical teachers. Most strikingly, the faculty, not the resident, was the primary influence on the cognitive growth of students (Griffith *et al.*, 1997, 1998; Stern *et al.*, 2000).

Faculty growth has much influence on the entire education system. The benefits of human capital investment have been documented for over two centuries; the relative importance of developing skills has been rising recently. The emergence of professionalism because of increased accountability, desire for optimal patient care, and professional experience, is key to these new standards of medical education (Figure 11-1).



Figure 11-1: Drivers of the Faculty Development

Nevertheless, even with the faculty development courses focused on improving teaching ability, results were not equitably distributed as a current practice ad hoc or short-term courses and workshops, and alternative methods have been in practice for the faculty development; multi-year longitudinal training programmes gaining growing popularity in the UK (Connor *et al.*, 2000).

A recent meta-analysis of clinical faculty development programmes revealed that the most important characteristics contributing to their efficiency were fostering personal growth opportunities and helping participants apply knowledge, which took place through thoughtful, meaningful assignments and using instructional approaches that promote inclusiveness. Generally, participants reported improvements in teaching skills which were reported by their students as well. Most, if not all, changes in organisational practices were undocumented, but additional educational activity and strengthening of professional relationships were noted (Steinert *et al.*, 2006; Swanwick, 2008).

Few universities invest in clinical faculty development since teaching hospitals do not make it a big priority; in addition, the training occurs at irregular intervals and is administered by postgraduate medical institutions (deaneries). Some problems in training trainers include a lack of funding and resources. It has also been stated that involving just clinical teachers for the faculty development strategy and institutional growth will attract nothing but cynicism (Gunstone, 2008).

Considering all the above-mentioned factors, the way forward would be to create a spiral curriculum instead of a longitudinal one since more than one domain of competence needs to be achieved concurrently. Bruner's notion of a "spiral curriculum" is extensively utilised in medical training (Bruner, 2019). A spiral curriculum, also known as the "spiral of learning" or "cyclical education model", is based on a process known as a repetitive review of themes, topics, or subjects throughout the study. Hence, in other words, a spiral curriculum includes the opportunity for repeating the concepts.

Furthermore, each session builds on the prior, continually maturing and expanding the knowledge and deep understanding (Harden and Stamper, 1999; Jones *et al.*, 2001).

Active autonomous learning should be encouraged through problem-based learning. By incorporating several subjects, the trainers will have a unified teaching and learning approach that bridges the boundaries between them. This should be coupled with forward-facing assessment or a form of a reflective account of their learning and development. Not only that, but the indicative curriculum should also have all the components from the learning domain and specifically address accountability.

Based on the interactions with the trainers throughout this research, I propose four domains of competence in a faculty development programme, they are:

### 11.3.1 **Mentorship**

A mentor's work may be viewed as having two dimensions in a mentorship program: helping and judging. Shaping the mentors' behaviour, connections with their mentees, and perceived rewards of being a mentor are all consequences of this knowledge. Self-awareness of one's comprehension is vital in raising the overall success of mentor programmes. Mentors, teachers, and educational developers can benefit from the increased clarity that comes from learning to improve procedures.

### **11.3.2 Educational practices**

One way to think of clinical teachers' pedagogical knowledge is that it is "specific to content" and grows through the "apprenticeship model" of observation and experience. Once the teachers have absorbed the information, their content expertise translates into a form that students can easily comprehend and learn. In addition, their skill derives from practical know-how that enables them to identify effective instructional strategies and techniques, which are also referred to as 'best practices'. Moreover, medical educators are expected to demonstrate a deeper understanding of applicable educational theories and promote scholarship.

### **11.3.3 Clinical Research Excellence**

The importance of clinical excellence in healthcare delivery has grown with an emphasis on applied research that furthers patient care. Thus, the very act of promoting research is crucial for promoting and recognising clinical excellence.

### **11.3.4 Leadership and professional accountability**

Although individuals administer healthcare, it is accomplished through complex systems functioning in concert, with multiple persons and organisations often participating. A competent physician needs to have a comprehensive understanding of all relevant systems and pathways and be capable of doing so within and alongside the different systems to help their patients. Caveats of "solitary counselling" must be exposed, for no one person can meet all the patients' needs. To stay involved with leading

and directing various health care systems, professionals must learn the art of delegation.

An indicative schematic presentation of the proposed three years programme is presented below with the faculty development framework (Figure 11-2) of the “Academy of Medical Educators” (AoME) (Academy of Medical Educators, 2014; Royal College of Obstetricians and Gynaecologists, 2015):

Table 11-1: Faculty development framework

Proposed Domains of Competence	AoME Educators Domain						
	Ensuring safe and effective care through training	Establishing and maintaining an environment for learning	Teaching and facilitating, and learning	Enhancing learning through assessment	Supporting and monitoring educational progress	Guiding personal and professional development	Continuing professional development as an educator
Mentorship	1	2	1	1	2	3	3
Educational practices	1	1	1	2	2	3	3
Clinical Research Excellence	1	1	1	1	2	2	3
Leadership and Professional Accountability	1	1	1	2	2	3	3

\*The number in the circle indicates the year of delivery

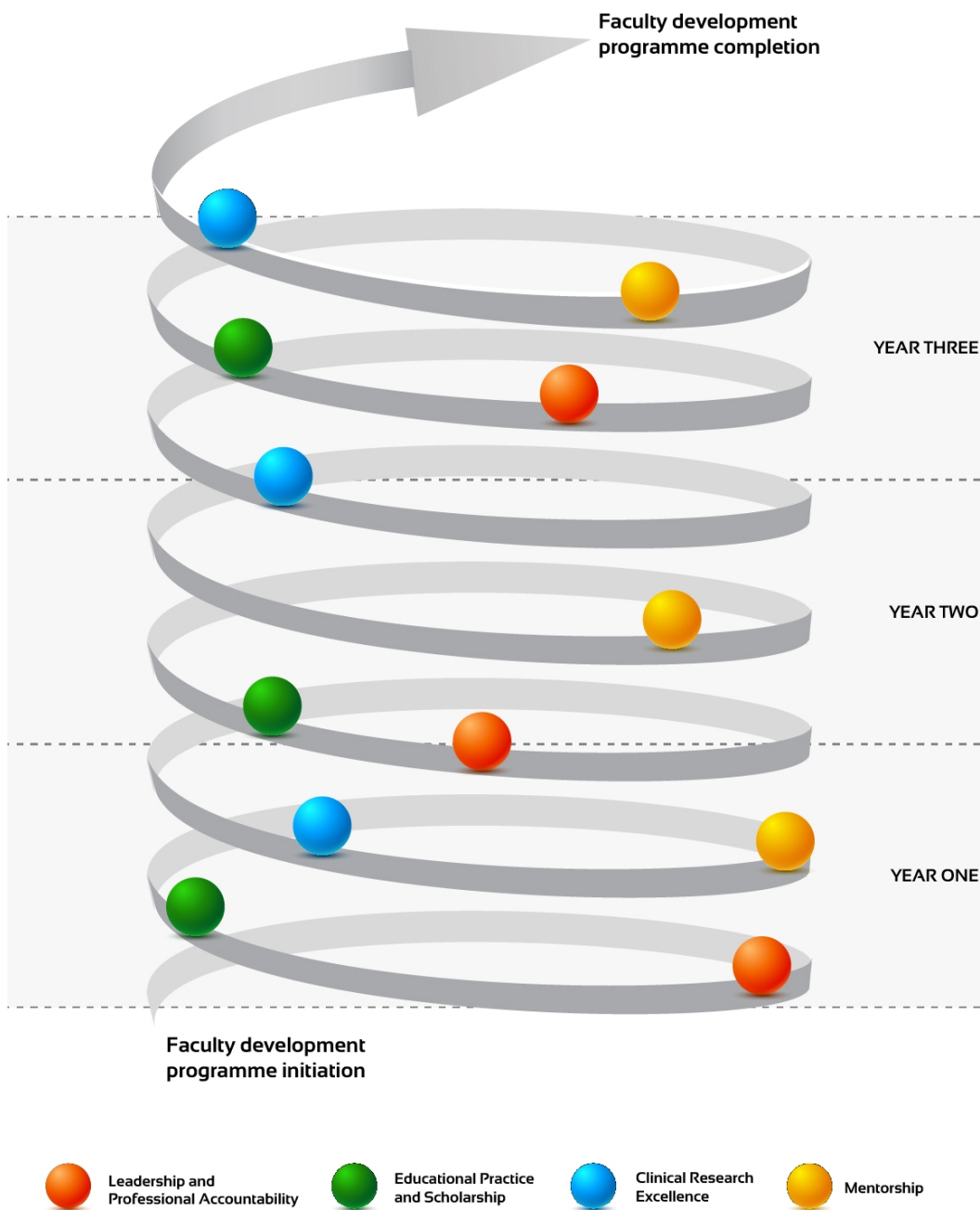


Figure 11-2: Spiral Curriculum for Faculty Development with Assessment Checkpoints



## 11.4 The synergists

### 11.4.1 Regulation of NSA

In 2013, the committee headed by Sir Bruce Keogh had made sharp observations on the existing situation in the training and practice of NSA. The British government was alarmed by such observations. As a result, in 2014, the government published guidelines to improve the safety, transparency, and answerability of the industry and those who practice NSA in the United Kingdom. Moreover, the panel also recommended creating a central register, yearly appraisal, and that Health Education England (HEE) must facilitate the creation of appropriate accredited qualifications in NSA. The Joint Council for Cosmetic Practitioners (JCCP) will supervise the central register for training organisations and practitioners and report to General Medical Council (GMC). The Cosmetic Practitioner's Standard Authority (CPSA) will set the benchmark for the competence of practitioners and training providers.

Majority of regulatory authorities, including the "Medicines and Healthcare Products Regulatory Authority (MHRA)", United Kingdom, presently classifies soft tissue fillers as a medical device and requires CE mark (Department of Health, 2014). Soft tissue fillers are not required to be prescribed by a physician in the UK, and regulators do not intend to make it a prescription-only product.

Further, in 2016, HEE published two guidance documents for the NSA practitioners and training and education providers (NHS Health Education England, 2015a, 2015b). It includes procedures such as Botulinum toxin,

soft tissue fillers, lasers, IPL and LED treatments, chemical peel, skin rejuvenation, and hair restoration. In their guidance document, HEE has made it very clear who can offer NSFA and essential academic qualifications. The HEE guidelines mandate a level seven prerequisite for the practitioners who wish to offer procedures in the United Kingdom.

Although Royal Colleges and the professional statutory regulatory bodies like the GMC of the UK published guidance on safe cosmetic practices, none is enforceable without the government's appropriate endorsement (approved by the parliament). This ultimately leads to the point of the original outcry.

Substantial legislation, especially in recent years, gives the governing authorities ample grounds for exerting control over external physicians. However, the process of regulation could become more challenging to follow as it becomes more sophisticated and intricate. When it comes to healthcare, times have changed dramatically in the last several years. Scientific and technical advances are helping to increase the public's understanding that both benefit and risk are in medical research and that the reality has become more complex, and the realisation that medicine is no more "simple and safe" (Chamberlain, 2011). The shift has been propelled by a massive number of incidents in which the medical community fails to take a stand or rectify their errors. The Patient Safety Agency works hand in hand with legislation that offers generous protections for whistle-blowers to gather data on incidents concerning patient and staff endangerment. More information and understanding by the public have developed an acute awareness of their rights and entitlements. It is

assumed that given the trend towards patient-focused practices and enhanced expectations of medical performance, healthcare regulation will rise (Pollock, 1995; Samanta and Samanta, 2003).

When patients can rely on the accuracy of a regulation-based system of medical practitioners, the community also has faith in it. By and for their patients, physicians cooperate with other professionals. Regulation cannot merely be directed at doctors but also affect the patients they serve. Also, it must stay current with doctors and all healthcare workers and others involved in the field. Unless this is done, medical standards will not be able to achieve and keep their present objective of providing patients with reliable and cost-effective healthcare and may go in the wrong direction of maintaining subpar or less-than-satisfactory treatment, especially in the clinical aesthetic practice.

This is the first study concerning training and education in NSA employing an evidence-based approach for developing a postgraduate curriculum. The proposed curriculum is an essential step towards the standardisation of training and education in NSA with academic rigour. Furthermore, the present study helps bridge the gap in the literature, which is relatively scant on training and education in NSA.

#### **11.4.2 Industry Partnership**

In the traditional model, stakeholders' involvement in course advisory committees usually consists of working within a restricted setting to make their ideas known. However, in this unique case of programme

development, using a co-design strategy will make the stakeholders' input process more open and equitable.

