COMPARATIVE EVALUATION OF VERTICAL FACIAL HEIGHT REDUCTION AND SEVERITY OF TEMPOROMANDIBULAR JOINT DISORDERS VERSUS CONTROLS USING SHIMBASHI NUMBER AND CEPHALOMETRIC ANALYSIS

DISSERTATION

Submitted to The Tamil Nadu Dr. M.G.R Medical University

in partial fulfillment of the requirement for the degree of

MASTER OF DENTAL SURGERY

BRANCH IX

ORAL MEDICINE AND RADIOLOGY

2016 - 2019

CERTIFICATE I

This is to certify that the dissertation titled **"Comparative evaluation of vertical facial height reduction and severity of Temporomandibular Joint disorders versus controls using Shimbashi number and Cephalometric analysis"** is a bonafide record of the work done by **Dr. Sajitha Jasmin S.L.,** under our guidance during her postgraduate study period of 2016 - 2019. The dissertation is submitted to **The Tamil Nadu Dr. M.G.R Medical University, Chennai,** in partial fulfillment of the requirement for the Degree of Master of Dental Surgery in Oral Medicine and Radiology, Branch IX. It has not been submitted (partial or full) for the award of any other degree or diploma.

Dr. TATU JOY. E. M.D.S.,
Professor & HOD
Department of Oral Medicine & Radiology
Sree Mookambika Institute of Dental Sciences
Kulasekharam - 629161

Guide

Dr. TATU JOY E., MDS
Professor and HOD
Department of Oral Medicine and Radiology
Sree Mookambika Institute of Dental Sciences, Kulasekharam.

Dr. RAHUL .R. M.D.S.
Reader
Department of Oral Medicine and Radiology
Sree Mookambika Institute of Dental Sciences
Kulasekharam - 629161.

Co-Guide

Dr. RAHUL R., MDS
Reader
Department of Oral Medicine and Radiology
Sree Mookambika Institute of Dental Sciences, Kulasekharam.

URKUND

Urkund Analysis Result

Analysed Document:	Plagiarism file SAJITHA.docx (D45662327)
Submitted:	12/13/2018 10:02:00 AM
Submitted By:	sajithasljasmin@yahoo.co.in
Significance:	7 %

Sources included in the report:

THESIS.docx (D34921592)
thesis.docx (D34267881)
https://en.wikipedia.org/wiki/Temporomandibular_joint_dysfunction
https://www.sciencedirect.com/science/article/pii/S0889540606006986
https://www.sciencedirect.com/science/article/pii/S0889540606006974
https://www.ncbi.nlm.nih.gov/pubmed/16627175
https://www.sciencedirect.com/science/article/pii/S1079210411000941
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3598125/
https://pdfs.semanticscholar.org/9784/ca80eb0145081220f8bd8b5c463d2d6e5251.pdf
https://www.semanticscholar.org/paper/Longitudinal-study-of-temporomandibular-joint-disc-Flores-Mir-Nebbe/798c00f7a4e5b7a975839eb9859744c61963f142

Instances where selected sources appear:

25

CERTIFICATE II

This is to certify that this dissertation work titled **"Comparative evaluation of vertical facial height reduction and severity of Temporomandibular Joint disorders versus controls using Shimbashi number and Cephalometric analysis"** of the candidate **Dr. Sajitha Jasmin S.L.,** with registration Number .....**241627251**..... for the award of **MASTER OF DENTAL SURGERY** in the branch of Oral Medicine and Radiology **[Branch - IX]**. I personally verified the urkund.com website for the purpose of plagiarism Check. I found that the uploaded thesis file contains from introduction to conclusion pages and result shows **7** percentage of plagiarism in the dissertation.

Guide & Supervisor sign with Seal.

Dr. TATU JOY. E. M.D.S.,
Professor & HOD
Department of Oral Medicine & Radiology
Sree Mookambika Institute of Dental Sciences
Kulasekharam - 629161

Date: 22.12.2018

Place: Kulasekharam

SREE MOOKAMBIKA INSTITUTE OF DENTAL SCIENCES, KULASEKHARAM

ENDORSEMENT BY THE PRINCIPAL / HEAD OF THE INSTITUTION

This is to certify that the dissertation entitled **"Comparative evaluation of vertical facial height reduction and severity of Temporomandibular Joint disorders versus controls using Shimbashi number and Cephalometric analysis"** is a bonafide research work done by **Dr. Sajitha Jasmin S.L.,** under the guidance of **Dr. Tatu Joy., MDS,** Head of the Department, of Oral Medicine and Radiology, Sree Mookambika Institute of Dental Sciences, Kulasekharam.

27/12/18

Dr. Elizabeth Koshi M.D.S.
Principal
Sree Mookambika Institute of Dental Sciences
Kulashekaram, K.K. Dist.

Dr. Elizabeth Koshi, MDS,
PRINCIPAL
Sree Mookambika Institute of Dental Sciences,
V.P.M Hospital Complex,
Padanilam,
Kulasekharam,
Kanyakumari District,
Tamil Nadu - 629161

DECLARATION

I hereby declare that this dissertation "**Comparative evaluation of vertical facial height reduction and severity of Temporomandibular Joint disorders versus controls using Shimbashi number and Cephalometric analysis**" is a bonafide record of work undertaken by me and that this thesis or a part of it has not been presented earlier for the award of degree, diploma, fellowship or similar title of recognition.

Dr. Sajitha Jasmin S.L.,
MDS Student
Department of Oral Medicine and Radiology
Sree Mookambika Institute of Dental Sciences
Kulasekharam.

ACKNOWLEDGEMENT

I extent my profound gratitude to my guide ***Dr. Tatu Joy E, MDS,*** Professor and HOD of the Department of Oral Medicine and Radiology for his invaluable guidance, co-operation, constant encouragement and immense patience with me in every step of this endeavour. I thank him for the trust he had in me that made me complete this work and I also consider it as a great opportunity to do my postgraduate programme under his guidance.

I am thankful to ***Dr. Rahul R MDS,*** Reader, Department of Oral Medicine and Radiology, for his enthusiasm, strive for perfection, and patience he showed me for writing this Dissertation.

I take this opportunity to express my sincere gratitude to ***Dr. Shashi Kiran M MDS,*** Reader, Department of Oral Medicine and Radiology for his constant encouragement, support and professional guidance in this endeavour.

I extent my sincere gratitude to my beloved teachers ***Dr. Redwin Dhas Manchil P MDS, Dr. Farakath Khan M MDS,*** and ***Dr. Lakshmi P MDS,*** Senior Lecturers for their enormous support throughout the course of this study.

I would acknowledge the help and support given by ***Dr. Velayuthan Nair***, Chairman and ***Dr. Rema V Nair,*** Director, Sree Mookambika Institute of Medical Sciences, for academic support and facilitates to carry out my dissertation work.

I express my sincere gratitude to ***Dr. Elizabeth Koshi***, Principal, Sree Mookambika Institute of Dental Sciences, Kulasekharam, for giving me mental

support in difficult times and providing me an opportunity to utilize the facilities available in this Institution, to complete my work on time without barriers.

I thank my batch mates ***Dr. Dhanya SV*** and ***Dr. Tanuja S***, and my immediate juniors ***Dr. Maria Monisha A, Dr. Janetha Edwin*** and ***Godwi Femine CP*** for their support and encouragement.

I would like to thank my fellow postgraduates ***Dr. Reshmi M, Dr. Leema RK,*** and ***Dr. Abijah RS*** for helping me to get through difficult times and for all emotional support and caring.

I remember my father ***Late. Mr. Sukumaran***, for his great vision in guiding me to achieve great goals. Words are very less to express my deep gratitude to my loving mother, ***Mrs. Lilly***, who has taught me to face challenges in life and my mother in law ***Mrs. Pushpa Bai*** who has always been my side

I thank my aunty ***Dr. Geetha,*** for directing me this college and giving me mental support to handle tough situations in this endeavour.

I extend sincere thanks to my beloved husband ***Mr. Shajimon*** and my loving daughter ***Haethal S Manas*** for their mental support and encouragement.

Last but not the least I thank God Almighty for the blessings, wisdom, health, and strength, He has showered on me.

CONTENTS

LIST OF ABBREVIATIONS

TMJ	-	Temporomandibular Joint
VDO	-	Vertical Dimension of Occlusion
TMD	-	Temporomandibular Joint Disorder
N	-	Nasion
Gn	-	Gnathion
S	-	Sella
Go	-	Gonion
CT	-	Computed Tomography
MRI	-	Magnetic Resonance Imaging
BDDR	-	Bilateral Disk Displacement with Reduction
DD	-	Disk Displacement
ID	-	Internal Derangement
UFH	-	Upper Facial Height
LFH	-	Lower Facial Height
TMJOA	-	Temporomandibular Joint Osteoarthritis
BF	-	Bite Force
F-H	-	Frankfort Horizontal
mA	-	Milliamperes
KVp	-	Kilovolts peak
SPSS	-	Statistical Package for Social Sciences
ANOVA	-	Analysis Of Variance

LIST OF TABLES

LIST OF GRAPHS

LIST OF COLOR PLATES

Fig No	Title
1	Thompson and Brodie's analysis
2	Cephalometric points and angles
3	Digital vernier calliper and a Digital SLR Camera used to measure Shimbashi number and to take photograph
4	Panoramic Radiographic Machine (Proline XC) for OPG and Lateral Cephalogram
5	Clinical picture showing Measurement of Shimbashi number with a Digital Vernier Calliper
6	Desktop installed with Planmeca Romexis 2.6.0 R software
7	Lateral cephalometric radiograph showing the measurement between upper CEJ to lower CEJ
8	Lateral cephalometric radiograph showing the measurement between Point A to Point B
9	Lateral cephalometric radiograph showing the measurement between ANS to Gn
10	Lateral cephalometric radiograph showing the measurement between N to Gn
11	Lateral cephalometric radiograph showing the measurement between S to Go
12	Lateral cephalometric radiograph showing the measurement of < N-Go-Gn
13	Lateral cephalometric radiograph showing the measurement of < ANS-PNS-(Go-Gn)
14	Lateral cephalometric radiograph showing the measurement of Interincisal angle
15	Lateral cephalometric Radiograph showing the measurements
16	Mandible-as-Class-III-lever

LIST OF ANNEXURE

No	Title
Appendix -1	Certificate from Institutional Research Committee Certificate from Institutional Human Ethics Committee
Appendix - 2	Patient information sheet ➢ English ➢ Malayalam ➢ Tamil
Appendix - 3	Patient consent form ➢ English ➢ Malayalam ➢ Tamil
Appendix - 4	Data Sheet

ABSTRACT

ABSTRACT

Background

Bite collapse is a Medical and a dental dilemma where the patient's bite and Temporomandibular joint (TMJ) do not function in harmony because of loss of vertical dimension of occlusion. It is an abnormal state in which mandible rises beyond the point of normal occlusal contact, caused by drifting of teeth, loss of occlusal vertical dimension, change in tooth shape and size through grinding, loss of teeth or abnormal positioning of lower jaw to the cranium. Bite collapse causes symptoms like frequent headaches, dull pain of the elevator muscles, ear stiffness, tinnitus and vertigo. Maintenance of ideal vertical dimension of occlusion is very important for optimal functioning of jaw muscles.

Many studies were carried out in the past to diagnose bite collapse and to evaluate neuromucular and TMJ disorders associated with loss of vertical dimension of occlusion by analysing soft tissue and skeletal parameters. However, there are only very few studies that analysed the dental and skeletal parameters in the diagnosis of collapsed bite and explains the importance of re- establishing physiologic vertical dimension. The significance of this study was that it explains the amount of bite reduction and severity of Temporomandibular Joint disorders, which in turn would shed new light in the management of neuromuscular and Temporomandibular Joint disorders. Shimbashi number is the easiest Dental tool to analyse occlusal vertical dimension and Cephalometric evaluation of facial skeletal proportion in vertical direction is more accurate.

Aim

The main aim of the study was to determine the extent of reduction in occlusal vertical dimension and it's correlation to the severity of TMJ disorders by measuring 'Shimbashi number and Cephalometric analysis.

Materials and Methods

Patients with a clinical history suggestive of TMJ disorders were taken and measured Shimbashi number with digital vernier caliper when the teeth were in maximum intercuspation or in centric occlusion. Shimbashi number is 19 mm plus or minus 1mm. Patients identified with collapsed bite and controls were subjected to a cephalometric analysis. Compared clinically obtained Shimbashi number with the measurement CEJ-CEJ in the radiograph. Correlated the other results obtained from cephalometric analysis with the Shimbashi number and evaluated changes in vertical dimension of occlusion in TMJ disorders. All the values were compared with the control group.

Results

The results of this study showed the prevalence of temporomandibular joint disorders increases with age and females are more prone to TMD. There was a significant reduction in values like Shimbashi number, Radiographic CEJ-CEJ, A-B, ANS-Gn, N-Gn, S-Go,< N-Go-Gn and < ANS-PNS-(Go -Gn) in patients with TMD. It also shows a significant increase in interincisal angle in TMD compared to controls. All parameters are significant and P value less than 0. 05. Result revealed the severity of TMD increases with reduction in values like Shimbashi number and Radiographic CEJ-CEJ and increase in interincisal angles.

Conclusion

Temporomandibular joint disorder is one among the major reasons in which patients seek dental treatment and bite collapse is a major causative factor. This study revealed, how bite collapse or reduced vertical dimension of occlusion affects TMJ, and its correlation to the severity of joint disorders by clinically measuring Shimbashi number and Cephalometric analysis. Based on the result of this study, females are more prone to TMD and the prevalence of TMD increases with age. It also revealed that the severity of TMD increases with the degree of reduction in vertical dimension of occlusion.

Key Words

Temporomandibular Joint Disorders, Cephalometry, Vertical dimension, Stomatognathic system, Dental occlusion

INTRODUCTION

INTRODUCTION

Bite collapse is an abnormal condition in which mandible raises beyond the point of normal occlusal contact, caused by drifting of teeth, loss of occlusal vertical dimension, change in tooth shape and size through grinding, loss of teeth or abnormal positioning of lower jaw to the cranium.[1,2,3] It is a Dental and a Medical problem where the patient's bite and Temporomandibular joint (TMJ) do not function in harmony because of loss of vertical dimension of occlusion. The vertical dimension in which the superoinferior relationship of mandible to the maxilla, when the posterior teeth are in maximum intercuspation is defined as the vertical dimension of occlusion (VDO). The loss of vertical dimension of occlusion can significantly affect patient's TMJ, oral function and comfort.[4,5,6,7]

Bite collapse may cause symptoms like frequent headaches, dull pain of the elevator muscles, ear stiffness, tinnitus and vertigo.[8] Bite Collapse may be accompanied by difficulty in chewing and swallowing leads to frequent gastrointestinal distress. Maintaining ideal vertical dimension of occlusion is very important for optimal functioning of jaw muscles.

Henry Hank Shimbashi established a number to indicate an ideal relationship between upper and lower jaw. This simple number which we use to measure from the gum line of upper front tooth to the gum line of lower front tooth, which is approximately 19 mm plus or minus one.[9, 10] If the relationship of upper and lower jaw is altered, one or more of the muscles of head, neck and face will be over worked and leads to muscle spasm and pain. Measuring vertical dimension of occlusion using Shimbashi number is applicable to all age groups and races all over

the world. It is the simplest and reliable tool to determine occlusal vertical dimension, both in therapeutic approach to TMJ disorders and to educate the patient and public.

Cephalometric analysis utilises the application of cephalometry in diagnosis and treatment planning.[11,12,13] Reduction in vertical dimension of occlusion is determined by measuring 'Shimbashi number' combined with Cephalometric analysis.

Genesis 1:27 "So God created man in His own image." According to scriptures we were all created perfectly, imperfections crept in with our genetic changes, environmental factors, habits and lifestyle. The nourishment to this perfect organism is through the mouth and around this corridor lies most of the sense organs. We could safely say that, changes in the normal composition starts from the first point, the oral cavity.

The area in which the mandible articulates with the temporal bone of cranium is called temporomandibular joint (TMJ). It is a ginglymoarthrodial joint of condylar variety and differs from other joints of the body because of its gliding as well as rotatory movements.

JB Costen, an ENT physician discovered around 70 years back that, after referring his symptomatic edentulous TMJ patients to a local Dentist for prosthodontic rehabilitation of edentulous space with dentures; many returned with their TMJ, head and ear pain symptoms completely relieved. So Temporomandibular disorders are collectively called as "Costen's syndrome".[14,15,16] Temporomandibular joint disorder (TMD) is a collective term used to denote all problems relating to

TMJ and related musculoskeletal structures.[17,18,19] Around 60- 70% of population has at least one sign of temporomandibular joint disorder, which includes limited mouth opening, clicking and locking.

Based on history and physical examination TMD are classified in to Mild, Moderate and severe. The etiology of TMD is multifactorial and it is related to a number of conditions such as dental occlusion, orthodontic tooth movement, improper tooth restorations, posture, parafunctional habits, genetic and psychosocial factors, emotional stress, and trauma, anatomy of disc, pathophysiology of muscles, age and gender. Even though TMD is related to many factors; the first and foremost etiology is the reduction in vertical dimension of occlusion.

The aim of the study was to assess the occlusal vertical dimension by evaluating both the dental and skeletal parameters using Shimbashi number and Cephalometric evaluation of facial proportions in vertical direction according to Thompson and Brodie analysis[20,21,22] that should shed light on the diagnostic aspects vis a vis clinical and radiographic pertaining to TMJ Disorders. In this study, measured upper Cementoenamel junction(CEJ) to lower Cementoenamel junction(CEJ) clinically and radiographically, point A to Point B, Nasion(N) to Gnathion(Gn), Anterior nasal spine(ANS) to Gnathion(Gn), Sella(S) to Gonion(Go) and angles like inter incisal, Nasion-Gonion-Gnathion (N-Go-Gn) & Anterior nasal spine(ANS)-Posterior nasal spine(PNS)-Mandibular (Go-Gn) plane. Although vertical loss occurs in all three axis with changes in pitch, yaw and roll of the mandible, since the vertical (pitch) is easily measured without carry additional equipment.

Reduction in vertical dimension of occlusion is the common condition among patients seeking treatment for TMJ disorders. So its identification is crucial for effective management of TMJ disorders associated with over closure. By assessing reduction in vertical dimension of occlusion and evaluating signs and symptoms associated with over closure, Clinician can determine the need for re-establishing physiologic vertical dimension.

AIM AND OBJECTIVES

AIMS AND OBJECTIVES

Aim

- Evaluation of vertical facial height reduction by measuring Shimbashi number and radiographic CEJ- CEJ and cephalometric analysis
- Comparing variations in the measurements of Cephalometric analysis seen in different study groups with the control.
- Correlating clinical findings of TMD with Shimbashi number and Cephalometric analysis.

Objectives

- To determine the extent of reduction in occlusal vertical dimension and it's correlation in TMJ disorders by measuring 'Shimbashi number.
- To assess correlation of skeletal CEJ-CEJ in cephalometric analysis with the clinical 'Shimbashi number'.
- To calculate 'inter incisal angle' in loss of occlusal vertical dimension of occlusion.
- To determine the reduction in vertical height between N-Gn, ANS-Gn, A-B, S-Go and reduction in angles like N-Go-Gn, ANS-PNS-Mandibular (Go-Gn) plane in cephalometric analysis in bite collapse.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Costen JB in 1934 stated that A syndrome of ear and sinus symptoms dependent upon disturbed function of TMJ due to loss of vertical dimension of occlusion known as Costen's syndrome.[14] Auricular symptoms and headache are dependent on altered function of temporomandibular joint. Even though medical, rhinologic, ophthalmologic causes are there for headache, bite collapse is the major cause of TMJ disorder and headache in edentulous patients. Hearing tests on patients with ear symptoms showed mild type of catarrhal otitis with Eustachian tube involvement, mostly simple obstruction due to pressure on the anterior membranous wall, transmitted through soft tissue from relaxed pterigoid muscle and sphenomandibular ligament during overbite. Costen found out that the ear condition was due to trauma or concussion of the tympanic structure or labyrinth by the mandibular condyles.

Dizziness were due to changes in intra tympanic pressure affecting the labyrinth. The effects were transient and recurrent and relieved by inflation of the Eustachian tube. Cases of headache were of posterior sinus origin and persistence of pain after sinus surgery, suggested the possibility of TMJ pathology. Over closure of TMJ produces pathology of meniscus, condyles and surrounding structures.

Costen found that many edentulous patients reported with headache, ear ache and TMJ pain of unknown origin are relieved after rehabilitation with complete denture. The prognosis in such cases were depends on, (a) The accuracy with which the dentures relived the abnormal joint pressure. (b) The extent of injury to the

condyle, meniscus, joint capsule and to the tube. The exact reason for the abnormal conditions of Eustachian tube, distribution of pain towards occiput, vertex, pharynx and tongue were due to joint pathology. It also causes glossopharyngeal neuralgia because of involvement of chorda tympani and auriculotemporal with the ninth via sensory connections to the otic ganglion.

Thompson and Brodie in 1942, after evaluating 50 adult radiographs and 300 dry skulls, concluded that nasal height (nasion-anterior nasal spine) accounts for 43% of the total facial height (nasion-gnathion). According to his study the effects on the mandible due to losses in vertical dimension, through either attrition or extraction are, [20]

1) In loss of vertical dimension of occlusion, the mandible assumes a new relationship to the maxilla. This relation may be achieved by a protrusive drifting of the bone or a decrease in the vertical height of the face from nose to chin, that results in falling in of the lips.
2) Loss of the "stopping" action of the teeth causes the masseter and medial pterygoid muscles to exert an unopposed pull over the angle of the mandible. This pull or tension slowly flattens the angle, warps the neck of the condyle and lengthening of the bone with subsequent projection of the chin.

For radiographic assessment, Thomson and Brodie have taken cephalometric radiograph using Broadbent-Bolton cephalometer, a head-positioning device similar craniostat. The head is secured in position by means of left and right ear posts, which can be inserted in the ear canals, by which he head will be calibrated in the machine. Head is oriented in the Frankfort horizontal plane by means of a pointer to

the left orbitale, the pointer lying at the same level as the top of the ear posts. Once the head is brought to this position, it will be locked by means of a rest which engages the bridge of the nose. For an ideal radiography,

1) The central ray of the lateral tube passes through the length of the ear posts along the superior surfaces and meets the mid sagittal plane and the film surface at right angles. The central ray of the posterior tube travels along the midsagittal plane at the horizontal level as that of the lateral ray and meets the transmeatal axis and the frontal film at right angles.
2) After stabilizing the head firmly, roentgenographed in two planes without change of position.

In this cephalometric analysis, calculated the total facial height by measuring nasion to gnathion, and tracing the facial changes following extraction because of loss of vertical dimension of occlusion.

Wylie and Johnson in 1952, studied 171 patients and found that in harmonious individuals total facial height (TFH) is divided into 45% of nasal height (anterior nasal spine) and 55% of dental height (anterior nasal spine-menton), i.e., upper facial height (UFH) and lower facial height (LFH), respectively.[23]

In orthodontics there are ‘good’ and ‘poor’ facial patterns. In his study, lateral head films are taken with teeth in occlusion prior to orthodontic treatment between age groups 11 to 13 years, grouped in to good, fair and poor facial forms using subjective appraisal. On each lateral head radiograph measured total facial height, percentage of contribution of lower facial height to the total facial height, mandibular body length, ramus length and the gonial angle. Also assessed the

vertical placement of glenoid fossa of the temporal bone. On evaluation, the group that was categorized as poor showed a reduced ramal height, large angle of the mandible and placement of glenoid fossa to the temporal bone became high.

Carlsson, Ingervall and Kocak in 1979 increased the OVD by 4 mm for six participants with removable appliances, temporarily cemented on the occlusal surface of the mandibular posterior teeth and the canines. After seven days, despite all the participants reported subjective symptoms of TMJ disorders, five of them reported resolution of the symptoms within two days. [24]

Many researches showed that the postural rest position of the mandible changes because loss of teeth, dental attrition and prosthodontic treatment. Immediately it has been corrected by many ways like, changing the occlusal vertical dimension both in subjects with natural teeth and in those with complete dentures, by placing restoration or refabricating dentures.

