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Alternative Medicine: A Recent Overview

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Abstract

Alternative medicine has renewed its growing public interest in recent times due to inequality of patients and healthcare professionals' ratios with increased workload for the latter, various side effects of modern medicine, lack of complete remission from chronic diseases, high cost of new drugs, and emerging new diseases. Hence, people have become more dependent on treatment systems replying on alternative medicine or herbal medicine from traditional medicinal practitioners. Alternative medicine has grown substantially over time and encompasses several millennia of therapeutic systems. The significant areas of alternative medicine include mind–body therapies, body manipulation, and the therapies based on biological systems. Natural products based biological treatment is the most popular of them as nature has endowed us with abundance of effective pharmacologically active phytochemicals. These phytochemicals possess numerous specific clinical health benefits including antioxidant, antidiabetic, anti-inflammatory, anticancer, anti-infectious and analgesic effects. In addition, alternative medicine is easily accessible, affordable, most often noninvasive, and provides favorable benefits during terminal periods of some diseases. However, due to the lack of well-designed clinical trials, the safety and effectiveness of many alternative medicines/therapies remains elusive. This chapter will critically discuss major areas, uses, safety and regulation, current challenges & future perspectives of alternative medicine.

Keywords: alternative medicine, health benefit, safety & regulation, challenges & future perspective of AM

1. Introduction

Alternative medicine (AM) is a holistic approach recognized as a heterogeneous set of medicinal products and practices with potent healing effects. The practices remain as the most ancient yet traditions for treating different ailments continues [1, 2]. It is estimated that two-thirds of the world's population seek health care support and services from alternative sources over modern medicine. Recent statistics show that half of the global population are dependent on AM, including the USA 42%, Australia 48%, Canada 70%, and France 49% (**Figure 1**) [3, 4]. Despite current progress in modern medicine, the use of AM has been found to be radically focused on treatment of deadly pandemic diseases e.g., novel coronavirus disease 2019 (COVID 19) when there is no approved systematic targeted therapy yet [5].

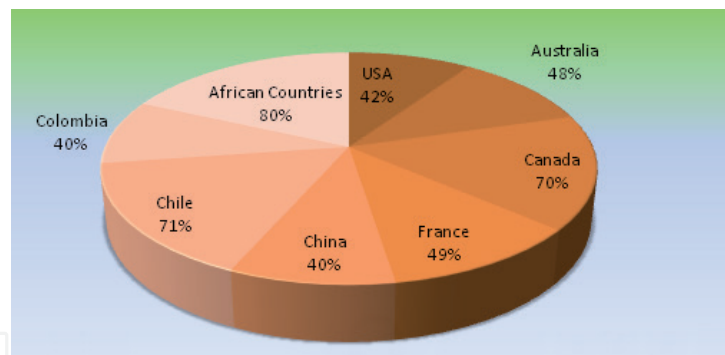


Figure 1.
Utilization of alternative medicine up to 2019.

The renewed public interest has revitalized due to the lack of curative treatment for several emerging and chronic diseases, high cost of modern drugs, time constrain from both patients and healthcare providers, microbial resistance and side effects of modern medicine [5, 6]. The most common treatments of AM are self-medication, traditional healing practices, indigenous systems of medicine particularly ayurveda, herbal preparations, yunani, homeopathy, acupuncture, naturopathy, chiropractic manipulation, etc. which have made AM more popular [1, 7]. In comparison, modern medicine focuses on symptom- related care, often utilizing pharmacological or invasive elimination procedures [8]. Although AM is not guaranteed to be safe, effective and biologically plausible [9], there is still a debate about which method can be proven as useful and secure. Old records encourage alternative modes whereas comprehensive clinical trials support conventional modes based on modern approaches [10]. However, today, many physicians accept the benefits of all forms of medicine, incorporating effective complementary and modern approaches in terms of patients, symptoms, and circumstances [11].

This scenario has necessitated development of knowledge bridge among physicians, traditional practitioners, pharmacist, and patients about AM treatments, safety use, and toxicity or contraindications. In addition, advancement of research efforts, minimizing publication bias, protecting intellectual property rights, and policymaker's contribution are required to make decisions about the future of alternative medical practice to provide cost-effective treatments. This would strengthen the position of AM industry and increase public acceptance in future [12, 13]. This chapter primarily discusses the different areas of AM, its uses, safety and regulation, current challenges and future perspectives.

2. Areas of AM

The National Center for Complementary and Alternative Medicine (NCCAM) has characterized the complementary and alternative medicine (CAM) as a community of various medical practices, methods and products currently excluded from modern medicine [14]. NCCAM has also categorized AM branches into five main groups: (1) traditional medical techniques, such as whole medical systems; (2) mind–body therapy; (3) biological substance-based treatment; (4) manipulative and body-based treatment; and (5) energy medicine [15].

2.1 Whole medical systems

A whole medical system is a complete system of theory and practice works independently or along with modern medicine. The methods contain various groups of

therapies or treatments that are practiced in diverse communities across the globe. Indian ayurveda and traditional Chinese medicine (TCM) are mainly practiced in the Eastern part of the world while homeopathy and naturopathy are predominantly used in the western region [16].

2.1.1 Ayurvedic medicine

Ayurveda is an extensive medical system that contemplates the body, mind, and soul essential to maintain the individual's wellbeing. Its fundamental purpose is to maintain good health instead of struggling against the illness. Various ayurvedic herbs or medicinal plants like turmeric, ashwagandha, amla, black cumin, rhubarb root, triphala, and kumanjam have medicinal properties for treatment of various diseases or health complications like cardiovascular conditions, cancer, neurological disorders, and diabetes [17, 18]. To determine the efficacy of the ayurvedic therapies, appropriate research with rigorous investigation is required [19].

2.1.2 Traditional Chinese medicine

Traditional Chinese medicine (TCM) originated thousands of years ago from ancient China and has flourished over time. Japan, Korea, and Vietnam have also developed similar systems for treatment of ailments [20]. TCM consists of several different techniques such as acupuncture, moxibustion, Chinese herbal medicines, nutrition, t'ai chi, qi gong and massage. However, the most frequent therapies are Chinese herbal medicine, t'ai chi and acupuncture [21].

2.1.2.1 Chinese herbal medicine

Chinese herbal medicine restores the balance of the whole body and equilibrates the forces of qi, yin and yang, which are basic elements of human body. Qi describes as a vital force energy which is carried throughout the body via meridians. Yin shows slow, cold and passive strength, where yang shows excited, hot, and active strength [22]. Chinese herbal formulas are known to have an advantage with regard to body regulation [23]. Several herbs tonify qi to treat patients with qi deficiency syndrome; some herbs promote yin to treat patients with yin deficiency syndrome and some reduce phlegm to treat patients with Phlegm syndrome. The medications related to Chinese herbal medicine are given in different ways like powders, tablets, and teas. Botanical extracts or plants are typically familiar to treat different diseases such as Chinese herbal medicine is often used as defensive care and improves health by stimulating an immune response before diseases arise [24].

2.1.2.2 Acupuncture

Acupuncture is a form of AM originated in China more than 2000 years ago. It is commonly used to alleviate pain or stress by inserting hair-thin needles through the skin at specific points on the body. Traditional Chinese medicine explains acupuncture as a technique for balancing the flow of energy or life force followed the principle of Yin and Yang. Acupuncture practitioners believe the human body has more than 2,000 acupuncture points connected by 12 pathways or meridians that interact with various organs such as heart, liver and kidneys [25]. Along these meridians, the energy flow rebalances by inserting the needles into specific points. In our contemporary lifestyle, numerous physical challenges arise due to the lack of proper physical activity, unbalanced food habits and lifestyle. Acupuncture has numerous positive effects against metabolic diseases, inflammation, digestive

issues, respiratory and nervous system problems [26]. In addition, releasing neurotransmitters and hormones also regulates neurochemistry, thus influencing the sensing and cognitive functions.

2.1.2.3 T'ai Chi

T'ai Chi is another type of AM of traditional Chinese medicine initiated during the 13th century in China. It is a movement technique that facilitates recovery through breathing and gradual movements of the body. The advantages of t'ai chi are improved mobility and balance, and reduced tension and anxieties [27]. It has been found to improve the quality of life, particularly those who are suffering from chronic diseases [28]. Many controlled and uncontrolled trials showed the effects of t'ai chi on various health conditions and diseases such as cardiovascular disorders [29], diabetes, osteoarthritis [30], anxiety, insomnia, functional mobility and fall prevention [31, 32]. The benefits of t'ai chi are generally most significant before developing a chronic illness or functional limitations. Tai chi is very safe, and no costly equipment is needed for the practice.

2.1.3 Naturopathy

Naturopathy is an integrating division of AM by combining traditional practices and health care approaches, and became popular in Europe during the 19th century. This medication system provides a unique way of treating patients, which maintains the homeostatic principle of the body, identifies the source as well as treats the diseases. Although many other allopathic or holistic therapy fields offer specific therapies to specific conditions, naturopathic practitioners tend to employ the self-healing process by maintaining healthier lifestyles, diet and nutrition [33]. Popular naturopathic therapies include physical treatments (light therapy, ultrasound and electric currents), dietary supplements, homeopathy, medical counseling, hormone therapy and personalized treatment modalities to relieve mental and emotional stress [34, 35].

2.1.4 Homeopathy

Homeopathy is another type of AM system discovered in the 19th century. Homeopathy comes from the Greek word in which homoios means 'similar' and pathos indicates 'suffering'. Homeopathic drugs treat diseases by triggering the body's natural defenses instead of fighting against them. The underlying principle of homeopathy is "like cures like". In other words, when a substance is capable of inducing a series of symptoms in a healthy living system, low doses of the same substance can cure these symptoms under certain circumstances ('similia similibus curentur') [36]. Hahnemann stated that treatments for a specific disorder could cause undesirable effects identical for the disease itself to stimulate a homeostatic or complementary reaction to correct these disorders [37]. This medicine industry solely depends on a "minimum dose law," in which dosage concentrations are inversely related to the active potency. Many homeopathic medicines contain active substances overly diluted and minimal amounts of active substances throughout the resulting dosages.