Moreover, unnecessary duplication of content and resources can emerge when industries and institutions dedicate significant resources to the short course design and delivery process, but they are not combined. The overbearing desire for the industry to be deeply involved in course development, especially for postgraduate courses and institutions, would reduce such burdens and promote a superior learning experience for students. Using a method of bridging the gap between industry and academia will work to connect current learning strategies with professional and regulatory mandates.

## **11.5 Limitations**

Like any other research, there are many limitations to this study too. Although the study utilises a global approach in addressing the research question, it revolves around HEE's academic framework and UK's professional statutory regulatory body guidelines. However, this research provides a robust framework on the NSA curriculum, which the program directors can quickly adapt in any country within their regulatory framework.

During the Delphi process and the focus group studies, the focus remained on plastic surgery and dermatology residency program and practising aesthetic physicians, missing any input from dentistry and nursing throughout this research. Unfortunately, literature is also silent on the NSA educational needs in dentistry and nursing. Nevertheless, to bring rigour

and varied viewpoints, the study involved experienced professionals across the geographies, core specialities and academia.

This study has effectively utilised expert focus groups by inviting trainers/faculties to generate the content, develop a survey questionnaire and ascertain the face validity. However, it did not utilise any trainee focus group for the face validity of the surveys.

Subsequently, the study has utilised the modified Delphi technique to develop consensus amongst the experts. However, while the modified Delphi technique has been proven as a robust tool for educational research involving curriculum design and development, it has its intrinsic limitations. It is time-consuming for both researchers as well as participants. Participants are required to allocate a significant amount of time for reading the number of statements to respond to the questionnaires. The entire process slows down and can take between weeks to months for each round. It is essential to mention that data collection, synthesis, and development of new questionnaires with feedback are all interconnected between the iterations. Therefore, it requires proper planning and time management. The possibility of a reduced response rate due to several feedback rounds is an inherent challenge for any Delphi Study.

The other challenge is the recruitment of a panel of experts. It is assumed that the Delphi participants have equal knowledge and experience in the subject area. However, this assumption may not always be correct when experts come from a large geographical area. There is a possibility of some panel members being deeply knowledgeable. However, others may be very

novice in the subject area and may struggle to respond appropriately. It will lead to a compromised outcome of the study.

However, there are several benefits of using the Delphi method. The ease of recruiting study participants electronically across a wide geographical area and confidentiality provides an unbridled possibility for all panellists to easily share their opinions (Kumar, Swift and Rahman, 2018). The Delphi technique's most prominent attribute is the participant's confidentiality, which decreases the effect of dominant members; always a concern in a group-based process for collecting and processing the data. Moreover, there is no confidentiality issue since the group is from a large geographical area and communication is facilitated via emails to collect the responses. Further, it avoids any pitfall, which occurs in a group due to the constraint of taking up a viewpoint. By making respondents anonymous and using surveys, it helps to avoid issues that can occur during group interviews, such as specious persuasion or falling in line with authority, the impact of the verbal facility, hesitation to change publicised positions as well as "bandwagon effects" (Schmitt-Beck, 2015).

The design of giving controlled feedback in the Delphi process diminishes the noise effect. The structured feedback with an overview of the previous iteration is deliberately circulated to the study participants, facilitating additional insight generation and comprehensibly clarifying the information gathered. It is believed that through multiple iterations, participants will become better focused on offering their opinions more insightfully. Interestingly, the feedback process empowers the study participants to review their initial responses and other participants' comments and

responses to modify or change their previous answers. The use of statistical tools further eliminates the scope of a group's pressure for congruity. The responses that are originated in a Delphi study can help subsequent analyses, rankings, and priority-setting. Along with other well-organised methods, this methodology pushes participants to consider what is going to happen. It also helps to give respondents a chance to review and obtain more ideas between the rounds genuinely.

# Chapter 12: Conclusion and Recommendations

## 12.1 Conclusion

This study has investigated the question: - How would a newly designed postgraduate curriculum in non-surgical aesthetics help clinicians to attain necessary skills?

The question has led to three specific research objectives (need analysis, the conceptual framework for curriculum design and implementation framework) explored during this research. In this chapter, I share my conclusions concerning the research question and the three objectives. I summarise what I have learnt and offer suggestions for future research.

### **Objective One: Need for a clinical curriculum in non-surgical aesthetics**

Increased demand for NSA treatment has led to a thriving number of non-health practitioners delivering scientifically questionable services and making unfounded promises. Medical practitioners are also increasingly interested in NSAs that they have never been trained during their medical school and a confused public who cannot discern a trained aesthetic physician from one who is not.

Many patients lose trust and confidence in the medical profession due to practitioners using aesthetic treatments without any proof of efficacy or even information about how it works. They combine treatments offered by non-medical practitioners with their treatments and endorse their use with the media, creating an unsustainable environment for medical providers.



These commercialized services tend to make misleading claims about the procedures' potential low or no risk, omitting side effects, presenting a positive impression, overstating benefits, and not disclosing limitations or problems. In chapter 7, a detailed need assessment analysis has been elaborated, employing both qualitative and quantitative methodology. The inference is that the need for a structured postgraduate programme in NSA cannot be overstated. This need is homogenous, critical beyond borders and bibliography. The identity of aesthetic practitioners has been camouflaged with overlapping primary clinical identities. Such a programme should provide theoretical and practical clinical learning and professional identity formation to build trust.

### **Objective Two: Conceptual framework for curriculum design**

To meet the tremendous new expectations of 21st-century education, evaluation, and reflection, there is a need for new approaches to curriculum design in NSA. In the world of learning, the new learnings are layered upon new requirements and challenges, resulting in increasingly advanced and intricate models of curriculum and instructional strategies in NSA. As a result of this understanding, curriculum design requires a more rigorous, systematic, holistic approach and should integrate recent innovations in pedagogy.

In chapter 8, a detailed conceptual framework for curriculum design has been explored. Considering the available literature and its critical analysis, my findings are consistent with the fact that critical thinking should lie at the heart of a postgraduate curriculum that supports both information mastery

and Values. Such a curriculum should also follow an enquiry-based learning strategy, enhance necessary skill acquisition, and promote professional identity formation in non-surgical aesthetics.

### **Objective Three: An evidence-based implementation framework**

In Chapter 9, I have conducted the global Delphi study to formulate the core content of the NSA curriculum on Basic Science, Clinical Science, Professionalism, Regulations and Compliance, Research and Critical Thinking. Once this was identified, I applied the threshold concept to construct the learning outcome on cognitive, psychomotor, and affective domains and undertook detailed curriculum mapping in Chapter 10. This facilitated the development of an indicative implementation framework to propose assessment strategies and executed experiments (10.8,10.9,10.10) to prove their effectiveness.

Education is critical to the sustainability of innovation. The innovative practices that a university incorporates must be strategically embedded in the curriculum and the process of curriculum design. This is critical for being adequately supported by ongoing professional development and being congruent with a comprehensive vision for the institution. Successful implementation involves identifying and overcoming obstacles and drives. This study showcases how embedded milestones, a strategic professional development plan, and a clear vision have been used throughout.

As far as educational research is concerned, design-based research (DBR) can make a significant contribution. In this research, the process of practice has been conceptualized, detailed, pondered, thought about, examined,

theorized, modified, and re-imagined where DBR has played a central role, and the data, debate, and conclusions here show its value and robustness.

One can conclude from the arguments mentioned above that the succinate implementation of the proposed curriculum will facilitate physicians to attain necessary skills in NSA to meet the ever-growing need of patients in this millennium and professional identity formation. The change is inevitable; the change is need of the hour; there is only one path to follow, to promote the evidence-based practices in aesthetic medicine, that is, to embrace a pedagogically sound patient-centred curriculum.

I shall end this with a quote from Robert Frost (1915) from his book *The Road Not Taken* .....

*“Two roads diverged in a yellow wood,*

*And sorry I could not travelled both.....*

*I took the one less travelled by,*

*And that has made all the differences”.*

## **12.2 Recommendations**

### **12.2.1 Program Leaders**

1. It is suggested that program directors gain an insight into the new curriculum and how it ties in with other fundamental instructional concepts. They should prioritise blueprinting the teaching and learning roadmap and partner with practising NSA experts to facilitate the implementation of the curricula. Further, empower faculties by

familiarising them with core components of the curriculum and how it fits within the larger scheme of things. Moreover, they should identify any gap in the curricular content and assessment strategy to take remedial action.

2. It is recommended to develop an instructional rubric that incorporates the latest research in teaching and learning to promote evidence-based teaching practices.
3. It is suggested to incorporate formal coaching and feedback sessions for the faculties to grow and develop as effective medical educators.
4. It is advised to run the pilot programme with a team of professionals to support the faculties by building the capacity while implementing the curriculum.

#### **12.2.2 Deaneries and Professional Statutory Regulatory Bodies (PSRB)**

1. There is an urgent need to develop a coherent relationship between higher education institutions, deaneries and PSRB to consult, create and implement a clinical training program in NSA.
2. PSRB should initiate an accelerated accreditation system and synchronised NSA clinical training pathway to recognise learning and achievement by the postgraduate trainees at the university to either gain exemption from PSRB examination or work towards recognising postgraduate clinical degrees.

### **12.2.3 Industry Partnerships**

It is recommended appointing industry champions within higher education institutions to develop working relationships with the industry to seek their input from the early stages of curriculum planning and development to make it relevant, gain research support, and propagate knowledge and skills.

### **12.3 Scope for further research**

The present research has provided a template for developing and implementing a postgraduate curriculum in non-surgical aesthetics. Future studies may take advantage of the ideas set out in this thesis by further investigating some aspects of the effectiveness of such a curriculum. For example, reflective writing in the clinical practice as a change agent; effect of 'community of practice' on professional identity formation. Moreover, curriculum and implementation are part of a cyclic process and needs continuous revision. Future studies must examine this topic in greater depth to better grasp the curriculum effectiveness.

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# Appendix A

## Ethics Approval



4<sup>th</sup> May 2017

Dear Narendra

**Principal Investigator:** Narendra Kumar

**FREP number:** FMSFREP16/17 141

**Project Title:** *Design, Validation, and Implementation of a comprehensive curriculum for a postgraduate non-surgical facial aesthetics program aesthetics.*

I am pleased to inform you that your ethics application has been approved by the Faculty Research Ethics Panel (FREP) under the terms of Anglia Ruskin University's Research Ethics Policy (Dated 8 September 2016, Version 1.7)

Ethical approval is given for 3 years from 4<sup>th</sup> May 2017. If your research will extend beyond this period, it is your responsibility to apply for an extension before your approval expires.

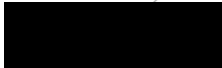
It is your responsibility to ensure that you comply with Anglia Ruskin University's Research Ethics Policy and the Code of Practice for Applying for Ethical Approval at Anglia Ruskin University, including the following.

- The procedure for submitting substantial amendments to the committee, should there be any changes to your research. You cannot implement these amendments until you have received approval from FREP for them.
- The procedure for reporting adverse events and incidents.
- The Data Protection Act (1998) and any other legislation relevant to your research. You must also ensure that you are aware of any emerging legislation relating to your research and make any changes to your study (which you will need to obtain ethical approval for) to comply with this.
- Obtaining any further ethical approval required from the organisation or country (if not carrying out research in the UK) where you will be carrying the research out. Please ensure that you send the FREP copies of this documentation if required, prior to starting your research.
- Any laws of the country where you are carrying the research and obtaining any other approvals or permissions that are required.
- Any professional codes of conduct relating to research or requirements from your funding body (please note that for externally funded research, a Project Risk Assessment must have been carried out prior to starting the research).
- Completing a Risk Assessment (Health and Safety) if required and updating this annually or if any aspects of your study change which affect this.
- Notifying the FREP Secretary when your study has ended.

Please also note that your research may be subject to monitoring.

Should you have any queries, please do not hesitate to contact me. May I wish you the best of luck with your research.