In addition to this, adaptability of the mandibular posture to changes in occlusal vertical dimension is also noticed. Increasing the vertical dimension of occlusion was thought to be a hazardous procedure in prosthetic treatment in the past because of the concept that, increased vertical dimension both in subjects with natural teeth and with complete dentures have been interpreted as deranging the function of both joints and muscles of the masticatory system. Clinical experience proved that the masticatory system adapts well to moderate changes in the occlusal vertical dimension. [24]

Six adult persons with complete natural dentitions were selected and an increase in occlusal vertical dimension was accomplished by using cemented acrylic resin splints covering the lower canines, premolars, and molars for 7 days. The

splints increased the occlusal vertical dimension beyond the original rest facial height, through this a new postural position of the mandible and a new inter occlusal distance were established. Upon placement of splints the subjects experienced moderate symptoms of discomfort but these symptoms were reduceed at the end of the treatment period. So this research proved that, a moderate increase in the vertical dimension of occlusion is not hazardous procedure, instead provided the occlusal stability and relieved the subjective symptoms of TMJ disorders. [24]

Brand et al, 1995 in his case control design with cephalometric radiography and TMJ MRI; revealed; considerably shorter maxillary and mandibular bodies associated with TMJ disorders and it is not necessarily be associated with changes in other cephalometric variables.[25]

In his study 23 female volunteers with normal temporomandibular joints were compared with 24 females with TMJ disorders. Lateral cephalometric radiographs and magnetic resonance imaging were used to investigate the relationship between TMJ disorder and facial skeletal form. The results showed that the patients with TMJ disorders had smaller maxilla and mandible. These sagittal measurements of jaw length were not always associated with changes in other measurements. The relationship between TMJ symptoms and a variety of occlusal parameters have been investigated in his study and revealed, there were no noticeable difference in vertical skeletal relations between those with internal derangements and those with normal disk position.

Dibbets and van der Weele, 1996 in their longitudinal study; clinically assess TMJ and taken lateral cephalograms at 2 time points to measure degree of stability of signs and symptoms during 14-yr period. He found out that signs and symptoms

in children were not associated with facial morphology but TMD signs in adults associated with sagittally shorter midface already present in childhood.[26]

In this study signs and symptoms of temporomandibular disorder were documented in 170 persons of average age of 12.5 years. In that 110 were reexamined at an average age of 26.4 years. Craniofacial forms were analyzed with the help of cephalograms by taking 22 linear and 8 angular measurements. In children signs and symptoms of TMJ disorder did not appear to be associated with craniofacial forms. But adults with clicking joints, crepitating joints and other symptoms of TMJ disorders had sagittally shorter maxilla and mandibular diagonal.

The sagittal shortness diagnosed at the earlier age in cephalometric evaluation, did not appear to have changed much over time. But the signs and symptoms of TMJ disorders were associated with sagittal shorter mid face. This study clearly states that, the crepitus and other signs of TMJ disorders were associated with; sagittally less maxilla, a shorter mandibular corpus, shorter pharynx and a shorter cranial base.

Nebbe, Major and Prassad in 1999 carried out a Cohort study with lateral cephalograms and bilateral TMJ MRI to determine the reliability of cephalometric variables to revealed the association between TMJ status and facial measurements such as increase in inclination of palatal plane, mandibular plane angle, gonial angle, and total anterior facial height, vertical ramal height, and total posterior facial height.[27]

One of the main functions of the articular disk and posterior attachment of temporomandibular joint is to provide the osseous articular surfaces with synovial fluid, which helps in lubrication, oxygenation, hydration and nutrition of the joint. In

disk displacement, the functional environment of the TMJ will be altered and it causes changes in the adaptive and growth capacity of tissues. This study was to found out the associations between the craniofacial morphology and temporomandibular joint (TMJ) disk displacement in the adolescents. Lateral cephalometric radiographs and magnetic resonance images of the TMJs were taken for 119 females between the ages of 10 and 17 years. The associations between TMJ internal derangement and craniofacial morphology were studied in 5 facial regions using 5 separate multiple regression analyses. In this research, the associations between altered facial morphology and altered disk position in each of the facial regions were investigated and the mandibular regions showed the strongest associations.

Yamada et al in 1999 done a study using TMJ CT and MRI, lateral and PA cephalograms. This study revealed mandibular retrusion and rotation, short ramus height, long lower anterior facial height with compensatory adaptation in lower incisors are associated with TMJ disorders. [28]

This study was performed to investigate the relationship of condylar bony changes in craniofacial morphology. Twenty nine subjects around the age of 18.8 with condylar bony changes were selected from orthodontic patients and subjected to both helical computed tomography (CT) and magnetic resonance imaging (MRI) to evaluate suspected temporomandibular joint (TMJ) internal derangement and condylar bony changes. Then assessed, the craniofacial morphology with the help of lateral and frontal cephalograms. Six linear and five angular measurements of each patient were compared with an age and sex-matched population from the Japanese standard and following observations were made

a) In bilateral condylar bony change group (bilateral group), erosion and osteophyte formation were the common bony change and were present in adults as well as children. In case of unilateral condylar bony change group (unilateral group), most common feature was flattening, and erosion was only present in subjects below 19 years.
b) Disk displacement without reduction in 90.6% of the bilateral group and 76.9% of the unilateral group was seen.
c) TMJ morphologic change such as decreased condylar head volume, decreased ramus height, progressive mandibular retrusion in adults or decreased growth rate in juvenile predisposes TMJ disorder.
d) The present research showed mandibular retrusion and rotation and short ramal height are associated with, compensatory adaptation in the lower incisors in the bilateral group.

This study strongly suggested that, the condylar bony changes might be progressive and unstable in adults of the bilateral group as well as juveniles of the both groups.

Gidarakou et al, in 2002 carried out a case control design with TMJ MRI and lateral cephalograms found out; shorter anterior and posterior cranial base, smaller SNA and SNB angles, larger interincisal angle, more retroclined upper incisor are associated with TMJ disorders. [29]

The main purpose of the study was to find out the effect of bilateral disk displacement with reduction (BDDR) on the skeletal and dental pattern of affected individuals. 42 symptomatic and 46 asymptomatic normal female volunteers were

selected and taken high resolution magnetic resonance imaging in the sagittal (closed and opens) and coronal (closed) planes to evaluate the TMJ.

Linear and angular cephalometric measurements were taken to evaluate the skeletal and dental characteristics of the two groups. The values were compared between the symptomatic subjects with the control subjects. The length the S-Na (anterior) and S- Ba (posterior) cranial base was smaller in the BDDR group. SNA and SNB angles were also less in symptomatic group. The upper incisor was more retroclined and the inter incisal angle was larger in the BDDR group. This study clearly delineates alterations in skeletal morphology might be associated with disk displacement (DD). The result of this research was that, the alterations in skeletal morphology may be associated with DD.

Gidarakou et al, 2003 in a Case-and-control design using TMJ MRI and lateral cephalograms; found out that; in symptomatic group, retrusion of maxilla, clockwise rotation of mandible, protruded upper incisors, retroclined lower incisors, excessive overjet are associated with TMJ disorders. [30]

The main purpose of the study was to evaluate the effect of bilateral degenerative joint disease (BDJD) on the skeletal and dental patterns of affected individuals. Selected 29 symptomatic patients 46 asymptomatic normal female as volunteers and taken a bilateral high resolution magnetic resonance scans in the sagittal (closed and open) and coronal (closed) planes to evaluate the temporomandibular joints.

Linear and angular cephalometric measurements were taken to evaluate the skeletal and dental characteristics of the two groups. Analysis of variance was used

to compare symptomatic subjects with control. There was retrusion of the maxilla and mandible with a clockwise rotation of mandible. Protruded upper incisors and retroclined lower incisors were noticed in the symptomatic group. This study clearly states that subjects with BDJD may manifest altered craniofacial morphology. The clinician must be aware of this possibility, especially for patients who are growing children and candidates for orthognathic surgery.

The results showed that alterations in skeletal morphology may be associated with BDJD. Many studies showed, DJD may affect skeletal morphology. Clinicians should be aware of the condition, especially for patients who are growing children and orthognathic surgery candidates, mainly when the patient presents with retrognathic or asymmetric jaw relationships.

Gidarakou et al, 2004 in a case control study using lateral cephalograms found out that; in symptomatic group, smaller cranial base length and facial plane angle, larger angle of convexity because of mandibular retroposition, larger overjet, steeper mandibular plane angle, more vertical y-axis, shorter posterior ramal height, increased angle between mandibular and palatal planes are associated with TMJ disorders. [31]

This study was done to evaluate the effect of bilateral disc displacement without reduction on the skeletal and dental pattern of affected individuals. This study involved 59 symptomatic female patients and 46 asymptomatic normal females without any signs and symptoms of TMJ disorders. After a thorough examination subjected the patients and volunteers to bilateral high resolution magnetic resonance imaging scans in the sagittal (closed and open) and coronal (closed) planes to evaluate the temporomandibular joints. Taken linear and angular

cephalometric measurements and evaluated the skeletal and dental characteristics of two groups. According to this study alterations in skeletal morphology might be associated with bilateral disk displacement without reduction.

Estomaguio et al, 2005 in a Cohort study by using TMJ CT, lateral cephalograms and unpaired t test for comparison between groups proposed; mandibular retrusion and rotation, short ramus height, long lower anterior facial height, compensatory adaptation in upper and lower incisors determines severity of TMJ disorders. [32]

This study was to found out the relation of craniofacial and glenoid fossa shapes in temporomandibular joint (TMJ) pathology. This research was carried out in 39 orthodontic patients with signs and symptoms of TMJ disorders, using helical CT scans. Cephalometric measurements revealed; 21 subjects with bilateral condylar bone change (BBC) had significantly smaller SNB angles, ramus heights and S- Ar /N-Ba ratios, as well as larger mandibular plane angles than the 18 subjects with no condylar bone change (NBC). The average posterior slope of right and left articular eminence in the central and lateral sections were significantly steeper in NBC than in BBC. According to this study condylar bone change is not only be related to the morphology of the mandible, but also of the glenoid fossa and cranial base. This states the adaptive changes in the condyle, articular eminence and cranial base in response to changes in loading.

Even though MRI or CT scanning has advantages; its application in diagnosing TMJ disorders has not yet become universal in clinical practice. Cephalometric radiography is reliable and readily available tool in diagnosing TMDs. The cephalometric analysis suggests the occurrence of condylar bone

change, assist orthodontic treatment plan as well as for pretreatment patient education. If the patients with bilateral or unilateral condylar bone change also show mandibular retrusion and/or mandibular deviation, the usefulness of lateral cephalograms in diagnosing and treating TMJ pathology can become even greater.

Flores-Mir et al in 2006 done a longitudinal study by using MRI and lateral cephalograms evaluated horizontal and vertical growth changes maxilla and mandible. In this stepwise multiple linear regression analysis evaluated the influence of disc status of TMJ and orthodontic treatment on growth changes in TMJ disc displacement associated with decreased forward growth of maxillary and mandibular bodies and decreased downward growth of mandibular ramus.[33]

The purpose of this retrospective cohort study was to assess the association of temporomandibular joint disc status and craniofacial growth. Fifty two females and twenty-seven males with and without TMJ disc abnormalities were followed for a mean time of 3 years 8 months. Of this, 40 subjects (21 female, 19 male) received orthodontic treatment. Disc displacement and disc length measurements from MRI of the jaw joints were used to evaluate TMJ disc status. Growth changes in horizontal and vertical directions were obtained from cephalometric radiographs. The Fishman skeletal maturation index system was used for the analysis. Along with this previous orthodontic treatment and time frames between the follow-up cephalometric radiographs were considered. In this study used a stepwise multiple linear regression analysis to evaluate the influence of TMJ disc status and orthodontic treatment between initial records (T1) and final records (T2) for each cephalometric point. Less horizontal and vertical growth observed in specific regions of the maxilla and the mandible in subjects with TMJ disc abnormalities.

This TMJ disc abnormality was associated with reduction in forward growth of maxillary and mandibular body and reduced downward growth of the mandibular ramus. Also it was related in the maxilla in which a decrease in the horizontal growth of PNS and ANS. The results of our study were that the craniofacial pattern associated with disc abnormality previously reported by Nebbe et al became more pronounced with growth and the mandible became more retrognathic. Reduced posterior facial height without altered anterior facial growth produced a clockwise mandibular growth rotation.

Based on this study, the following observations were made.

- TMJ disc abnormality has been associated with reduced forward growth of the maxillary and mandibular bodies.
- The TMJ disc abnormality has been associated with reduced downward growth of the mandibular ramus.

Ahn et al in 2006 carried out a Cohort study with lateral cephalograms and TMJ MRI found out that, backward rotation of mandible, decrease of ramus height, decrease mandibular body length, and effective mandibular length, increase of ramus inclination, articular angle, proclination of mandibular incisors and overjet and increased overbite associated with TMD progression. [34]

The purposes of this study were to find out the progress of Internal Derangement (ID) of the temporomandibular joint with the help of cephalometric analysis. This study carried out in 134 women whose primary complaints were malocclusions. Based on the results of magnetic resonance imaging of bilateral TMJs such as bilateral normal disc position, unilateral disc displacement with

reduction (DDR) and contralateral normal disc position, bilateral DDR, unilateral DDR and contralateral disc displacement without reduction (DDNR), and bilateral DDNR; the sample was categorized in to five groups.

Thirty-six cephalometric variables in the lateral cephalograms were analyzed with one way ANOVA and discriminant analysis to determine the key factors in identifying subjects with TMJ ID. Proclination of the mandibular incisors, backward positioning of the mandible, clockwise rotation of the mandible and increase in overjet intensified gradually with the progression of TMJ ID, and the subjects with bilateral DDNR showed the greatest changes in orofacial morphology. Stepwise analysis identified the following 2 variables; they are mandibular incisor to Frankfort horizontal plane angle and overjet. This study showed that, those with smaller mandibular incisor to Frankfort horizontal plane angles and larger overjets had high possibilities of TMJ ID and also suggested that some cephalometric variables can be used as an auxiliary diagnostic tool to help identify patients with potential TMJ ID. The posteriorly rotated mandibular ramus, steep mandibular plane, small mandible, protrusion of the mandibular incisors, large overjet, and protrusion of the upper and lower lips were associated with the progress of TMJ ID. This study suggests that a systematic evaluation of the lateral cephalograms can provide valuable information on the initial dentofacial changes associated with TMJ ID.

Hwang et al, in 2006 done a Cohort study by using lateral cephalograms and TMJ clinical evaluation revealed; hyperdivergent facial profile, more lingual tilting of maxillary incisors, steeper inclined occlusal plane in patients with TMJ disorders.[35]

There was much controversy about the relationship of temporomandibular joint disorders and the skeletal structures of lower face. It is not very clear whether

the disharmony of the facial skeletal structure is caused by the TMJ disorders or vice versa. The main aim of the study was to determine the relationship between craniofacial skeletal structures and TMJ disorders by using lateral cephalogram measurements to examine the facial profile of patients with TMJ disorders.

111 patients around 18 years old with TMJ disorders were selected. Taken lateral cephalogram for each subject and traced to confirm the significance of the craniofacial measurements between the experimental group and control group found out that there is a significant correlation between lower facial height and TMJ disorders.

Singh et al in 2006 conducted a pretreatment cephalogram study on females with Angle's class1 malocclusion among the age group of 13-19 years. The study has been done to find out the changes of dentoalveolar vertical dimension with variations in lower facial height in malocclusion cases. The selected clinical cases were divided in to three groups on the basis of Andre Horn's FHI. Study showed maxillary and mandibular sagittal and vertical alveolar basal bone were found to be increased or decreased with increase or decrease in FHI but the difference is greater for mandible than the maxilla. [36]

Height of lower face is a very important component in facial aesthetics. Different malocclusions present with varying lower facial height. It's clear that the cephalometric characteristics of long or short face structure are located below the palatal plane. According to Schudy that the proportion of facial height to the facial depth had a direct relation on vertical overbite and function. The position of glenoid fossa is the component of vertical and horizontal malocclusion and sagittal and vertical changes are more evident in mandible than maxilla.

Ioi et al, in 2008, done a case-and-control study using dental panoramic radiograph, transcranial TMJ xrays and lateral cephalometric radiographs revealed in patients with TMJ disorders have considerably larger craniocervical angles, more posteriorly rotated mandibles, shorter posterior facial height, more retroclined lower incisors than control group.[37]

Arthritis is the inflammation of the articular surfaces of a joint. Osteoarthritis is one of the common arthritis forms, affecting joints including temporomandibular joint (TMJ), and has been referred to as a degenerative joint disease.

The most common etiologic factor is generally thought to be overloading of the articular structures of the joint. When active bony changes leads to inflammation, often painful and referred to as osteoarthritis. Radiographic changes are commonly seen in osteoarthritis ⁄ osteoarthrosis (OA). Females are more commonly affected with OA than males. The relationship between head posture and temporomandibular disorders has been studied. The main aim of this study was to analyse the hypothesis that there is a relationship between TMJ OA, head posture and dentofacial morphology by means of a sex- and age-matched case control study design. In this study, investigated the relationships between TMJ OA, head posture and dentofacial morphology. The TMJ OA patients had larger craniocervical angles, meaning that they had a tendency to have more extended head positions than the control subjects. Also the TMJ OA patients had a more posteriorly rotated mandible and retroclined lower incisors compared with the control group. They also had shorter posterior facial height. These results showed that an association might exist between TMJ OA, head posture and dentofacial morphology.

Cho et al, 2009; done a case-and-control study with the help of panoramic radiography and TMJ CT revealed; considerably shorter condylar and ramus height, larger gonial angles and more distally inclined condylar head in TMDs vs control group. [38]

In this, study they have done a comparison of mandibular morphology between the asymptomatic normal group and the patients with TMJ disorders. 39 patients with osteoarthritis 44 controls were selected and included in this study. Linear and angular measurements were taken in panoramic and TMJ CT in patients with TMJ disorders and compared with controls.

The study proved, the condylar head and the condylar and ramal height of the osteoarthritis joints were significantly shorter compared to the control. The gonial angles were significantly larger and condylar head showed distal inclination. Unilateral TMJ disorder cases showed differences between the affected and contralateral sides of condylar head, condylar height and condylar head angle.

Marcia Cristina Cunha Costa, Barbosa and Bittencourt in 2011 determined the relationship between facial heights by evaluating the soft tissues and underlying skeleton by analyzing vertical facial proportions in the anterior region and found a positive correlation by Thompson and Brodie Cephalometric analysis.[39]

In late nineteenth and the early twentieth century, analysis of soft tissue profile was became the interest of leading orthodontists, trailblazers the likes of Angle and Case. The sculpture of Apollo Belvedere was selected by Angle as a model for body and facial beauty. But Case was reluctant to pursue a single beauty standard and therefore attempted to individualize the aesthetic goals of each one of his cases. He studied the facial contours of his patients and noted all details and

established a proper diagnosis treatment plan. Researchers focused most of their attention on anteroposterior balance, probably influenced by the widespread use of Angle's classification.

In 1942, Thompson and Brodie, after carried out measurements on cephalometric radiographs of 50 adults and 300 dry skulls, concluded that nasal height (nasion-anterior nasal spine) accounts for 43% of the total facial height (nasion-gnathion). Wylie and Johnson in 1952, studied 171 patients and found that in harmonious individuals total facial height (TFH) is divided into 45% of nasal height (anterior nasal spine) and 55% of dental height (anterior nasal spine-menton), that is, upper facial height (UFH) and lower facial height (LFH), respectively. In 1964, Schudy analysed cephalometric radiographs of 270 subjects, including both retrognathic and prognathic individuals, and with normal facial features. The results showed that UFH varied very little between the three facial types, although 2 mm higher in the prognathic group. LFH was about 56% of TFH (nasion-menton) in the group with normal growth pattern, 59.5% in the retrognathic group and 54.1% in the prognathic group.

A positive correlations obtained by evaluations of the soft tissues and underlying skeleton based on the analyses advanced by Schudy ($r=0.619$, $p<0.001$), Wylie and Johnson ($r=0.595$, $p<0.002$) and Thompson and Brodie ($r=0.630$, $p<0.001$), although, individually, some discrepancies were identified due to variability in soft tissue thickness.

Bertram et al, in the year 2011 carried out a cephalometric evaluation of mandibular morphology; a meaningful increase in risk of horizontal mandibular and vertical ramus deficiencies in patients with Temporomandibular joint disorders. [40]

In this study performed a bilateral MR imaging of the TMJ in 68 consecutive patients with TMJ arthralgia to identify those with bilateral TMJ DDwoR and/or OA. Linear and angular cephalometric measurements were taken to apply selected criteria of horizontal mandibular (gonion -menton [Go-Me] 73 mm and articulare-pogonion [Ar-Pog] 105 mm) and vertical ramus (articularegonion [Ar-Go] 45 mm) deficiencies. By using logistic regression analysis, estimate the association between selected MR imaging and cephalometric parameters.

In patients with TMJ arthralgia, the MR imaging parameters are important determinants of horizontal mandibular and vertical ramus deficiencies. Several researches have described associations between MR imaging findings of TMJ ID and specific cephalometric parameters.

Changes in facial morphology such as decreases in posterior facial and ramus height and backward rotations and retruded positions of the mandible have become more severe as TMJ ID progresses to bilateral disc displacement without reduction (DDwoR). This study is to determine, whether MR imaging diagnoses of bilateral TMJ DDwoR and/or OA are related to cephalometric parameters of horizontal mandibular and vertical ramus mandibular deficiencies. Taken lateral cephalograms with the teeth in a centric occlusion position and with the Frankfort horizontal parallel to the floor. All radiographs were taken on the same radiographic machine.

The result of this study showed that, the MR imaging parameter of bilateral DDwoR and OA had a major contribution for horizontal mandibular and vertical ramus deficiencies. Increase in the odds ratios in this study clearly indicates that these structural characteristics likely are important determinants of mandibular morphology.

Sakar et al, 2011 carried out a study using TMJ MRI and lateral cephalometric analysis found out that; the severity of TMJ disorders associated with alteration in all angular measurements related to vertical skeletal relations and articular angle and decrease ratio of posterior face height to anterior face height, indicating clockwise rotation of mandible. [41]

The main purpose of this study was to evaluate the effects of disk displacement (DD) and its progression in relation to changes in dentocraniofacial morphology in symptomatic patients and compare the results with asymptomatic volunteers. Dental and skeletal Class I female patients with DD, diagnosed using magnetic resonance imaging (MRI) and lateral cephalometric analysis were included in the study. Subjects were grouped in to: unilateral DD with reduction, bilateral DD with reduction, unilateral DD without reduction, and bilateral DD without reduction and control group with bilateral normal disc position. Measured thirty two (32) cephalometric variables and statistically significant differences were calculated.

Dental and soft tissue measurements did not showed any differences, but variables related to the mandible showed statistically significant differences. Severity of DD was associated with an increase in all angular measurements related to vertical skeletal relationships and a decrease in the ratio of posterior face height to anterior face height indicating clockwise rotation of the mandible. Also, the height of ramus was decreased with the progression of DD. This study demonstrated that the presence of DD in skeletal Class I female patients effects facial morphology, and its progression makes the differences more significant and remarkable.