2.2 Mind–body therapy

Mind can control physical and biological processes, and the mind–body modality regulates the connections between mind, body, spirit, and attitude.

Many of the treatments involved in the mind and body's stimulation aim to maintain sound health and heal diseases. Mind–body therapies include relaxation, meditation, yoga, breathing hypnotherapy, cognitive behavioral therapy, and visualization. Music, movement, and dance therapy have shown to have beneficial roles for patients with anxiety [38, 39], while hypnosis, acupuncture, and music therapy serve as a successful therapy for depression and anxiety in cancer patients [40].

2.3 Biology-based therapy

Natural and biological-based practices refer to the substances made from nature or living things, such as herbs, special dietary and orthomolecular substances to improve, control, and regulate human health. Among these, herbal preparations, are the most common variety of CAM in the United States [9]. The mechanism of this therapy is to stimulate the immune system of the body and help to fight against cancer, infection, and other diseases. Common supplements used for biology-based therapy are botanicals, nutritional supplements, such as vitamins and minerals, probiotics, prebiotics, fatty acids, proteins, amino acids, and functional foods [41].

2.4 Manipulative and body-based therapy

Manipulative and body-based practices rely on structures and systems of the body, such as bones and joints, the soft tissues and the circulatory as well as lymphatic systems. It is one of integral tools of alternative medicine in which body can regulate and heal itself [35]. Various manipulative and body-based techniques are currently used – such as massage (normalizes the soft tissues), reflexology, craniosacral therapy, chiropractic (affiliated between spinal structure and role), rolfing, and osteopathic manipulation [42]. These therapies are thought to stimulate the body's energy and enables toxins to leave the body.

2.5 Energy therapy

Energy therapies are based on the belief that vital life energy flows through the body. The goal of energy therapy is to restore energy balance in the body by unblocking flow of energy. The ancient Chinese healing traditions, energy therapies were well-established as a technique for easing pain, reducing anxiety, and mitigating side effects of cancer treatment. Energy therapies focus either on energy field originating into the body (biofields) or from other sources (electromagnetic fields). There are different energy medicine techniques, including hands up and down and remote therapies [43]. Biofield therapy aims to trigger the energy that covers and penetrates the body and has not been experimentally proven to exist. Certain types of energy treatment control biofields by putting pressure or controlling the body by bringing the hands in or through therapies touch [44]. Different ancient Chinese arts like qigong, which put together subtle physical action, deeper breath, and mental intensity, regulate the human body. The approach integrates body and soul efficiently and productively [45]. Another type of energy therapy denoted as bioelectromagnetic therapy is based on an electromagnetic field used to treat or prevent diseases, and promote health and longevity. It may be given singly or in combination with many other methods. This therapy involves different magnetic fields, pulsed fields, direct or altered electric sources to treat many kinds of ailments like asthma, cancer and migraine pain [46].

3. Uses of AM in different ailments

Alternative medicine became much popular over the past several decades. The use of this medicine has always been commonly seen among Chinese and other Asian patients in the countries such as Korea, Taiwan, Singapore, India and Hong Kong. A number of AM has been often used to manage some chronic diseases namely diabetes, cancer, cardiovascular diseases (CVD), asthma, menopause, rehabilitation, autism spectrum disorder etc. [47–53]. Patient characteristics, socio-demographic status, and gender are the predominant determinants of AM use. The following describes the multiple uses of AM in different fields.

3.1 Control of blood glucose

Diabetes mellitus (DM) is the most prevalent and chronic metabolic disorder. The worldwide prevalence of diabetes has risen approximately from 4.7% to 8.5% over the last 34 years [54]. To control blood glucose levels, numerous modern antidiabetic drugs have been discovered and introduced in the market. However, most of the drugs may have some drawbacks when it is used for long time, such as drug resistance, drug addiction, adverse side effects and so on [55]. In addition, the therapeutic expenditures and dissatisfaction with mainstream have prompted the search for alternatives [47]. Intriguingly, the treatment strategies of diabetes is in favor of alternative practices. Along with conventional drugs, diabetes patients are treated by diet and exercise [56]. Therefore, it has drawn much attention as the effects of AM particularly herbal medicine has been found effective in diabetes prevention, management and/or delay its complications.

The alternative treatment of diabetes is mainly accomplished by non-pharmacological ways including diet therapy, relaxation, kinesitherapy, acupuncture therapy, psychotherapy, hydrotherapy, yoga etc. [57]. Natural Health Products (NHP) based therapy including vitamins and minerals, herbal remedies, homeopathic medicines, traditional medicines, such as traditional Chinese medicines, probiotics, and other products like amino acids and essential fatty acids are also commonly used for the effective management of diabetes [47, 58]. All are used in both type 1 and type 2 diabetes and found to improve diabetic condition significantly, or even, it can revert from prediabetes to normal stage [59, 62]. For example, the traditional Chinese medicine Shenzhu Tiaopi granule (SZTP) decreased the conversion rate of 8.52% from impaired glucose tolerance (IGT) to type 2 diabetes and 15.28% from with placebo, and normalized blood glucose from patients with IGT [59]. NHP have also been shown to improve diabetes complications by reducing 0.5% glycated hemoglobin within 3 months [47]. The following products are used in the treatment, and prevention of diabetes and its complications:

- Ayurveda polyherbal formulation, *Citrullus colocynthis*, *Coccinia cordifolia*, Eicosapentaenoic acid, *Ganoderma lucidum*, Ginger (*Zingiber officinale*), *Gynostemma pentaphyllum*, *Hintonia latiflora*, lichen genus *Cladonia* BAFS “Yagel-Detox”, marine collagen peptides, soybean extract etc. are used for T2DM management [60]
- Traditional Chinese medicine herbs are also used for DM treatment like, fructus mume, gegenqinlian decoction (GQD), jianyutangtang (JYTK) with metformin, jinlida with metformin, sancaijiangtang, shen-qi-formula (SQF) with insulin, tang-min-ling-wan (TM81), xiaoke (contains glyburide), zishentongluo (ZSTL) and *Trigonella foenum-graecum* (fenu-greek) [61]

- A few products, such as vitamin D, vitamin E, L-carnitine, cinnamon, gymnema, green tea, fibre, bitter melon, momordica, chromium, and vanadium have been the subjects of special interest in diabetes [62].
- *Panax ginseng* and *P. quiquefolius* (ginseng) play significant role in controlling diabetes by altering hepatic glucose metabolism, however, evidence of its clinical use in patients with diabetes is scarce [63]

For decreasing stress-related hyperglycemia, mind–body medicine, such as yoga, reflexology, chiropractic or osteopathic manipulation, homeopathy, shiatsu, registered massage therapy or craniosacral therapy have been shown short term significant benefits in clinical use, however, specific mind–body interventions and long-term improvements in glycemic control have not been found in larger randomized controlled trials (RCTs) [64].

3.2 Management of inflammation

The body naturally responds to various stresses including infection, irradiation, chemical, or physical injury [65]. Short term inflammation protects the body, while long term inflammatory response in the body damages healthy cells, tissues, and organs leading to the development of some diseases, such as arthritis, alzheimer's disease, and even cancer [65, 66]. The common treatment option for inflammatory diseases have been limited to nonsteroidal anti-inflammatory (NSAIDs) medications such as COX-2 inhibitors or steroid hormones (e.g., corticosteroids). Although most of the NSAIDs are considered to be safe however, it may aggravate other diseases such as stomach ulcer, hemorrhage, liver or kidney impairments for long term use [67]. The National Kidney Foundation reported that in each year, approximately 10% of kidney failures are directly associated with the substantial overuse of NSAIDs [68]. AM has been used for hundreds and even thousands of years in the management of chronic inflammation through antioxidative alternative medicine-based therapies, mainly diet- and natural products based therapies [69]. Strong scientific evidence supports the use of some products such as omega-3 essential fatty acids (EFAs) (ω -3) as an alternative and/or complementary agent to NSAIDs [70]. Capsaicin, oil of camphor, is commonly being used for muscle soreness and it has also local application for painful traumatic injuries [68]. Epidemiological studies and associated meta-analyses strongly suggest that long term consumption of diets rich in plant polyphenols (red and blueberries, green and black tea) protects the body from cancers, cardiovascular diseases, diabetes, osteoporosis and neurodegenerative diseases [71, 72].

Other alternative practices namely exercise, mind–body treatments like t'ai chi, qigong, yoga, meditations, massage, acupuncture, and moxibustion may decrease pain intensity by reducing circulatory concentrations of proinflammatory cytokines like IL-6, IL-18, C-reactive protein and other circulatory inflammatory cytokines like IL-1 α , and TNF- α , through controlling the expression of these proinflammatory and inflammatory marker genes [73, 74].

Music therapy plays an important role in alleviating pain of various etiology. A systematic review of 42 RCTs documented the effect of music therapy on relieving preoperative anxiety and stress as well as postoperative pain in cardiac surgery [75]. A Cochrane database of systemic review of 51 studies concluded that listening to music reduced pain intensity and opioids requirements [76]. Thus, the above findings strongly support the importance of different alternative approaches to pain and inflammation management, and better understanding on the mechanism and function associated with AM may provide new insights to treat inflammatory diseases.