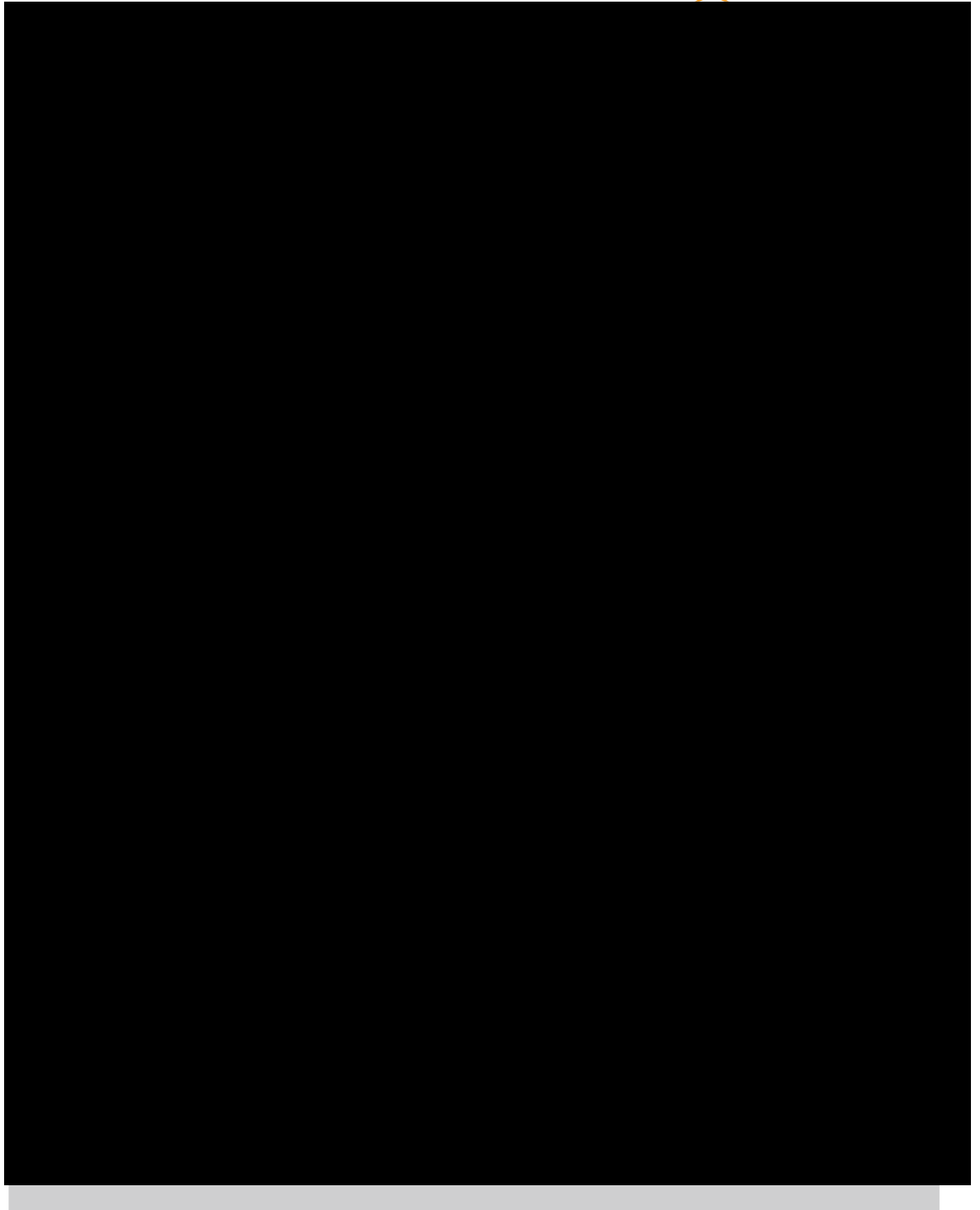
Yours sincerely,

  
FREP Chair  
Date 24.4.17  
V1.0



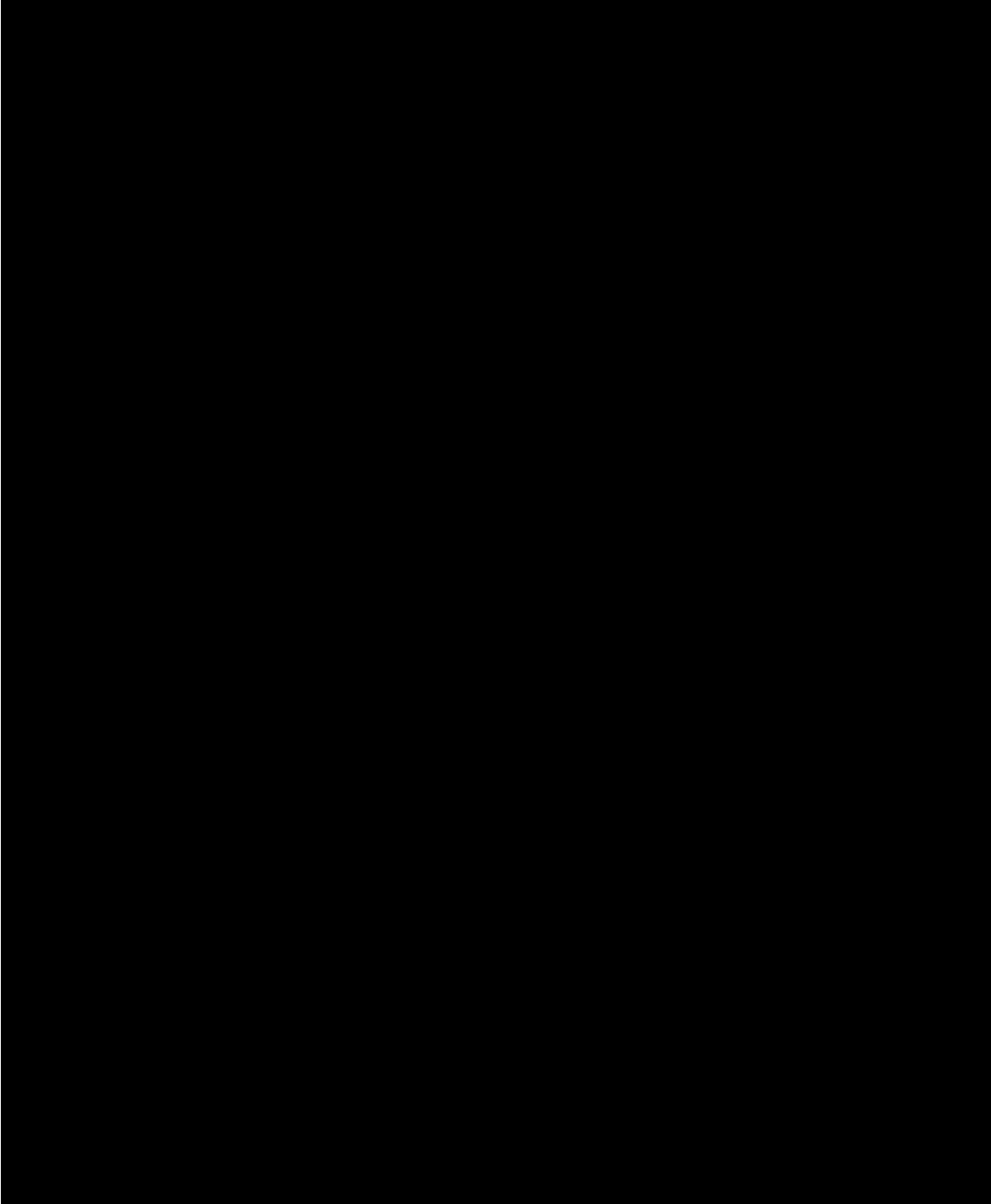
## Appendix B

### A Novel Three-Dimensional Interactive Virtual Face to Facilitate Facial Anatomy Teaching Using Microsoft HoloLens



## **Appendix C**

### **Global Needs-Assessment for a Postgraduate Program on Nonsurgical Facial Aesthetics**



# Appendix D

## Development of “Core Syllabus” for Facial Anatomy Teaching to Aesthetic Physicians: A Delphi Consensus

OPEN



ORIGINAL ARTICLE

Cosmetic

### Development of “Core Syllabus” for Facial Anatomy Teaching to Aesthetic Physicians: A Delphi Consensus

Narendra Kumar, MSc\*  
Arthur Swift, MD†  
Eqram Rahman, MBBS, MS, PhD\*

**Background:** A detailed understanding of facial anatomy, specifically the vascular framework, is crucial for delivering safe nonsurgical aesthetic procedures. To date, there is no core document based on consensus for the teaching of facial anatomy to aesthetic physicians exists. The aim of this study was to ascertain the most critical anatomical structures for avoiding disastrous complications during nonsurgical aesthetic procedures.

**Methods:** After a detailed literature review, Delphi questionnaire was developed listing 154 anatomical structures of the face and neck for consensus review. Thirty-five international experts in surgical and nonsurgical facial aesthetics were invited to complete an online survey designed to rank the relevance of each anatomical element on a Likert scale from 1 (not at all important) to 4 (very important) or 5 (no opinion). Consensus for items included in the core syllabus was predefined as achieving a Cronbach's  $\alpha \geq 0.90$  and an agreement score of  $\geq 80\%$ .

**Results:** Thirty-four international experts (97.14%) completed the iterative online Delphi survey. The consensus among the specialists polled was achieved after 1 round of the survey (Cronbach's  $\alpha = 0.94$ ). The expert panel reached an agreement score of  $\geq 80\%$  on 137 of the 154 anatomical structures listed.

**Conclusion:** The outcome of this Delphi study represents an essential first step in systematizing an evidence-based facial anatomy “Core Syllabus” for the teaching of aesthetic physicians and practitioners. This “Core Syllabus” will act as a blueprint for the educators while crafting a program. (*Plast Reconstr Surg Glob Open* 2018;6:e1687; doi: 10.1097/GOX.0000000000001687; Published online 6 March 2018.)

#### INTRODUCTION

The Merriam-Webster dictionary notes that the word anatomy was first used in the 14th century and was defined as “the art of unraveling the parts of an organism to ascertain their position, relations, structure, and function.”<sup>1</sup> The study of gross anatomy traditionally epitomizes a crucial stage in the training of prospective physicians. “The Anatomy Lesson,” one of the first portraits by the young Rembrandt in the year 1632, displays assiduous scholars hovering over a corpse under the direction of a praelector

or mentor (Dr. Nicolaes Tulp). This famous masterpiece bears witness to the significance of physicians obtaining a sound basis in the anatomical sciences.<sup>2</sup>

A thorough understanding of anatomy is a primary requisite for physicians to assess, diagnose, select appropriate treatment, and complete clinical procedures safely and more efficiently. For centuries, detailed appreciation of human anatomy has remained a cornerstone of the successful practice of medicine.<sup>3</sup> More recently, the method of anatomy teaching in medical schools has undergone significant changes. This is no better exemplified than in the United Kingdom after the publication of the General Medical Council's *Tomorrow's Doctors*. The transformation has brought a range of pedagogical styles including problem-based, patient-centric, self-directed, and system-based teaching, delivered through small group classes or clinical sessions.<sup>4</sup> Recent technological advances such as virtual reality, computer-aided learning, and multimedia resources integrated into the classic

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learning method of prosections have changed the entire perspective of anatomical teaching.

In the literature, many authors have expressed substantial concern about the decline of proper anatomy education and its consequences in undergraduate training.<sup>5,6</sup> Applying anatomical expertise requires sequential learning, in which core knowledge developed during pre-clinical years is contextualized during the clinical years. Inevitably, there is a limited recall of the knowledge, which was gained by learning the 3-dimensional functional anatomy, even in a spiral curriculum where familiarity with anatomical structures is repeated several times during the course.<sup>7</sup> This apparent inability to contextualize remote anatomical learnings has led to the questioning of the proficiency of newly graduated physicians. Recent surveys have shown that clinicians in both the United Kingdom and North America perceive modern anatomical education to be inadequate.<sup>8,9</sup> A review article published in 2012 added credence by citing 32 cases of blindness as a result of inadvertent cosmetic filler or autologous fat vascular occlusion.<sup>10</sup> In a more recent review article, 98 cases of blindness due to cosmetic injection therapy were identified, originating from different facial areas.<sup>11</sup>

This fundamental lack of anatomical knowledge leads to significant concerns about the competency levels of many aesthetic practitioners and particularly the level of safety in clinical practice.<sup>5,8,12</sup> Acknowledging that anatomical familiarity is paramount to safe and efficient clinical practice, the question remains as to “what ought to be taught.”

There is an urgent need to integrate all the available anatomical nomenclature into a mandatory list of critical structural knowledge that is common to all nonsurgical facial aesthetics procedures. Furthermore, there is a lack of a single database to which course directors can refer to ensure that all the attendees have gained the critical knowledge necessary for safe clinical practice; nonpractical superficial memorization through textbooks is not sufficient.

To determine appropriate content for facial anatomy teaching and learning, the authors conducted a modified Delphi study to build consensus among aesthetic plastic surgeons and dermatologists with global recognition as experts in both the practicing and teaching of nonsurgical facial aesthetics. Author’s objective was to ascertain the most significant anatomical landmarks and structures necessary to avoid disastrous complications during nonsurgical aesthetic procedures. The goal of the present study was to create a facial anatomy core document for postgraduate and continuing medical education in facial aesthetics.

## METHODS

### Study Design

The study was approved by the Ethics Committee, Faculty of Medical Sciences, Anglia Ruskin University, Chelmsford, United Kingdom. A modified Delphi methodology was used to build the consensus among the expert panel of aesthetic dermatology and plastic surgery educators.