Sun et al, in 2011 in this Cohort study with the help of lateral cephalograms, panoramic, transcranial, and transpharyngeal radiography for TMJ assessment,

evaluated different groups of TMJ disorders revealed; the group with shorter posterior ramus height and shorter condyles, smaller facial plane angle and larger angle of convexity and steeper mandibular plane angle have positive correlation with the degree of TMJ Disorders.[42]

This study was to evaluate the craniofacial morphological features in young patients affected by bilateral temporomandibular joint osteoarthrosis (TMJOA). 43 males and 189 females aged 15 to 25 years were selected and taken lateral cephalograms and temporomandibular joint (TMJ) radiographs. Based on the findings of TMJ bony status, the samples were classified into a TMJOA group and a control group. Lateral cephalometric variables were analyzed by t test to evaluate the cranial and dentofacial differences between the groups. TMJOA group showed the features such as, a shorter posterior ramus height and shorter condyles, smaller SNB angle and larger ANB angle, smaller facial plane angle and larger angle of convexity, steeper mandibular plane angle and more vertical y-axis. Bilateral TMJOA is associated with orofacial alterations characterised by a tendency towards retrognathism and short mandibles. A temporomandibular disorder (TMD) includes a variety of conditions affecting the temporomandibular joint (TMJ) and masticatory muscles.

Controversies exist in the theory of TMD etiology and the interrelationship between TMD, malocclusion and orthodontic treatment. Both malocclusion and TMD are prevalent in teenagers or young adults; however after decades of endeavour, dentists still could not find the etiological role of malocclusion in the development of TMD. Disc displacement with or without reduction, the most common subtype of TMD, has been reported to be associated with decreased growth

of the mandible. Characteristic findings included, decreased ramus height and mandibular length, a steep mandibular plane angle that resulted in malocclusion. Facial asymmetry, also found to be associated with unilateral or bilateral internal derangement with greater severity on the unilateral side.

Lateral cephalograms were taken to all the subjects on the same radiographic machine with their teeth in centric occlusion and the Frankfort horizontal plane parallel to the floor. Traced the cephalograms manually on acetate papers and the cephalometric analysis was done by one of the authors. The variables were divided into five groups: cranial base relationship, denture pattern relationship, size and position of maxilla, size and position of mandible and facial profile. Shows positive association of bilateral osteoarthrosis of TMJ in a young population with the craniofacial skeletal changes, which are mostly characterised by the shortening of the ramus and backward rotation of the mandible.

Yang et al, 2012 in a Cohort study with the help of lateral cephalometric analysis concluded that patients with TMJ disorders have short ramus height and clockwise rotation of ramus and mandible vs those with control. [43]

This study was designed to analyze the skeletal differences in patients with temporomandibular joint (TMJ) disc displacement (DD) This cross-sectional study design included Korean women older than age 17 years. According to the magnetic resonance image findings of the bilateral TMJs, the subjects were classified in to three groups, bilateral normal disc position (BN), bilateral disc displacement with reduction, and bilateral disc displacement without reduction. Each group was in to 2 using the mandibular body length to anterior cranial base ratio as a sagittal jaw parameter: normal-size mandible (NM) and oversized mandible (OM). Seventeen

variables in the lateral cephalograms were analyzed using 2-way analysis of variance to analyze the differences in skeletal characteristics with respect to the mandible size and TMJ DD status.

Those with TMJ DD generally had a short ramus height and clockwise rotation of the ramus and mandible compared with control. Backward positioning and rotation of the ramus and mandible were found between BN and bilateral disc displacement with reduction or bilateral disc displacement without reduction in the OM group.

This study suggested that the skeletal characteristics associated with TMJ DD are differently represented according to the sagittal jaw relationship. TMJ DD generally progresses from reduction to nonreduction and leads to TMJ clicking, crepitus, pain, and limitation in jaw movement.

Almasan et al, in the year 2013 done a study using lateral cephalometric analysis and clinical examination found out that greater overjet and overbite in patients with TMJ disorders. [44]

This study was done to establish the skeletal pattern in subjects with malocclusions and temporomandibular disorders (TMD) that is, to assess the relationship between craniofacial skeletal structures and TMD in subjects with malocclusions. Sixty four cases with malocclusions, around 18 years of age were included in the study. Assessed the TMD clinically based on Helkimo Anamnestic Index. Lateral cephalogram were taken to all subjects and grouped according to the sagittal skeletal pattern (ANB angle) into class I, II and III.

Twenty-four patients with TMD (experimental sample); 40 patients without TMD (control group); interincisal angles and overjet were higher in class I and II experimental subjects; midline shift and Wits appraisal were broader in the experimental group in all three classes.

In class III, the SNB angle was higher in the experimental group. Joint crepitus followed by reduced mobility of mandible, muscular pain and temporomandibular joint (TMJ) pain were the most frequent symptoms in subjects with TMD and malocclusions. Temporomandibular joint status is very important while planning orthodontic treatment in patients with severe malocclusions; midline shift, large overjet and deep overbite has been associated with signs and symptoms of TMD.

Temporomandibular joint disorder (TMD) is "a collective term embracing a number of clinical problems that involve the masticator musculature, the temporomandibular joint (TMJ) associated structures, or both". The etiology of TMJ disorder is generally multifactorial, involving a large number of direct and indirect etiological factors, occlusion being frequently cited as one of the major etiological factors causing TMD. Malocclusion is widely accepted as a cause of jaw dysfunction. The importance of occlusion and its role in causing TMD, compared with other factors, has been studied and is still debated nowadays. Subjects with malocclusions have a significantly higher prevalence of signs and symptoms of TMD than subjects without malocclusions.

Sierpinska et al in 2013, carried out a pretreatment cephalometric analysis showed that lost vertical dimension reduced anterior facial height that results in small angular skeletal parameters. In this research assessed the facial morphology

and the occlusal vertical dimension by means of Cephalometric analysis combined with 'Shimbashi' measurement from CEJ to CEJ. Post treatment anterior facial height increased from the increased occlusal vertical dimension.[45]

Advanced tooth wear mostly results in lost vertical dimension and affects facial aesthetics. Complex restorative treatment modalities can replace the lost tooth structure and improve functional, occlusal and facial skeleton parameters. The main aim of this study was to assess changes in the morphological and functional occlusal parameters of the facial skeleton after prosthetic rehabilitation that increases lost occlusal vertical dimension.

50 selected patients with advanced tooth wear were examined clinically, to assess the degree of tooth wear. Each subject had undergone a cephalometric analysis, digital occlusal analysis, and electromyographic analysis of the anterior temporalis, superficial masseter, anterior digastric, and the sternocleidomastoid muscles. A prosthodontic treatment was done to restore the occlusal vertical dimension of each subject's, which was followed by repeating the pretreatment analyses. Pre and post treatment parameters were compared statistically. Pre-treatment cephalometric analysis revealed, the lost vertical dimension and reduced anterior facial height resulted in small angular skeletal parameters. Post treatment cephalometric analysis showed anterior facial height was increased from the increased occlusal vertical dimension. The mean value of post treatment functional electrical activity during clenching was increased compared to pretreatment. Increasing the VDO improved facial aesthetics by positively affecting facial skeletal angles. The restored occlusal surface changed the pretreatment flat broad occlusal contacts into more point contacts.

The increased VDO also increased muscle activity levels over the pretreatment levels after three months period of adaptation. Advanced tooth wear is one among the major source of tooth structure loss that often requires an advanced and costly prosthetic rehabilitation to reconstruct the occlusion. Before planning a complete prosthetic rehabilitation, it is important to find out the etiology of tooth wear, the amount of hard tissue loss, the change in the occlusal vertical dimension resultant from the wear, the amount of available interocclusal space required to restore the lost vertical dimension, the levels of contractile muscle activity and changes in facial morphology. The facial morphology, the existing occlusal vertical dimension, and the amount of available interocclusal space, can be determined by Shimbashi measurement of CEJ to CEJ combined with cephalometric analysis. Shimbashi measurement refers to the skeletal classes of facial morphology by calculating the distance between the cementoenamel junction [CEJ] of the central upper and lower incisors for class I should amount to 17-20 mms.

1. Cephalometric analysis revealed, increasing the vertical dimension of occlusion positively affects many of the linear and angular morphological facial skeleton parameters.
2. Creating point contacts with the restorations, increased muscle activity levels compared to the pretreatment levels after three months period of adaptation.
3. TMJ disorders did not report post treatment in the group of patient being treated.

Derek Mahony in 2014, found out the need for reestablishing a physical vertical dimension of occlusion by evaluating the patient for common signs and symptoms associated with over closure. Over closed patient may experience TMJ disorders, headache, ear stiffness, difficulty in swallowing, persistent pain in masticatory elevator muscles, vertigo and tinnitus. Amount of reduction in occlusion can be assessed by using 'Shimbashi number' which is the distance between CEJ to CEJ [46].

Over-closed patients reported with symptoms such as frequent headaches, dull pain of the elevator muscles and pain or stiffness in their neck muscles. Ear stuffiness, tinnitus and/or vertigo also can occur. Other symptom, less often reported, is frequent gastrointestinal distress in various forms because of difficulty in chewing and/or swallowing due TMDs. An overclosed patient are usually reported with the symptoms like, frequent headache with no identifiable pathology, ear stuffiness without any reason, difficulty in chewing hard foods, discomfort or difficulty in swallowing, frequent GIT distress, vertigo, Tinnitus, persistent dull pain in elevator muscles of mastication, neck stiffness or pain and increased wear of incisor teeth.

Signs indicating overclosure includes, freeway space greater to 3 mm, visual identification or EMG diagnosis of a tongue thrust swallow, Curve of Spee become deep, posterior edentulous spaces, lingually inclined mandibular molars, EMG diagnosis of elevator muscle hyperactivity at rest of more than 2.0 microvolts average (or 2.2 microvolts RMS), shortened and worn teeth, horizontal skin creasing and s weeping of saliva at the corners of the mouth and measurement of cementoenamel junction of the maxillary central incisor to that of its opposing mandibular tooth in centric occlusion (Shimbashi Number) is less than 17mms.[46]

Patient may not seek treatment for TMJ disorders because of any of the signs; instead, they are more likely to seek rehabilitative treatment for headache, jaw-ache, and ear-ache, difficulty in chewing/swallowing or for purely esthetic reason.

Overclosure is one of the common conditions among patients seeking restorative and/or orthodontic rehabilitation. By evaluating the patient's signs and symptoms associated with overclosure, one can find out the need for reestablishing the physiologic vertical dimension.

Bite opening can be accomplished in a number of ways by following specific guidelines. The uses of objective diagnostic aids are extremely helpful by allowing the clinician to optimize TMJ and craniofacial muscle function at the new VDO. The correction of the vertical dimension during a rehabilitative procedure should result in enhanced comfort and improved function in the finished case.

Babatunde O. Akinbami and Prince E. Nsirim in 2014 carried out a research to determine the mean and baseline values of the occlusal vertical dimension and height of the mandibular basal bone in a Nigerian population. Asked the participants to bring the upper and lower teeth to come into contact, the distance between the nasal sill and dimple on the lower lip was measured (OVD).[47]

To reconstruct the mandible to maintain the OVD, heights of bone grafts must not be less than 2 cm or greater than 4 cm. The mandible is a horseshoe shaped bone and body of the mandible on either side has the basal bone component and a mandibular arch embedding teeth. The head of the condyle of mandible articulates with the glenoid fossa to form the temporomandibular joint. Morphological changes of the mandible are influenced by occlusal status and the age. Human mandible is a

bone which exhibits a large degree of anatomical variations. During growth of face, the maxilla and mandible translate downward and forward. Even though the forward displacement of the maxilla is less than that of the mandible the interarch relationship of the teeth in the sagittal view during growth remains unchanged.

Interdigitation of teeth thought to provide compensatory tooth movement mechanism for maintaining the pattern of occlusion during growth; the maxillary teeth move anteriorly relative to the maxillary posteriors. After cessation of growth, the single most important factor governing the gross morphological shape of the bone is related to the presence or absence of the teeth. After the extraction of tooth, follows a phase of remodeling this may result in an extensive loss in the height of the jaws, mostly in the mandible. When the occlusal vertical dimension (OVD) is reduced; there will be functional and esthetic problems, difficult lip contact, speech problems, and also temporomandibular joint pain dysfunction. Many methods are used to determine OVD based on vertical dimension in rest position of the mandible or phonetics, but none is better than the other. So a combination of the methods is commonly used. Reduction in VDO needs restoration of vertical height and such alterations may be a compatible modality of management and will improve esthetics, facial height, and effective bite force in the masticatory system.

Waleska CALDAS N et al in 2016 stated that there is a strong relationship between TMJ, masticatory muscles and dental occlusion. He also found that occlusal changes and reduction in vertical dimension of occlusion reflects the presence of TMJ disorders and by reestablishing normal vertical height of occlusion can relieve signs and symptoms of TMJ disorders.[48]

The relationship between Temporomandibular Disorders (TMD) and malocclusion is a critical issue in dentistry. Old concept was that malocclusion causes joint or muscle disorders due to the interrelation between these structures and the dental occlusion. The aim of the study was to present the most commonly occurring occlusal changes secondary to TMD. When present, symptoms must always be controlled to reestablish a "normal" occlusion and allow proper treatment strategy.

In the 1980s, a lawsuit declared that orthodontic treatment was the main cause of TMD. Various studies have been conducted to investigate this association. In early 1990s, well conducted studies stated that some occlusal or skeletal factors, such as anterior open bite, unilateral posterior crossbite, overjet greater than 6 to7 mms, absence (CR) to maximum intercuspation (MI) discrepancy greater than 2 mm could be considered occlusal risk factors for TMDs. But there is a relationship between TMJ, masticatory muscles and the dental occlusion. TMD signs and symptoms must always be controlled to reestablish a normal occlusion and allow proper treatment strategy.

Paula Furlan Bavia et al in 2016 stated that, craniofacial morphology affects masticatory performance in healthy dentate subjects, but little is known about its effects in patients with painful temporomandibular disorders (TMDs). Forty-eight female patients with mean age of 28±5.8 year with painful TMD underwent lateral cephalometric radiography. Subjects were classified based on their craniofacial morphology into three groups using Ricketts' cephalometric analysis and the Vert method: brachyfacial (n=22), mesofacial (n=13), and dolichofacial (n=13). Pain intensity was measured to each patient based on a visual analog scale (VAS). [49]

Measured the maximum bite force (MBF) with pressure sensors placed on the first molar site. Masticatory performance (MP) was by chewing a silicone-based artificial material and determining the resulting particle size by the sieve method. Chewing ability (CA) was evaluated for seven food types and analyzed by a questionnaire. MBF differed in each group. The brachy facial patients are having the highest MBF values. There was no difference in MP among the groups. The groups differed only in the ability to chew one of the seven evaluated food items. So the craniofacial morphology affects the MBF without impairing MP in patients with painful TMDs.

Bite force (BF) is an important tool in masticatory function assessment. BF is responsible for comminuting food in preparation for swallowing. Factors such as the number of occlusal pairs, masticatory muscle thickness, and malocclusion can influence BF. Alteration in bite forces impairs masticatory functions. Dolichofacial patients have lower BF values compared to other craniofacial morphology. TMDs such as, disc displacement with reduction and temporomandibular joint or muscle pain, can also decrease BF, suggesting poorer masticatory function in such subjects. Masticatory ability can also be analysed by masticatory performance (MP) and chewing ability (CA) tests. The main purpose of this study was to evaluate the maximum BF (MBF), MP and CA in painful TMD subjects, considering different craniofacial morphologies. The result showed that, craniofacial morphology affects the MBF without impairing MP or CA in subjects with painful TMDs.

Assis et al. in 2018 stated in a case report that, tooth wearing causes dimensional changes in facial morphology and OVD. The correction of reduction in occlusal vertical dimension represents a factor of success in the rehabilitation

treatment, because if it is not properly restored, that may cause damage to the teeth, muscles, TMJ, swallowing and speech.[50]

During the life time of person teeth undergo certain wear due to functional activity. Occlusal wears are mostly attrition, erosion or abrasion. Diet and diseases such as gastric reflux, congenital abnormalities, and eating disorders are important contributors to excessive occlusal wear. Excessive wear of anterior teeth affects the smile's esthetics and harmony. As cases become more and more complex, recovery of the occlusal vertical dimension (OVD) can be done to prevent the morbidity. Occlusal vertical dimension is defined as the vertical distance between two points, one in maxilla and one in mandible, when the occlusal surfaces are in contact. One of the most important aspects in facial aesthetics is Vertical Dimension of Occlusion and when a patient presents decreased OVD, because of advanced tooth abrasion, attrition, or tooth loss, its face looking aged due to the decrease of the lower third of the face, lips intrusion, drop of the nose and can also bring phonetic and masticatory disorders and possible involvement of the temporomandibular joint (TMJ) and mastication muscles. Restoring the occlusalheight by temporary acrylic resin crowns, fixed prosthesis or even interim removable prosthesis for initial adaptation. After creating optimum maxillomandibular relationship and the restitution of a restorative space the treatment plan can evolve into a definitive rehabilitation

The patient who was asymptomatic remained so; the rehabilitation treatment did not cause any painful symptoms to such patient. The presence of episodes of painful symptomatology prior to treatment may be associated with loss of OVD, once there was a remission of these symptoms after its restoration, almost all cases it is permanent. The results obtained were quite satisfactory because after the end of

treatment the patient was highly satisfied with the recovery of the aesthetic previously committed.

Al Shaban et al in 2018 stated that temporomandibular joint disorder is a complex disorder caused by multiple factors that are poorly understood. Mostly it affects people between 20 and 40 years old. Around 20% to 40% of the adult populations are affected to some degree of TMD that affects the harmony and balance between the masticatory system and the function. If anything that disrupts the equation of harmony and balance, the body tries to correct it but to certain limit; when the abnormal functions continue, at that time the signs and symptoms appear. So according to the research, the main etiology of the TMD is the abnormal functions of TMJ due to incorrect habits and practices. [51]

More importance will be given towards educating the patient on how to avoid behaviors that are abusive to the TMJ. Proper function of TMJ depends on the harmony between the different structures of the TMJ including mandibular condyles, meniscus, glenoid fossa, ligaments, and muscles of mastication.

TMJ continues to function as usual until it is disturbed by external influences that affect the function of the joint, such as mechanical, psychological, occupational, and habits. Human body tries to repair itself, but if this continues, the body loses its ability to repair and the signs & symptoms begin to appear. Signs and symptoms of TMD include orofacial and preauricular pain, as well as limitation of mouth opening, TMJ brut during function and displacement of articular disc.

The study by de Kanter et al in 2018 stated that vertical dimension is the distance between two selected anatomical or marked points in a vertical direction. For dentate individuals, the vertical dimension of occlusion (VDO) is largely

determined when the teeth are in maximum intercuspation. Loss of tooth substance will directly affect the VDO, leading to alteration in facial morphology, function, comfort, and esthetics. The original VDO can be maintained by a dentoalveolar compensatory mechanism that involves the overeruption of worn teeth. This dynamic nature of the stomatognathic system is considered as adaptation. [52]

Generalized loss of crown height due to tooth wear can be regained by increasing the VDO using restorative material; enhance the esthetic tooth display, rectify anterior teeth relationship, allow for re-establishment of physiologic occlusion, and minimize the need for biologically invasive clinical procedures such as crown-lengthening surgery and elective endodontic treatment. According to some researchers, the VDO is a constant dimension through individual life. The expected consequences while increasing the VDO are, hyperactivity of muscles of mastication, elevation of bite force in temporomandibular disorders (TMD).

MATERIALS AND METHOD

MATERIALS AND METHODS

SOURCE OF THE DATA

This study was carried out in the Department of Oral Medicine and Radiology, Sree Mookambika Institute of Dental Sciences, Kulasekharam, Kanyakumari district.

METHODS OF SELECTION OF DATA

Total number of Subjects: 160

Based on the clinical examination, patients with TMDs are grouped in to Mild, Moderate and Severe.[53,54,55]

1. **1th group** (**Control group)** consisting of 40 healthy volunteers without Temporomandibular joint (TMJ) Disorders.
2. **2st group** consisting of 40 cases diagnosed with Mild Temporomandibular (TMJ) Disorders/ Intra capsular (Mild clicking with adaptation, Mild tenderness on palpation of the retrodiscal tissues, No restriction in mouth opening, Mild deviation with adaptation, TMJ noises/ crepitus upon movement with adaptation)
3. **3nd group** consisting of 40 cases diagnosed with Moderate Temporomandibular joint (TMJ) Disorders /Extra capsular (Inflammatory and infective conditions of the jaw joints, Internal derangement and TMJ dislocation, Disc displacement with and without reduction)
4. **4nd group** consisting of 40 cases diagnosed with Severe Temporomandibular joint (TMJ) Disorders / Myogenous (Myofacial pain, Headaches, Neck pain, Shoulder pain, Regional, dull, muscle ache with the

presence of localized tenderness (trigger point) in muscle tendon or fascia, Masticatory and / or cervical myofacial pain and Sleep disturbances)

SELECTION OF CASES

Inclusion criteria

- Individuals diagnosed with TMJ problems.
- Individuals must have maxillary and mandibular anterior teeth with or without full complement of teeth
- Patients with reduced vertical dimension of occlusion.
- Angle's Class I cases

Exclusion criteria

- Developmental anomalies and Syndromes affecting the size and shape of the mandible.
- Bone altering diseases such as osteo-dystrophies and also including pathologies of the mandible such as neoplasms, cysts and fractures.
- Completely edentulous patients.
- Patients undergoing orthodontic treatment.
- Angle's Class II malocclusion
- Class III malocclusion with anterior crossbite.
- Anterior open bite

PARAMETERS STUDIED

- Measured Shimbashi number clinically.
- Cephalometric measurements on radiograph.

MATERIALS REQUIRED

Ideal Cephalometric Images obtained by Planmeca Proline XC Digital Orthopantomograph Machine, a digital Vernier calliper, SPSS 16.0 software, SLR digital Camera.

PROCEDURE

Individuals satisfied the inclusion and exclusion criteria were included in the study. Patients with a clinical history suggestive of TMJ disorders were taken and measured Shimbashi number with digital vernier calliper when the teeth are in maximum intercuspation or in centric occlusion. Shimbashi number- a simple number and it is the measurement from the gum line of the upper front tooth to the gum line of lower front tooth. The ideal distance is approximately 19 mm plus or minus 1mm. All the selected samples were subjected to cephalometric analysis. The images were acquired using Planmeca Proline XC Digital Orthopantomograph Machine, Finland. For an ideal cephalometric radiograph, Frankfort horizontal plane should be parallel to the floor and midsagittal plane should be 90 degree or perpendicular to the floor and F-H plane. Patient is positioned in which, the left side of the face is towards the image receptor in this radiography. Central ray is directed toward the external auditory meatus, perpendicular to the film and the midsagittal plane with exposure parameters of 70-80 kvp, 50- 60 mA and1.6 seconds. Cephalometric imaging devices results in a 10% magnification of the image with 60 inch focal spot to object and 6 inch object to film distance. Magnifications in cephalometric radiographs should be considered while calculating radiographic CEJ-CEJ. Traced the radiographs using Planmeca Romexis software.

Cephalometric analysis used in this study was Thompson and Brodie's analysis[29] (Figure 1). In this analysis traced points N, ANS and Gn, N - Gn line, Total facial height (TFH) =Distance between N and Gn measured on N - Gn line, Upper facial height (UFH) = Distance between N and ANS measured on N - Gn line, lower facial height (LFH) - Distance between ANS and Gn measured on N - Gn line. In addition to this, A-B & S-Go and angles like inter incisal, N-Go-Gn & ANS-PNS-Mandibular (Go-Gn) plane (Figure 2) were also measured.

Marked upper CEJ to lower CEJ, Nasion to Gnathion, ANS to Gnathion, Sella to Gonion and angles like inter incisal, N-Go-Gn, ANS-PNS-Gn by Cephalometric analysis in subject with TMJ disorders and compared with the controls. Also compared the clinical Shimbashi number obtained with the measurement CEJ-CEJ in the radiograph. Correlated the other results obtained from cephalometric analysis with the Shimbashi number and evaluated the changes in vertical dimension of occlusion in TMJ disorders.