3.3 Asthma treatment

Asthma is a common, multifactorial respiratory disease with chronic inflammation of the respiratory system affecting more than 300 million people world-wide and 25 million people in the United States, including 1 in 10 US children (10%) [77]. Common symptoms of asthma include: wheeze, cough, shortness of breath, and chest tightness. Despite advancement of modern medicine and its treatment modalities, many people are turning to alternative medicine as an another option for treating respiratory diseases.

Several types of alternative medicine are used in asthma treatment such as herbs and supplements, yoga, relaxation therapy, and biofeedback [50, 78]. Herbal products and dietary supplements have been used for thousands of years to treat lung problems. Ethnobotanical Survey in Nigeria found 87 local medicinal plant species from 39 families and these plant species are being used for treating cough associated respiratory diseases [79]. Whole plants, leaf, roots, fruit etc. are preferentially used to combat the diseases [9]. Korean ginseng root extract has potential role for treating lung inflammatory disorders. Some Chinese herbs, like ding-chan tang, may decrease inflammation and relieve bronchospasm [80]. The fruits of *Momordica charantia* L. are commonly used for cold, cough, tuberculosis, and asthma [81]. Again, caffeine is a natural and mild bronchodilator, which can improve airway function in people with asthma. Further, supplements like magnesium and fish oil (omega-3 fatty acids), vitamin C, D, and E may reduce inflammation and alleviate asthma symptoms. Moreover, both breathing exercises in yoga and massage therapy can control breathing and relieve stress [50, 82]. Although much of the research is currently under investigation or found to elicit significant improvements of the diseased conditions yet some findings indicate that many natural and over-the-counter products have potential side effects.

3.4 Management of cancer

The most common modern treatment modalities for cancer are surgery with radiation and/or chemotherapy, and immunotherapy. However, these therapies possess severe side effects including fatigue, skin problems, hair loss and low blood count [83]. Thus, many cancer patients and health care practitioners prefer AM as a potential therapeutic management [84]. AM may provide numerous health benefits by managing disease symptoms, preventing illness, or improving immune function [85]. The widely accepted and safe alternative practices are acupuncture, aromatherapy, massage therapy, exercise, hypnosis, meditation, music therapy, relaxation techniques, tai chi and yoga [86].

The uses of AM vary among different cancers. The highest uses of AM are found in breast cancer patients (93%), followed by colorectal cancer (83%), prostate cancer (77%), and lung cancer (77%). Each of the 4 cancer types, dietary supplements were the prominent alternative modality (52% to 82%), followed by energy medicine (39% to 55%), mind-body medicine (16% to 52%), and body-based therapy (14% to 42%) [87–88]. Although AM is not powerful enough to replace modern medicine, it may be used parallelly with modern medicine for better management in cancer patients. The following alternative practices are commonly used in different symptoms related care

- Hypnosis, massage, meditation, prayer, relaxation techniques are predominantly used to relief patients from anxiety [89]
- Exercise, message, relaxation techniques and yoga reduce fatigue and improve quality of life in cancer patients [90]

- Acupuncture, aromatherapy, hypnosis and music therapy prevent nausea as well as vomiting
- Acupuncture, aromatherapy, hypnosis, massage and music therapy are helpful in relieving pain [84, 86]
- Exercise, prayer, relaxation techniques and yoga may help cancer patients to sleep better [86, 91].

There are also some alternative modalities used in cancer patient's treatment, which are outlined as

- Dietary treatments including gerson, ketogenic, peskin, budwig, alkaline, paleo, vitamins and minerals, and herbalism [92].
- Biologic products-based therapy including different kinds of tea (e.g., green, medicinal, chaga mushroom, Essiac), natural health products such as ginger, curcumin, flaxseed oil; and miscellaneous products like pancreatic enzyme therapy, medicinal cannabis, laetrile B17, and probiotic foods and supplements [48].
- Energy therapies based on therapeutic touch and reiki, which use surrounding subtle known energy field and penetrate the human body [93]
- Alternative medical systems that are mainly traditional Chinese medicine, Indian medicine, homeopathy, chiropractic etc. used in different cancers [23, 48].
- Improvements in physical and psychosocial well-being and increasing hope to the cancer patients e.g., osteopathy, and Aboriginal medicine.
- Certain natural products (taxol, vinca alkaloids) are also much famous [94].

3.5 Management of blood pressure and CVD

CVDs are the leading cause of deaths all over the world. The recent advances in modern western medicine have been made available for treating CVDs, however, the complications and disease recurrence still occur, which compromise quality of life. Noticeably, AM has drawn great attention to treat such chronic CVDs for long term benefits by relieving symptoms, rehabilitation, and even in preventing these diseases.

Many of the natural products can act more directly on cardiovascular homeostasis by improving lipid profiles and vascular reactivity, and reducing the undesirable immune response [95, 96]. Diet should be regarded as a cornerstone of preventive medicine and, at least in part, as a viable treatment for blood pressure (BP), CVD and other chronic diseases [49]. Certain dietary supplements like fish oil, multivitamins, and coenzyme Q10 are considered the best preventive medications [97].

Beyond dietary strategies, certain additional non-pharmacological treatments have been shown to lower BP. These alternative approaches can be broadly classified into three categories: behavioral therapies, including meditation, yoga, biofeedback, and relaxation or stress-reduction programs; noninvasive procedures or devices, including device-guided breathing modulation and acupuncture; and

exercise-based regimens, including aerobic, resistance, and isometric exercise methods [98].

Traditional medicine methods, including acupuncture, electroacupuncture, and transcutaneous electrical acupoint stimulation, have been increasingly adopted by health-care professionals despite the lack of evidence on its effects on CVDs [99].

Medicinal herbs namely *Allium sativum*, *Ginseng*, *Aesculus hippocastanum*, *Ginkgo biloba*, *Salvia miltiorrhiza* have been used in patients with atherosclerosis, hyperlipidemia, systolic hypertension, cerebral and venous insufficiency, angina pectoris, and congestive heart failure [100–102]. In fact, numerous bioactive compounds present in the herbs can prevent vascular smooth muscle cell phenotypic switching, endothelial dysfunction, platelet activation, lipid peroxidation, ROS production, and macrophage atherogenicity, and thus, it may have the ability to modulate the CVD incidence [49, 103]. However, the role of these herbs in CVDs still needs more clinical evidence and elucidation of definite mechanism of actions.

A Cochrane database of systematic review of 23 RCT's concluded that listening to music has beneficial effects on BP, heart rate and respiratory rate, and also on anxiety and pain in persons with coronary heart disease [104].

Therefore, alternative medicine use in patients with CVDs seems to be common, however, a more patient-physician communication about the use of AMs and evidence-based research are required.

3.6 Alternative medicine for management of anxiety or sleep disorders

Anxiety disorders are the most common psychiatric disorder, with an estimated lifetime prevalence is 29% in the general population [105]. The high prevalence and complex comorbidity of anxiety or sleeping problems such as insomnia makes a concern particularly in elder people because it affects physical and mental health, and worse the quality of life by relating with significant clinical implications in obesity, diabetes, hypertension, cardiovascular and neurological diseases [106]. It is well documented that treatment of anxiety or insomnia may provide positive effects, not only by alleviating comorbidity but also by preventing new incidents.

Insomnia patients can be treated by alternative therapies namely herbs, supplements, relaxation and meditation, acupuncture, and exercise. Among these therapies, biologically-based products such as herbal or nutritional medicine, and mind–body therapies, are the most commonly used interventions. For instance, herbal supplements particularly Valerian root and Chamomile may help to fall asleep faster and boost the quality of sleep however, more research is needed for the safety and efficacy [107]. Melatonin is the key natural hormone in the sleep–wake cycle produced by the pineal gland, regulates numerous biological functions including circadian rhythm, sleep, stress response, aging, and immunity [108]. Aromatherapy with lavender (*Lavandula angustifolia*) increases serum melatonin levels as evident from nonrandomized clinical trials on older adults [109]. Furthermore, acupuncture, relaxation and meditation, and regular exercise may improve sleep quality, sleep onset latency, total sleep time, and insomnia severity [110–112]. Lately, high levels of anxiety, fear, depression, panic, emotional outburst and sleep disturbances has been observed in COVID-19 positive patient, particularly from isolation and quarantine events [113]. Some sedatives and antianxiety drugs are used to manage these symptoms however, it may inhibit the respiratory system and worsen the condition [114]. Evidence suggests that progressive muscle relaxation technique can reduce anxiety and improve sleep quality in patients with COVID-19 beyond the side effects [115].

Music has a powerful effect on our emotions, therapy such as mind–body medicine has a direct influence in antianxiety effect. Listening to music may have an immediate positive impact on stress-related physiological, cognitive, and emotional processes [116]. It enhances parasympathetic activity, increase physiological coherence, reduce the cortisol ratio, and boost immunity. A systematic review of 23 studies on physiological parameters, the anxiolytic effect of music therapy is proved in all the studies [117]. Moreover, it has been shown that music can increase comfort, decrease anxiety thereby can improve sleep disorder [118]. Hence, healthy and safe alternative practices may at least in part, replace the strong anti-anxiety medications thereby improving the quality of life in these patients.

3.7 Treatment of menopause

Hormone therapy is one of the most effective treatment for managing symptoms of menopause. However, many women need to avoid hormone therapy due to health risks from stroke, heart attack and cancer. In these cases, AM is preferred for symptom management [51].