The Delphi method is a proven technique commonly used in medical education research for curriculum and competency development.<sup>13-15</sup> The process attempts “to assess the extent of agreement (consensus measurement) and to resolve disagreement (consensus development)” where there is either a lack of scientific evidence or contradictory evidence on a particular topic.<sup>16</sup> The Delphi method has been established as an effective approach to systematically collecting experts’ opinions to achieve consensus on subjects without bias.<sup>13</sup> Based on the assumption that “group opinion is considered more valid and reliable than individual belief,”<sup>17</sup> the Delphi method was adopted as the methodological approach to achieve consensus regarding the importance of specific anatomical components of facial assessment and treatment through injection therapy.

### Expert Panel

The members of the consensus group were selected based on their experience as global thought leaders in the field of nonsurgical facial aesthetics. This subjective selection was supported by their contribution to education and research through the medical/surgical journal and textbook publications and podium appearances at major aesthetic meetings. Every polled participant required affiliation to an aesthetic plastic surgery or dermatology society within the Americas, Asia, Australia, or Europe (Table 1). Members of the expert panel were invited from 12 countries averaging more than 20 years of experience to represent views from a wide geographical area (Fig. 1).

### Questionnaire Development

A comprehensive list of vital anatomical structures was developed that was deemed applicable for carrying out nonsurgical aesthetic procedures. This list was prepared from multiple sources including the authors’ extensive experience with surgical anatomy and detailed cadaver dissec-

**Table 1. Geographical Distribution of Expert Panel**

Country	Specialty	Invitation Sent	Response Received
Argentina	Plastic surgery	1	1
Australia	Plastic surgery	2	2
	Dermatologist	1	1
Belgium	Dermatologist	1	1
Brazil	Plastic surgery	1	1
	Dermatologist	1	1
Colombia	Plastic surgery	1	1
	Facial plastic surgery	1	1
Canada	Plastic surgery	6	6
	Dermatologist	1	1
France	Plastic surgery	1	1
	Facial plastic surgery	1	1
Germany	Dermatologist	2	2
India	Plastic surgery	2	1
	Dermatology	1	1
Italy	Plastic surgery	2	2
Korea	Plastic surgery	1	1
	Anatomist	1	1
Malaysia	Plastic surgery	1	1
Singapore	Plastic surgery	1	1
South Africa	Dermatology	1	1
United Kingdom	Facial plastic surgery	1	1
The United States of America	Plastic surgery	6	5

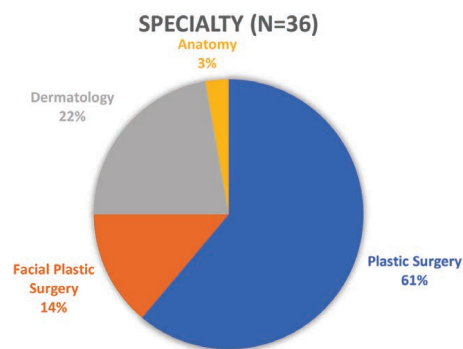


Fig. 1. Specialty wise distribution of expert panel.

tions, and an in-depth review of published literature and reference textbooks on facial anatomy.<sup>10,18-21</sup> The survey questionnaire comprised 154 anatomical structures of the face and neck including topographical landmarks, neurovascular structures, mimetic muscles of facial expression, functional muscles of mastication, superficial and deep fat compartments, true osteocutaneous and false ligaments, fascial planes, and defined anatomical spaces. The online questionnaire was developed using a web-based survey tool (www.surveymonkey.net), and contributors received an e-mail invitation to participate. Panel members were asked to rate the relevance of each of the 154 facial anatomical structures for nonsurgical facial aesthetics on a 5-point Likert-type Scale (1 = Not at all Important; 2 = Slightly Important; 3 = Fairly Important; 4 = Very Important; 5 = No Opinion). The consensus participants were able to provide comments, suggestions, and expand on their reasons for selecting low-level importance (“not at all important”; Table 2).

**Determination of Consensus**

Delphi method does not have a set rule as to the number of rounds of questionnaires provided; however, 2 or 3 rounds are commonly in practice.<sup>22</sup> Internal consistency or the homogeneity of the opinion among group members was defined as consensus. Cronbach’s alpha analysis is 1 of the statistical indices commonly used to determine the reliability at the end of each round. In the statistical literature, an alpha of 0.70 or higher is required to be satisfactory for educational research purposes, whereas for direct clinical applications, it is suggested to obtain a minimum alpha of 0.90.<sup>23</sup> For consensus-seeking methodologies, an agreement score of  $\geq 80\%$  is considered a significant achievement.<sup>24</sup> Therefore, for this study, an agreement score of  $\geq 80\%$  and Cronbach’s  $\alpha \geq 0.90$  was set to represent consensus. Initial survey items that lacked consensus were modified based

on the comments from the responders and resubmitted in round 2 for secondary alpha analysis.

**Data Collection**

**Delphi Round 1**

The first round of Delphi process triggered with 146 anatomical structures of the face and neck aimed for each panel member to select the critical structures for nonsurgical facial aesthetic procedures. The experts were given the option of the free text box where they could propose additional items.

**Delphi Round 2**

Items from the first round that were selected by  $\geq 80\%$  (consensus) of the experts were essential anatomical structures and were not presented in round 2 for further review. Items with less than 50% consensus were also excluded from round 2. Consequently, only items with an agreement level of 50–79% in the first round were presented to the participants for consensus in round 2. Furthermore, 8 new items proposed by respondents in round 1 were also submitted for the consensus.

**RESULTS**

The overall response rate was 97.22% (n = 35 of 36) in the first round and 71.4% (n = 25 of 35) in the second round. In the second round, all the comments and suggestions from the panel members were included. The expert panel reached consensus ( $\geq 80\%$ ) on 137 anatomical structures of 154 as critical knowledge for the safe and efficient practice of nonsurgical facial aesthetics. Cronbach’s alpha for the Delphi process was 0.94, which showed a high level of internal consistency and reliability.

A summary of the final consensus organized by anatomical theme is as follows:

**Anatomical Layers of the Face**

Of the 14 anatomical layers of the face and neck included in the Delphi process, there was complete consensus ( $\geq 83\%$ ) among the experts that 12 structures were “Very Important” for the inclusion in the core syllabus: mimetic muscles, muscles of mastication (temporalis, masseter, pterygoid), subcutaneous and deep fat layers, true retaining ligaments (osteocutaneous retaining ligaments), anatomical spaces (Ristow’s space, prezygomatic, premaxillary), periosteum (bone), superficial musculoaponeurotic system (Table 3). However, there was no consensus ( $\leq 71\%$ ) on the inclusion of false ligaments (fascia-cutaneous ligaments) and skin histology and thickness.

**Topographical Landmarks**

Of the 13 topographical landmarks of the face and neck included in the Delphi process, there was complete consensus ( $\geq 89\%$ ) to include them all in the core syllabus: tem-

**Table 2. Example of the Questionnaire (1 = Not at all Important; 2 = Slightly Important; 3 = Fairly Important; 4 = Very Important; 5 = No Opinion)**

Anatomical Structure	Not at all Important	Slightly Important	Fairly Important	Very Important	No Opinion
Facial artery					

**Table 3. Summary of consensus of inclusion to Core Syllabus of anatomical layers, topographical landmarks, fold, crease, and grooves of face and neck per Delphi Method Survey identified as “Very Important” by ≥ 80% of experts.**

Anatomical Structure	Level of Agreement (%)	Consensus
<b>Anatomical layers of the face</b>		
Facial mimetic muscles	100	Yes
Deep fat compartments	94	Yes
Superficial fat compartments	94	Yes
Facial muscles of mastication (temporalis, masseter, pterygoid)	89	Yes
Osteocutaneous retaining ligaments	89	Yes
Anatomical spaces (Ristow’s space, prezygomatic, premaxillary)	86	Yes
Periosteum (bone)	83	Yes
Superficial musculoaponeurotic system	71	No
False ligaments (fascia-cutaneous ligaments)	69	No
Skin histology and thickness		
<b>Topographical landmarks</b>		
Orbital rim	100	Yes
Temporal crest	100	Yes
Anterior border of the masseter	97	Yes
Foramina (infraorbital, supraorbital, supratrochlear, mental, zygomaticofacial)	97	Yes
Inferior maxillary border	94	Yes
Gonial angle	94	Yes
Medial and lateral iris	89	Yes
<b>Facial grooves, creases, and folds</b>		
Nasolabial fold	100	Yes
Nasojugal groove	94	Yes
Medial corrugator crease	89	Yes
Labio-mental crease	89	Yes
Forehead-lid crease	80	Yes
Alar crease	80	Yes
Supratarsal fold	80	Yes
Neck crease	66	No
Preauricular crease	51	No
<b>Fat compartments</b>		
Infraorbital fat compartments	94	Yes
Submental fat pad (pre/postplatysmal)	94	Yes
Retroorbicularis oculi fat	89	Yes
Sub-orbicularis oculi fat compartment	89	Yes
Medial, middle, lateral temporal-cheek fat compartment “malar”	86	Yes
Deep medial cheek fat	86	Yes
Superior and inferior jowl fat compartment	85	Yes
Cervical fat compartment	85	Yes
Nasolabial fat compartments	83	Yes
The superior, inferior, and lateral orbital fat compartments	83	Yes
Buccal fat	83	Yes
Fat compartment of upper and lower lip	80	Yes
Chin fat compartment	80	Yes
The central, middle, lateral fat compartment in the forehead	69	No
Medial and lateral corrugator fat compartment	63	No
Periauricular fat compartment	63	No
<b>Muscles</b>		
Frontalis	100	Yes
Glabella complex (corrugator supercilii, depressor supercilii, procerus)	100	Yes
Orbicularis oris, depressor anguli oris and depressor labii inferioris	100	Yes
Zygomaticus major, minor, levator labii superioris, levator labii superioris alaeque nasi	100	Yes
Mentals and platysma	100	Yes
Masseter and risorius	100	Yes
Orbicularis oculi	97	Yes
Temporalis, temporoparietalis muscle	91	Yes
Nasalis, dilator naris, depressor septii muscle	86	Yes
Malaris muscle	51	No

poral crest, orbital rim, inferior maxillary border, pyriform fossa, gonial angle, middle and lateral border of the iris, foramina (infraorbital, supraorbital, supratrochlear, zygomaticofacial, mental), and anterior border of the masseter.

**Facial Grooves, Creases, and Folds**

Of the 9 facial grooves, creases and folds of the face and neck included in the Delphi process, there was complete consensus (≥ 89%) to include 7 of them in the core syllabus: nasolabial fold, supra-tarsal fold, nasojugal groove, medial corrugator crease, labio-mental crease, forehead lid crease, and alar crease. There was no consensus (≤ 66%) on preauricular and neck crease. One of the experts emphasized the importance of the folds and creases as landmarks for the underlying neuro-vasculature.

**Fat Compartments**

Of the 23 facial fat compartments of the face and neck included in the Delphi process, there was complete consensus (≥ 86%) to include 20 of them in the core syllabus: orbital (infra, superior, inferior, lateral), temporal cheek (medial, middle, lateral), nasolabial, retro-orbicularis oculi fat, sub-orbicularis oculi fat, deep medial cheek, buccal, upper and lower lip, chin, superior and inferior jowl, submental (pre/postplatysmal) fat compartments. There was no consensus (≤ 69%) on the inclusion of forehead (central, middle, lateral), corrugator (medial, lateral), and periauricular fat compartments in the core syllabus. One of the experts commented that trainees should be required to distinguish the differences in function and morphology of the static (deep) versus the dynamic (superficial) fat pads and the importance of treating a particular fat compartment for a specific indication.

**Muscles**

Of the 22 muscles (mimetic and mastication) of the face and neck included in the Delphi process, there was complete consensus (≥ 89%) to include 21 of them in the core syllabus: frontalis, corrugator supercilii, depressor supercilii, procerus, orbicularis oculi, zygomaticus major, zygomaticus minor, levator labii superioris, levator labii superioris alaeque nasi, nasalis, dilator naris, depressor septii nasi, orbicularis oris, risorius, depressor anguli oris, depressor labii inferioris, mentalis, platysma, temporalis, temporoparietalis, and masseter. There was no consensus (≤ 51%) on the malaris muscle.

**Vasculature and Innervation**

**Forehead Anatomy**

All 9 anatomical structures of the forehead included in the Delphi process achieved complete consensus (≥ 82%) as “critical” structures in the core syllabus (Table 4). These included the supraorbital and supratrochlear foramina, vessels, and nerves; the deep branch of supraorbital nerve and its associated artery; the central forehead artery; and the galea aponeurotica.