COLOUR PLATES

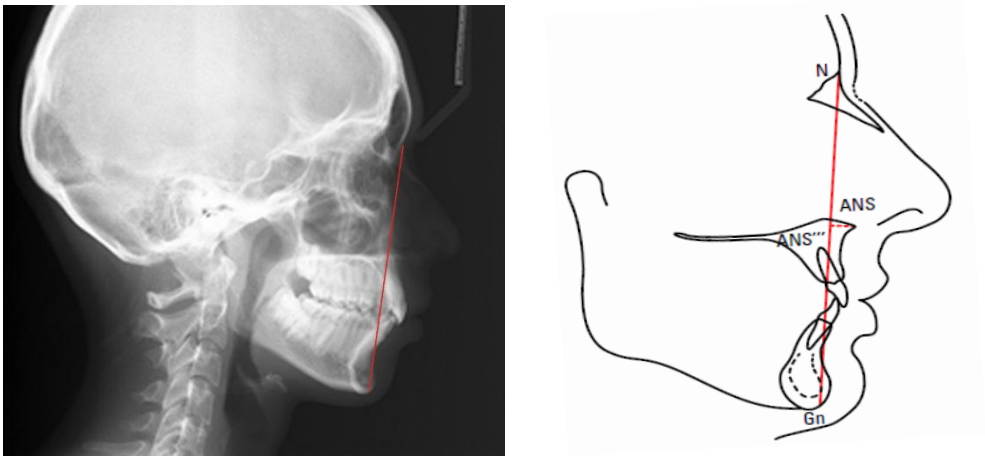


Figure 1: Thompson and Brodie's analysis

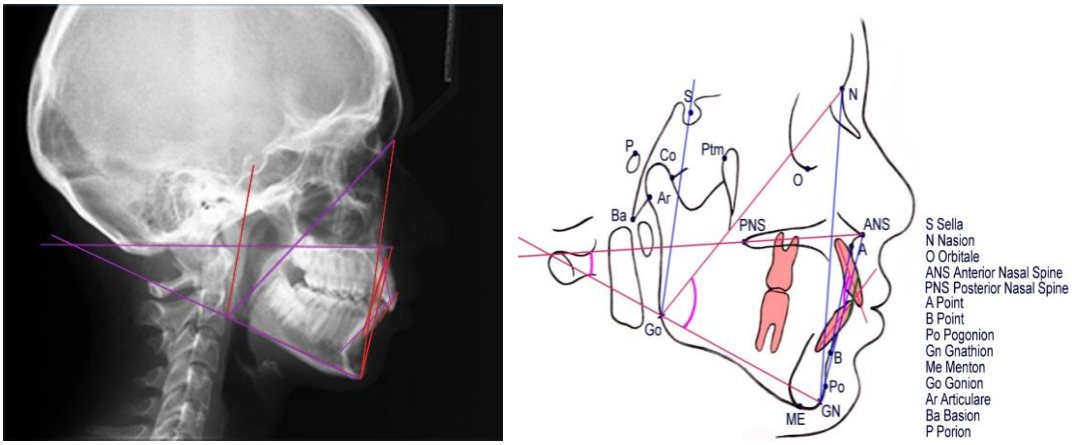


Figure 2: Cephalometric points and angles

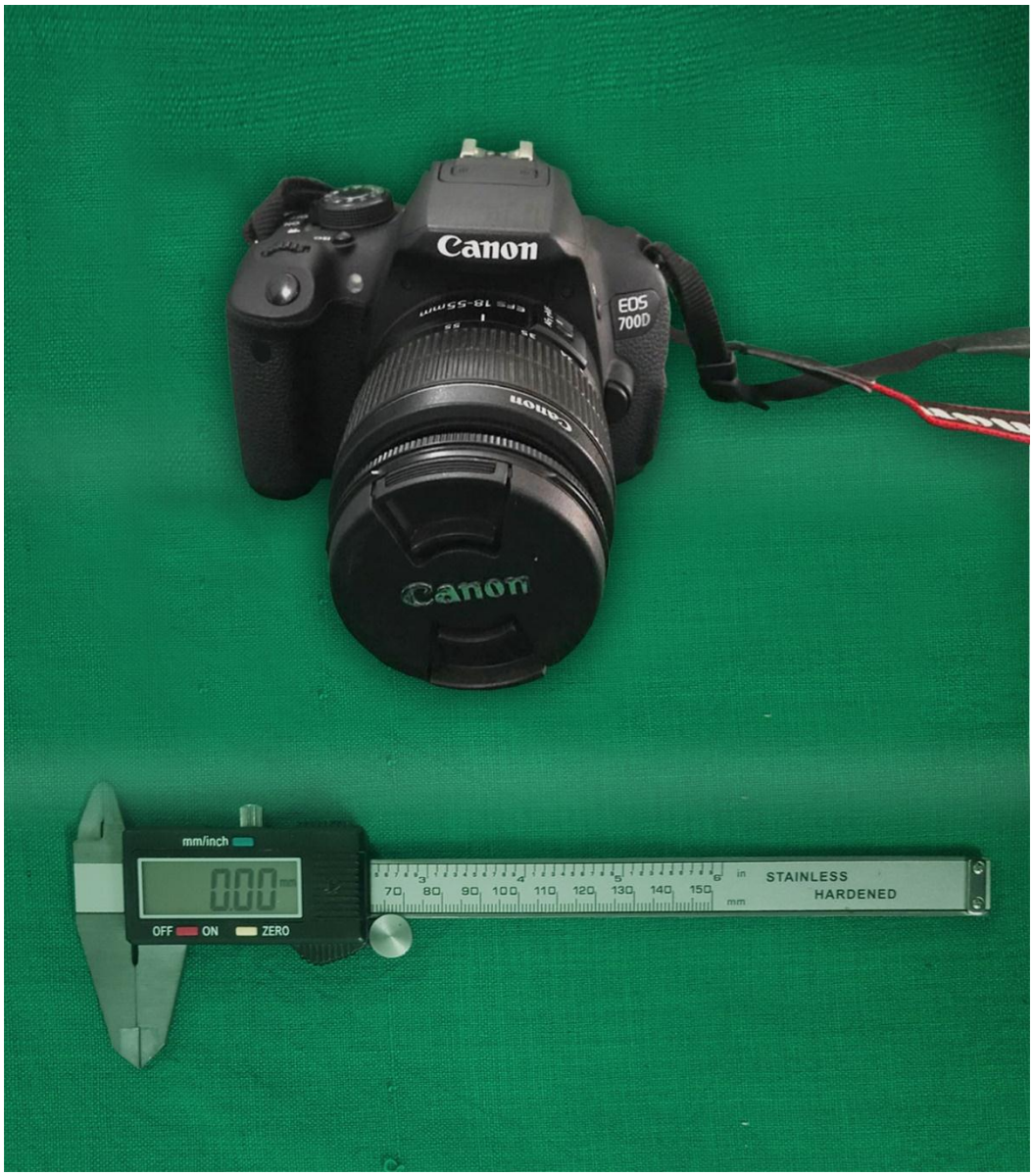


Figure 3: Digital vernier calliper and a Digital SLR Camera used to measure Shimbashi number and to take photograph

Figure 4: Panoramic Radiographic Machine (Proline XC) for OPG and Lateral Cephalogram

Figure 5: Clinical picture showing Measurement of Shimbashi number with a Digital Vernier Calliper

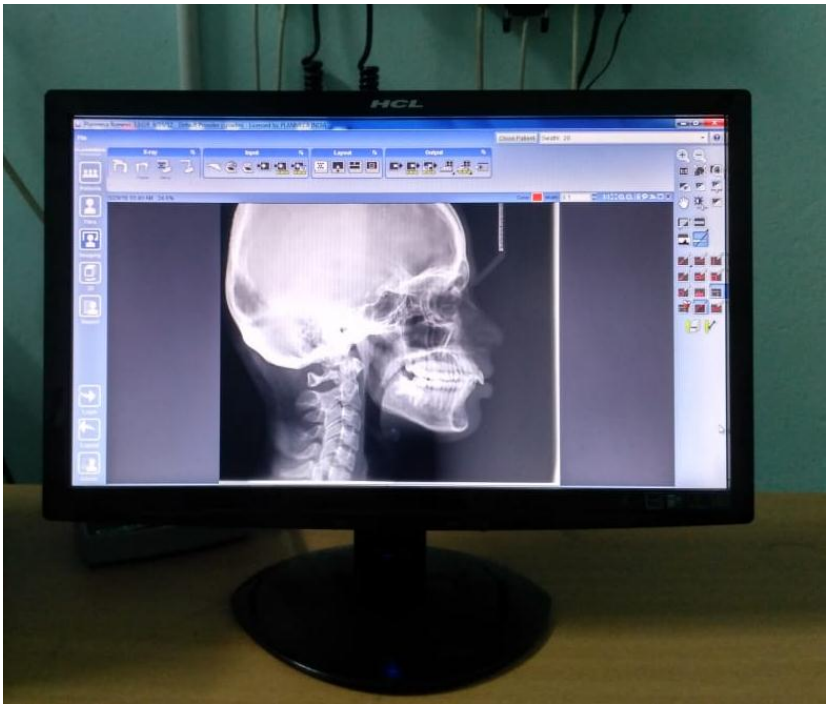


Figure 6: Desktop installed with Planmeca Romexis 2.6.0 R software

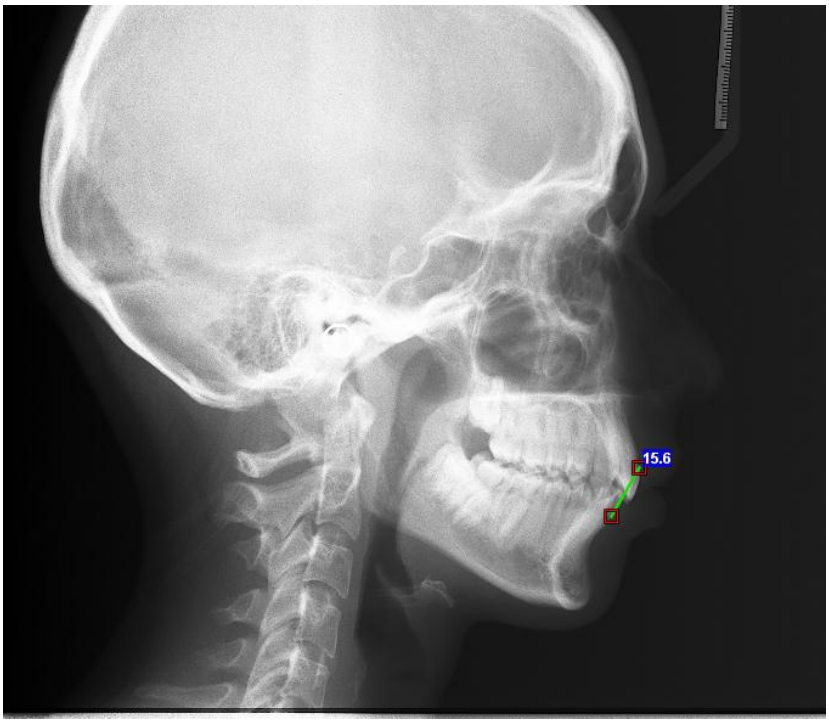


Figure 7: Lateral cephalometric radiograph showing the measurement between upper CEJ to lower CEJ

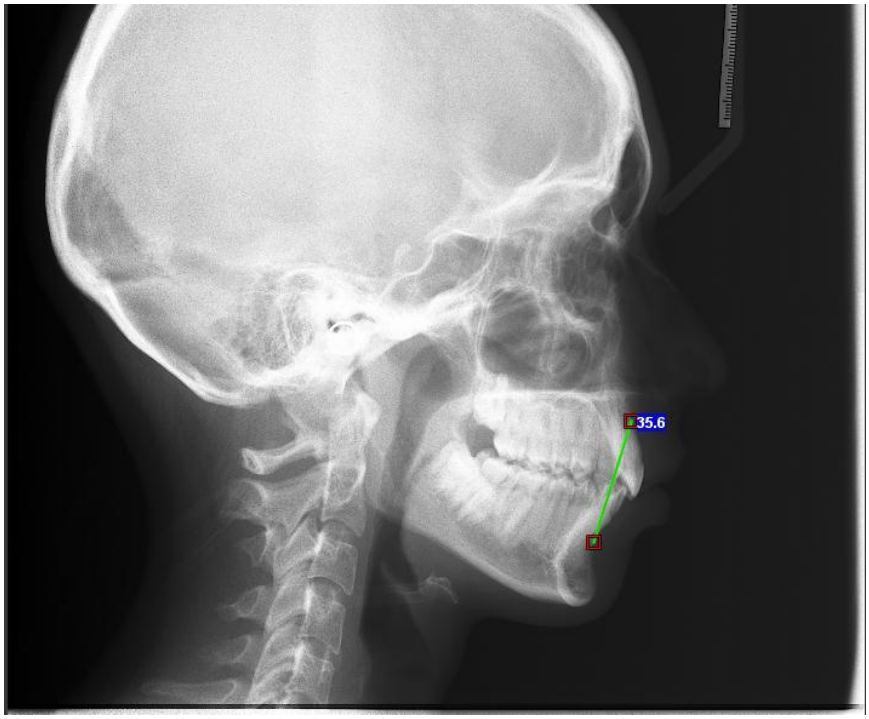


Figure 8: Lateral cephalometric radiograph showing the measurement between Point A to Point B

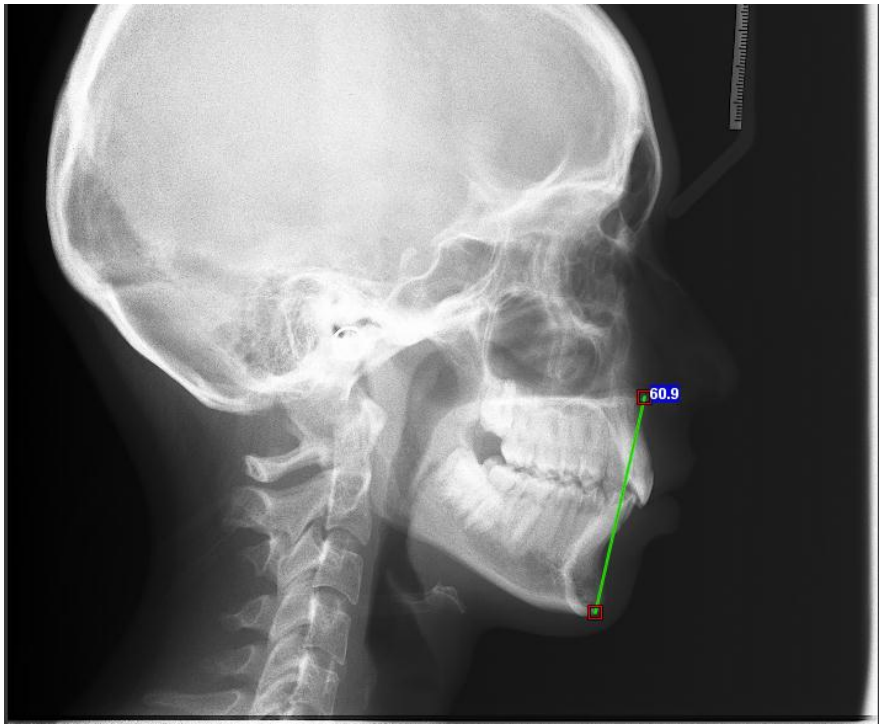


Figure 9: Lateral cephalometric radiograph showing the measurement between ANS to Gn

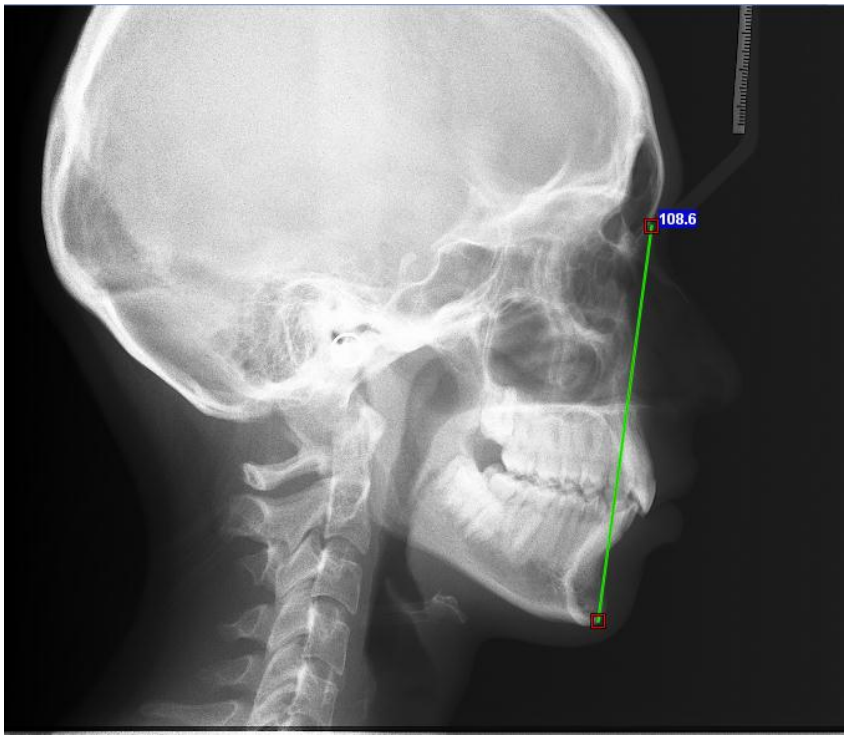


Figure 10: Lateral cephalometric radiograph showing the measurement between N to Gn

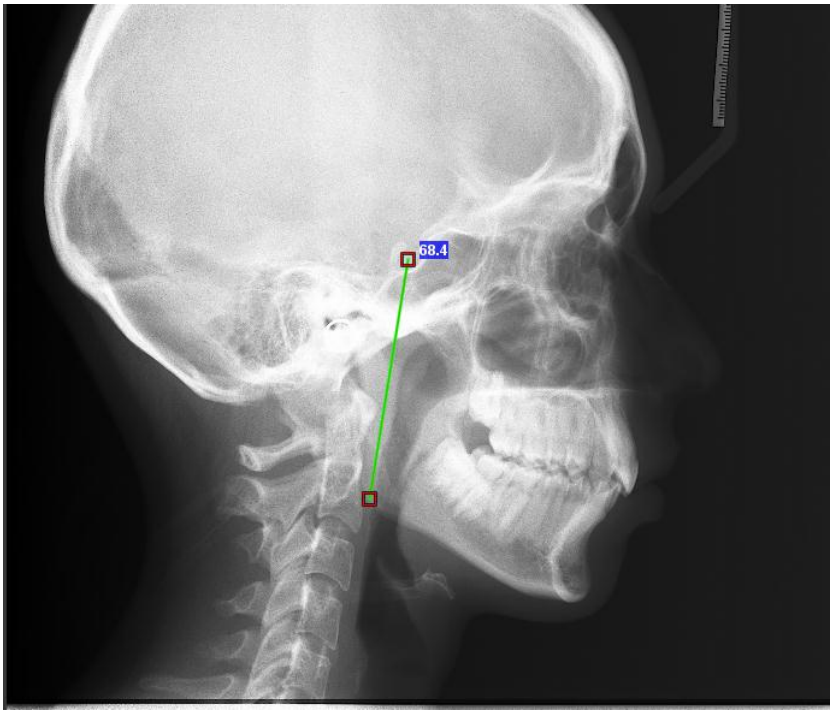


Figure 11: Lateral cephalometric radiograph showing the measurement between S to Go

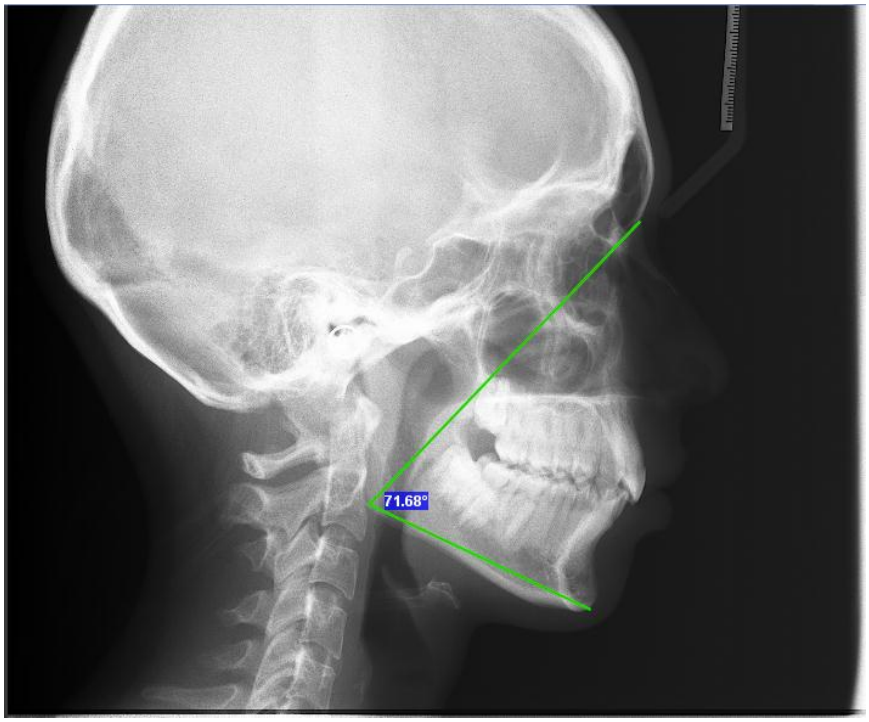


Figure 12: Lateral cephalometric radiograph showing the measurement of < N-Go-Gn

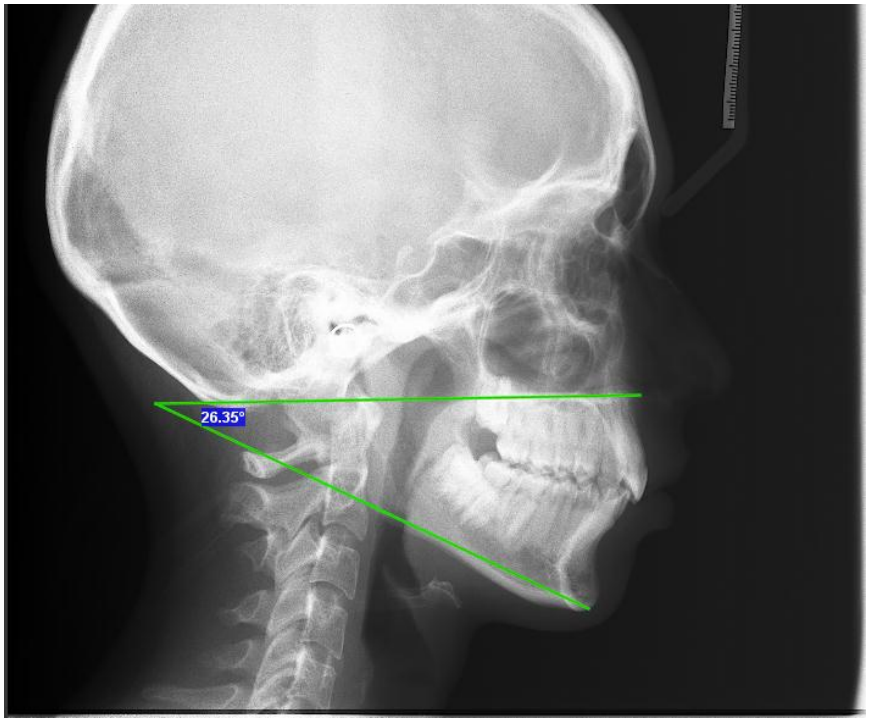


Figure 13: Lateral cephalometric radiograph showing the measurement of < ANS-PNS-(Go-Gn)