There are various alternative interventions for the treatment of menopause. They fall into two main categories: a) mind–body practices that combines mental focus, controlled breathing, and body movements resulting in relaxation of body and mind. It has significant health benefits by reducing pain, stress, anxiety, and mood. Some common mind–body practices are meditation, hypnosis, cognitive behavioral therapy, biofeedback, yoga, and tai chi, and b) natural products-based intervention by using herbs, vitamins, minerals, and dietary supplements [51, 119]. Apart from these categories, some interventions based on system-wide AM have been commonly used such as traditional Chinese medicine, reflexology, acupuncture, and homeopathy [120]. Several studies indicate that mind–body practices such as hypnotherapy, meditation, relaxation etc. are beneficial in reducing problematic menopausal symptoms [119, 121]. Therefore, AM may improve the quality of life particularly, the women who are transitioning to menopause. Finally, though natural products, such as herbs, vitamins, minerals etc. are commonly used for remedy of symptoms related menopause, consistent evidence to support their safety and efficacy still remains elusive [122].

3.8 Management of rehabilitation

Patients in rehabilitation of musculoskeletal conditions often use alternative medicine treatments. Commonly used treatments including massage therapy, acupuncture, manipulation medicine, yoga and pilates, mind–body medicine, effleurage, petrissage, friction, tapotement, and vibration [52, 123, 124].

Massage therapy is one of the most commonly used therapies for athletes to enhance recovery and performance, particularly postexercise [123]. The benefits from therapeutic massage are enormous such as relieve of muscle tension and stiffness, healing of strains and sprains; reduce muscle pain, swelling and spasm; improve flexibility and motion, enhance blood flow and so on [125, 126].

3.9 Treatment of autism spectrum disorder

Autism spectrum disorder (ASD) is a heterogeneous group of neurodevelopmental conditions, which is characterized by impaired social interactions and communications, restricted, repetitive, and stereotyped patterns of behavior and interests [127]. It is assumed that both genetic and environmental factors play a key role in ASD etiology, but no clear pathogenesis has been identified yet [128]. Although autism is a lifelong disorder and there is no causal treatment currently

known, AM may stand as an therapeutic option for alleviating symptoms of patients with autism spectrum disorder.

Biologically based therapy including dietary supplement (vitamins and minerals), and herbal medication (meadowsweet, calendula, chamomile, marshmallow root and lemon balm etc.) can be used for treating ASD. In addition, mind–body medicine (i.e., prayer, yoga, music, dance, and art in general), manipulative and body-based practices (i.e., massage, chiropractic care, and acupuncture), and energy medicine (i.e., reiki or homeopathy) are useful for treating ASD [129]. Music therapy may have strong impact in autistic children. Cochrane meta-analysis showed that listening music significantly improved the cooperation and communication ability in autistic children [130]. Another study remarked that music therapy might provide a basic and supportive therapy for children with delayed speech development [131].

Though some trials demonstrated the importance of chosen alternative therapies (e.g., equine therapy) and have gained attention by the scientific community, there is insufficient evidence to assess the safety and efficacy of AM [9, 132]. Therefore, combination of standard medical therapies along with safe alternative approaches like diet, exercise and lifestyle modification might benefit patients from functional disorder like autism.

3.10 Prevention or treatment of COVID-19

COVID-19 is considered as a life-threatening disease, which is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [133]. To date, it has been accounted as a global public health emergency and declared as a pandemic by World Health Organization (WHO) as there is no specific antiviral treatment available in the modern medicine system [5, 19]. Although several attempts have been initiated after the disease onset, truly effective vaccine is still unavailable [134, 135]. A few vaccines exist in the market but the safety and efficacy need further scrutiny using multi-site clinical data [134]. Under this circumstance, a more rational phytotherapeutic choice to the disease may be a cheaper option for prophylaxis or treatment against this virus [136]. Strikingly, the phytochemicals of *Momordica charantia* L. and *Azadirachta indica* have been recently shown adequate inhibitory potential against SARS-CoV-2 when compared with FDA reference drugs such as ribavirin, remdesivir and hydroxychloroquine [137]. In China itself, the total number of confirmed cases treated by TCM has reached 60,107 [138]. Indian government ministry of Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homoeopathy (AYUSH) recommended homeopathy and ayurveda for prophylaxis and unani medicines for symptomatic management of COVID-19 [139, 140]. In Bangladesh, herbal and fruit extracts have been used to get relief from COVID-19. Infected people are advised to drink masala tea, ginger tea, and lemon with hot water for recovery [141].

It has been shown that Chinese, Indian and Iranian herbal medicine with 1000 years' experience in the prevention of pandemic and endemic infectious diseases are worth learning, and provide alternative candidates for controlling patients with COVID-19 infection [19, 142]. As there are no effective treatments for COVID-19, it provides one of the biggest opportunities to test different plants and discover new targeted bioactive compounds for therapeutic management of this disease.

4. Safety and regulatory issue of AM

Though approximately 80% ailing people in developing countries rely on AM as a source of primary healthcare or traditional medical practice [143], there is limited scientific evidence regarding the potential toxicity of a variety of AM [9].

In fact, most of the AM are untested and the safety and efficacy are either poorly or not even monitored at all [144]. Moreover, doctors and nurses are not trained enough to describe the potential side effects and contraindications to their patients [145]. Again, not all health professionals favor the concept of integrative health approaches, neither do they have the confidence in dealing with CAM due to lack of knowledge on standardization of practices and overall benefits of holistic approaches. In contrast, most of the patients who use CAM are hesitant to inform their primary health care provider about the methods for fear of disapproval [145]. Further more, biological substances are not tested rigorously to ensure their safety and efficacy in the context of pharmaceutical products because FDA approval is not mandatory in case of a new therapeutic component [146]. Manufacturer only need to attest as a dietary supplement's safety, purity, and contents by expressing on the label before marketing. However, some medicinal plants might be inherently toxic. Herbal products may also cause adverse side effects including hypersensitivity reactions, cardiovascular events, neurologic dysfunction, hepatic and renal failures, and the development of malignant disease due to the presence of mercury, lead, arsenic, corticosteroids and poisonous organic substances [147, 148]. Adverse events may also arise from the lack of knowledge by selecting wrong species of medicinal plants, incorrect dosing, interactions with other drugs and error in the use of herbal medicines [144]. For example, the herb arnica, black seed and feverfew stimulate uterine contractions and possible miscarriage in pregnant women [149, 150]. In addition, ginkgo *Ginkgo biloba* and chamomile (*Matricaria chamomilla*) may increase the risk of bleeding in patients taking nonsteroidal anti-inflammatory drugs like aspirin, and anticoagulant-warfarin. Even many forms of AM are rejected by orthodox medicine as the safety and efficacy of the drugs have not been confirmed in clinical trials [144].

The regulation on AM varies widely from country to country because each country has their own regulations policy. In most countries, the AM market is poorly regulated, and the medical products are often neither registered nor controlled [151]. However, relatively few countries have developed policies and regulations on TM/AM. Among the 194 Member States of WHO, only 98 countries have a national policy on TM/AM, and 109 countries regulate herbal products. The WHO African and South-East Asian countries (>80%) have the highest percentage of national or state level laws and regulations for traditional and AM whereas, European (40%) and American (43%) region have the lowest percentage [152]. In the United States, TM/AM legislation is the responsibility of state, provinces or territorial jurisdictions, and regulation varies from jurisdiction to jurisdiction.

In the United Kingdom (UK), there is no regulation that restricts the practice of AM except of chiropractic and osteopathy. However, now the UK Government has gradually acknowledged the need for extensive regulation of AM. Chiropractic and osteopathy have adopted statutory self-regulation, though this has proved expensive for individual members of these professions. A recent House of Lords has recommended that the herbal medicine and acupuncture professions should also develop a system of statutory regulation. Some occupations, such as aromatherapists, are in the process of forming a common professional body as a first step towards self-regulation [153].

Hence, it would be helpful to increase training opportunities for health care professionals and share information to their patients about potential interactions of AM with modern treatments. Finally, the knowledge of the usage, safety and efficacy of AM as well as the evolution of awareness may increase the ability of health care providers to follow the legislation.

5. The current marketplace of AM

The global demand for AMs was reported at USD 69.2 billion in 2019 and is rising every day. Different energy healing therapy comprises reflexology, reiki, and havening techniques are increasingly used in anxiety and mental disorder patients in different countries. Nowadays, many magnetic therapies such as bioflex magnets, mattresses, and magnabloc for pain reduction are used. Other alternative therapies like yoga, meditation, and spa have been well attributed globally due to their popularity, which led to development in the number of yoga studios, meditation centers, spas, and complementary healing facilities institutes in the particular communities [154–156]. Moreover, some alternative medicine services are now offered as benefits in state Medicaid programs, Medicare, and private health insurance plans [157, 158]. Study shows that at least 50% American medical schools are currently offering courses in alternative medicine to their medical students. Among which 25.0% of the courses referenced personal growth or self-care through alternative practices, while only 11.0% referenced inter-professional education activities involve interaction with alternative medicine providers [159]. In the promotion of CAM, a governmental initiative can play a crucial role. In India “Ministry of Ayush” has been set up by national authorities to govern research, development, increased funding opportunities, education, and other facilities pertaining to ayurveda, yoga, naturopathy, and homeopathy [154]. Therefore, the expensive existence of mainstream treatment and governmental facilities devoted to alternative therapies may encourage companies to invest in alternative medicine markets.

6. Major challenges for AM

Alternative treatment has improved our awareness and centered our view of medical treatment, but it still faces tremendous challenges. After two eras of robust efforts by the NCCAM at the National Institute of Health (NIH) on behalf of AM research, it remains an extreme challenge for scientists to analyze thousands of years’ worth of clinical research issues to demonstrate the safety as well as efficacy of AM [160]. The complex and complicated, multivariate and multifaceted factors of AM systems require continual innovations for comprehensive and well-designed studies. The control trends of existing biomedicine restrict alternative treatment research, which must be expanded and extended [161]. The exploration and eventual discovery of plausible scientific mechanisms, theoretical and historical investigations are essential to further and fully understand the holistic role of alternative medicine and claim it within the realm of modern medicine [162]. In many cases, alternative therapies are commonly documented as false cases due to proper public awareness [124, 146]. Many modern medical practitioners and physicians are reluctant to discuss the importance of new effective AM with patients. A study showed 89% of patients were self-referred to an alternative practitioner and 72% did not inform to their physicians about their AM use [163]. In addition, alternative treatments defy the scientific procedures in terms of objectivity, measurement, codification, and classification because it comprises physical and spiritual realms, that cannot be subjected to scientific analysis [154]. So, it is essential to generate important insights into comparative clinical efficacy trials to improve patients’ treatments, especially for long-term results.