**Temple Anatomy**

Of the 12 anatomical structures of the temple region included in the Delphi process, there was complete con-

**Table 4. A Summary of consensus of inclusion to Core Syllabus of aesthetic zones of face and neck per Delphi Method Survey identified as “Very Important” by ≥ 80% of experts.**

Anatomical Structure	Level of Agreement (%)	Consensus
<b>Forehead anatomy</b>		
Supratrochlear artery and vein	100	Yes
Supraorbital artery, vein	100	Yes
Galca	91	Yes
Supraorbital nerve and its deep branch	88	Yes
Central forehead artery	85	Yes
Supratrochlear nerve	82	Yes
<b>Temple anatomy</b>		
Superficial temporal artery/vein	100	Yes
Deep temporal fascia (superficial and deep layers)	100	Yes
Superficial temporal fascia	100	Yes
Anterior and posterior deep temporal arteries	94	Yes
Frontal branch of the 7th nerve	94	Yes
Sentinel vein	82	Yes
Middle temporal vein	82	Yes
Zygomatocotemporal nerve	76	No
Auriculotemporal nerve	65	No
<b>Periorbital anatomy</b>		
Orbital septum	100	Yes
Tear trough ligament, and it's anatomy	97	Yes
Orbicularis retaining ligament	97	Yes
Arcus marginalis	85	Yes
Lateral canthal tendon	76	No
<b>Nose anatomy</b>		
Angular artery	100	Yes
Lateral nasal artery	100	Yes
Columellar branches of superior labial artery	100	Yes
Dorsal nasal artery	97	Yes
Nasal bone, septal cartilage, alar cartilage, upper lateral cartilage, anterior nasal spine	95	Yes
Supratip arterial plexus	88	Yes
Intercanthal artery and vein	85	Yes
Philtral arteries	85	Yes
Middle alar compartment	79	No
Nasal valves (internal and external)	71	No
<b>Mid and lower face anatomy</b>		
Facial artery	100	Yes
Transverse facial artery	94	Yes
Parotid gland and Stensen's duct	91	Yes
Zygomatic ligament	82	Yes
Masseteric cutaneous ligament	81	Yes
<b>Lip anatomy</b>		
Superior and inferior labial artery	100	Yes
Oral commissure, cupid's bow, philtral column, vermilion-cutaneous junction, G-K point,* wet-dry junction, tubercle	100	Yes
Modiolus	100	Yes
Teeth position/dental occlusion	90	Yes
<b>Chin anatomy</b>		
Mental arteries and nerve	94	Yes
Submental arteries (horizontal and vertical)	91	Yes
Central branch of submental artery	85	Yes
<b>Neck anatomy</b>		
Marginal mandibular nerve	97	Yes
Mandibular ligament	91	Yes
Submandibular glands	94	Yes
Hyoid bone	76	No
Thyroid gland	76	No
Digastric muscle and anterior/external jugular vein	71	No

\*Glogau-Klein point

sensus (≥ 82%) to include 10 of them in the core syllabus: superficial temporal artery and vein, anterior and posterior deep temporal arteries, middle temporal vein, senti-

nel vein, temporal branch of the facial nerve, superficial temporal fascia, both layers of the deep temporal fascia, the interposed extension of the buccal fat pad, and the temporal bone and pterion. There was no consensus on the inclusion of the zygomatocotemporal and auriculotemporal nerves (≤ 76%).

#### Periorbital Anatomy

Of the 5 anatomical structure of the periorbital region included in the Delphi process, there was a complete consensus (≥ 85%) to include 4 of them in the core syllabus: orbital septum, tear trough ligament, lid cheek junction, orbicularis retaining ligament, and arcus marginalis. There was no consensus (≤ 76%) on the inclusion of the medial and lateral canthal tendons.

#### Nose Anatomy

Of the 16 anatomical nasal structures included in the Delphi process, there was complete consensus (≥ 85%) to include 13 of them in the core syllabus: angular arteries, dorsal nasal arteries, lateral nasal arteries, columellar branches of the superior labial artery, intercanthal artery and vein, supratip arterial plexus, philtral arteries, nasal bone, septal cartilage, lower lateral cartilages, upper lateral cartilages, medial crura, and anterior nasal spine. There was an inadequate consensus (≤ 71%) regarding the middle alar compartments and the internal and external nasal valves.

#### Mid and Lower Face Anatomy

There was complete consensus to include the facial artery (100%), the transverse facial artery (94%), the parotid gland, Stensen's duct (91%), and the masseteric ligament (81%) into the core syllabus.

#### Lip Anatomy

All 11 anatomical structures of the lip included in the Delphi process obtained complete consensus (≥ 90%) for inclusion in the core syllabus: modiolus, oral commissure, cupid's bow and peaks, philtral columns, vermilion-cutaneous junction, Glogau-Klein point (G-K point), wet-dry junction, tubercle of the upper lip, superior labial artery, inferior labial artery, and teeth position/dental occlusion.

#### Chin Anatomy

All 5 anatomical structures of the chin included in the Delphi process achieved complete consensus for inclusion in the core syllabus: mental foramen, mental artery, submental (horizontal and vertical) arteries, and the central branch of the submental artery.

#### Neck Anatomy

Of the 8 anatomical structures of the neck included in the Delphi process, there was complete consensus to include 4 of them into the core syllabus: marginal mandibular nerve, submandibular glands, mandibular ligament, and cervical fat compartment. The experts polled did not achieve consensus to include the thyroid gland, hyoid bone, digastric muscles, and anterior/external jugular vein in the syllabus. One of the expert commented

that for the treatment of submental fat pad, it is essential to know the position of the hyoid bone and thyroid gland.

Concerning the best approach for organizing the anatomy instructions, no consensus was achieved. Nonetheless, most experts polled preferred to structure the anatomy per aesthetic zones with exploration from superficial to deep.

### DISCUSSION

This is the first reported global consensus to develop a “Core Syllabus” for teaching facial anatomy to aesthetic practitioners. Rising demand for minimally invasive facial aesthetic treatments such as botulinum toxin and dermal fillers has renewed interest in the detailed understanding of facial anatomy.<sup>25,26</sup> A recent global consensus on avoiding complications related to injectable aesthetic procedures has emphasized the understanding of detailed facial anatomy.<sup>27</sup> A systematic and structured approach to anatomy teaching to aesthetic physicians is self-evident, as most of the present teaching is occurring outside of formal medical school systems. A lack of guidance in anatomical topic selection for prospective aesthetic specialists has led to a significant disparity in curricula among postgraduate continuing medical education initiatives. In this study, the authors aimed to define a list of essential content for a basic core syllabus.

The modified Delphi method using an online questionnaire has several advantages. It gives the flexibility of recruiting participants across vast geographical locations, and the anonymous construct provides an unbridled opportunity for all the panel members to express their opinion. The Cronbach alpha value of  $\geq 0.90$  obtained in this study indicates that there were enough members in the polled group to achieve consensus without significant controversy. This lack of divergence can be attributed to the authors’ efforts to include only those anatomical elements that were selected based on genuine evidence.

As the number of the facial aesthetic courses are on the rise across the globe, there is an emergent need to standardize the content of the curriculum to facilitate uniformity in learning experience and activities. Hence, the result of this study can be adopted by the educators as a blue print while road mapping the learning objectives to craft a program. This will in turn help learners to have a comparable learning experience and will help educators to systematically identify the effectiveness or further improvement.

### LIMITATIONS

The authors recognize the limitation of the study’s design in that the geographical distribution of the specialties was not equal, and a high proportion of the group members polled were aesthetic plastic surgeons from North America, thereby introducing a perspective bias. Although basic human anatomy is similar in humans, cultural, racial, and ethnic preferences for aesthetic enhancement portend an experiential shift in plastic surgical practices, which could influence the ranking of essential facial anatomical landmarks. Future studies can address this issue by surveying the aesthetic physicians and derma-

tologists individually using the Delphi method and then pooling the result.

### CONCLUSIONS

The outcome of this study has produced a consensus on 137 facial anatomical structures that are the core knowledge necessary for “safer” injection therapy. It represents an essential first step in systematizing a postgraduate evidence-based facial anatomy curriculum directed at aesthetic physicians and practitioners.

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# Appendix E

## An effective and novel method for teaching applied facial anatomy and related procedural skills to esthetic physicians

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ORIGINAL RESEARCH

### An effective and novel method for teaching applied facial anatomy and related procedural skills to esthetic physicians

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**Background:** An understanding of facial anatomy is crucial for the safe practice of nonsurgical facial esthetic procedures. Contextual learning, aided with instructional design, enhances the trainees' overall learning experience and retention, and makes a positive impact on the performance of procedural skills. The present study aimed to develop a teaching approach based on Bloom's taxonomy involving cognitive, affective, and psychomotor learning domains.

**Materials and methods:** The practicability of Assess & Aware, Demonstrate, Decode, Act & Accomplish, Perform, Teach & Test (ADDAPT), a new approach to teaching applied facial anatomy and procedural skills to esthetic physicians in a large group setting, was evaluated in this study. Study participants were from two cohorts (n=124) who underwent 2 days of applied anatomy training in Singapore. Pre- and post-course multiple choice questions and objective structured practical examination were conducted to measure the effectiveness and applicability of the teaching model. Expert raters, table demonstrators, and participants rated the steps involved in the ADDAPT model on an 11-point Likert scale.

**Results:** Pre- and post-course evaluation mean scores for multiple choice questions were 17.32 (SD ±3.36) and 22.61 (SD ±1.77) and for objective structured practical examination were 24.53 (SD ±4.63) and 43.57 (SD ±5.35), respectively ( $P < 0.001$ ). Inter-rater agreement, expressed as the intraclass correlation coefficient, was 0.91 (95% CI: 0.62–0.98) for expert raters and 0.90 (95% CI: 0.78–0.97) for table demonstrators, which reflects the real strength of sound educational practice. The trainees well accepted the model and found the sessions intellectually stimulating. Trainees' feedback stated that the learning experience was enhanced by the repeated observation and constructive feedback provided by the tutors.

**Conclusion:** The ADDAPT model is practical to instruct a large group of trainees in clinical anatomy and procedural skill training. This approach to instructional design may be feasible and transferable to other areas of psychomotor skill training in medical education.

**Keywords:** facial anatomy, anatomy teaching model, anatomy knowledge, pre- and posttest, OSPE, Bloom's taxonomy, instructional design

#### Introduction

The recent availability of "volume" fillers has extended cosmetic physicians' ability to contour facial architecture nonsurgically and with minimal discomfort. The deeper plane injection can create pleasing facial shapes, shaped brows, youthful eyes, elegant noses, and fuller lips – all within ideal proportions. Once the needle breaks the facial skin envelope, it can encounter vital structures; therefore, it is necessary for the esthetic physician to have an in-depth understanding of facial injection anatomy to avoid disastrous complications such as blindness due to accidental filler or fat vascular occlusion.<sup>1-3</sup>

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An abundance of conjectures exists in many empirical and narrative articles regarding physicians' lack of anatomical proficiency.<sup>4-8</sup> Both anatomists and clinicians agree that precise understanding of facial anatomy and individual variations is crucial<sup>9</sup> to assure safe and efficient procedural outcomes from injection of facial fillers.

Anatomy instructions are under-taught within appropriate contexts, such as clinical procedures. It is easier to transfer anatomical knowledge to solve a clinical problem by retrieving a concept that was learned in context. Anatomy teaching is primarily delivered by nonclinical teachers, who may not possess an apposite clinical perspective.<sup>10</sup> Globally, in many medical schools, anatomy teaching, amidst didactic lectures and cadaveric dissection, has been reduced.<sup>11,12</sup> Research has revealed that integrated curricula (such as problem solving, system-based learning, and computer-assisted learning) are replacing competent teachers and facilitators in anatomy laboratories to assist students in erudition, which deprives them of interactions with knowledgeable mentors.<sup>13</sup> Study behavior and knowledge retention appear to be partially dependent on the examination pattern. Prior awareness of the format of assessment (eg, multiple choice questions [MCQs]) has a strong influence on the way anatomical knowledge is compartmentalized and retained.<sup>6,14</sup> Iteration and reiteration in the context have a strong impact on the learning and retention of anatomical knowledge. However, limited time allocation for anatomy teaching in medical schools poses a challenge.<sup>15-17</sup>

Due to a growing practitioner demand and perceived need, many pharmaceutical and device companies have instituted training programs to refresh anatomical knowledge of their physician clientele to promote safer injection techniques. These symposia are based on the belief that simple exposure to basic anatomy would intuitively lead to the learning of safer injection techniques. Moreover, following Professor Bruce Keogh's report on "Review of the Regulation of Cosmetic Interventions," it was recommended that the Health Education England's mandate should include the development of appropriate accredited qualifications for providers of nonsurgical facial esthetic interventions.<sup>18</sup> This has led to a surge in the number of training institutes providing such qualifications in UK. However, there is little evidence of a standardized instructional teaching design, where complex knowledge of facial anatomy and nonsurgical procedural skills is taught, following the appropriate teaching and learning andragogy.