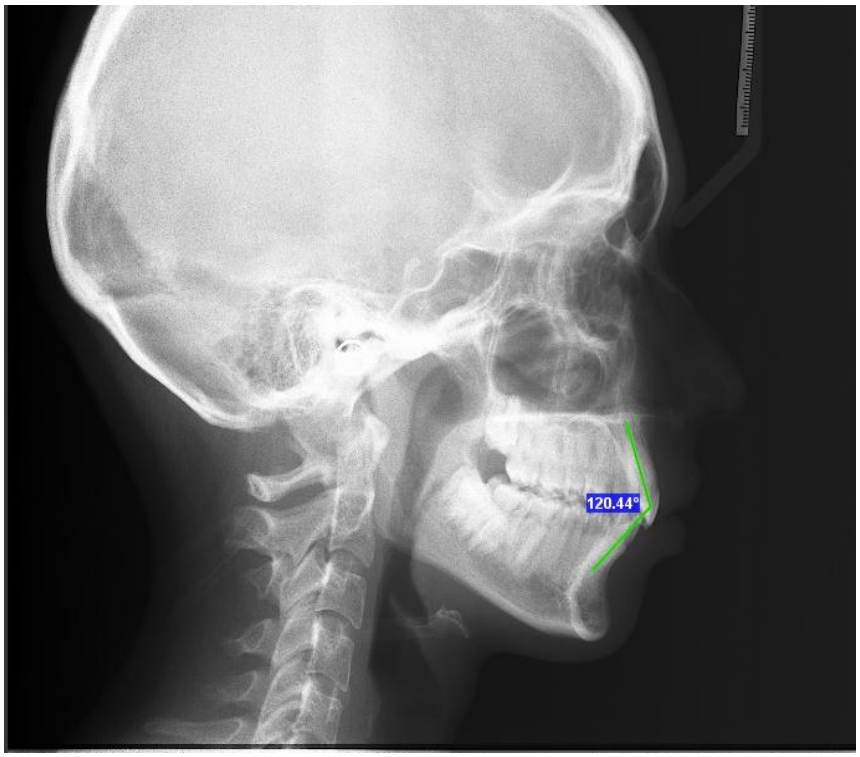


Figure 14: Lateral cephalometric radiograph showing the measurement of Interincisal angle

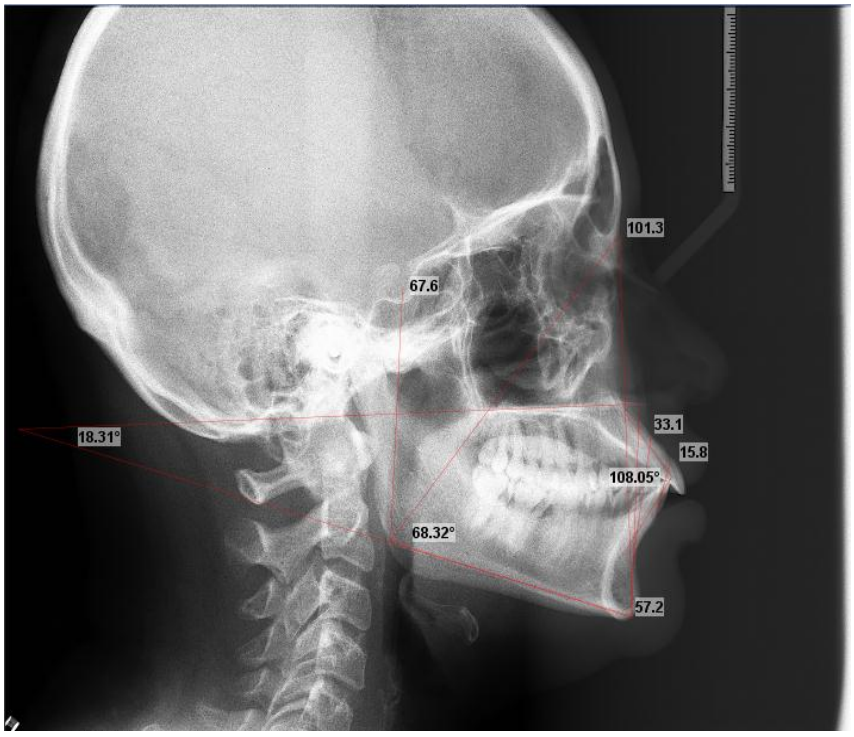


Figure 15: Lateral cephalometric Radiograph showing the measurements

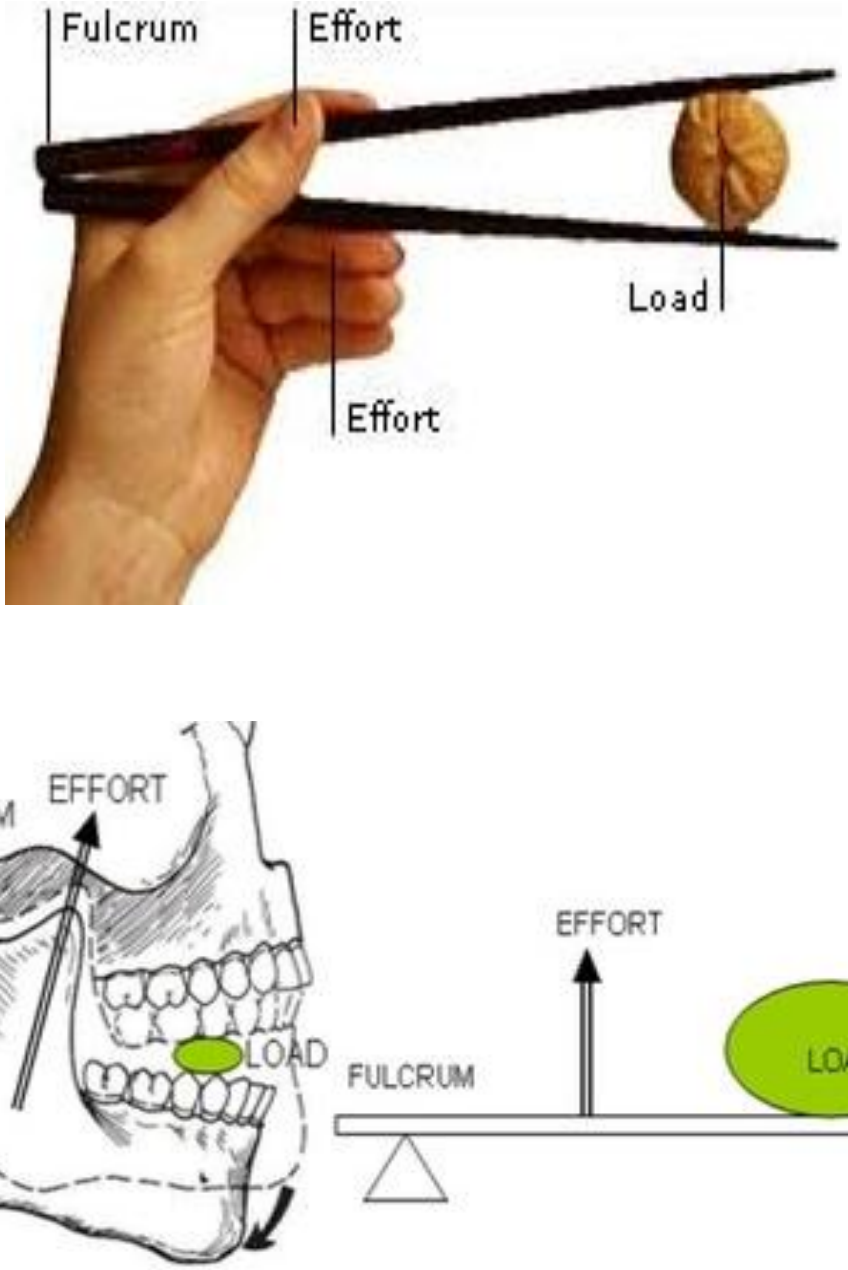


Figure 16: Mandible-as-Class-III-lever

RESULTS AND OBSERVATION

RESULTS AND OBSERVATION

The present study was undertaken to evaluate the vertical facial height reduction and severity of Temporomandibular Joint disorders (TMD) versus controls using Shimbashi number and Cephalometric analysis. The study was carried out on 160 patients with TMD, divided in to four groups as Control (Group 1), Mild (Group 2) moderate (Group 3) and severe (Group 4) based on the severity and it comprises 40 patients in each group. Clinical Shimbashi number obtained and values of cephalometric analysis in patients with TMD were compared with the control.

The data was expressed in number, percentage, mean and standard deviation. Statistical Package for Social Sciences 16.0 (SPSS 16.0) version was used for analysis. ANOVA (Post hoc) followed by Dunnet t test applied to find the statistical significant between the groups. P value less than 0.05 considered statistically significant at 95% confidence interval.

In this study evaluated, mean age of patients between groups, distribution of patients based on gender, mean Shimbashi number, Radiographic CEJ-CEJ, A-B, ANS-GN, N-Gn and S-Go, mean angle N-Go-Gn, ANS-PNS-(Go-Gn) and Inter incisal and correlation of Shimbashi number and radiographic CEJ-CEJ.

On the basis of age, the mean age of occurrence of Temporomandibular joint disorders in various groups, represented in the Table 1 and Graph 1 are Group 1- 17.94$\pm$4.03, Group 2- 20.95± 5.09, Group 3-25.62± 8.31, Group 4- 32.92±1.44. So result shows the severity of TMD increases with age.

Male and female patients in various group on the basis of number and percentage is represented in Table 2 and Graph 2. Based on this, Group 1 with 17 males(42.40%) and 23 females (57.50%) , group 2 with 7 males(17.50%) and 33 females(82.50), group 3 with 8 males(20%) and 32 females(80%) and Group 4 with 2 male(5%) and 38 females(95%). This indicates females are more affected with TMJ disorders compared to males

Comparison of mean clinical Shimbashi number and the radiographic CEJ to CEJ between controls (Group 1) and other groups, mild(Group 2), moderate (Group 3) and severe (Group 4) is represented in Table 3 and Graph 3 and the correlation of clinical Shimbashi number and radiographic CEJ to CEJ is represented in Graph 4. In Group 1 Shimbashi number 18.43±0.54, Radiographic CEJ-CEJ 20.24±0.60, in Group 2 Shimbashi number 15.13±0.67, Radiographic CEJ-CEJ 16.59±0.77; in Group 3 Shimbashi number 14.86±0.69, Radiographic CEJ to CEJ 16.30± 0.76 and in Group 4 Shimbashi number was 13.60±1.10, Radiographic CEJ to CEJ 14.96±1.24. Shimbashi number and Radiographic CEJ to CEJ represent the measurements of clinical and radiographic CEJ-CEJ in millimeters and decrease in values indicates reduction in vertical dimension of occlusion. Result reveals the severity of TMD increases with reduction in vertical dimension of occlusion. Graph 4 shows definite correlation between the values of Shimbashi number and Radiographic CEJ-CEJ.

A-B indicates maximum concavity of anterior maxilla to the maximum concavity of anterior mandible (Table 4), ANS-Gn and N-Gn indicates anterior facial heights and S-Go indicates posterior facial heights. The mean of ANS-Gn, N-

Gn and S-Go and its comparison are represented in the Table 4 and Graph 5 and the correlation of ANS-Gn, N-Gn and S-Go is represented in the graph 6. The means of the values in different groups are, Group 1; A-B- 36.60±2.64, ANS-Gn-62.01±3.86, N-Gn- 108.27±5.25, S-Go- 70.76±5.22: Group 2; A-B- 33.37±2.50, ANS-Gn-58.91±3.66, N-Gn- 103.68± 4.35, 69.53±b5.63: Group 3; A-B- 34.30±2.96, ANS-Gn-60.94±4.84, N-Gn-106.24±6.15, S-Go-72. 63±6.04 and in Group 4; A-B-33.00±2.68, ANS-Gn-58.11±4.22, N-Gn- 102.99±6.15, S-Go-68.94±5.09. The result shows both anterior and posterior facial height reduction in subjects with TMD compared to control but less posterior reduction.

The mean of angles N-Go-Gn, ANS-PNS- Mandibular plane angle(Go-Gn) and inter incisal angles and its comparison are are sited in the Table 5 and Graph 7. The values are, Group1; N-Go-Gn-72.78±3.21, ANS-PNS(Go-Gn)-25.48±3.70, interincisal angle- 103.84±1.65: Group 2; N-Go-Gn-69.44±3.43, ANS-PNS(Go-Gn)-21.98±2.97, interincisal angle-110±8.19: Group; N-Go-Gn- 69.81±4.25, ANS-PNS(Go-Gn)- 22.97±4.12, interincisal angle- 114.73±9.05 and in Group 4; N-Go-Gn- 69.18±4.00, ANS-PNS(Go-Gn)-23.28±4.59, interincisal angle-119.91±1.28. The result reveals mild reduction in N-Go-Gn angles in subjects with TMJ disorders compared to controls, ANS-PNS- (Go-Gn) shows not much changes and Interincisal angles are increased significantly in subjects with TMD compared to controls. The severity of TMD increases with increase in interincisal angle.

Statistical Analysis

On statistical analysis the prevalence of TMD increses with age (Table1 and Graph 1) and females are more prone to TMD (Table 2 and Graph 2). The values

like Shimbashi number, Radiographic CEJ-CEJ, A-B, ANS-Gn, N-Gn, S-Go and angles like N-Go-Gn, ANS-PNS-(Go -Gn) are reduced in subjects with TMD compared to controls and interincisal angle is increased in TMD compared to controls. All parameters are significant and P value less than 0. 05. Result reveals the severity of TMDs increases with reduction in values like Shimbashi number and Radiographic CEJ-CEJ and increase in interincisal angles. So there is a positive correlation between vertical facial height reduction and severity of TMJ Disorders.

Table-1: Mean age of patients between the groups

Groups	Age (years) (MEAN±SD)
Group-I (control)	17.97±4.03
Group-II (mild)	20.95±5.09
Group-III (moderate)	25.62±8.31
Group-IV (severe)	32.92±1.44

Table-2: Distribution of patients based on the gender

Groups	Male		Female	
	Number	**Percentage (%)**	**Number**	**Percentage (%)**
Group-I	17	42.50	23	57.50
Group-II	7	17.50	33	82.50
Group-III	8	20.00	32	80.00
Group-IV	2	5.00	38	95.00

Table-3: Comparison of mean shimbashi number, CEJ-CEJ with control group

Groups	Shimbashi number (MEAN±SD)	p value	CEJ-CEJ (MEAN±SD)	p value
Group-I	18.43±0.54		20.24±0.60	
Group-II	15.13±0.67*	**0.04**	16.59±0.77*	**0.03**
Group-III	14.86±0.69*	**0.04**	16.30±0.76*	**0.03**
Group-IV	13.60±1.10*	**0.03**	14.96±1.24*	**0.03**

(*p<0.05 significant compared Group-I with other groups)

Table-4: Comparison of mean A-B, ANS-Gn, N-Gn, S-Go with control group

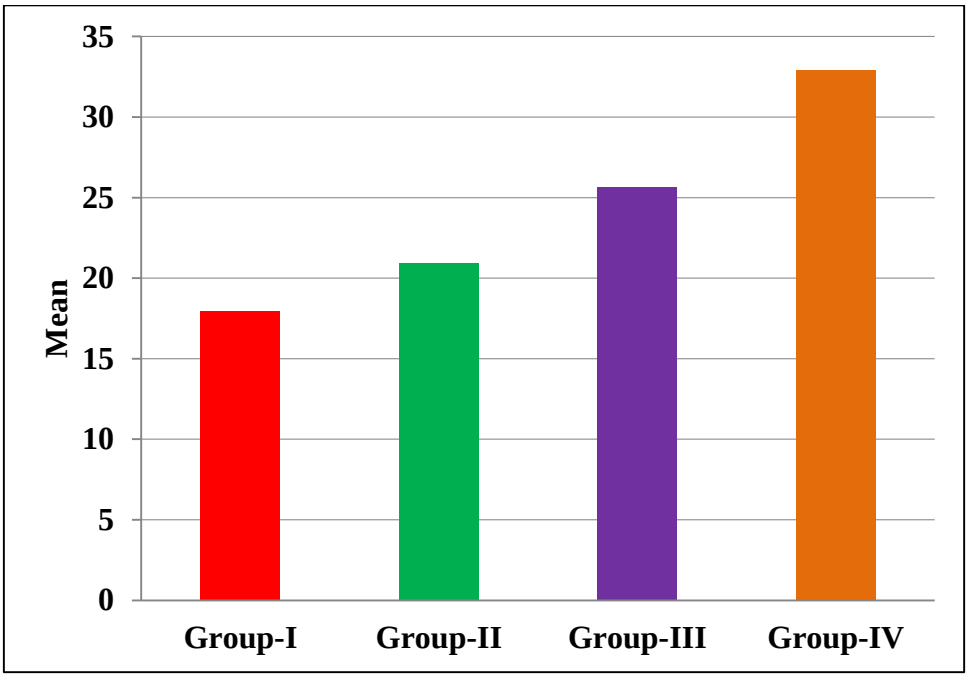
Groups	A-B (MEAN±SD)	p value	ANS-Gn (MEAN±SD)	p value	N-Gn (MEAN±SD)	p value	S-G0 (MEAN±SD)	p value
Group-I	36.60±2.64		62.01±3.86		108.27±5.25		70.76±5.22	
Group-II	33.37±2.50*	**0.03**	58.91±3.66*	**0.03**	103.68±4.35	**0.02**	69.53±5.63	**0.04**
Group-III	34.30±2.96*	**0.04**	60.94±4.84*	**0.04**	106.24±6.15	**0.02**	72.63±6.04	**0.03**
Group-IV	33.00±2.68*	**0.03**	58.11±4.22*	**0.03**	102.99±6.15	**0.02**	68.94±5.09	**0.03**

(*p<0.05 significant compared Group-I with other groups)

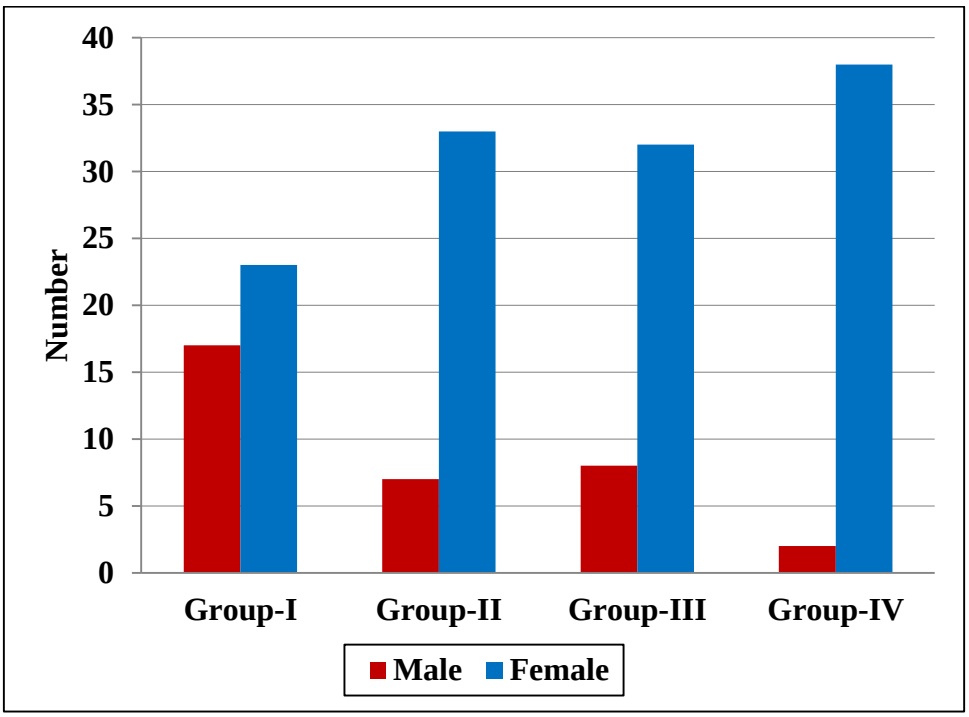
Table-5: Comparison of Angle N-Go-Gn, ANS-PNS-mandibular plane (G0-Gn), interincisal angle with control group

Groups	N-Go-Gn (MEAN±SD)	p value	ANS-PNS mandibular plane (Go-Gn) (MEAN±SD)	p value	Interincisal angle (MEAN±SD)	p value
Group-I	72.78±3.21		25.48±3.70		103.84±1.65	
Group-II	69.44±3.43*	**0.03**	21.98±2.97*	**0.03**	110.07±8.19*	**0.02**
Group-III	69.81±4.25*	**0.03**	22.97±4.12*	**0.04**	114.73±9.05*	**0.01**
Group-IV	69.18±4.00*	**0.03**	23.28±4.59*	**0.04**	119.91±1.28*	**0.001**

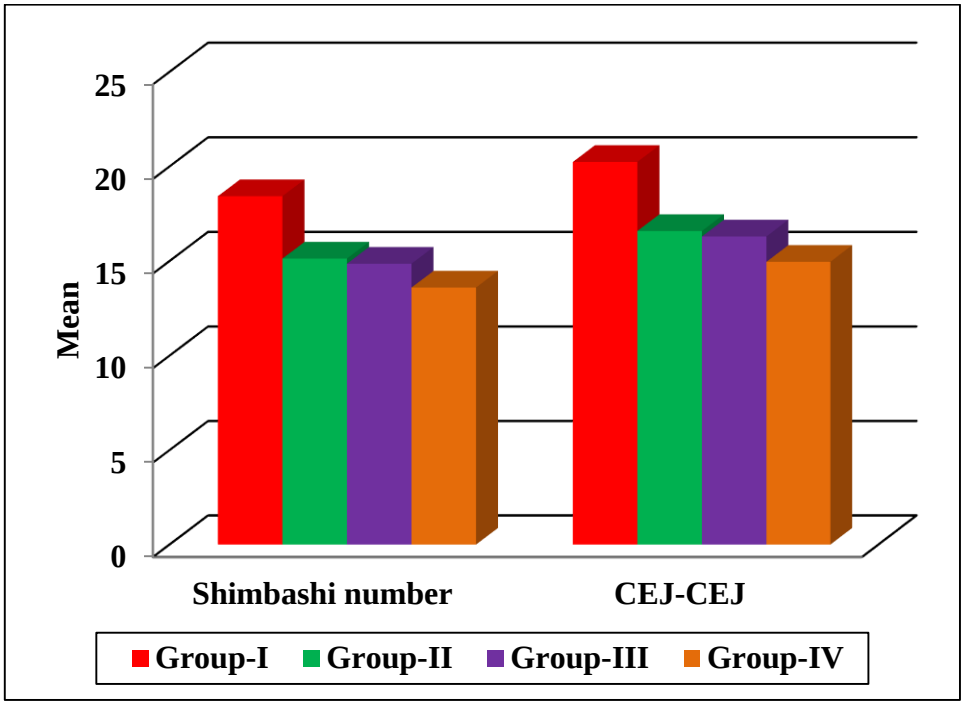
(*p<0.05 significant compared Group-I with other groups)



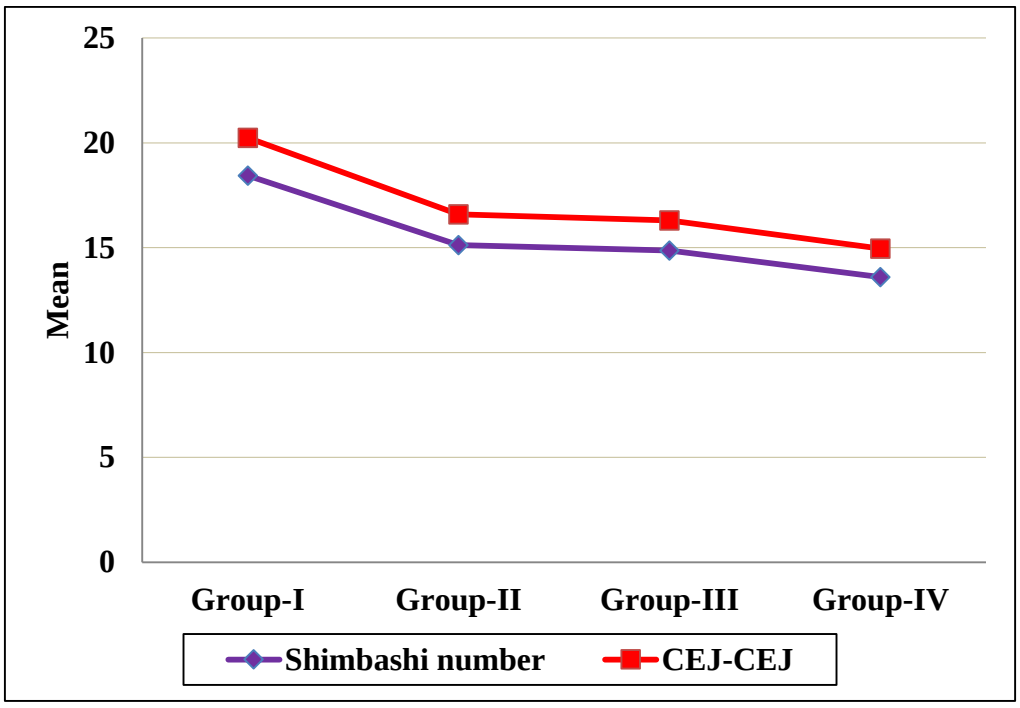
Graph-1: Mean age of patients between the groups