7. Conclusion

AM has been practiced in numerous countries before the advent of modern medical science but its usage is not supported by the medical community due to lack

of evidence-based safety and effectiveness evaluation. Despite the promising results reported with various natural and biologic products, the clinical efficacy of such alternative therapies is yet to be determined. More than half of the world's population does not have access to modern medicine where most funding for healthcare in the developing world goes to 20% of the population and it can certainly be presumed that healthcare costs will be expected to double over the next decade. Low-cost intervention, such as lifestyle modifications, diet, supplement therapy and behavioral medication, can be used as a replacement for prescribed high-cost medications and technological innovation. More research of AM treatments in humans are needed to elucidate whether alternative treatments can have beneficial effects when they are used alone or have additional benefit while used with modern treatment methods. As a result, its usage requires exploration and eventual discovery of plausible scientific mechanisms, theoretical and historical investigations, continual innovations, comprehensive and well-designed studies in order to validate, advance and fully understand the holistic roles of AM and position it appropriately within the context of modern medicine. It is imperative that medical practitioners and physicians need to be aware about potential alternative therapies and discuss benefits and potential adverse effects or limitations with patients. With concerted efforts involving different relevant stakeholders including medical and research councils in different countries, systematic approaches could be developed and incorporation of standardized procedures, awareness of validated, authenticated and easily accessible scientific resources can substantially improve the current scenario of AM and meet the increasing healthcare needs of global population.

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Conflict of interests

The authors declare that they have no conflict of interests.

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References

- [1] Sakagami H, editor. *Alternative Medicine*. BoD–Books on Demand; 2012 Dec 18.
- [2] Patwardhan B, Warude D, Pushpangadan P, Bhatt N. Ayurveda and traditional Chinese medicine: a comparative overview. *Evidence-Based Complementary and Alternative Medicine*. 2005 Dec 1;2(4):465-473.
- [3] Pal SK. Complementary and alternative medicine: an overview. *Current Science*. 2002 Mar 10;518-524.
- [4] The impact of alternative medicine in the 21st century. Available from: <https://sourceessay.com/the-impact-of-alternative-medicine-in-the-21st-century/> [Accessed: 2020 March 21]
- [5] Cyranoski D. China is promoting coronavirus treatments based on unproven traditional medicines. *Nature*. 2020. doi: <https://doi.org/10.1038/d41586-020-01284-x>
- [6] Sayligil O. Ethical evaluation of clinical research on complementary and alternative medicine. *Evidence-based Medicine*. 2020 June 30. IntechOpen
- [7] *Alternative Medicine. Disease Prevention and Healthy Lifestyles*. <https://courses.lumenlearning.com/diseaseprevention/chapter/alternative-medical-practices/>
- [8] Yuan H, Ma Q, Ye L, Piao G. The traditional medicine and modern medicine from natural products. *Molecules*. 2016 Apr 29;21(5):559.
- [9] Bent S. Herbal medicine in the United States: review of efficacy, safety, and regulation. *Journal of General Internal Medicine*. 2008 Jun 1;23(6):854-859.
- [10] Anlauf M, Hein L, Hense HW, Köbberling J, Lasek R, Leidl R, Schöne-Seifert B. Complementary and alternative drug therapy versus science-oriented medicine. *German Medical Science*. 2015;13.
- [11] Singh AR. *Modern Medicine: Towards Prevention, Cure, Well-being and Longevity*. *Mens Sana Monogr*. 2010 Jan;8(1):17-29.
- [12] Hao GA, Xin-Sheng YA. Strengthen the research on the medicinal and edible substances to advance the development of the comprehensive healthcare industry of TCMs. *Chinese Journal of Natural Medicines*. 2019, 17(1):Pages 1-2, ISSN 1875-5364,
- [13] Heinrich M, Edwards S, Moerman DE, Leonti M. Ethnopharmacological field studies: a critical assessment of their conceptual basis and methods. *Journal of Ethnopharmacology*. 2009 Jul 6;124(1):1-7.
- [14] Fan KW. National Center for Complementary and Alternative Medicine Website. *Journal of the Medical Library Association*. 2005 Jul;93(3):410-2.
- [15] Koithan M. Introducing complementary and alternative therapies. *Journal for Nurse Practitioners* 2009 Jan 1;5(1):18-20.
- [16] Srinivasan R, Sugumar VR. Spread of traditional medicines in India: Results of national sample survey organization's perception survey on use of Ayush. *Journal of Evidence-Based Complementary & Alternative Medicine*. 2017 Apr;22(2):194-204.
- [17] Sun XD, Liu XE, Huang DS. Curcumin induces apoptosis of triple-negative breast cancer cells by inhibition of EGFR expression. *Molecular Medicine Reports*. 2012 Dec 1;6(6):1267-1270.

- [18] Kummerdkhonkaen P, Saenglee S, Asgar MA, Senawong G, Khongsukwiwat K, Senawong T. Antiproliferative activities and phenolic acid content of water and ethanolic extracts of the powdered formula of *Houttuynia cordata* Thunb. fermented broth and *Phyllanthus emblica* Linn. fruit. BMC Complementary and Alternative Medicine. 2018 Dec 1;18(1):130.
- [19] Payyappallimana U, Patwardhan K, Mangalath P, Kessler CS, Jayasundar R, Kizhakkeveetil A, Morandi A, Puthiyedath R. The COVID-19 pandemic and the relevance of ayurveda's whole systems approach to health and disease management. The Journal of Alternative and Complementary Medicine. 2020 Dec 1;26(12):1089-1092.
- [20] Tran BX, Nguyen NK, Nguyen LP, Nguyen CT, Nong VM, Nguyen LH. Preference and willingness to pay for traditional medicine services in rural ethnic minority community in Vietnam. BMC Complementary and Alternative Medicine. 2015 Dec;16(1):1-8.
- [21] Dong FH. Precise application of Traditional Chinese Medicine in minimally-invasive techniques. Zhongguo Gu Shang= China Journal of Orthopaedics and Traumatology. 2018 Jun 1;31(6):493-6.
- [22] Gilca M, Gaman L, Lixandru D, Stoian I. Estimating the yin-yang nature of Western herbs: a potential tool based on antioxidation-oxidation theory. African Journal of Traditional Complementary & Alternative Medicines. 2014 Apr 3;11(3):210-6.
- [23] Ma Y, Chen M, Guo Y, Liu J, Chen W, Guan M, Wang Y, Zhao X, Wang X, Li H, Meng L, Wen Y, Wang Y. Prevention and treatment of infectious diseases by traditional Chinese medicine: a commentary. APMIS 2019; 127: 372-384.
- [24] Zhu H. Acupoints initiate the healing process. Medical Acupuncture. 2014 Oct 1;26(5):264-270.
- [25] Longhurst JC. Defining meridians: a modern basis of understanding. Journal of Acupuncture and Meridian Studies. 2010 Jun 1;3(2):67-74.
- [26] Kaptchuk TJ. Acupuncture: theory, efficacy, and practice. Annals of Internal Medicine. 2002 Mar 5;136(5):374-383.
- [27] Wang F, Lee EK, Wu T, Benson H, Fricchione G, Wang W, Yeung AS. The effects of tai chi on depression, anxiety, and psychological well-being: a systematic review and meta-analysis. International Journal of Behavioral Medicine. 2014 Aug;21(4):605-617.
- [28] Wang C, Collet JP, Lau J. The effect of Tai Chi on health outcomes in patients with chronic conditions: a systematic review. Archives of Internal Medicine. 2004 Mar 8;164(5):493-501.
- [29] Yeh GY, Wang C, Wayne PM, Phillips R. Tai chi exercise for patients with cardiovascular conditions and risk factors: a systematic review. Journal of Cardiopulmonary Rehabilitation and Prevention. 2009 May;29(3):152.
- [30] Yan JH, Gu WJ, Sun J, Zhang WX, Li BW, Pan L. Efficacy of Tai Chi on pain, stiffness and function in patients with osteoarthritis: a meta-analysis. PloS One. 2013 Apr 19;8(4):e61672.
- [31] Sjösten N, Vaapio S, Kivelä SL. The effects of fall prevention trials on depressive symptoms and fear of falling among the aged: a systematic review. Aging and Mental Health. 2008 Jan 1;12(1):30-46.
- [32] Maciaszek J, Osiński W. The effects of Tai Chi on body balance in elderly people—a review of studies from the early 21st century. The American Journal of Chinese Medicine. 2010;38(02):219-229.