Most of the small group, clinical skills teaching, follows the well-known Peyton's<sup>19</sup> four-step approach (demonstration, deconstruction, comprehension, and execution), based on

Bloom's taxonomy, which was initially designed to support 1:1 teaching.

Bloom's<sup>20</sup> taxonomy of learning objectives has been the foundation for deconstructing and reasoning about the aim of educational interventions, in cognitive and affective domains only.<sup>21</sup> Subsequent work by many authors bridged the gap, by adding the psychomotor domain and covering the learning and acquisition of skills.<sup>22-24</sup>

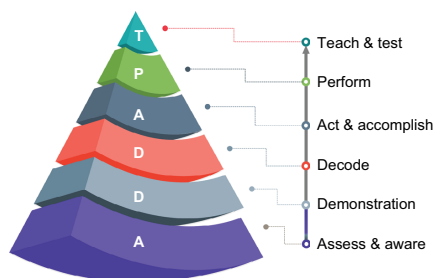
Subsequently, Dawson<sup>25</sup> revised and refined Bloom's taxonomy into four definite steps, namely observation, refinement, consolidation, and mastery. This has created an opportunity for assessment in the latter three steps to confirm the knowledge gain and procedural skill acquisition. On the review of the present medical literature, to the authors' best knowledge, no empirical, evidence-based educational model exists for teaching complex facial anatomy and related procedural skills, employing all the three learning domains.

The present study was proposed to design and evaluate a new educational intervention for large group teaching of applied facial anatomy and procedural skills based on the revised Bloom's taxonomy. We hypothesized that such a teaching model could be applied to teaching and assessing the complex facial anatomy and procedural skills in a large group setting.

## Materials and methods

### Development of the teaching model

The first author (NK) developed a six-step approach ADDAPT (Assess & Aware, Demonstrate, Decode, Act & Accomplish, Perform, Teach & Test) under the supervision of co-author (ER) for the teaching of applied facial anatomy and related procedural skills (ie, injection of botulinum toxin type A and dermal fillers) to esthetic physicians (Figure 1).



**Figure 1** ADDAPT teaching steps.  
**Abbreviation:** ADDAPT, Assess & Aware, Demonstrate, Decode, Act & Accomplish, Perform, Teach & Test.

## Steps of delivery

### Step 1: assess & aware

The MCQs and objective structured practical examination (OSPE) are conducted at the beginning of the course to assess the baseline knowledge of the trainees. The lead tutor (LT) introduces the topic by delivering a 10-minute snap presentation to make the learners aware of the knowledge, skills, and their significance as part of the conceptualization.

### Step 2: demonstrate

The LT demonstrates the relevant surface marking, injection technique, and corresponding anatomical structures. The individual table demonstrators then repeat the procedure without description to create a broad visual perception. This visualization is a critical step in the psychomotor domain since the learners often use this to evaluate their skills.

### Step 3: decode

The LT performs the procedure with the narration of the individual steps (often referred to as verbalization). The verbalization is a crucial stage of learning for acquiring new skills, as the auditory stimulus reinforces the visual memory. The table demonstrator repeats the step while the learners have a chance to ask any questions to clarify their understanding.

### Step 4: act & accomplish

The next step is for the trainees to internalize the one subset of skills in a cycle. Trainee 1 completes the surface marking, trainee 2 marks the injection points, trainee 3 explains the corresponding anatomy, trainee 4 performs the injection procedure, and trainee 5 explains the clinical relevance, under the guidance of the table demonstrator, and aided by the peer narration. This cycle is repeated until all the learners have completed all the subsets of skills. Iteration and reiteration help them to improve their understanding, thereby reinforcing the internalization of the taught knowledge and skills.

### Step 5: perform

Trainees simulate the injection procedure independently on the cadaveric face by completing the spotting/flagging, surface marking under the observation of the table demonstrator. The table demonstrator gives immediate feedback on their performance.

### Step 6: teach & test

The trainees do peer teaching on one skill set assigned by the table demonstrator, followed by feedback from the table demonstrator and peers. As a final step, all the trainees take

the formative assessment MCQs and OSPE to evaluate the knowledge and skills gained from the session.

## Study design

In this quasi-experimental design, the authors examined the effectiveness and practicality of the ADDAPT model, a new approach to teaching applied facial anatomy and procedural skills to esthetic physicians in a large group setting. The study was conducted with two cohorts (n=124) of esthetic physicians who underwent a 2-day applied facial anatomy course at the Academia, Singapore. The study was approved by the Faculty Research Ethics Panel of the Faculty of Medical Science, Anglia Ruskin University, Chelmsford, UK.

## Participants

Participation in the workshop was invitation-based to esthetic physicians, dermatologists, and plastic surgeons. The mean experience of practicing nonsurgical esthetic procedures was 9.18 years with a mix of male (38.7%) and female (61.3%) participants.

## Course structure

A 2-day course was designed to ensure the in-depth learning of applied facial anatomy relevant to nonsurgical injection therapy using fresh frozen cadavers. Emphasis was placed on safer injection techniques linked to vital anatomical structures through active trainee participation as described in previous publications.<sup>1,26</sup>

## Course delivery

The course was delivered over two cohorts (n=124), utilizing a plastic surgeon with over 20 years of clinical and teaching experience as the LT. Each table group was organized into smaller units of 5, wherein esthetic practitioners with over 10 years of clinical experience acted as table demonstrators to guide and facilitate active participation and to keep the group task focused (Figure 2).

## Assessment methods

A formal 20-minute examination was administered before and after the course (pre-/post-course). The test comprised 25 MCQs focused on factual and case-based applied facial anatomy knowledge. MCQs have been proven reliable in testing both recall and recognition.<sup>27</sup> In addition to recall and recognition, the test format has a unique ability to assess the participants' conceptual understanding, rather than merely the regurgitation of facts.

An OSPE for procedural skills was also instituted pre and post-course, as it involves visual, logical, linguistic, kinesthetic, and interpersonal intelligence.<sup>28</sup> Blueprinting of the OSPE was done according to the previously published global consensus on the “core syllabus” for applied facial anatomy teaching to esthetic physicians.<sup>26</sup> Thirty-one stations were constructed, where participants spent 1 minute at each station.

### Independent expert rating

Two independent experts, blinded to the study, evaluated the entire session on an 11-point Likert scale (0= strongly

disagree, 10= strongly agree) and gave their feedback on both didactic and procedural aspects of the teaching (Table 1).

### Table demonstrators' rating

Table demonstrators (n=11) were also asked to complete an 11-point Likert scale rating (0= strongly disagree, 10= strongly agree) on theoretical and practical aspects of the session, especially on the content, flow, timing, group interaction, and peer feedback (Table 1).

### Participant feedback

Participants were asked to give their feedback after the session on an 11-point Likert scale (0= strongly disagree, 10= strongly agree). The questionnaire was based on the knowledge and skills gained in the cognitive, affective, and psychomotor domains. Participants also gave feedback on teaching processes (ADDAPT), such as skill segmentation, reiterations, demonstrators, peer feedback, and overall skills gained from the session which could be applied in clinical practice. They were also asked to give additional comments regarding the session in general or any suggestions for future improvement.

### Statistical analyses

The descriptive statistics were expressed in frequency, mean, and SD. A paired-sample *t*-test was performed to compare



**Figure 2** Students engagement in the small group where the table demonstrator is explaining the steps of the procedure.

**Table 1** ADDAPT rating scale

Steps	Expert rater	Table demonstrator	Rating (0= strongly disagree, 10= strongly agree)
<b>A</b>	Content and pace are adequate to capture the attention of the participants	Content and pace are adequate to capture the attention of the participants	
<b>D</b>	<ul style="list-style-type: none"> <li>The LT is confident in demonstrating anatomy and procedural skills</li> <li>The individual group demonstrators mirrored the skills accurately and competently</li> </ul>	The LT is confident in demonstrating anatomy and procedural skills	
<b>D</b>	<ul style="list-style-type: none"> <li>The procedural narration is clear, concise, and fluid</li> </ul>	The procedural narration is clear, concise, and fluid	
<b>A</b>	<ul style="list-style-type: none"> <li>The participants repeated the steps without interruption</li> <li>The demonstrators can control the group</li> </ul>	The participants repeated the steps without interruption	
<b>P</b>	Feedback provided to the participants is adequate and clear	Feedback provided to the participants is adequate and clear	
<b>T</b>	<ul style="list-style-type: none"> <li>Trainees were thoroughly engaged in peer teaching</li> <li>Questions were written in the appropriate format</li> <li>Time allocated to complete the examination was adequate</li> </ul>	<ul style="list-style-type: none"> <li>Trainees were thoroughly engaged in peer teaching</li> <li>Questions were written in the appropriate format</li> <li>Time allocated to complete the examination was adequate</li> </ul>	

**Abbreviations:** ADDAPT, Assess & Aware, Demonstrate, Decode, Act & Accomplish, Perform, Teach & Test; LT, lead tutor.

the pre-/posttest scores of the MCQs and OSPE to ascertain the statistical significance. All *P*-values were two tailed, and statistical significance was set at  $P \leq 0.05$ . The agreement among the independent expert raters was measured by computing the two-way mixed intraclass correlation coefficient (ICC) for consistency. An ICC value of  $>0.7$  is considered as satisfactory.<sup>29</sup> Although Cohen's  $\kappa$  is a more stringent measure of the inter-rater agreement, it was not employed because of the presence of 5 or more rating categories. The same statistical principle was also applied to measure the agreement between the table demonstrators.

IBM SPSS Statistics for Windows, Version 24.0 (IBM Corporation, Armonk, NY, USA) was used to analyze quantitative data.

## Results

Pre-/post-course evaluation mean scores for MCQs were 17.32 (SD  $\pm 3.36$ ) and 22.61 (SD  $\pm 1.77$ ) and OSPE scores were 24.53 (SD  $\pm 4.63$ ) and 43.57 (SD  $\pm 5.35$ ), respectively ( $P < 0.001$ ; Tables 2 and 3; Figures 3 and 4). Delegates from all the specialties showed improvement in their applied anatomy knowledge and related procedural skills based on the comparison of pre- and posttest scores ( $P < 0.001$ ).

Two independent expert raters, blinded to the study, demonstrated less variance and higher reliability, where ICC was 0.91 (95% CI: 0.62–0.98). A similar trend was observed among the table demonstrators, where ICC was 0.90 (95% CI: 0.78–0.97), considered as excellent (Tables 4 and 5).

**Table 2** Paired-samples statistics

Mean		N	SD	Standard error of the mean	
Pair 1	MCQ_pre	17.3226	124	3.36058	0.30179
	MCQ_post	22.7500	124	1.70425	0.15305
Pair 2	OSPE_pre	24.5323	124	4.63538	0.41627
	OSPE_post	43.5726	124	5.35894	0.48125

**Abbreviations:** MCQ, multiple choice question; OSPE, objective structured practical examination.

**Table 3** Paired-samples test

Mean	SD	Paired differences			t	df	Significance (two-tailed)	
		Standard error of the mean	95% CI of the difference					
			Lower	Upper				
Pair 1: MCQ_post–MCQ_pre	5.42742	3.05551	0.27439	4.88428	5.97056	19.780	123	0.000
Pair 2: OSPE_post–OSPE_pre	19.04032	6.39664	0.57444	17.90326	20.17738	33.146	123	0.000

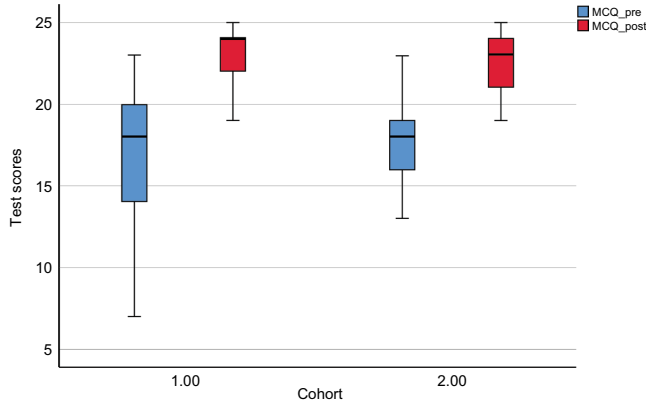
**Abbreviations:** MCQ, multiple choice question; OSPE, objective structured practical examination.