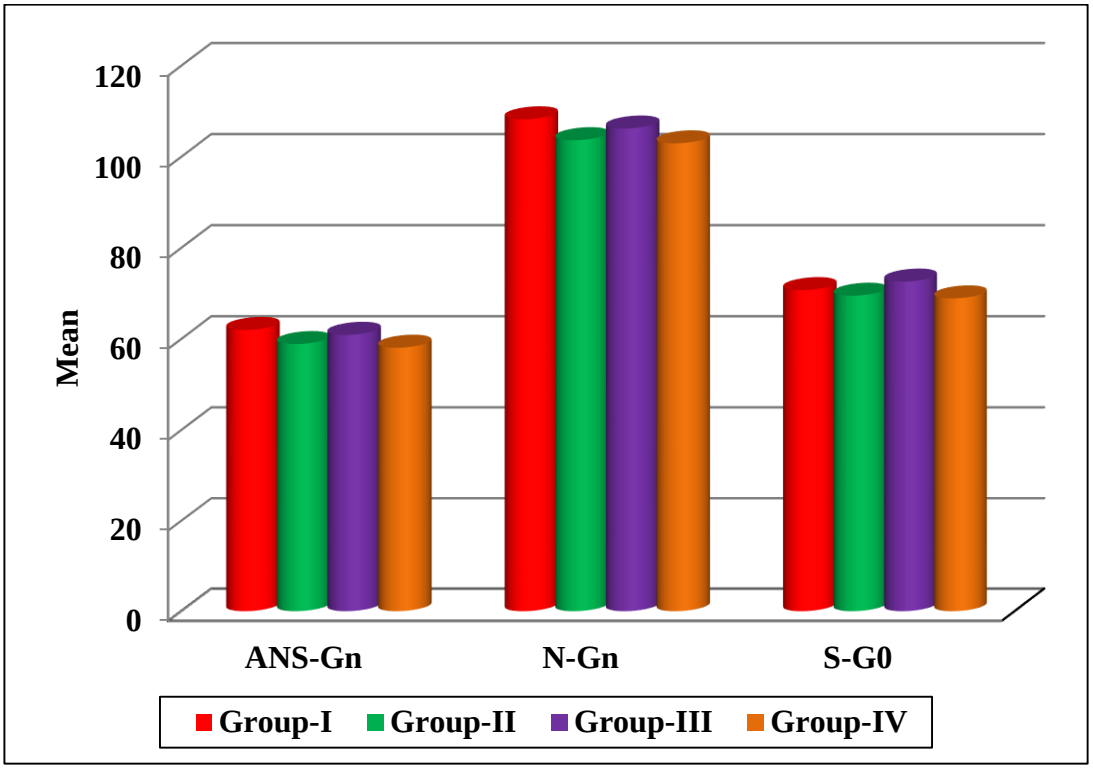
Graph-2: Distribution of patients based on the gender



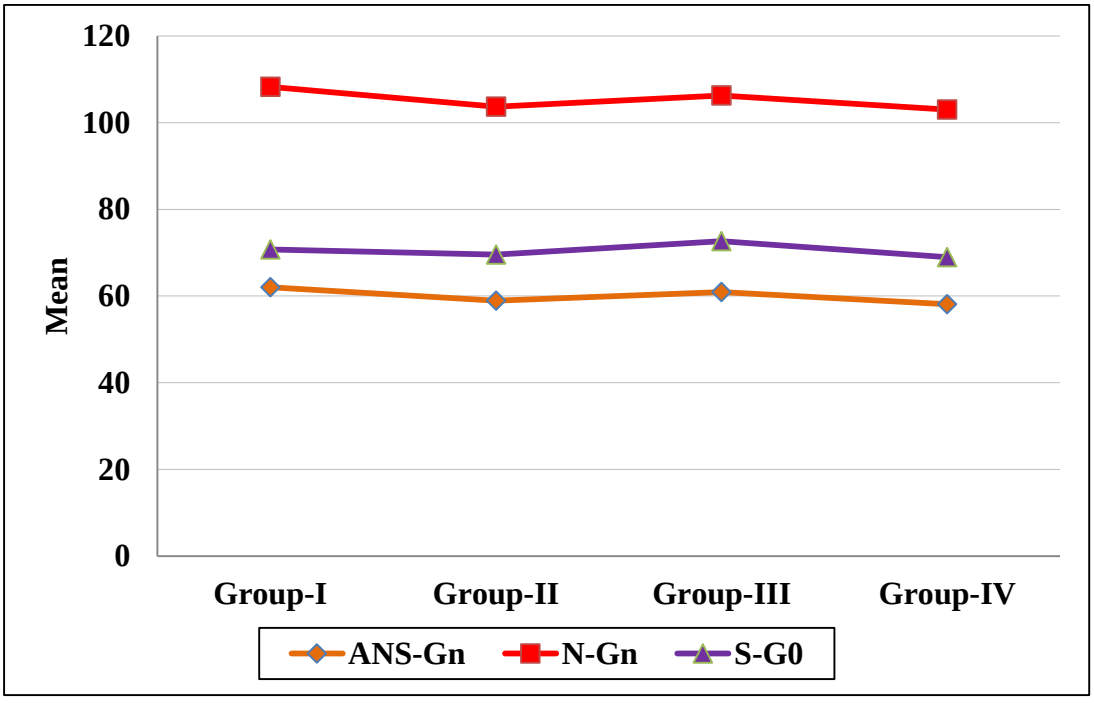
Graph-3: Comparison of mean shimbashi number, CEJ-CEJ, A-B with control group



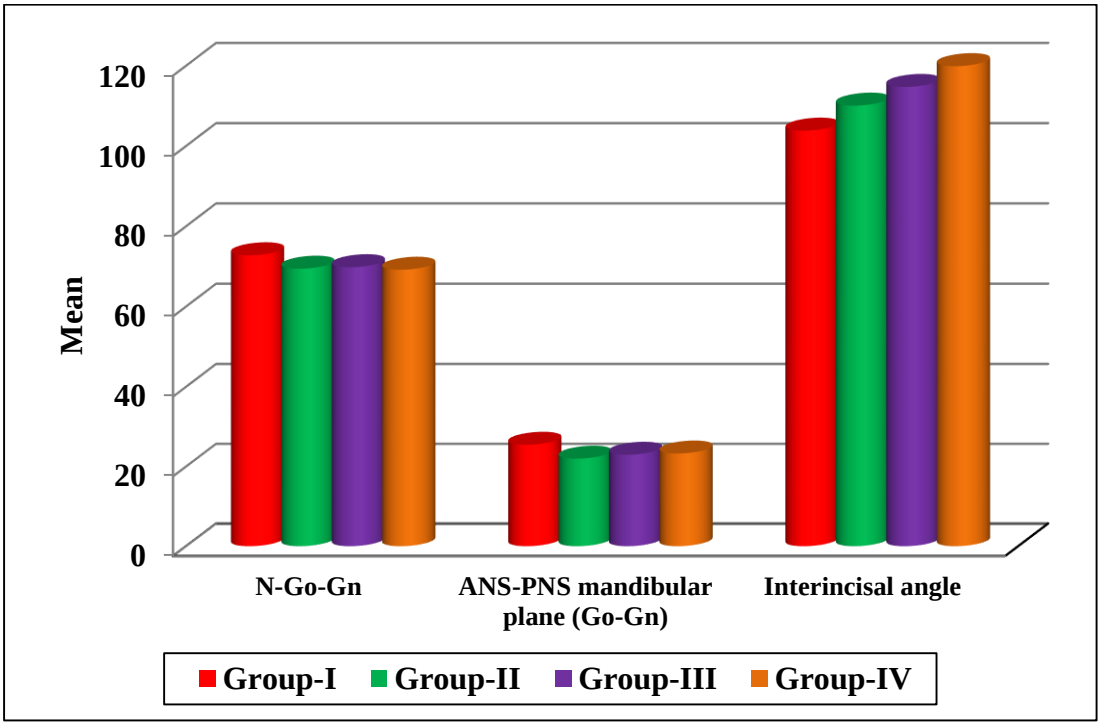
Graph-4: Correlation of shimbashi number and CEJ-CEJ of groups



Graph-5: Comparison of mean ANS-Gn, N-Gn, S-Go with control group



Graph-6: Correlation of ANS-Gn, N-Gn, S-Go of the groups



Graph-7: Comparison of Angle N-Go-Gn, ANS-PNS-mandibular plane (G0-Gn), interincisal angle with control group

DISCUSSION

DISCUSSION

The facial bones and teeth together with muscles, nerves and connective tissue form the stomatognathic system. Presence of a complex temporomandibular joint (TMJ) making the system more complicated[56,57,58]. Temporomandibular joint (TMJ) is a movable compartment with more complex bony architecture and variable functions like, swallowing, mastication, opening, closing, assisting speech etc. It is a, ginglymo diarthrodial and synovial joint of condylar variety. The term diarthrodial indicates that the joint has two articular bone components - mandibular condyle inferiorly and articular eminence & glenoid fossa of the temporal bone superiorly. Ginglymoid meaning that the joint has a hinge like moving component. The joint surface is lined by the synovial membrane and is freely movable. TMJ functions bilaterally and can be influenced by dental occlusion, positioning of lower jaw to the cranium, chewing pattern, hereditary and environmental factors[59].

Temporomandibular joint disorder (TMD) is a term collectively used to describe all signs and symptoms involving the TMJ, masticatory muscles and associated structures. There are four muscles of mastication. They are masseter, temporalis, medial pterygoid and lateral pterygoid. The signs and symptoms include clicking, pain on jaw movements, tenderness of joints, painful chewing, restricted mouth opening, and headache and shoulder pain. Bite collapse, altered chewing pattern, parafunctional habits, degenerative joint disorders like osteoarthritis, hereditary and environmental influence are the major etiologic factors of TMD. Among these, bite collapse plays a prime role in joint pathosis.

Bite collapse is a progressively regressive alteration in which mandible is raised beyond the point of normal occlusal contact because of tooth structure loss

due to grinding, loss of teeth or abnormal positioning of lower jaw to the cranium. It causes symptoms like frequent headache, ear stiffness, tinnitus, vertigo, difficulty in chewing and swallowing, persistent pain on masticatory muscle and shoulder pain[60]. These factors clearly explain the importance of maintaining ideal vertical dimension of occlusion for proper jaw and muscle function and mandate proper diagnosis. This study combined both dental and skeletal parameters by means of Shimbashi number and cephalometric evaluation of dental and skeletal proportions to find out the loss of vertical dimension of occlusion in TMD.

In 1970's Dr. Henry Hank Shimbashi established a number that measures from the gum line of upper front tooth to the complement of the lower one. The ideal distance is 19mm ±1. This value is significantly reduced in bite collapse and reduced vertical dimension of occlusion. It's a simple reliable tool to diagnose reduction in vertical dimension of occlusion for therapeutic and patient education purposes. Cephalometric analysis is the utilization of the cephalometric application in diagnosis and treatment planning. Extent of reduction in occlusal vertical dimension was determined by the clinical Shimbashi number and radiogrphically with cephalometric analysis[61].

Patients with a clinical history of TMD (mild, moderate or severe) and controls were taken and evaluated for their Shimbashi number with a digital vernier caliper with the teeth in maximum intercuspation and similarly subjected to Cephalometric analysis. The images were acquired using Planmeca Proline XC Digital Orthopantomograph machine in which the the patient positioned with F-H plane parallel and midsagittal plane perpendicular to the floor. In cephalometry measurements made were CEJ to CEJ, N- Gn (total facial height), ANS- Gn (lower

facial height), Point A- Point B, S-Go (posterior facial height), N-Go-Gn (facial angle), ANS-PNS-(Go-Gn) and inter incisal angle.

The main objectives in this research evaluated were, (1) The Age and Sex distribution of temporomandibular joint disorders, (2) Reduction in mean values of Shimbashi number and Cephalometric CEJ- CEJ in bite collapse, (3) Reduction in anterior facial height (A-B, N-Gn, ANS-Gn), posterior facial height (S-Go) and facial angles (N-Go-Gn, ANS-PNS- Mandibular plane) and (4) Increased interincisal angle in bite collapse.

One of the study by Brazilian adolescents, the prevalence of TMDs increases with age. They found that signs and symptoms of TMD increases once age advances[62,63]. Our study also reveals that prevalence and severity of temporomandibular joint disorders increases with age. This research studied the gender effect on the prevalence of signs and symptoms of TMD. Epidemiological studies documented and explained a greater frequency and severity of TMD in females than in males[64,65]. Our study concluded with the observation that females were found to be at a higher risk of TMD than males. Manfredini et al made similar observations in his study of 433 patients and showed a clear evidence female predilection [62,66,67,68]. In our study prevalence, signs and symptoms of TMD increase with age with more female predilection and male female ratio 1:20.

Shimbashi number and radiographic CEJ to CEJ in TMD shows significant reduction in our study when compared to controls and severity increases with the progression of loss of vertical dimension in occlusion. Shimbashi number and Radiographic CEJ to CEJ represent the measurements of clinical and radiographic CEJ-CEJ in millimeters. Decrease in these values indicated reduction

in vertical dimension of occlusion. Graph 4 shows a definite correlation exists between the values of Shimbashi number and Radiographic CEJ-CEJ.

The reduction in mean values of A-B, ANS-Gn, N-Gn and S-Go shows reduced anterior and posterior facial height as the disease progresses except in moderate TMD. A mild increase in the mean values of the above parameters in moderate TMD was noticed. This we have attributed to the marginal excess in number of male candidates in moderate TMD

The result also reveals that the extent of posterior facial height reduction is less in comparison to anterior facial height reduction[64]. The prominent anterior facial height reduction may be explained by the class III lever working principle of the mandible. The mandible functions against a static skull (Figure 14). The movable lower jaw, joint assembly, muscles of mastication and teeth represents the various parts of the lever, in the order as the rod, fulcrum, force and load. As the mandible rotates around a fixed point, the plane away from this point shows maximum axis of opening and closing. That facilitates the incisal region to show maximum height reduction compared to the posterior molar region. So it is clear that there is gradual increase in the vertical height reduction when moving from the posterior most point towards the anterior[6, 7, 8].

The ratio of Shimbashi number and A-B is 1:2 with a minimum variation in the range of 1:2-1:2.2. This shows A-B has double the value of the clinical Shimbashi number. This is an important outcome of this study and the radiographic A-B can be utilized to calculate the amount of reduction in vertical dimension in situations where edentulous and partially edentulous with missing anterior teeth, need an established vertical height measurement.

Our research revealed, little or marginal change in the ANS-PNS-(Go-Gn) in comparison to the more anteriorly located N-Go-Gn angle which showed a more quantifiable decrease in angle there by indicating a marginal posterior vertical loss too. The lever III principle with the joint as fulcrum, the masseter and temporalis as effort and occlusion as load was explanatory in this anticipated change. However vertical loss was maximum in the incisal region[62, 63, 69.]

In our study the interincisal angles were increased significantly in subjects with TMD compared to controls, as anticipated and reciprocally the severity of TMD increases with increase in interincisal angles. When the mandible raised beyond the point of normal occlusal contact, the inter incisal angle becomes wider[70, 71]. All parameters in our study except except interincisal angle were reduced with the reduction in vertical dimension of occlusion. The inter incisal angle was the only parameter that increased in our study with the progression of TMD and work towards a more measured occlusal height.

In this research all parameters were significant and the P values were all less than 0.05. This result positively endorses the fact that the severity of TMD increases with reduction in values like Shimbashi number and Radiographic CEJ-CEJ and with increased interincisal angles. Hence in this study, a positive correlation is observed between vertical facial height reduction and severity of TMJ Disorders.

Collapsed bite or reduced vertical dimension of occlusion is the prime causative factor of Temporomandibular joint disorders among patients seeking treatment. By evaluating patient's signs and symptoms associated with over closure, we can determine the importance of reestablishing the physiologic vertical dimension.

CONCLUSION

CONCLUSION

Temporomandibular joint is a movable compartment with a complex bony architecture that permits opening, closing, side to side movement and rotation. Any revilement in the form of bite collapse, degenerative joint disorders, and altered chewing pattern and Para functional habits affects TMJ and its function.

This study unveiled, bite collapse or reduced vertical dimension of occlusion is a major causative factor of Temporomandibular joint disorders. The result also revealed the prevalence of TMJ disorders increases with age with a definite female predilection. The merit of our study is that it can be carried out in a minimal clinical set up and measuring Shimbashi number is the easiest dental contrivance to assess vertical dimension of occlusion in patients with Temporomandibular joint disorders. Further, it opens and offers choices to patients with missing anterior teeth.

Appraising reduction in vertical dimension of occlusion by means of Shimbashi number and Cephalometric analysis is the forerunner to more accurate, 3 dimensional and qualitative assessment of TMJ pathosis, this original research could achieve its objectives.

BIBLIOGRAPHY

BIBLIOGRAPHY

1. Turner KA, Missirlian DM. Restoration of the extremely worn dentition. J Prosthet Dent 1984; 52:467-74.
2. Stern N, Brayer L. Collapse of the occlusion-aetiology, symptomatology and treatment. J Oral Rehabil 1975;2(1):1-19.
3. Granados JI: The influence of the loss of teeth and attrition on the articular eminence. J Prosth Dent 1979; 42:78-85.
4. Egermark-Eriksson I, Carlsson GE, Ingervall B. Prevalence of mandibular dysfunction and orofacial parafunction in 7-, 11-and 15-year-old Swedish children. Eu J Orthod 1981;3(3):163-72.
5. Farrar WB. Diagnosis and treatment of painful temporo-mandibular joints. J Prosthet Dent 1968;20:345-51.
6. Mohlin B, Thilander B. The importance of the relationship between malocclusion and mandibular dysfunction and some clinical application in adults. Eur J Orthod 1984; 6:192-204.
7. Schellhas KP. Unstable occlusion and temporomandibular joint disease. J Clin Orthod 1989; 23:332-7.
8. Costen JB. Neuralgias and ear symptoms. J Am Med Assn 1936;107:252-5
9. Tallgren A. Changes in adult face height due to ageing, wear and loss of teeth and prosthetic treatment. Acta Odontol Scand 1957;15(24):73.
10. Nakai N, Abekura H, Hamada T, Morimoto T. Comparison of the most comfortable mandibular position with the intercuspal position using cephalometric analysis. J Oral Rehabil 1998; 25:370-75.

11. Bjork A. Cephalometric X-ray investigations in dentistry. Int Dent J. 1954;4(5):718-44.

12. Nebbe B, Prasad NGN, Hatcher D, Major PW. Quantitative assessment of the temporomandibular joint disk status. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1998;85:598-607.

13. Droel R, Isaacson RJ. Some relationships between the glenoid fossa position and various skeletal discrepancies. Am J Orthod 1972;61:64-78.

14. Costen JB. A syndrome of ear and sinus symptoms dependent upon disturbed function of the TMJ. Ann Otol Rhin Laryngol 1934; 43:1-15.

15. Okeson JP. Bell's orofacial pains, 5th edition. Chicago: Quintessence Publishing Co, Inc; 1995. p. 295-343.

16. Costen JB. Glossodynia: Reflex irritation from the mandibular joint as the principal etiologic factor. Arch Otolaryg 1935; 22:554-564.

17. Hall HD: Intra- articular disc displacement Part II: Its significant role in temporomandibular joint pathology. J Oral Maxillofac Surg 1995;53:1073

18. de Bont LGM, Stegenga B. Pathology of temporomandibular joint internal derangement and osteoarthrosis. Int J Oral Maxillofac Surg 1993;22:71

19. McNamara JA, Seligman DA, Okeson JP. Occlusion orthodontic treatment, and temporomandibular disorders: a review. J Orofac Pain 1995; 9:73-90.

20. Thompson JR, Brodie AG. Factors in the position of the mandible. J Am Dent Assoc 1942; 29(7):925-41.

21. Thompson JR. Concepts regarding the function of the stomatognathic system. J Am Dent Assn 1954; 48:626-37.

22. Bosio JA, Burch JG, Tallents RH, Wade DB, Beck FM. Lateral cephalometric analysis of asymptomatic volunteers and symptomatic patients with and without temporomandibular joint displacement. Am J Orthod Dentofacial Orthod 1998; 114:248-55.

23. Wylie WL, Johnson EL. Rapid evaluation of facial dysplasia in the vertical plane. Angle Orthod 1952;22(3):165-82.

24. Carlsson GE, Ingervall B, Kocak G. Effect of increasing vertical dimension on the masticatory system in subjects with natural teeth. J Prosthet Dent 1979; 41:284-9.

25. Brand JW, Nielson KJ, Tallents RH et al. Lateral cephalometric analysis of skeletal patterns in patients with and without internal derangement of the temporomandibular joint. Am J Orthod Dentofacial Orthop 1995;107:121

26. Dibbets JM, Van DerWeele LT. Signs and symptoms of temporomandibular disorder (TMD) and craniofacial form. Am J Orthod Dentofacial Orthop 1996;110:73

27. Nebbe B, Major PW, Prasad NG. Female adolescent facial pattern associated with TMJ disk displacement and reduction in disk length: Part I. Am J Orthod Dentofacial Orthop 1999;116:168

28. Yamada K, Hiruma Y, Hanada K, et al: Condylar bony change and craniofacial morphology in orthodontic patients with temporomandibular disorders (TMD) symptoms: A pilot study using helical computed tomography and magnetic resonance imaging. Clin Orthod Res 1999;2:133

29. Gidarakou IK, Tallents RH, Kyrkanides S, et al: Comparison of skeletal and dental morphology in asymptomatic volunteers and symptomatic patients with bilateral disk displacement with reduction. Angle Orthod 2002;72:541.
30. Gidarakou IK, Tallents RH, Kyrkanides S et al. Comparison of skeletal and dental morphology in asymptomatic volunteers and symptomatic patients with bilateral degenerative joint disease. Angle Orthod 2003;73:71.
31. Gidarakou IK, Tallents RH, Kyrkanides S et al. Comparison of skeletal and dental morphology in asymptomatic volunteers and symptomatic patients with bilateral disk displacement without reduction. Angle Orthod 2004;74:684.
32. Estomaguio GA, Yamada K, Ochi K. Craniofacial morphology and inclination of the posterior slope of the articular eminence in female patients with and without condylar bone change. Cranio 2005;23:257
33. Flores-Mir C, Nebbe B, Heo G, et al. Longitudinal study of temporomandibular joint disc status and craniofacial growth. Am J Orthod Dentofacial Orthop 2006;130:324,
34. Ahn SJ, Baek SH, Kim TW, et al: Discrimination of internal derangement of temporomandibular joint by lateral cephalometric analysis. Am J Orthod Dentofacial Orthop 2006;130:331.
35. Hwang CJ, Sung SJ, Kim SJ. Lateral cephalometric characteristics of malocclusion patients with temporomandibular joint disorder symptoms. Am J Orthod Dentofacial Orthop 2006;129:497
36. Singh A, Sharma VP, Tandon P. A Cephalometric Evaluation of Lower Face Height and its Relationship with Dentoalveolar Vertical Dimensions. J Ind Orthod Soc 2006; 39:204-212

37. Ioi H, Matsumoto R, Nishioka M et al. Relationship of TMJ osteoarthritis/ osteoarthrosis to head posture and dentofacial morphology. Orthod Craniofac Res 2008;11:8.
38. Cho BH, Ahn YW, Jung YH. Comparison of mandibular morphology between patients with temporomandibular joint osteoarthritis and asymptomatic normal subjects. Quintessence Int 2009;40:e49.
39. Costa MCC, de Castelluccie BM, Bittencourt MAV. Evaluation of facial proportions in the vertical plane to investigate the relationship between skeletal and soft tissue dimensions. Dental Press J Orthod 2011;16(1):99-106
40. Bertram S, Moriggl A, Rudisch A et al. Structural characteristics of bilateraltemporomandibular joint disc displacement without reduction and osteoarthrosis are important determinants of horizontal mandibular and vertical ramus deficiency: A magnetic resonance imaging study. J Oral Maxillofac Surg 2011;69:1898
41. Sakar O, Calisir F, Oztas E et al. Evaluation of the effects of temporomandibular joint disk displacement and its progression on dentocraniofacial morphology in symptomatic patients using lateral cephalometric analysis. Cranio 2011;29:211
42. Sun ZP, Zou BS, Zhao YP et al. Craniofacial morphology of Chinese patients with bilateral temporomandibular joint osteoarthrosis. Chin J Dent Res 2011;14:21
43. Yang IH, Moon BS, Lee SP et al. Skeletal differences in patients with temporomandibular joint disc displacement according to sagittal jaw relationship. J Oral Maxillofac Surg 2012; 70:e349.