- [33] Ritenbaugh C, Hammerschlag R, Calabrese C, Mist S, Aickin M, Sutherland E, Leben J, DeBar L, Elder C, Dworkin SF. A pilot whole systems clinical trial of traditional Chinese medicine and naturopathic medicine for the treatment of temporomandibular disorders. *The Journal of Alternative and Complementary Medicine*. 2008 Jun 1;14(5):475-487.
- [34] Boon HS, Cherkin DC, Erro J, Sherman KJ, Milliman B, Booker J, Cramer EH, Smith MJ, Deyo RA, Eisenberg DM. Practice patterns of naturopathic physicians: results from a random survey of licensed practitioners in two US States. *BMC Complementary and Alternative Medicine*. 2004 Dec;4(1):1-8.
- [35] Tabish SA. Complementary and alternative healthcare: is it evidence-based?. *International Journal of Health Sciences*. 2008 Jan;2(1):V.
- [36] Paterson IC. Homeopathy: What is it and is it of value in the care of patients with cancer?. *Clinical Oncology*. 2002 Jun 1;14(3):250-253.
- [37] Teixeira MZ. New homeopathic medicines: use of modern drugs according to the principle of similitude. *Homeopathy*. 2011 Oct 1;100(4):244-252.
- [38] Ando M, Morita T, Akechi T, Ito S, Tanaka M, Ifuku Y, Nakayama T. The efficacy of mindfulness-based meditation therapy on anxiety, depression, and spirituality in Japanese patients with cancer. *Journal of Palliative Medicine*. 2009 Dec 1;12(12):1091-1094.
- [39] Boehm K, Cramer H, Staroszyński T, Ostermann T. Arts therapies for anxiety, depression, and quality of life in breast cancer patients: a systematic review and meta-analysis. *Evidence-Based Complementary and Alternative Medicine*. 2014 Oct;2014.
- [40] Deng G. Integrative medicine therapies for pain management in cancer patients. *Cancer Journal (Sudbury, Mass.)*. 2019 Sep;25(5):343.
- [41] Cencic A, Chingwaru W. The role of functional foods, nutraceuticals, and food supplements in intestinal health. *Nutrients*. 2010 Jun;2(6):611-625.
- [42] Jackson C. Trends in the use of complementary health approaches among adults in the United States: new data. *Holistic Nursing Practice*. 2015 May 1;29(3):178-179.
- [43] Astin JA, Harkness E, Ernst E. The efficacy of “Distant Healing” a systematic review of randomized trials. *Annals of Internal Medicine*. 2000 Jun 6;132(11):903-910.
- [44] Rao A, Hickman LD, Sibbritt D, Newton PJ, Phillips JL. Is energy healing an effective non-pharmacological therapy for improving symptom management of chronic illnesses? A systematic review. *Complementary Therapies in Clinical Practice*. 2016 Nov 1;25:26-41.
- [45] Yeung A, Chan JS, Cheung JC, Zou L. Qigong and Tai-Chi for mood regulation. *Focus*. 2018 Jan;16(1):40-47.
- [46] Singh S, Kapoor N. Health implications of electromagnetic fields, mechanisms of action, and research needs. *Advances in Biology*. 2014 Sep 23;2014.
- [47] Grossman LD, Roscoe R, Shack AR. Complementary and alternative medicine for diabetes. *Canadian Journal of Diabetes*. 2018 Apr 1;42:S154–S161.
- [48] Buckner CA, Lafrenie RM, Dénommée JA, Caswell JM, Want DA. Complementary and alternative medicine use in patients before and after a cancer diagnosis. *Current Oncology*. 2018 Aug;25(4):e275.

- [49] Qidwai W, Yeoh PN, Inem V, Nanji K, Ashfaq T. Role of complementary and alternative medicine in cardiovascular diseases. *Evidence Based Complementary and Alternative Medicine*. 2013;2013:142898.
- [50] George M, Topaz M. A systematic review of complementary and alternative medicine for asthma self-management. *Nursing Clinics*. 2013 Mar 1;48(1):53-149.
- [51] Johnson A, Roberts L, Elkins G. Complementary and alternative medicine for menopause. *Journal of Evidence-Based Integrative Medicine*. 2019 Mar 12;24:2515690X19829380.
- [52] Burton MS. Complementary and alternative medicine in rehabilitation. *Current Sports Medicine Reports*. 2019 Aug 1;18(8):283-284.
- [53] Ghosh S, Koch M, Suresh Kumar V, Rao AN. Do alternative therapies have a role in autism. *Online Journal of Health and Allied Sciences*. 2010 Apr 30;8(4).
- [54] WHO, Diabetes. <https://www.who.int/news-room/fact-sheets/detail/diabetes> [Accessed: 8 June 2020]
- [55] Osadebe PO, Odoh EU, Uzor PF. Natural products as potential sources of antidiabetic drugs. *Journal of Pharmaceutical Research International*. 2014 Sep 1:2075-2095.
- [56] Pang GM, Li FX, Yan Y, Zhang Y, Kong LL, Zhu P, Wang KF, Zhang F, Liu B, Lu C. Herbal medicine in the treatment of patients with type 2 diabetes mellitus. *Chinese Medical Journal*. 2019 Jan 5;132(1):78.
- [57] Pandey A, Tripathi P, Pandey R, Srivatava R, Goswami S. Alternative therapies useful in the management of diabetes: A systematic review. *Journal of Pharmacy & Bioallied Sciences*. 2011 Oct;3(4):504.
- [58] Non-prescription Health Products Directorate (NNHPD). What are natural health products. Ottawa: Health Canada, 2004. <http://www.hc-sc.gc.ca/dhp-mps/prodnatur/index-eng.php>.
- [59] Fang Z, Zhao J, Shi G, Shu Y, Ni Y, Wang H, Ding L, Lu R, Li J, Zhu X, Cheng S. Shenzhu Tiaopi granule combined with lifestyle intervention therapy for impaired glucose tolerance: A randomized controlled trial. *Complementary Therapies in Medicine*. 2014 Oct 1;22(5):842-850.
- [60] Kuriyan R, Rajendran R, Bantwal G, Kurpad AV. Effect of supplementation of *Coccinia cordifolia* extract on newly detected diabetic patients. *Diabetes Care*. 2008 Feb 1;31(2):216-220.
- [61] Tian J, Jin D, Bao Q, Ding Q, Zhang H, Gao Z, Song J, Lian F, Tong X. Evidence and potential mechanisms of traditional Chinese medicine for the treatment of type 2 diabetes: A systematic review and meta-analysis. *Diabetes, Obesity and Metabolism*. 2019 Aug;21(8):1801-1816.
- [62] Neczyk C, Zubach-Cassano L. Natural health products and diabetes: a practical review. *Canadian Journal of Diabetes*. 2017 Dec 1;41(6):642-647.
- [63] Cheung F. TCM: made in China. *Nature*. 2011 Dec;480(7378):S82-S83.
- [64] Birdee GS, Yeh G. Complementary and alternative medicine therapies for diabetes: a clinical review. *Clinical Diabetes*. 2010 Oct 2;28(4):147-155.
- [65] Chen L, Deng H, Cui H, Fang J, Zuo Z, Deng J, Li Y, Wang X, Zhao L. Inflammatory responses and inflammation-associated diseases in organs. *Oncotarget*. 2018 Jan 23;9(6):7204.
- [66] Akiyama H, Barger S, Barnum S, Bradt B, Bauer J, Cole GM, Cooper NR,

- Eikelenboom P, Emmerling M, Fiebich BL, Finch CE. Inflammation and Alzheimer's disease. *Neurobiology of Aging*. 2000 May 1;21(3):383-421.
- [67] Goldstein JL, Cryer B. Gastrointestinal injury associated with NSAID use: a case study and review of risk factors and preventative strategies. *Drug, Healthcare and Patient Safety*. 2015;7:31.
- [68] Maroon JC, Bost JW, Maroon A. Natural anti-inflammatory agents for pain relief. *Surgical Neurology International*. 2010;1.
- [69] El-Refaei MF, Abduljawad SH, Alghamdi AH. Alternative medicine in diabetes-role of angiogenesis, oxidative stress, and chronic inflammation. *The Review of Diabetic Studies: RDS*. 2014;11(3):231.
- [70] Maroon JC, Bost JW. ω -3 Fatty acids (fish oil) as an anti-inflammatory: an alternative to nonsteroidal anti-inflammatory drugs for discogenic pain. *Surgical Neurology*. 2006 Apr 1;65(4):326-331.
- [71] Zhang YJ, Gan RY, Li S, Zhou Y, Li AN, Xu DP, Li HB. Review Antioxidant phytochemical for the prevention and treatment of chronic disease. *MDPI*. 2015:21138-21156.
- [72] Pandey KB, Rizvi SI. Plant polyphenols as dietary antioxidants in human health and disease. *Oxidative Medicine and Cellular Longevity*. 2009 Nov 1;2(5):270-278.
- [73] Bower JE, Irwin MR. Mind-body therapies and control of inflammatory biology: A descriptive review. *Brain, Behavior, and Immunity*. 2016 Jan 1;51:1-1.
- [74] Weizman AV, Ahn E, Thanabalan R, Leung W, Croitoru K, Silverberg MS, Hillary Steinhart A, Nguyen GC. Characterisation of complementary and alternative medicine use and its impact on medication adherence in inflammatory bowel disease. *Alimentary Pharmacology & Therapeutics*. 2012 Feb;35(3):342-349.
- [75] Nilsson U. The anxiety-and pain-reducing effects of music interventions: a systematic review. *AORN Journal*. 2008 Apr;87(4):780-807.
- [76] Cepeda MS, Carr DB, Lau J, Alvarez H. Music for pain relief. *Cochrane Database Systemic Review*. 2006 Apr 19;(2):CD004843.
- [77] Centers for Disease Control and Prevention (CDC). Vital signs: asthma prevalence, disease characteristics, and self-management education: United States, 2001--2009. *MMWR. Morbidity and Mortality Weekly Report*. 2011 May 6;60(17):547-52.
- [78] Ng TP, Wong ML, Hong CY, Koh KT, Goh LG. The use of complementary and alternative medicine by asthma patients. *QJM*. 2003 Oct 1;96(10):747-754.
- [79] Lawal IO, Olufade II, Rafiu BO, Aremu AO. Ethnobotanical survey of plants used for treating cough associated with respiratory conditions in Ede South local government area of Osun State, Nigeria. *Plants*. 2020 May;9(5):647.
- [80] Lee JH, Min DS, Lee CW, Song KH, Kim YS, Kim HP. Ginsenosides from Korean Red Ginseng ameliorate lung inflammatory responses: inhibition of the MAPKs/NF- κ B/c-Fos pathways. *Journal of Ginseng Research*. 2018 Oct 1;42(4):476-484.
- [81] Younis W, Asif H, Sharif A, Riaz H, Bukhari IA, Assiri AM. Traditional medicinal plants used for respiratory disorders in Pakistan: a review of the ethno-medicinal and pharmacological evidence. *Chinese Medicine*. 2018 Dec;13(1):1-29.
- [82] Kohn CM, Paudyal P. A systematic review and meta-analysis of complementary and alternative

medicine in asthma. *European Respiratory Review*. 2017 Mar 31;26(143).