Evaluation rating with better inter-rater agreement reflects credibility and strength of good educational intervention.<sup>30</sup>

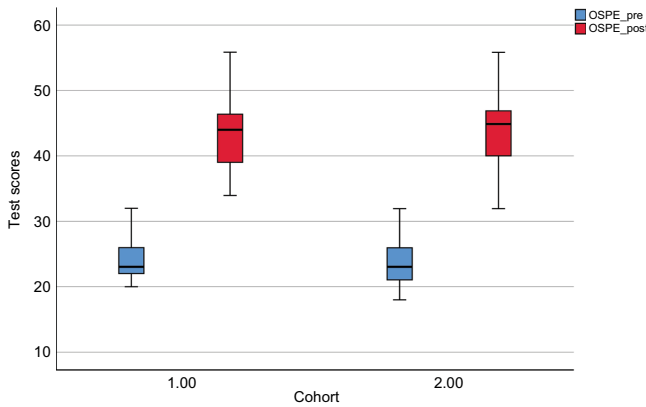
Feedback confirmed the acceptance and practicability of the ADDAPT model by the participants, as they gained sufficient knowledge and the necessary skills during the course applicable to their clinical practice. Additional comments included “sessions were intellectually stimulating”, “segmentation of the procedural skills was clear”, and “repeated observation within the group” were beneficial. Attendees noted that the peer-assisted learning, as well as the feedback provided by the table demonstrators and peers, was very constructive and helpful (Figure 5).

## Discussion

Facial rejuvenation with the use of soft tissue fillers is a popular and growing nonsurgical esthetic procedure globally. Due to rapid growth which now runs in millions of syringes in a year, rare but severe vascular complications including iatrogenic blindness are seen by many practicing physicians. A recent review article reported 98 cases of blindness due to soft tissue filler injections and highlighted the importance of comprehensive understanding of facial anatomy knowledge.<sup>3,26</sup> Currently, nonsurgical facial esthetic procedures are primarily taught outside of the formal medical school curriculum; trainees are mostly exposed to a “show and tell” type of course in various symposia and congresses. Such an approach is unlikely to provide enough opportunity to learners for the development of their affective and psychomotor skills in a structured way. Hence, it is essential to develop and validate a postgraduate nonsurgical facial esthetic curriculum to have a safe esthetic practice. As the target audience is the mature, postgraduate, clinical students, more careful attention should be given to address the format of instruction. Adult learners with a different approach to learning are interested in knowing the immediate gain from the process. This attitude presents with questions such as “what is in it for me?” or “can this learning be used in clinical practice?” Therefore, the medical educator's goal should be continuously trying to move his/her trainee to a higher level of human learning



**Figure 3** MCQ pre- and posttest score.  
**Abbreviation:** MCQ, multiple choice question.



**Figure 4** OSPE pre- and posttest score.  
**Abbreviation:** OSPE, objective structured practical examination.

**Table 4** Reliability statistics among independent expert raters

ICC							
	Intraclass correlation <sup>a</sup>	95% CI		Value	F-test with true value 0		
		Lower bound	Upper bound		df1	df2	Significance
Single measures	0.826 <sup>b</sup>	0.447	0.954	10.524	9	9	0.001
Average measures	0.905 <sup>c</sup>	0.617	0.976	10.524	9	9	0.001

**Notes:** Two-way mixed-effects model where people effects are random and measures effects are fixed. <sup>a</sup>Type C ICCs using a consistency definition. The between-measure variance is excluded from the denominator variance. <sup>b</sup>The estimator is the same, whether the interaction effect is present or not. <sup>c</sup>This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

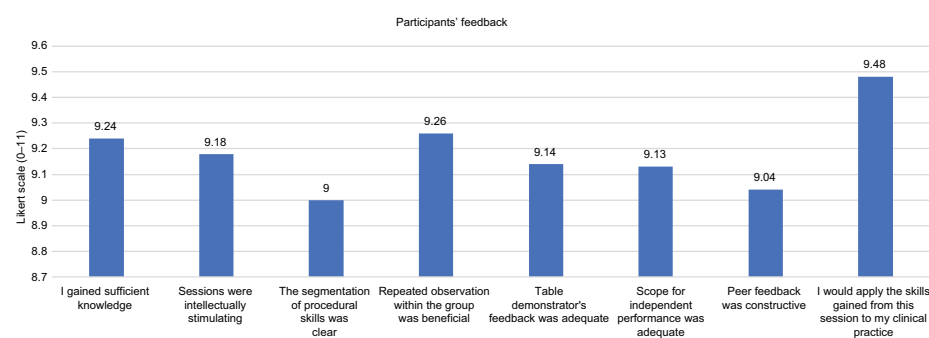
**Abbreviation:** ICC, intraclass correlation coefficient.

**Table 5** Reliability statistics among table demonstrators

ICC	Intraclass correlation <sup>a</sup>	95% CI		Value	F-test with true value 0		
		Lower bound	Upper bound		df1	df2	Significance
Single measures	0.452 <sup>b</sup>	0.239	0.752	10.073	9	90	0.000
Average measures	0.901 <sup>c</sup>	0.776	0.971	10.073	9	90	0.000

**Notes:** Two-way mixed-effects model where people effects are random and measures effects are fixed. <sup>a</sup>Type C ICCs using a consistency definition. The between-measure variance is excluded from the denominator variance. <sup>b</sup>The estimator is the same, whether the interaction effect is present or not. <sup>c</sup>This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

**Abbreviation:** ICC, intraclass correlation coefficient.

**Figure 5** Participants' qualitative feedback.

by touching cognitive (knowledge or head), affective (heart or feeling), and psychomotor (kinesthetic or hand) domains. At the beginning of a learning process for the psychomotor task, trainees should be provided with an intellectual stimulus by using a sententious approach, covering the cognitive and affective domain of learning.

Health care practitioners require the development of psychomotor skills; therefore, it is one of the key learning outcomes in all the medical education curricula. Unfortunately, medical schools emphasize developing the learning framework around the cognitive and affective domains and leave the progress of psychomotor skills to a clinical clerkship, where trainees are provided with controlled clinical practice opportunities. The success of such an approach is reliant on the competency of clinical supervisors. Institutions are relying on qualified clinicians in the workplace to educate and develop the psychomotor skills of trainees during these supervised sessions. However, these clinicians often have inadequate knowledge of instructional theory.<sup>31</sup> Thus, ADDAPT successfully implements all the three domains of learning, ie, cognitive, affective and the psychomotor by providing a platform that is clear, time specific, and outcome-

based where a sound knowledge of anatomy is gained, then applied and tested before any complex facial esthetic procedures are taught.

To the best of our knowledge, the current study is the first to present and appraise not only the methodological approach to anatomy-based procedural skill teaching in a large group setting, but also to facilitate working in a group assisted by peer-assisted learning, involving all the domains of human learning. ADDAPT's six steps provide a well-organized erudition pathway as they give structure to the facial anatomy lesson plan that fits several learning styles. The authors described a practical teaching approach with clearly defined steps focusing on different stages of learning a complex task such as conceptualization, visualization, verbalization, and actualization. Since trainees may have a wide range of learning styles, they learn most efficiently from a combination of activities that kindles the visual, auditory, verbal (read-write), and kinesthetic sensory modalities.<sup>32</sup>

Pre- and post-course assessment results during the anatomy workshop prove the practicability of the ADDAPT model for large group teaching. The trainees, as well as the table demonstrators, acknowledged and rated the ADDAPT



model as easy to implement, resulting in a good flow of teaching and success in attracting the trainees' attention. With the ADDAPT model, trainees get sufficient opportunity to build their understanding on the taught knowledge and skills during the first three steps (assess & aware, demonstrate, decode), while the last three steps (act & accomplish, perform, and teach & test) focus on the internalization by performing the learnt skills. Step 4 (act & accomplish) and step 5 (perform) are the anchors of this model and superior to Peyton's<sup>19</sup> third and fourth step (comprehension and performance) as evident by the participant's feedback (Figure 5), where the peers and table demonstrators facilitate learning in a safe environment. Feedback is proven to be highly effective in the learning process,<sup>33</sup> a gift that benefits in making the trainees aware of their strength and areas to focus. Although the ADDAPT model is a simple approach, it propounds a strategy for explicit instruction, by engaging all participants to focus on optimizing the overall learning experience and attaining skill mastery.

The ADDAPT model is a three-dimensional teaching and assessment framework, where complex nonsurgical facial esthetic interventions and elaborate facial anatomy were taught to attain mastery of the necessary skills. This unified teaching model has facilitated an interdependent learning network aided by peer-assisted learning, which has proven to be the soul of modern medical education. Combining such tools not only enforces theoretical knowledge and refinement of procedural skills by repetition but also helps in minimizing potentially serious complications.<sup>1</sup> Thus, the ADDAPT model has proven to be advantageous in taking students on a journey involving all three domains of human learning.

### Limitations

This research has several limitations. First, we conducted the study without any control group, in two cohorts and at a single center, as it limits the external validity. We suggest replicating the present study at different centers with multiple cohorts to evaluate its practicality and effectiveness. Second, conducting an OSPE for a large group and maintaining 1:5 (table demonstrator:trainee) ratio require extensive resource planning regarding infrastructure and time, which can be challenging in many situations. Lastly, it is difficult to estimate the impact of this educational intervention on clinical practice, such as safer injection techniques. Patient-related outcomes usually are not a quixotic proxy to establish the effectiveness of the educational intervention. Regardless of this, most educational interventions are based on the rational

assumption that knowledge and skill attainment eventually lead to improved patient care.

### Conclusion

The current study has proposed and evaluated a new and innovative teaching model ADDAPT – a six-step approach – which is useful in teaching applied facial anatomy and procedural skills to esthetic physicians in a large group setting. Both participants and tutors accepted the ADDAPT model very well. This alternative to conventional instructional design may be workable and transferable to other areas of psychomotor skill training in medical education.

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### Disclosure

The authors report no conflicts of interest in this work.

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# Appendix F

## Effectiveness of teaching facial anatomy through cadaver dissection on aesthetic physicians' knowledge

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ORIGINAL RESEARCH

### Effectiveness of teaching facial anatomy through cadaver dissection on aesthetic physicians' knowledge

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**Background:** Cadaver dissection for anatomy training provides an opportunity to understand the precise nature of human tissues with their clinical and structural relationships. This study assessed the effectiveness of this practical educational intervention for teaching applied facial anatomy on the knowledge and confidence of aesthetic physicians.

**Methods and materials:** A total of 168 aesthetic physicians underwent facial applied anatomy training for 2 days at The Academia, Singapore. The 2-day course encompassed detailed facial anatomy of neurovasculature, fat compartments, ligaments, and muscles followed by simulated practice of safer injection techniques. To enable quality interaction between the participants and the faculties, the delegates were divided into four groups. Academic impact of the program was evaluated by a pre-course and post-course multiple choice question (MCQ) test. Participants, also completed a paper-based feedback on their knowledge, skills, and confidence in performing nonsurgical facial aesthetic procedures. Different sets of MCQs were utilized for pre-course post-course test to avoid any recall bias.

**Results:** All 168 participants completed the test and were included in the analysis. Mean pre-course and post-course test scores were 4.8 (standard deviation [SD] 1.9) and 7.6 (SD 1.7), respectively ( $p < 0.001$  vs pre-course test). All the four groups showed improvement in their facial anatomy knowledge based on the comparison of pre-course and post-course test results ( $p < 0.001$ ). The average post-course test score in all the groups from baseline significantly improved. However, there was no statistical difference in pre-course and post-course test evaluation between the groups ( $p = 0.32$ ).

**Conclusion:** Our results showed that cadaver anatomy training improved applied facial anatomy knowledge for most of the aesthetic practitioners, which may enhance their confidence in performing nonsurgical facial aesthetic procedures.

**Keywords:** MCQ, facial anatomy, non-surgical, anatomy teaching, simulation, anatomy knowledge, pre-course test, post-course test

#### Introduction


Strong knowledge of anatomy is an essential component of a safe and effective procedural practice. Cadaver dissection has been considered the principle teaching method of anatomy for the last 400 years.<sup>1,2</sup> It comprises understanding of the relationship between patients' symptoms and pathology, appreciation of the three-dimensional perspectives of structures,<sup>1,3</sup> identification of anatomical variations,<sup>4</sup> and exposure to more realistic tactile features compared to technologically supported synthetic training models.<sup>5-7</sup> However, in recent times, cadaver dissection-based teaching has significantly declined due to the adoption of integrated medical curricula worldwide, the significant cost and required time, and religious restrictions.<sup>8,9</sup> The permanence of basic science knowledge learned in

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medical school has been a source of concern for as long as this knowledge has been included in the curriculum. More specifically, there is a common belief among physicians and medical educators that a significant percentage of the basic science knowledge attained in the preclinical years in medical school is lost during the final, predominantly clinical, years.<sup>10,11</sup> Studies have shown that residents fail to recall a considerable proportion of apparent anatomical knowledge in the transition from their pre-clinical years to practice.<sup>12-14</sup> Due to the effectiveness and safety of nonsurgical aesthetic procedures in reducing the signs of facial aging, increasing numbers of people are opting to undergo nonsurgical facial aesthetic procedures worldwide.<sup>15</sup> Understanding facial anatomy further enhances the aesthetic practitioners' knowledge of the aging process, to provide a better treatment plan for an optimal clinical outcome.<sup>16,17</sup> Furthermore, intravascular complications associated with injectables have been shown to be mainly related to a lack of facial anatomy knowledge and awareness.<sup>18</sup> The importance of facial anatomy knowledge has been discussed by many experts.<sup>19</sup> A global consensus on avoidance of aesthetic procedure-related complications has also echoed the importance of detailed facial anatomy knowledge to prevent devastating complications.<sup>20</sup> Increased usage of botulinum toxin and dermal fillers in facial aesthetic procedures has brought with it a renewed interest in elaborate facial anatomy, previously a relatively low priority in medical school. For many aesthetic practitioners whose last experience with gross anatomy was during their early preclinical years, refreshing this knowledge is necessary for safe and optimal clinical outcome.<sup>21</sup> The aim of this research was to evaluate the impact of cadaver dissection on facial anatomy learning among experienced aesthetic practitioners. The hypothesis of this study was that enhancing facial anatomy knowledge, specifically, the vasculature, fat compartments, ligaments, and muscles, through a cadaveric dissection of the face would increase anatomical knowledge needed to perform safe and effective nonsurgical facial aesthetic procedures.