44. Almasan OC, Baciut¸ M, Almasan HA et al. Skeletal pattern in subjects with temporomandibular joint disorders. Arch Med Sci 2013; 9:118.

45. Sierpinska T, Kuc J, Golebiewska M. Morphological and Functional Parameters in Patients with Tooth Wear before and after Treatment. The Open Dentistry Journal 2013; 7:55-61.

46. Mahony D. Re-establishing Physiologic Vertical Dimension for an Overclosed Patient. Orthodontic Journal of Nepal 2014; 4(1):52-6.

47. Akinbami BO, Nsirim PE. Analysis of Occlusal Vertical Dimension and Mandibular Basal Bone Height in a Nigerian Population. Anatomy Research International 2014;1-5.

48. Waleska C, de Castro CAC, Guilherme J, Rodrigues CPC. Occlusal changes secondary to temporomandibular joint conditions: a critical review and implications for clinical practice. J Appl Oral Sci 2016; 24(4):411-9.

49. Bavia PF, Vilanova LSR, Matheus RC et al. Craniofacial Morphology Affects Bite Force in Patients with Painful Temporomandibular Disorders. Braz Dent J 2016; 27(5): 619-24.

50. de Assis EGR, Aguiar FHB, Pereira R et al. Re Establishment of an Occlusal Vertical Dimension: A Case Report. J Dent Health Oral Disord Ther 2018, 9(1): 94-9.

51. AlShaban KK, Waheed EGA. Prevalence of TMJ Disorders among the Patients Attending the Dental Clinic of Ajman University of Science and Technology-Fujairah Campus, UAE. Int J Dent 2018; 1-6.

52. de Kanter RJAM, Battistuzzi GFCM, Gert-Jan T. Temporomandibular Disorders: “Occlusion” Matters!. Pain Research and Management 2018;1-13.

53. Ash MM. Paradigmatic shifts in occlusion and temporomandibular disorders. J Oral Rehabil 2001; 28:1-13.

54. Ash MM. Occlusion: Reflexions on science and clinical reality. J Prosthet Dent 2003; 90:373-84.

55. Bell WE. Orofacial Pains: Classification, Diagnosis, Management. 4th ed. Chicago: Year Book, 1989. P. 239-84.

56. Tanaka E, van Eijden T. Biomechanical behavior of the temporomandibular joint disc. Crit Rev Oral Biol Med 2003; 14:138-50.

57. Helkimo M. Studies on function and dysfunction of the masticatory system II. Index for anamnestic and clinical dysfunction and occlusal state. Sven Tandlak Tidskr 1974; 67:10121.

58. Bonjardim LR, Gavião MB, Pereira LJ, Castelo PM, Garcia RC. Signs and symptoms of temporomandibular disorders in adolescents. Braz Oral Res. 2005;19:93-8.

59. Badel T, Savic-Pavicin I, Zadravec D, Marotti M, Krolo I, Grbesa D. Temporomandibular joint development and functional disorders related to clinical otologic symptomatology. Acta Clin Croat 2011;50:51-60.

60. Bush FB, Dolwick MF. The Temporomandibular Joint and Related Disorders. 1st ed. Philadelphia, 1995. PA: J. B. Lippincott Co.;

61. Johansson A, Johansson AK, Omar R, Carlsson GE. Rehabilitation of the worn dentition. J Oral Rehabil 2008; 35(7):548-66.

62. Manfredini D, Chiappe G, Bosco M. Research diagnostic criteria for temporomandibular disorders (RDC/TMD) axis I diagnoses in an Italian patient population. J Oral Rehabil 2006; 33(8):551-8.

63. Mezitis M, Rallis G, Zachariades N. The normal range of mouth opening. J Oral Maxillofac Surg 1989; 47(10):1028-9.

64. Roda PR, Bagan JV, Fernández DJM, Bazán HS, Soriano JY. Review of temporomandibular joint pathology. Part I: classification, epidemiology and risk factors: review. Med Oral Patol Oral Cir Bucal 2007; 12:292-8.

65. De Leew R, Klasser GD. Orofacial pain: guidelines for assessment, diagnosis and management. Chicago: Quintessence; 2013. 312 p.

66. Mc Collum BB, Stuart CE. A Research Report, South Pasadena, 1955, Scientific Press, p.28

67. Granger ER. Centric Relation, J Pros Dent 1952; 2(2):160-71.

68. Grander ER. Practical Procedure in Oral Rehabilitation, Philadelphia, 1962, JB Lippincott Company. p.4

69. Gallagher C, Gallagher V, Whelton H, Cronin M. The normal range of mouth opening in an Irish population. J Oral Rehabil 2004; 31(2):110-16.

70. Bonjardim LR, Gaviao MB, Pereira LJ, Castelo PM, Garcia RC. Signs and symptoms of temporomandibular disorders in adolescents. Braz Oral Res 2005;19(2):93-8.

71. Lauriti L, Motta LJ, da Costa Silva PF, de Godoy CH, Alfaya TA, Fernandes KP, Mesquita-Ferrari RA, Bussadori SK. Are occlusal characteristics, headache, parafunctional habits and clicking sounds associated with the signs and symptoms of temporomandibular disorder in adolescents?. J Phys Ther Sci 2013; 25(10):1331-4.

ANNEXURE

SREE MOOKAMBIKA INSTITUTE OF DENTAL SCIENCES

KULASEKHARAM, KANYAKUMARI DIST., TAMIL NADU, INDIA.

INSTITUTIONAL RESEARCH COMMITTEE

Certificate

This is to certify that the research project protocol, ***Ref no. 04/09/2017*** titled, ***"Comparative evaluation of vertical facial height reduction and severity of temporomandibular joint disorders versus controls using Shimbashi number and cephalometric analysis"*** submitted by ***Dr. Sajitha Jasmin S.L., II Year MDS, Department of Oral Medicine and Radiology*** has been approved by the Institutional Research Committee at its meeting held on ***22nd September 2017.***

Convener
Dr. T. Sreelal

Secretary
Dr. Pradeesh Sathyan

INSTITUTIONAL HUMAN ETHICS COMMITTEE

SREE MOOKAMBIKA INSTITUTE OF MEDICAL SCIENCES,
KULASEKHARAM, TAMILNADU

Communication of Decision of the Institutional Human Ethics Committee(IHEC)

SMIMS/IHEC No: 2 / Protocol no: 26 / 2017

Protocol title: COMPARATIVE EVALUATION OF VERTICAL FACIAL HEIGHT REDUCTION AND SEVERITY OF TEMPOROMANDIBULAR JOINT DISORDERS VERSUS CONTROLS USING SHIMBASHI NUMBER AND CEPHALOMETRIC ANALYSIS
Principal Investigator: Dr.Sajitha Jasmin S.L
Name& Address of Institution: Department of Oral Medicine and Radiology Sree Mookambika Institute of Dental Sciences ☑ New review ☐ Revised review ☐ Expedited review
Date of review (D/M/Y): 05-12-2017 Date of previous review , if revised application:
Decision of the IHEC: ☑ Recommended ☐ Recommended with suggestions ☐ Revision ☐ Rejected
Suggestions/ Reasons/ Remarks:
Recommended for a period of :One year

Please note*

- Inform IHEC immediately in case of any Adverse events and Serious adverse events.
- Inform IHEC in case of any change of study procedure, site and investigator
- This permission is only for period mentioned above. Annual report to be submitted to IHEC.
- Members of IHEC have right to monitor the trial with prior intimation.

Reneegalgangadhar

Signature of Member Secretary (IHEC)

SREE MOOKAMBIKA INSTITUTE OF MEDICAL SCIENCES
IHEC
Date..6/12/17..
KULASEKHARAM

CONSENT FORM
PART 1 OF 2
FORMATION FOR PARTICIPANTS OF THSTUDY

1. **Name of the Principal Investigator:** Sajitha Jasmin S L
   Second Year Post Graduate student
   Department of Oral Medicine and Radiology
   Sree Mookambika Institute of
   Dental Sciences, Kulasekharam

2. **Name of the Guide:** Dr. Tatu Joy. E MDS
   Professor and Head
   Department of Oral Medicine and Radiology
   Sree Mookambika Institute of Dental
   Sciences, Kulasekharam,
   Kanya Kumari District- 629161

3. **Name of the Co-Guide:** Dr. Rahul R
   Reader
   Department of Oral Medicine and Radiology.
   Sree Mookambika Institute of Dental
   Sciences, KanyaKumari District-629161

4. **Institute:** Sree Mookambika Institute of Dental
   Sciences, V.P.M Hospital complex, Padanilam,
   Kulasekharam, Kanyakumari – 629161
   Tamilnadu

5. **Title of the study:** "Comparative evaluation of vertical facial height reduction and Severity of Temporomandibular Joint disorders versus controls using Shimbashi number and Cephalometric analysis"

6. **Background information:**
   Reduction in vertical dimension of occlusion or collapsed bite associated with TMJ disorders is a common problem in general population for many years. Bite collapse is mainly due to tooth wear, loss of one or more teeth or abnormal positioning of lower jaw with the cranium. Reduction in vertical height causes headaches, earaches, muscle pain etc. Other effects of bite collapse are vertigo, tinnitus, difficulty in chewing and gastro intestinal distress. In this study we evaluate the Shimbashi number and Cephatoletric measurements in both case and control to find out the relationship between the degree bite overclosure and severity of TMJ disorders.

7. **Aims and Objectives**
   - To determine the extent of reduction in occlusal vertical dimension and it's correlation in TMJ disorders by measuring 'Shimbashi number'and 'freeway space'.
   - To assess correlation of skeletal CEJ-CEJ in cephalometric analysis with the clinical 'Shimbashi number' and to calculate 'inter incisal angle' in loss of occlusal vertical dimension of occlusion.

- To determine the reduction in vertical height between N-Gn, ANS-Gn, A-B, S-Go and reduction in angles like N-Go-Gn, ANS-PNS-Mandibular(Go-Gn)plane in cephalometric analysis in bite collapse by comparison with the control.

8. Scientific justification of the study:

Many studies were carried out to diagnose bite collapse and to evaluate neuromucular and TMJ disorders associated with loss of vertical dimension of occlusion by analysing soft tissue and skeletal parameters. The significance of this study is that it explains the amount of bite reduction and severity of TMJ disorders, which in turn would shed new light in the management of neuromuscular and TMJ disorders. Shimbashi number is the easiest Dental tool to analyse occlusal vertical dimension and Cephalometric evaluation of facial skeletal proportion in vertical direction is more accurate when correct exposure parameters are followed.

9. Procedure for the study:

This study will be carried out in the Department of Oral Medicine and Radiology, SMIDS. Individuals satisfying the inclusion and exclusion criteria will be included in the study. Patients with a clinical history suggestive of TMJ disorders will be taken and measurements of Shimbashi number with digital vernier caliper when the teeth are in maximum intercuspation or in centric occlusion will be made. Shimbashi number- a simple number and it is the measurement from the gum line of the upper front tooth to the gum line of lower front tooth. The ideal distance to be approximately 19 mm plus or minus 1mm. Freeway space can be calculated by measuring subnasale to mentum at maximum intercuspation and at rest position. Patients identified with collapsed bite and controls will be subjected to a cephalometric analysis. The images will be acquired using Planmeca Proline XC Digital Orthopantomograph Machine, Finland. For an ideal cephalometric radiograph, Frankfurt horizontal plane should be parallel to the floor and midsagittal plane should be 90 degree or perpendicular to the floor and F-H plane. Trace the radiographs using Planmeca Romexis software. Mark upper CEJ to lower CEJ , Nasion to Gnathion, ANS to Gnathion, Sella to Gonion and angles like inter incisal, N-Go-Gn, ANS-PNS-Gn by Cephalometric analysis in subject with TMJ disorders and compare with the controls and categories in to 4 groups based on clinical and radiographic evaluation. 1.Mild/ Intra capsular 2.Moderate/ Extra capsular 3. Severe/ Myogenous 4. Contol(without TMDs). Cephalometric analysis use in this study is **Thompson and Brodie's analysis**

10. Expected risks for the participants: NIL

11. Expected benefits of research for the participants:

The study will help health care practitioners understand the TMJ and associated structures better in physiological and pathological states and in due course improve health care for the patients at large.

12. Maintenance of confidentiality:

a. You have the right to confidentiality regarding the privacy of your medical information (Personal details, results of physical examinations, investigations, and your medical history).

b. By signing this document, you will be allowing the research team investigators, other study Personnel, sponsors, institutional ethics committee and any person or agency required by law to view your data, if required.
c. The results of study performed as part of this research may be included in your medical record.
d. The information from this study, if published in scientific journals or presented at scientific meetings, will not reveal your identity.

13. Why have I been chosen to be in this study?

a. Chosen because of grouping under the inclusion and exclusion criteria
b. Need of good sampling size
c. No invasive procedure that harm your health and it helps in diagnosis and helpful for the society

14. How many people will be in the study? 160

15. Agreement of compensation to the participants (In case of a study related injury):
No related injury anticipated. Patient will be taken care in case of complication and medical treatment will be provided.

16. Anticipated prorated payment, if any, to the participant(s) of the study: Not applicable.

17. Can I withdraw from the study at any time during the study period?

- The participation in this research is purely voluntary and you have the right to withdraw from this study at any time during the course of the study without giving any reasons.
- However, it is advisable that you talk to the research team prior to stopping information.

18. If there is any new findings/information, would I be informed? Yes

19. Expected duration of the participant's participation in the study? 12 months

20. Any other pertinent information?
No other information

21. Whom do I contact for further information?

Dr.Sajitha Jasmin S L,
Post graduate student,
Department of Oral Medicine and Radiology
Sree Mookambika Institute of Dental Sciences
Kulasekharam, Kanyakumari District-629161
9495245657
sajithasljasmin@yahoo.co.in

Place: Kulasekharam
Date: **Signature of Principal Investigator**

Signature of the participant

CONSENT FORM

PART 2 OF 2

PARTICIPANTS CONSENT FORM

The details of the study have been explained to me in writing and the details have been fully explained to me. I confirm that I have understood the study and had the opportunity to ask questions. I understand that my participation in the study is voluntary and that I am free **to** withdraw at any time, without giving any reason, without the medical care that will **normally** be provided by the hospital being affected. I agree not to restrict the use of any data or results that arise from this study provided such a use is only for scientific purpose(s). I have been given an information sheet giving details of the study. I fully consent to participate in the study titled:

"Comparative evaluation of Vertical facial height reduction and Severity of Temporomandibular joint(TMJ) disorders versus controls using Shimbashi number and Cephalometric analysis."

Serial no / Reference no:

Name of the participant:

Address of the participant:

Contact number of the participant:

Signature / thumb impression of the participant / Legal guardian

Witnesses:

1.

2.

Date:

Place:

സമ്മത പത്രം - ഭാഗം - 1

പഠനവുമായിസഹകരിക്കുന്ന വ്യക്തികളുടെഅറിവിലേയ്ക്ക്

പ്രിയപ്പെട്ട സന്നദ്ധ സേവകരേ,

ഞങ്ങൾ നിങ്ങളെ സ്വാഗതം ചെയ്യുന്നു. അതോടൊപ്പം ഈ പഠനവുമായി സഹകരിക്കാനുള്ള സന്നദ്ധതയോട് നന്ദി രേഖപ്പെടുത്തുന്നു. നിങ്ങൾ ഈ പഠനത്തിൽ പങ്കെടുക്കുന്നതിനു മുൻപ് ഈ പഠനം എന്തിനാണ് നടത്തപ്പെടുന്നത് എന്ന് അിറയേ□തു□്. അതിനാൽ ഈ ഫോറത്തിന്റ ഗവേഷണ പഠനത്തിന്റെ വിവരങ്ങളും മറ്റും വിശദമായി രേഖപ്പെടുത്തിയിരിക്കുന്നു. ഈ പഠനത്തിന്റെ രീതി, ഉദ്ദേശം, പ്രയോജനം, അപകടസാദ്ധ്യത, ക്ലേശം, മുൻകരുതൽ, എങ്ങനെ ഈ പഠനം മുൻപോട്ടു കൊ□ുപോകുന്നു എന്നിങ്ങനെ എല്ലാവിവരങ്ങളും ഫോറത്തിൽ രേഖപ്പെടുത്തിയിരിക്കുന്നു. സദയം ഈ വിവരങ്ങൾ വായിച്ചു മനസ്സിലാക്കുവാൻ അഭ്യർത്ഥിക്കുന്നു. ഈ വിവരങ്ങളിൽ ശാസ്ത്രപരമായ പദങ്ങൾ ഉള്ളതിനാൽ സംശയനിവാരണത്തിനു പ്രധാന പഠനകർത്താവിനോടോ താഴെ രേഖപ്പെടുത്തിയിരിക്കുന്ന വ്യക്തികളോടോ ഫോറം ഒപ്പിടുന്നതിനു മുൻപോ അല്ലെങ്കിൽ ഈ പഠനത്തിന്റെ കാലാവധി തീരുന്നതു വരെയോ സമീപിക്കാവുന്നതാണ്.

1. മുഖ്യ ഗവേഷകൻ : **ഡോ. സജിത ജാസ്മിൻ. എസ്.എൽ**
ര□ാം വർഷം പോസ്റ്റുഗ്രാജുവേറ്റ്
ഡിപ്പാർട്ട്മെന്റ് ഓഫ് ഓറൽ മെഡിസിൻ & റേഡിയോളജി,
ശ്രീമൂകാംബിക ഇൻസ്റ്റിറ്റ്യൂട്ട് ഓഫ്ഡെന്റൽ സയൻസ്,
കുലശേഖരം - 629 161.

2. പ്രധാന മാർഗ്ഗദർശി : **ഡോ. റ്റാറ്റുജോയ്. ഇ, എം.ഡി.എസ്.**
പ്രൊഫസർ & ഹെഡ്ഓഫ് ദി ഡിപ്പാർട്ടുമെന്റ്,
ഡിപ്പാർട്ട്മെന്റ്ഓഫ്ഓറൽ മെഡിസിൻ & റേഡിയോളജി
ശ്രീമൂകാംബിക ഇൻസ്റ്റിറ്റ്യൂട്ട് ഓഫ്ഡെന്റൽ സയൻസസ്,
കുലശേഖരം.

3. സഹമാർഗ്ഗ ദർശി : **ഡോ. രാഹുൽ ആർ, എം.ഡി.എസ്.**
റീഡർ
ഡിപ്പാർട്ട്മെന്റ്ഓഫ്ഓറൽ മെഡിസിൻ &റേഡിയോളജി
ശ്രീമൂകാംബിക ഇൻസ്റ്റിറ്റ്യൂട്ട് ഓഫ്ഡെന്റൽ സയൻസസ്,
കുലശേഖരം.

4. ഇൻസ്റ്റിറ്റ്യൂട്ട് : **ശ്രീ. മൂകാംബിക ഇൻസ്റ്റിറ്റ്യൂട്ട് ഓഫ്ഡെന്റ്ൽ സയൻസസ്**
പടനിലം, കുലശേഖരം, കന്യാകുമാരി - 629 161.
തമിഴ്നാട്.

5. പഠന ശീർഷകം

ഷിമ്പാഷി നമ്പറും സെഫലോമെട്രിക്വിശകലനവും ഉപയോഗിച്ച് ലമ്പ മുഖത്തിന്റെഉയരക്കുറവും റ്റി.എം.ജെ. രോഗവും തമ്മിലുള്ള ബന്ധം നിയന്ത്രണ ഗ്രൂപ്പുമായുള്ള താരതമ്യ പഠനം.

6. പശ്ചാത്തലവിവരം?

കടിയിലെ തകരാറ് റ്റി.എം.ജെ. രോഗത്തിന് കാരണമായി സാധാരണക്കാരിൽ സുദീർഘനാളായി ക□ുവരുന്നു. കടിയിലെ തകരാറിന്റെ പ്രധാന കാരണങ്ങൾ, ദന്തക്ഷയം, തേയ്മാനം, ഒന്നോ അതിലധികമോ ദന്തം നഷ്ടപ്പെടുക. കീഴ്ത്താടി മസ്തകവുമായുള്ള സ്ഥാനപ്പെടൽ ക്രമവിരുദ്ധമാവുക എന്നിവയാണ്. കടിയിലെ ലമ്പമായ ഉയരക്കുറവ് തലവേദന, ചെവി വേദന, പേശി വേദന എന്നിവയ്ക്ക് കാരണമാകുന്നതോടൊപ്പം തലചുറ്റൽ, ചെവിയിലെ ഇരമ്പൽ ശബ്ദം, ചവയ്ക്കാനുള്ളക്ലേശം, ദഹന പ്രക്രിയയിലെ തകരാറ് എന്നിവയ്ക്കും നിദാനമാവുന്നു. ഈ പഠനം ഷിമ്പാഷി നമ്പറിനേയും സെഫലോമെട്രിക് അളവിനെയും താരതമ്യപ്പെടുത്തി

കടിയിലെ ലമ്പ അളവിലെ കുറവ് റ്റി.എം.ജെ. രോഗവുമായി എത്ര അധികം ബന്ധപ്പെട്ടിരിക്കുന്നു എന്ന് വിലയിരുത്തുന്നു.

7. പഠനോദ്ദേശ്യം.

- കടിയിലെ ലമ്പ അളവിലെ കുറവ് റ്റി.എം.ജെ. രോഗത്തിൽ എത്ര എന്നത് ഷിമ്പാഷി നമ്പർ ഉപയോഗിച്ച് നിർണയിക്കുക.
- CEJ – CEJ അളവിലെ കുറവ് കടിയിലെ തകരാറിൽ, സെഫലോമെട്രിക് വിശകലനം വഴി ഷിമ്പാഷി നമ്പരുമായി താരതമ്യപ്പെടുത്തി നിർണയിക്കുകയും അടഞ്ഞക്കടിയിൽ ഇന്ററർ ഇൻസൈസൽ ആംഗിൾ എത്രയെന്നു നിശ്ചയിക്കും ചെയ്യുക.
- N-Gn, ANS-Gn, A-B, S-Go, എന്നിവയിലെ നീളകുറവും N-Go-Gn, ANS-PNS-Gn എന്നിവയിലെ കുറവും എത്രയെന്നു സെഫലോമെട്രിക് വിശകലനം വഴി നിയന്ത്രണ ഗ്രൂപ്പുമായി താരതമ്യപ്പെടുത്തി നിർണയിക്കുക.