[83] Radiation therapy side effects. <https://www.cancer.org/treatment/treatments-and-side-effects/treatment-types/radiation/effects-on-different-parts-of-body.html>. [Accessed: 2020 December 10]

[84] Luo, Q., & Asher, G. N. Complementary and alternative medicine use at a comprehensive cancer center. *Integrative Cancer Therapy*. 2017 Mar;16(1):104-109.

[85] Knecht K, Kinder D, Stockert A. Biologically-based complementary and alternative medicine (CAM) use in cancer patients: the good, the bad, the misunderstood. *Frontiers in Nutrition*. 2020 Jan 24;6:196.

[86] Kievisiene J, Jautakyte R, Rauckiene-Michaelsson A, Fatkulina N, Agostinis-Sobrinho C. The effect of art therapy and music therapy on breast cancer patients: what we know and what we need to find out—a systematic review. *Evidence-Based Complementary and Alternative Medicine*. 2020 Jul 15;2020.

[87] Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA: A Cancer Journal for Clinicians*. 2018 Nov;68(6):394-424.

[88] Zaid H, Silbermann M, Amash A, Gincel D, Abdel-Sattar E, Sarikahya NB. Medicinal plants and natural active compounds for cancer chemoprevention/chemotherapy. *Evidence Based Complementary Alternative Medicine*. 2017 Apr 9;:7952417.

[89] Greenlee H, DuPont-Reyes MJ, Balneaves LG, Carlson LE, Cohen MR,

Deng G, Johnson JA, Mumber M, Seely D, Zick SM, Boyce LM. Clinical practice guidelines on the evidence-based use of integrative therapies during and after breast cancer treatment. *CA: A Cancer Journal for Clinicians*. 2017 May 6;67(3):194-232.

[90] Taso CJ, Lin HS, Lin WL, Chen SM, Huang WT, Chen SW. The effect of yoga exercise on improving depression, anxiety, and fatigue in women with breast cancer: a randomized controlled trial. *Journal of Nursing Research*. 2014 Sep 1;22(3):155-164.

[91] Alternative cancer treatments: 10 options to consider. <https://www.mayoclinic.org/diseases-conditions/cancer/in-depth/cancer-treatment/art-20047246>. [Accessed: 2020 January 17]

[92] Huebner J, Marienfeld S, Abbenhardt C, Ulrich C, Muenstedt K, Micke O, Muecke R, Loeser C. Counseling patients on cancer diets: a review of the literature and recommendations for clinical practice. *Anticancer Research*. 2014 Jan 1;34(1):39-48.

[93] Coakley AB, Barron AM. Energy therapies in oncology nursing. *Seminars in Oncology Nursing*. 2012 Feb 1 (Vol. 28, No. 1, pp. 55-63). WB Saunders.

[94] Habli Z, Toumieh G, Fatfat M, Rahal ON, Gali-Muhtasib H. Emerging Cytotoxic Alkaloids in the Battle against Cancer: Overview of Molecular Mechanisms. *Molecules*. 2017 Feb 8;22(2):250.

[95] Li L, Zhou X, Li N, Sun M, Lv J, Xu Z. Herbal drugs against cardiovascular disease: traditional medicine and modern development. *Drug Discovery Today*. 2015 Sep 1;20(9):1074-1086.

[96] Shaito A, Thuan DT, Phu HT, Nguyen TH, Hasan H, Halabi S, Abdelhady S, Nasrallah GK,

Eid AH, Pintus G. Herbal medicine for cardiovascular diseases: efficacy, mechanisms, and safety. *Frontiers in Pharmacology*. 2020;11.

[97] Bronzato S, Durante A. Dietary supplements and cardiovascular diseases. *International Journal of Preventive Medicine*. 2018;9.

[98] Brook RD, Appel LJ, Rubenfire M, Ogedegbe G, Bisognano JD, Elliott WJ, Fuchs FD, Hughes JW, Lackland DT, Staffileno BA, Townsend RR. Beyond medications and diet: alternative approaches to lowering blood pressure: a scientific statement from the American Heart Association. *Hypertension*. 2013 Jun;61(6):1360-1383.

[99] de Lima Pimentel R, Duque AP, Moreira BR, Junior LF. Acupuncture for the treatment of cardiovascular diseases: a systematic review. *Journal of Acupuncture and Meridian Studies*. 2019 Apr 1;12(2):43-51

[100] Rastogi S, Pandey MM, Rawat AK. Traditional herbs: a remedy for cardiovascular disorders. *Phytomedicine*. 2016 Oct 15;23(11):1082-1089.

[101] Ashraf R, Khan RA, Ashraf I, Qureshi AA. Effects of *Allium sativum* (garlic) on systolic and diastolic blood pressure in patients with essential hypertension. *Pakistan Journal of Pharmaceutical Sciences*. 2013 Sep 1;26(5).

[102] Sun YE, Wang W, Qin J. Anti-hyperlipidemia of garlic by reducing the level of total cholesterol and low-density lipoprotein: A meta-analysis. *Medicine*. 2018 May;97(18).

[103] Shaito A, Thuan DT, Phu HT, Nguyen TH, Hasan H, Halabi S, Abdelhady S, Nasrallah GK, Eid AH, Pintus G. Herbal medicine for cardiovascular diseases: efficacy, mechanisms, and safety. *Frontiers in Pharmacology*. 2020;11.

[104] Bradt J, Dileo C, Potvin N. Music for stress and anxiety reduction in coronary heart disease patients. *Cochrane Database of Systematic Reviews*. 2013 Dec 28: (12).

[105] Ekor M, Adeyemi OS, Otuechere CA. Management of anxiety and sleep disorders: role of complementary and alternative medicine and challenges of integration with conventional orthodox care. *Chinese Journal of Integrative Medicine*. 2013 Jan;19(1):5-14.

[106] Dashti HS, Scheer FA, Jacques PF, Lamon-Fava S, Ordovás JM. Short sleep duration and dietary intake: epidemiologic evidence, mechanisms, and health implications. *Advances in Nutrition*. 2015 Nov;6(6):648-659.

[107] Alternative treatments for insomnia. <https://www.webmd.com/sleep-disorders/alternative-treatments-for-insomnia> [Accessed: 2020 October 13]

[108] Tordjman S, Chokron S, Delorme R, Charrier A, Bellissant E, Jaafari N, Fougere C. Melatonin: pharmacology, functions and therapeutic benefits. *Current Neuropharmacology*. 2017 Apr 1;15(3):434-443.

[109] Velasco-Rodríguez R, Pérez-Hernández MG, Maturano-Melgoza JA, Hilerio-López ÁG, Monroy-Rojas A, Arana-Gómez B, Vásquez C. The effect of aromatherapy with lavender (*Lavandula angustifolia*) on serum melatonin levels. *Complementary Therapies in Medicine*. 2019 Dec 1;47:102208.

[110] Hmwe NT, Browne G, Mollart L, Allanson V, Chan SW. Acupressure to improve sleep quality of older people in residential aged care: a randomised controlled trial protocol. *Trials*. 2020 Dec;21:1-0.

[111] Black DS, O'Reilly GA, Olmstead R, Breen EC, Irwin MR. Mindfulness

meditation and improvement in sleep quality and daytime impairment among older adults with sleep disturbances: a randomized clinical trial. *JAMA Internal Medicine*. 2015 Apr 1;175(4):494-501.

[112] Banno M, Harada Y, Taniguchi M, Tobita R, Tsujimoto H, Tsujimoto Y, Kataoka Y, Noda A. Exercise can improve sleep quality: a systematic review and meta-analysis. *Peer J*. 2018 Jul 11;6:e5172.

[113] Pera A. Cognitive, behavioral, and emotional disorders in populations affected by the COVID-19 outbreak. *Frontiers in Psychology*. 2020 Jan 1;11.

[114] Ostuzzi G, Papola D, Gastaldon C, Schoretsanitis G, Bertolini F, Amaddeo F, Cuomo A, Emsley R, Fagiolini A, Imperadore G, Kishimoto T. Safety of psychotropic medications in people with COVID-19: evidence review and practical recommendations. *BMC Medicine*. 2020 Dec;18(1):1-4.

[115] Liu K, Chen Y, Wu D, Lin R, Wang Z, Pan L. Effects of progressive muscle relaxation on anxiety and sleep quality in patients with COVID-19. *Complementary Therapies in Clinical Practice*. 2020 May 1;39:101132.

[116] Loewy J. Music therapy as a potential intervention for sleep improvement. *Nature and Science of Sleep*. 2020;12:1.

[117] Sarris J, Byrne GJ. A systematic review of insomnia and complementary medicine. *Sleep Medicine Reviews*. 2011 Apr 1;15(2):99-106.