## Methods and materials

### Participants

The study was approved by the Ethics Committee of the Faculty of Medical Science, Anglia Ruskin University, Chelmsford, UK. The study cohort comprised 168 aesthetic physicians who attended a 2-day applied facial anatomy course with fresh cadaver dissection at The Academia, Singapore. Participation in the workshop was by invitation, and the delegates were from China, India, Indonesia, Malaysia, Taiwan, Thailand, Turkey, and Singapore. Participants' mean experience of practicing aesthetic medicine since primary

medical qualification was 7.6 years (standard deviation [SD] 3.8); 36% of participants were men, and 64% were women.

### Course structure

An instructional curriculum was developed in consultation with dermatologists and aesthetic plastic surgeons globally recognized for their interest in non-surgical facial aesthetics. The course was delivered over 2 days. Day 1 was focused on cadaveric dissection and day 2 was focused on live demonstration of safer injection techniques linked to anatomical correlation, with active audience participation. Each session had a logical sequence of teaching activities, which included lectures on the relevant anatomical areas with an emphasis on critical neurovasculature, fat compartments, ligaments and muscles of the upper, mid and lower third of the face. This was followed by task-driven, facilitator-led small group functional anatomy dissection and simulated practice of safer injection techniques with a variety of dermal fillers delineating the depth and location of the injection (Table 1).

### Course delivery

Participants (n=168) were organized into four groups, each headed by a lead faculty. Each group was further subdivided into smaller units of 7 with a table demonstrator to encourage discussion, active interaction, feedback, and reflection. This two-tier strategy was incorporated to maximize the tutor intervention as it keeps the group tasked focused when members in the group are new to one another and complex task needs to be achieved.<sup>22</sup>

### Assessment materials

Measurement of knowledge retention has been debated in the literature. There is no single agreed measure of knowledge retention, but rather several different methods, which may

**Table 1** Course structure

Day 1	Day 2
Pre-course MCQ test	Review of facial anatomy (lecture)
Review of facial anatomy (lecture)	Live demonstration
Cadaveric dissection:	<ul style="list-style-type: none"> <li>• Surface marking</li> <li>• Injection technique (with active audience participation)</li> </ul>
Divided into lower, middle, and upper thirds of the face with special attention to:	
<ul style="list-style-type: none"> <li>• Fat compartments</li> <li>• Neuro-vasculature</li> <li>• Ligaments</li> <li>• Muscles</li> </ul>	
Simulated practice of safer injection techniques with a variety of dermal fillers, delineating the depth and location of injection	Post-course MCQ test Feedback

**Abbreviation:** MCQ, multiple choice question.

not always yield equivalent results. Open-ended (recall) and true-false (recognition) questions are most commonly used in educational contexts to measure retention. However, multiple choice questions (MCQs) enable the testing of both recall and recognition.<sup>23</sup> Hence, a formal 10-minute test was administered before the course (pre-course) and the day following the dissection session (post-course). The test comprised 10 MCQs with four stem answers focused on facial anatomy (Figure S1). These questions were randomly selected from a list of 40 questions prepared and validated by a panel of five dermatologists and aesthetic plastic surgeons, each with >20 years of clinical and academic experience. Participants were given different sets of MCQs during pre- and post-course test to avoid any recall bias.

Participants were also asked to complete a paper-based feedback on their knowledge, skills, and confidence in performing nonsurgical facial aesthetic procedures after the course using a 5-point Likert scale (0= strongly disagree, 5= strongly agree).

### Statistical analysis

Descriptive statistics were computed including frequency, mean, and SD. Primary outcome measures were the pre-course and post-course test scores. The data were normally distributed at baseline but skewed at the subsequent time points. The analysis compared scores from consecutive time

points to determine whether there was an improvement. The measures of the central tendency for assessment score were presented as median with interquartile ranges.

The Wilcoxon signed-rank test was utilized as it compares two related samples or repeated data (in this case, the pre-course and post-course test scores). All *p*-values were two-tailed, and due to the multiple testing of the items, statistical significance was set at  $p \leq 0.001$ .

IBM SPSS statistics for Windows, Version 20.0 (IBM Corporation, Armonk, NY, USA) was used to analyze quantitative data.

### Results

Mean pre-course and post-course test scores were 4.8 (SD 1.9) and 7.6 (SD 1.7), respectively. All four groups showed improvement in their facial anatomy knowledge ( $p < 0.001$ ) based on the comparison of pre-course and post-course test results (Figure 1). The average post-course test score in each of the groups was higher than the pre-course test score. There was no significant difference ( $p = 0.32$ ) in pre-course and post-course test evaluation scores between the groups (Table 2).

### Participant feedback

All 168 students in the dissection course completed an anonymous feedback. Participants' response revealed that the course strengthened the ability of physicians to carry

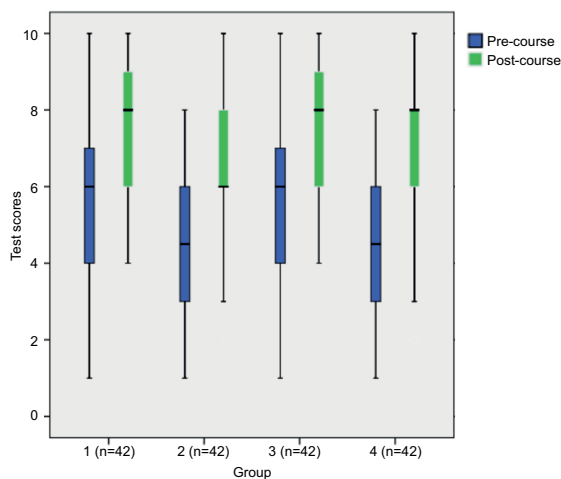


Figure 1 Box plot showing pre-course and post-course test scores in each group.

**Table 2** Wilcoxon signed rank test

	Post-course test – pre-course test	Difference group	Pre-course test group	Post-course test group
Z	-9.233 <sup>a</sup>	-0.995 <sup>b</sup>	-9.312 <sup>a</sup>	-11.209 <sup>a</sup>
Asymptotic significance (two-tailed)	0.000	0.320	0.000	0.000

Notes: <sup>a</sup>Based on negative ranks; <sup>b</sup>based on positive ranks.

out nonsurgical aesthetic procedure independently in a less stressful environment, by increasing their understanding of facial anatomy (n=162; 96.42%), skills for surface marking (n=165; 98.21%), and confidence (n=157; 93.4%). All physician attendees rated the program as extremely useful and that they would apply the learnings into their clinical practices (n=164; 97%) (Figure 2).

Examples of the participants' comments included: "invaluable experience to learn facial anatomy after medical school" and "best and much-needed refresher training for every physician."

Additional comments revealed that some participants found the course to be very intensive, with a lack of sufficient breaks (n=14; 8%), while others expressed that it would have been useful to have additional time for more detailed dissection (n=19; 11%).

## Discussion

Overall, this program objectively demonstrated that the cadaver dissection course could significantly improve the facial anatomical knowledge of aesthetic physicians.

Since multiple educational modalities were incorporated in a sequential fashion, it is not possible to discern which intervention had the most significant effect. The goal was to impart facial anatomy knowledge that would have an expected impact on injection competency and safety, thereby minimizing unintended complications.

Our findings here support the intuitive belief that cadaver dissection is a valuable educational tool for the understanding of facial anatomy and may promote safe patient outcomes after nonsurgical aesthetic treatment.

Cadaver dissection has been an essential part of medical education for centuries and has been consistently utilized to teach anatomy to medical students and practitioners. This method has been shown to establish practical insights within the framework of human anatomy teaching.<sup>24</sup> Moreover, dissection familiarizes students not only with the anatomical details but also with anatomical variations, and an appreciation for fully exposed structures that could potentially be damaged during invasive treatment.<sup>2</sup> Conventional teaching, including lectures and practical gross anatomy, allows the practitioners to express, assess and reflects on their learning, and has been found to be objectively achievable, unambiguous, and clinically relevant.<sup>25</sup> Most physicians who have undergone this training perceived the experience of cadaver dissections as a way of enhancing reverence toward the human body.<sup>1,26,27</sup>

## Limitations

This research has several limitations. First, we conducted the study without any control group at a single anatomy center;

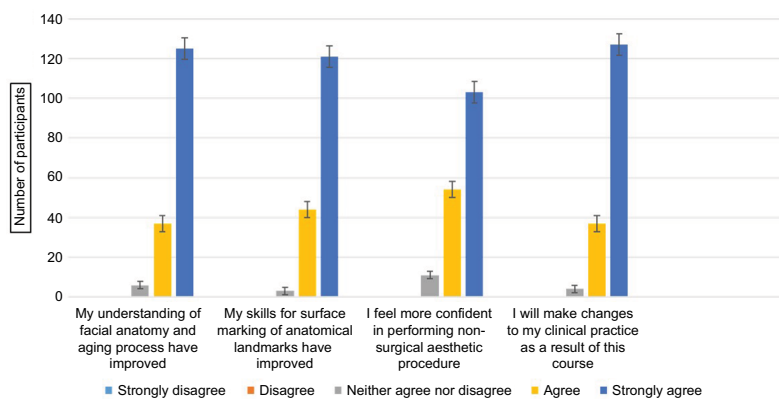


Figure 2 Participants' feedback.

however, in this quasi experimental intervention study, we incorporated a pre-course test; post-course test design without non-equivalent control group as pre-course test itself can act as a control group.<sup>28,29</sup> Moreover, participants were invited to attend the workshop; there was an expectation of gaining additional knowledge and skill, hence allocating a proportion of them into a control would have been a disadvantage to some. Second, we did not assess the students' self-study or motivation, which may have impacted their baseline scores. Third, we did not record repeated measure effects or evaluate their long-term retention of this acquired knowledge. Fourth, although the participants performed simulated procedural skills, they were not assessed formally. However, we ensured that the procedures were thoroughly demonstrated, deconstructed and subject to feedback given by the group demonstrators.

## Conclusion

Procedure-oriented and replicable cadaver dissection-based anatomy training improves the knowledge, understanding, and confidence of aesthetic physicians, thereby theoretically enhancing patient safety. It can be concluded that facial anatomy training should remain a key component of post-graduate and continued medical education for aesthetic physicians, with cadaver dissection as its core teaching method.

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## Disclosure

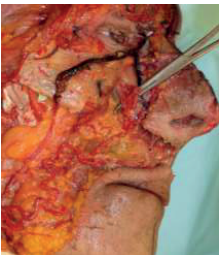
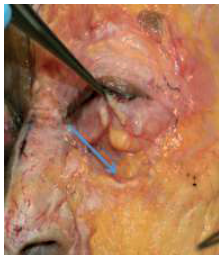

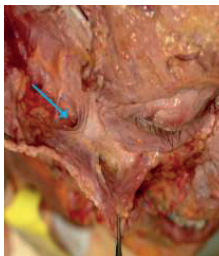
The authors report no conflicts of interest in this work.

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## Supplementary material

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 <p>Q1. Which important artery arises from a foramen in the medial cheek area in the line of medial limbus?</p> <p>a) Angular artery b) Facial artery c) Infra-orbital artery d) Zygomatico-facial artery</p>	 <p>Q2. Which ligamentous structure is attached here?</p> <p>a) Tear trough ligament b) Masseter ligament c) Zygomatic ligament d) Parotid auricular ligament</p>
 <p>Q3. Which superficial fat compartment is indicated here?</p> <p>a) Lateral orbital b) Inferior orbital c) Medial cheek d) Lateral temporal cheek</p>	 <p>Q4. Which anatomical space is present in the indicated area?</p> <p>a) Premaxillary b) Prezygomatic c) Premasseteric d) None of the above</p>

**Figure S1** Example of multiple choice questions.  
**Abbreviation:** Q, question.

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