[118] Trahan T, Durrant SJ, Müllensiefen D, Williamson VJ. The music that helps people sleep and the reasons they believe it works: A mixed methods analysis of online survey reports. *PLoS One*. 2018 Nov 14;13(11):e0206531.

[119] Innes KE, Selfe TK, Vishnu A. Mind-body therapies for menopausal

symptoms: a systematic review. *Maturitas*. 2010 Jun 1;66(2):135-149.

[120] Hill-Sakurai LE, Muller J, Thom DH. Complementary and alternative medicine for menopause: a qualitative analysis of women's decision making. *Journal of General Internal Medicine*. 2008 May 1;23(5):619-622.

[121] Hickey M, Szabo RA, Hunter MS. Non-hormonal treatments for menopausal symptoms. *The BMJ*. 2017 Nov 23;359.

[122] Johnson A, Roberts L, Elkins G. Complementary and Alternative Medicine for Menopause. *J Evid Based Integr Med*. 2019 Jan-Dec;24:2515690X19829380.

[123] Poppendieck W, Wegmann M, Ferrauti A, Kellmann M, Pfeiffer M, Meyer T. Massage and performance recovery: a meta-analytical review. *Sports Medicine*. 2016 Feb 1;46(2):183-204.

[124] Coveney C, Faulkner A, Gabe J, McNamee M. Beyond the orthodox/CAM dichotomy: Exploring therapeutic decision making, reasoning and practice in the therapeutic landscapes of elite sports medicine. *Social Science & Medicine*. 2020 Apr 1;251:112905.

[125] Brummitt J. The role of massage in sports performance and rehabilitation: current evidence and future direction. *North American Journal of Sports Physical Therapy*. 2008 Feb;3(1):7.

[126] Best TM, Hunter R, Wilcox A, Haq F. Effectiveness of sports massage for recovery of skeletal muscle from strenuous exercise. *Clinical Journal of Sport Medicine*. 2008 Sep 1;18(5):446-460.

[127] American Psychiatric Association. Diagnostic and statistical manual of

mental disorders (DSM-5®). American Psychiatric Pub; 2013 May 22.

[128] Watts TJ. The pathogenesis of autism. *Clinical Medicine Insights: Pathology*. 2008 Jan;1:CPATH-S1143.

[129] Höfer J, Hoffmann F, Kamp-Becker I, Küpper C, Poustka L, Roepke S, Roessner V, Stroth S, Wolff N, Bachmann CJ. Complementary and alternative medicine use in adults with autism spectrum disorder in Germany: results from a multi-center survey. *BMC Psychiatry*. 2019 Dec;19(1):1-8.

[130] Gold C, Wigram T, Elefant C. Music therapy for autistic spectrum disorder. *Cochrane Database of Systematic Reviews*. 2006(2).

[131] Groß W, Linden U, Ostermann T. Effects of music therapy in the treatment of children with delayed speech development—results of a pilot study. *BMC Complementary and Alternative Medicine*. 2010 Dec;10(1):1-0.

[132] Ghosh S, Koch M, Suresh Kumar V, Rao AN. Do alternative therapies have a role in autism?. *Online Journal of Health and Allied Sciences*. 2010 Apr 30;8(4).

[133] Lai CC, Shih TP, Ko WC, Tang HJ, Hsueh PR. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and coronavirus disease-2019 (COVID-19): The epidemic and the challenges. *International Journal of Antimicrobial Agents*. 2020 Mar 1;55(3):105924.

[134] Kim JH, Marks F, Clemens JD. Looking beyond COVID-19 vaccine phase 3 trials. *Nature Medicine*. 2021 Jan 19:1-7.

[135] Abubakar AR, Sani IH, Godman B, Kumar S, Islam S, Jahan I, Haque M. Systematic Review on the Therapeutic Options for COVID-19: Clinical Evidence of Drug Efficacy

and Implications. *Infection and Drug Resistance*. 2020;13:4673.

[136] Nugraha RV, Ridwansyah H, Ghozali M, Khairani AF, Atik N. Traditional herbal medicine candidates as complementary treatments for COVID-19: A Review of Their Mechanisms, Pros and Cons. *Evidence-Based Complementary and Alternative Medicine*. 2020 Oct 10;2020.

[137] Ogidigo JO, Iwuchukwu EA, Ibeji CU, Okpalefe O, Soliman ME. Natural phyto, compounds as possible noncovalent inhibitors against SARS-CoV2 protease: computational approach. *Journal of Biomolecular Structure and Dynamics*. 2020 Oct 24:1-8.

[138] Ren JL, Zhang AH, Wang XJ. Traditional Chinese medicine for COVID-19 treatment. *Pharmacological Research*. 2020 May;155:104743.

[139] Nandan A, Tiwari S, Sharma V. Exploring alternative medicine options for the prevention or treatment of coronavirus disease 2019 (COVID-19)—A systematic scoping review. *medRxiv*. 2020 Jan 1.

[140] Luo H, Tang QL, Shang YX, Liang SB, Yang M, Robinson N, Liu JP. Can Chinese medicine be used for prevention of corona virus disease 2019 (COVID-19)? A review of historical classics, research evidence and current prevention programs. *Chinese Journal of Integrative Medicine*. 2020 Apr;26(4):243-250.

[141] Azam MN, Al Mahamud R, Hasan A, Jahan R, Rahmatullah M. Some home remedies used for treatment of COVID-19 in Bangladesh. *Journal of Medicinal Plants Studies*. 2020;8(4):27-32.

[142] Mirzaie A, Halaji M, Dehkordi FS, Ranjbar R, Noorbazargan H. A narrative

literature review on traditional medicine options for treatment of corona virus disease 2019 (COVID-19). *Complementary Therapies in Clinical Practice*. 2020 Jun 17;101214.

[143] WHO traditional medicine strategy: 2014-2023; 2013: 7-15; Available at: http://apps.who.int/iris/bitstream/10665/92455/1/9789241506090_eng.pdf?ua=1.

[144] Ekor M. The growing use of herbal medicines: issues relating to adverse reactions and challenges in monitoring safety. *Frontiers in Pharmacology*. 2014 Jan 10;4:177.

[145] Lazar JS, O'Connor BB. Talking with patients about their use of alternative therapies. *Primary Care: Clinics in Office Practice*. 1997 Dec 1;24(4):699-714.

[146] Curtis P, Gaylord S. Safety issues in the interaction of conventional, complementary, and alternative health care. *Complementary Health Practice Review*. 2005 Jan;10(1):3-1.

[147] Corns CM. Herbal remedies and clinical biochemistry. *Annals of Clinical Biochemistry*. 2003 Sep 1;40(5):489-507.

[148] Wu ML, Deng JF, Lin KP, Tsai WJ. Lead, mercury, and arsenic poisoning due to topical use of traditional Chinese medicines. *The American Journal of Medicine*. 2013 May 1;126(5):451-454.

[149] World Health Organization. WHO guidelines on safety monitoring of herbal medicines in pharmacovigilance systems. World Health Organization; 2004. <https://apps.who.int/iris/handle/10665/43034>

[150] Anthony GM. Herbs during pregnancy; <https://whfcjackson.com/wp-content/uploads/2013/10/Herbs-During-Pregnancy.pdf>.

[151] Ajazuddin SS. Legal regulations of complementary and alternative medicines in different countries. *Pharmacognosy Reviews*. 2012 Jul;6(12):154.

[152] WHO global report on traditional and complementary medicine 2019. Geneva: World Health Organization; 2019. Licence: CC BY-NC-SA 3.0 IGO.

[153] Walker LA, Budd S. UK: the current state of regulation of complementary and alternative medicine. *Complementary Therapies in Medicine*. 2002 Mar 1;10(1):8-13.

[154] Pelletier KR, Marie A, Krasner M, Haskell WL. Current trends in the integration and reimbursement of complementary and alternative medicine by managed care, insurance carriers, and hospital providers. *American Journal of Health Promotion*. 1997 Nov;12(2):112-123.

[155] Awad A, Al-Shaye D. Public awareness, patterns of use and attitudes toward natural health products in Kuwait: a cross-sectional survey. *BMC Complementary and Alternative Medicine*. 2014 Dec;14(1):1-1.

[156] Tharakan YG. Development of a health and wellness centre at Manipal-an introspection. *JOHAR*. 2012 Jul 1;7(2):52.

[157] Steyer TE, Freed GL, Lantz PM. Medicaid reimbursement for alternative therapies. *Alternative Therapies in Health and Medicine*. 2002 Nov 1;8(6):84.

[158] Ross KM, Gilchrist EC, Melek SP, Gordon PD, Ruland SL, Miller BF. Cost savings associated with an alternative payment model for integrating behavioral health in primary care. *Translational Behavioral Medicine*. 2019 Apr;9(2):274-281.

[159] Cowen VS, Cyr V. Complementary and alternative medicine in US medical

schools. *Advances in Medical Education and Practice*. 2015;6:113.

[160] Chez RA, Jonas WB. The challenge of complementary and alternative medicine. *American Journal of Obstetrics and Gynecology*. 1997 Nov 1;177(5):1156-1161.

[161] Fischer FH, Lewith G, Witt CM, Linde K, von Ammon K, Cardini F, Falkenberg T, Fønnebo V, Johannessen H, Reiter B, Uehleke B. High prevalence but limited evidence in complementary and alternative medicine: guidelines for future research. *BMC Complementary and Alternative Medicine*. 2014 Dec;14(1):1-9.

[162] Wang C. Challenges for the future of complementary and integrative care. *Health Care Current Review*. 2014 Feb;2(1)

[163] Eisenberg DM, Kessler RC, Foster C, Norlock FE, Calkins DR, Delbanco TL. Unconventional medicine in the United States--prevalence, costs, and patterns of use. *New England Journal of Medicine*. 1993 Jan 28;328(4):246-252.