8. പഠനത്തെക്കുറിച്ചുള്ളശാസ്ത്രീയ ന്യായീകരണം

കടിയിലെ പ്രശ്നങ്ങളും റ്റി.എംജെ. രോഗവും എന്നതിനെഷ്റ്റി വിലയിരുത്താൻ മൃദുചർമ്മവും അസ്ഥിയും തമ്മിലുള്ള താരതമ്യ പഠനങ്ങൾ ഏറെ നടന്നിട്ടു□ . എന്നാൽ ദന്തവും അസ്ഥിയും തമ്മിൽ താരതമ്യ പഠനം നടത്തി കടിയിലെ പ്രശ്നങ്ങൾ നിർണയിച്ച് റ്റി.എം.ജെ. രോഗവുമായി ബന്ധപ്പെടുത്തിയുള്ള പഠനം വളരെ വിരളമാണ്. അടഞ്ഞ കടി റ്റി.എം.ജെ. രോഗവുമായി എത്ര അധികം ബന്ധപ്പെട്ടിരിക്കുന്നു എന്നത് വിശകലനം ചെയ്യുന്ന ഈ പഠനം, റ്റി.എം.ജെ. ജന്യരോഗങ്ങളുടെ നിർണയത്തിലും, ചികിത്സയിലും പുതിയ പ്രഭ പടർത്തുന്നു. കടിയിലെ അകലം നിർണയിക്കാൻ ഏറെ എളുപ്പവും പര്യാപ്തവുമായ ഒന്നാണ് ഷിബഷി നമ്പർ. സെഫലേമെട്രിക് ഇവാലുവേഷൻ വളരെ കൃത്യമായ അളവുകൾ നൽകുന്നതും.

9. പഠനരീതി

ഈ പഠനം നിർവഹിക്കുകഓറൽ മെഡിസിൻ ആന്റ് റേഡിയോളജി ഡിഷാർട്ട്മെന്റ്, മിഡ്സി- ൽ ആണ്. ഉൾപ്പെടുത്തൽ, ഒഴിവാക്കാൻ നിബന്ധനകൾ തൃപ്തിപ്പെടുത്തുന്നവരെ ഈ പഠനത്തിൽ ഉൾപ്പെടുത്തിയിരിക്കുന്നു. റ്റി.എം.ജെ. രോഗികളെ രോഗലക്ഷണങ്ങൾ നിരീക്ഷിച്ച് വിലിയിരുത്തി ഷിബാഷി നമ്പർ ഡിജിറ്റൽ വെർനിയർകാലിപറിലെ സഹായത്താൽ നിർണയിക്കുന്നു. മുകളിലെ താടിയുടെ ഗംലൈൻ മുതൽ താഴത്തെ ഗംലൈൻ വരെയുള്ള വളരെ ലളിതമായ ഒരു അളവാണ് ഷിമ്പാഷി നമ്പർ സാധാരണഗതിയിൽ ഈ അളവ് 19±1 മി.മീ ആയിരിക്കും. അടഞ്ഞ കടി ഉള്ളവരിൽ ഷിമ്പാഷി നമ്പർ കുറഞ്ഞു കാണപ്പെടുന്നു. ഇത്തരം രോഗികളേയും കൺട്രോൾ ഗ്രൂഷിനേയും സെഫലോമെട്രിക് അനാലിസിസിന് വിധേയപ്പെടുത്തുന്നു. പ്ലാൻ മേക്ക പ്രൊലൈൻ എക്സ്.സി ഡിജിറ്റൽ ഓൽത്തോപാന്റമോഗ്രാഫ് മഷിൻ, ഫിൻലാൻഡ്-ൽ റേഡിയോഗ്രാഫ്സ് എടുക്കുന്നു. F-H പ്ലെയിനിൽ പ്രതലത്തിന് സമാന്തരമായും, മിഡ്സജിറ്റൽ പ്ലയിൻ പ്രതലത്തിനും F-H പ്ലെയിനിനും ലമ്പമായും ആയിരിക്കും. പ്ലാൻമേക്ക റോമെക്സിസ് സോഫ്റ്റ്വെയർ ഉപയോഗിച്ച് റേഡിയോഗ്രാഫ് ട്രെയ്സ് ചെയ്ത് സി.ഇ.ജെ. മുതൽ സി.ഇ.ജെ വരെയുള്ള അളവ് N-Gn വരെയുള്ള അളവ്, ANS- ഏിവരെയുള്ള അളവ്, S-Go ഇന്റർ ഇൻസൈസൽ ആങ്കിൾ N-Go-Gn ആങ്കിൾ, ANS-PNS-Gn ഇവരേഖപ്പെടുത്തി വിശകലനം ചെയ്ത് റ്റി.എം.ജെ. രോഗികളെ നാലായി തരം തിരിക്കുന്നു. 1. മൈൽഡ്/ ഇൻട്രാകാപ്സുലാർ, 2. മോഡറേറ്റ് / എക്സ്ട്രാകാപ്സുലാർ, 3. സിവിയർ / മയോജീനസ്, 4. കൺട്രോൾ. ഈ പഠനത്തിൽ ഉപയോഗിക്കുന്ന സെഫലോമെട്രിക് അനാലിസിസ് തോംസൻ ആന്റ് ബ്രോഡി അനാലിസിസ് .ഇതിൽ N,ANS, Gn എന്നീ പോയിന്റുകളും N-Gn ലൈൻ (ടോട്ടൽഫേഷ്യൽഹൈറ്റ്) N-ANS ലൈൻ (അപ്പർ ഫേഷ്യൽഹൈറ്റ്) ANS-Gn (ലോവർഫേഷ്യൽഹൈറ്റ്) ഇതു കൂടാതെ A-B ലൈൻ ഇന്റർ ഇൻസൈസൻ ആങ്കിൾ N-Go-Gn, ANS-PNS-Gn ആങ്കിൽ ഇവ രേഖപ്പെടുത്തി ഷിമ്പാഷി നമ്പറും CEJ വരെയുള്ള റേഡിയോഗ്രാഫിലെ അളവും തമ്മിൽ താരതമ്യ പഠനം നടത്തി കടിയിലെ പ്രശ്നങ്ങൾ റ്റി.എം. ജെ.രോഗവുമായി എത്ര അധികം ബന്ധപ്പെട്ടിരിക്കുന്നു എന്ന് ക□ത്തുന്നു. എല്ലാ അളവുകളും കൺട്രോൾ ഗ്രൂപ്പുമായിതാരതമ്യ പഠനം നടത്തുന്നു. ഫലം സ്റ്റുഡന്റ് റ്റി. ടെസ്റ്റ്സ്റ്റാറ്റിസ്റ്റിക്കൽ അനാലിസിസ് വഴിലഭിക്കുന്നു.

10. പഠനം മൂലം പങ്കെടുക്കുന്ന ആൾക്ക് ഉ□ ാകാൻ ഇടയുള്ള അപകട സാദ്ധ്യത

അപകട സാധ്യത ഇല്ല

11. രോഗികൾക്ക് പ്രതീക്ഷിക്കാവുന്ന ഗുണങ്ങൾ ?

ഈ പഠനം ആരോഗ്യപരിപാലന പരിശീലകരെ ശാരീരികമായും രോഗനിലയിലും രോഗിയുടെ ശരീരത്തെ നന്നായി മനസ്സിലാക്കി ആരോഗ്യത്തെ മെച്ചപ്പെടുത്തുന്നതിന് സഹായിക്കുന്നു.

12. വിവരങ്ങൾരഹസ്യമായിസൂക്ഷിക്കുമോ ? അതെ

13. എന്നെ എന്തുകൊ□ ്ഈ പഠനത്തിൽഉൾപ്പെടുത്തി ?

നിങ്ങൾ ഞങ്ങളുടെ പഠനത്തിന് അനുയോജ്യമായ ഘടകങ്ങൾ പാലിക്കപ്പെടുന്ന മാതൃകാപരമായ ഉദാഹരണമാകുന്നു. ഈ പഠനം മൂലംരോഗ നിർണ്ണയത്തിന് സഹായവും സമൂഹത്തിന് നന്മയും പ്രധാനം ചെയ്യുന്നു.

14. എത്ര ആളുകൾ ഈ പഠനത്തിൽഉൾപ്പെടുന്നു ? 160

15. പഠനം മൂലമു□ ാകുന്ന ക്ഷതങ്ങൾക്ക് നഷ്ടപരിഹാരത്തിനുള്ള സമ്മതം

പഠനകർത്താവ് ചികിത്സാചെലവ് വഹിക്കുന്നതാണ്.

16. ഏതെങ്കിലുംവിധത്തിൽവേദനം ലഭിക്കുമോ? ഇല്ല

17. എപ്പോൾവേണമെങ്കിലും എനിക്ക്ഈ പഠനത്തിൽ നിന്ന് പന്മാറാമോ ?

സ്വന്തം താൽപര്യ പ്രകാരം കാരണങ്ങൾ നൽകാതെ തന്നെ ഈ പഠനത്തിൽ നിന്ന് എപ്പോൾ വേണമെങ്കിലും പിന്മാറാവുന്നതാണ്. എന്നിരുന്നാലും ഗവേഷണസംഘത്തോട് പിന്മാറുന്നതിനു മുൻപ് സംസാരിക്കുവാൻ ഞങ്ങൾ നിങ്ങളോട് അഭ്യർത്ഥിക്കുന്നു.

18. ഈ ഗവേഷണത്തിന്റെ ഫലമായി പുതിയ എന്തെങ്കിലും ക□ ത്തലുകളു□ ങ്കിൽ അത്എന്നെ അിറയിക്കുമോ? അതെ

19. ഈ പഠനത്തിന്റെസമയദൈർഘ്യം എത്രയാണ് ? പന്ത്ര□ ുമാസം

1. ഇതിന്റെ ഭാഗമായിഎന്തെങ്കിലുംകൂടുതൽവിവരങ്ങൾ ? ഇല്ല

21. കൂടുതൽവിവരങ്ങൾക്കായിതാഴെ പറയുന്നവരെ നിങ്ങൾക്ക് ബന്ധപ്പെടാവുന്നതാണ്.

ഡോ.സജിത ജാസ്മിൻ.എസ്.എൽ
ര□ ാം വർഷം പോസ്റ്റുഗ്രാജുവേറ്റ്
ഡിപ്പാർട്ട്മെന്റ് ഓഫ് ഓറൽ മെഡിസിൻ & റേഡിയോളജി,
ശ്രീമൂകാംബിക ഇൻസ്റ്റിറ്റ്യൂട്ട് ഓഫ്ഡെന്റൽ സയൻസ്,
കുലശേഖരം - 629 161.
മൊബൈൽ നമ്പർ : 9495245657
ഇ-മെയിൽഐഡി:മെഷശവേമഹെഷമാെശിര്യമവീീ.രീ.ശി

സ്ഥലം: പ്രഥമ
അന്വേഷകന്റെഒപ്പ്

തീയതി : പങ്കെടുക്കുന്ന
ആളിന്റെഒപ്പ്

സമ്മതപത്രം

ഭാഗം - 2

ഈ പഠനത്തെ പറ്റിയുള്ള എല്ലാകാര്യങ്ങളും എനിക്ക് പറഞ്ഞ് മനസ്സിലാക്കി തരികയും അതിന്റെ ഒരു പകർഷ് എനിക്കു നൽകുകയും ചെയ്തിട്ടു□്. ഈ പഠനം ഗവേഷണത്തിനായി ഉള്ളതാണെന്നും എനിക്ക് ഇതിൽ നിന്ന് നേരിട്ട് ഒരു ഫലവും ഉ□ാകില്ലെന്നും ഞാൻ മനസ്സിലാക്കുന്നു. ഈ പഠനത്തിന്റെ രീതിയും ഉദ്ദേശവും എനിക്ക് മനസ്സിലാക്കി തന്നിട്ടു□്. അതു പോലെ എനിക്ക് സംശയങ്ങൾ ചോദിക്കാൻ അവസരങ്ങൾ ലഭിച്ചിട്ടുമു□്. ഇതിൽ പങ്കെടുക്കാനും പങ്കെടുക്കാതിരിക്കാനും ഉള്ള അവകാശം എനിക്കുെ□ന്നും അതുപോലെ പഠനത്തിന്റെ ഏതു ഘട്ടത്തിലും ഇതിൽ നിന്ന് പിൻവങ്ങാനുള്ള സ്വാതന്ത്ര്യവും എനിക്കുെ□ന്ന് ഞാൻ മനസ്സിലാക്കുന്നു. ഈ പഠനത്തിൽ പങ്കെടുക്കുന്നതുകൊെ□ാ, പങ്കെടുക്കാത്തതുകൊെ□ാ എന്റെ മറ്റുചികിത്സകളെ ബാധിക്കുന്നതല്ലെന്ന് ഞാൻ അിറയുന്നു.

ഷിമ്പാഷി നമ്പറും സെഫലോമെട്രിക് വിശകലനവും ഉപയോഗിച്ച് ലമ്പ മുഖത്തിന്റെ ഉയരക്കുറവും ടി.എം.ജെ. രോഗവും തമ്മിലുള്ള ബന്ധം നിയന്ത്രണ ഗ്രൂപ്പുമായുള്ളതാരതമ്യ പഠനം. ഈഗവേഷണത്തിൽ പങ്കെടുക്കുന്നതിനും ഇതിന്റെ ഫലങ്ങൾ ശാസ്ത്രലേഖനത്തിൽ പ്രസിദ്ധീകരിക്കുന്നതിനും എനിക്ക് സമ്മതമാണെന്ന് ഞാൻ ഇതിനാൽ അിറയിച്ചുകൊള്ളുന്നു.

പങ്കെടുക്കുന്ന ആളിന്റെ പേര് :

മേൽവിലാസം :

ഫോൺ നമ്പർ :

ഒപ്പ് / വിരലടയാളം .....തീയതി.....

സാക്ഷിയുടെഒപ്പ്: തീയതി

പ്രധാന അന്വേഷകയുടെഒപ്പ്

ஒப்புதல் வாக்கு மூலம்

முதல் பாகம்

ஆராய்ச்சியில் பங்குபெறுவோருக்கான தகவல் குறிப்பு

அன்பார்ந்த பங்கேற்பாளர்களே,

இந்த ஆராய்ச்சியில் தங்களை ஈடுபடுத்திக்கொள்ள மிகுந்த ஆர்வத்துடன் முழுமனதுடன் கலந்துகொள்ள வந்த வரவேற்பாளர்களை வரவேற்கிறேன். நீங்கள் இந்த ஆராய்ச்சியில் பங்கெடுத்துக்கொள்வதற்கு முன் இந்த ஆராய்ச்சி எதற்காக நடத்தப்படுகிறது என்பதை தெளிவாக புரிந்து கொள்ளவேண்டும். உங்களுக்கு தேவையான அனைத்து விபரங்களும் கீழே கொடுக்கப்பட்டுள்ளது. இந்த ஆராய்ச்சியின் மூலம் ஏற்படும் நன்மைகள், ஏதேனும் ஆபத்துகள் மற்றும் அதற்காக மற்றும் எவ்வாறு இந்த ஆராய்ச்சி மேற்கொள்ளப்படும் முறைகளும் தெரிவிக்கப்பட்டுள்ளது. இதில் கொடுக்கப்பட்டுள்ள விபரங்களை தெளிவாக படித்து புரிந்து கொள்ளவேண்டும். நீங்கள் ஆராய்ச்சியில் பங்கேற்பாளர்களாக ஒப்புதல் வழங்குவதற்கு முன்பு உங்களுக்கு ஏற்படும் அறிவியல் சார்ந்த சந்தேகங்கள் மற்றும் ஆராய்ச்சி சம்பந்தப்பட்ட சந்தேகங்கள் அனைத்தும் இந்த ஆராய்ச்சியின் எந்த காலகட்டத்திலும் நீங்கள் படிவத்தில் குறிப்பிட்ட நபரிடம் கேட்டு தெளிவுபடுத்திக்கொள்ளலாம்.

1.	தலைமை ஆய்வாளர்	:	**டாக்டர். சஜிதா ஜாஸ்மின். எஸ்.எல்.**
	தகுதி	:	முதுகலை மாணவி (ஙஈந)
	பிரிவு	:	ஓரல் மெடிசின் மற்றும் ரேடியோளஜி
	நிறுவனம்	:	ஸ்ரீ மூகாம்பிகா இன்ஸ்டிட்யூட் ஆப் டென்டல் சயன்ஸஸ்,
	இடம்	:	குலசேகரம் - 629 161.
2.	வழிகாட்டி	:	**டாக்டர். டாட்டு இ. ஜாய்,** ஙஈந.
	தகுதி	:	தலைமையாளர், பேராசிரியர்
	பிரிவு	:	ஓரல் மெடிசின் மற்றும் ரேடியோளஜி,
	நிறுவனம்	:	ஸ்ரீ மூகாம்பிகா இன்ஸ்டிட்யூட் ஆப் டென்டல் சயன்ஸஸ்,
	இடம்	:	குலசேகரம் - 629 161
3.	இணைவழிகாட்டி	:	**டாக்டர். *ராகுல் ஆர்***
	தகுதி	:	பேராசிரியர்
	பிரிவு	:	ஓரல் மெடிசின் மற்றும் ரேடியோளஜி,
	நிறுவனம்	:	ஸ்ரீ மூகாம்பிகா இன்ஸ்டிட்யூட் ஆப் டென்டல் சயன்ஸஸ்,
	இடம்	:	குலசேகரம் - 629 161
4.	**கல்லூரி**	:	ஸ்ரீ மூகாம்பிகா இன்ஸ்டிட்யூட் ஆப் டென்டல் சயன்ஸஸ், படநிலம், குலசேகரம்- 629 161.

5. ஆராய்ச்சியின் தலைப்பு

ஷிம்பாஷி எண் மற்றும் சே:பாலெமெரிக் பகுப்பாய்வு பயன்படுத்தி செங்குத்து முக உயரம் குறைப்பு மற்றும் டெம்பரோமேன்டிபுலார் சீர்குலைவுகளின் கட்டுப்பாடு மற்றும் ஒப்பீட்டளவில் ஒப்பீட்டு மதிப்பீடு.

6. பின்னணி தகவல்

செங்குத்து முக உயரம் குறைதல் மற்றும் வேறுபட்ட கடிமானமும் பல வருடங்களாக டெம்பரோமேண்டி புலார் சீர்குலைவு உள்ள பெரும்பாலமான மக்களிடேயே பெரும் பிரச்சனையாக இருந்துவருகிறது. வேறுபட்ட கடிமானத்திற்கான காரணம் பல் தேய்வு, ஒன்றிற்கு மேற்பட்ட பற்கள் இழப்புஅல்லது கீழ் தாடையின்அசாதாரண மான நிலை ஆகும் செங்குத்து முக உயர்வு குறைதல் காரணமாகதலைவலி, காதுவலி, தசைவலி ஆகியென வரக்கூடும். தலைச்சுற்று, காது இரைச்சல், மெல்லும்போதுசிரமம், இரைப்பை குடல் துன்பம் ஆகியனவைகளும் இப்பிரச்சனயால் வர நேரடிலாம். இவ்வாய்வு மூலமாக நாங்கள், வேறுப்பட்ட கடிமானத்தையும், டெம்பரோமே

ண்புலார் சீர்குலைவின் அளவையும், பாதிக்கப்பட்டவர்களிடேயும் பாதிக்கப்படாதவர்களிடேயும், ஷிம்பாஷி எண் ம ற்றும் சே:பாலெமெரிக் பகுப்பாய்வின் மூலமாக ஒப்பிடலாம். என்றுள்ளோம்.

7. குறிக்கோள் மற்றும் நோக்கம் :

- ஷிம்பாஷி எண்ணை அளவிடுவதன் மூலம் TMJ கோளாறுகளில், செங்குத்து பரிமாணத்தின் உயரத்தி ன் வேறுபாட்டு அளவை தீர்மானத்தல்
- வேறுபட்ட கடிமானம் உள்ளவர்களுக்கு, CEJ-CEJஅளவு மற்றும் இன்டெர் இன்சிஷல் கோணம் எவ்வாறு என்று சே:பாலெருமரிக்மாற்றப்பட்டுள்ளதுபகுப்பாய்வு மற்றும் ஷிம்பாஷி எண் மூலமாக தீர்மானித்தல்
- வேறுபட்ட கடிமானத்தில், NGn, ANS-Gn, A-B, S-Go, NGO-Gn, ஆகியன எவ்வாறு மாற்றப்பட்டுள்ளது என்று சே:பாலெமெரிக் பகுப்பாய்வு மற்றும் ஷிம்பாஷி மூலமாக தீர்மானித்தல்.

8) ஆய்வின் அறிவியல் நியாயப்படுத்துதல்

இதுவரையில் பலவாறான ஆய்வுகள் திசு மற்றும் தாடை எலும்புகளை கொண்டு மேற்கொண்டு, செ ங்குத்து பரிமாணக்குறைவுடன் கூடிய நரம்பு தசை மற்றும் TMJ சீர்குலைவுடன் ஆராயப்பட்டுள்ளது. ஆனால், வெ றும் சில ஆய்வுகளே பற்களையும் தாடை எலும்புகளை சம்பந்தப்படுத்தி, கடிமானசீரமைப்பு மற்றும் செங்குத்து ப ரிமாணத்தின் சீரான அளவின் முக்கியத்துவத்தை வெளிக்கொண்டு வந்துள்ளது. இவ்வாய்வின் முக்கியத்தும், வே வறுபட்ட கடிமானம் மற்றும்TMJ சீர்குலைவின் அளவைக் கொண்டு நரம்புதசை மற்றும் TMJ சீர்குலவை சீராக்கு வதாகும் இதற்காக ஷிம்பாஷி மற்றும் சே:பலெமெரிக் பகுப்பாய்வு உபயோகப்படுத்தப்பட்டுள்ளது.

9. ஆய்வின் நடைமுறை

இவ்வாய்வு வாய்நோய் கண்டறிதல் துறை, SMIDSல் வைத்து நடைபெறும் இவ்வாய்விற்கு தகுதியான வர்கள் இதில் சேர்த்துக் கொள்ளப்படுவார்கள். TMJ சீர்குலைவு உள்ளவர்களுக்கு டிஜிட்டல் வொர்னியர் கருவி மூ லமாக கடிமானம் அளவிடப்படுகிறது. இக்கருவியை உபயோகிக்கும் போது ஷிம்பாஷி எண் மேற் பல்லின் ஈறு கோடு வரை அளவிடப்படுகிறது. இந்த எண் சராசரியாக 19 ம்ம் அல்லது அதற்கு 1ம்ம் குறைவாக குறைவாக அ ல்லது கூடுதலாக இருக்கலாம். வேறுப்பட்ட கடிமானம் உள்ளவர்கள் சே:பலெமெட்ரிக் பகுப்பாய்வுக்கு உட்படுத் தப்படுவார்கள் இதனுடைய படங்களை பிளான்மேகா புரோலைன் டிஜிட்டல் ஆர்தோபென்றனோகிராப் மேஷின், பின்லேண்ட் மூலமாக எடுத்துக்கொள்ளலாம் தரமான சே:பலெமெட்ரிக் படத்திற்கு பிராங்பிரட் ஹரிஷாண்டல் பி ளைன், தரைக்குஇணையாகவும், மிட்சாஜிட்டல் பிளைன் தரைக்கு செங்குத்தாக 90-யில் இருக்கவேண்டும் கதிர்வ ரைப்படங்கள் பிளான்மேகா ரோமைஸ் மென்பொருள் மூலமாக தடமறியப்படுகிறது சி.இ.ஜெ முதல் சி.இ.ஜெ வ ரை உள்ள அளவு, என். முதல் ஜி.என். வரையுள்ள அளவு செல்லா முதல் கோணியோண் வரையிலானஅளவு TMJ கோணம் N-Go-Gn, ANS-PNS-Gn

சே:பலெமெட்ரிக் பகுப்பாய்வு மூலமாக TMJ சீர்குலைவு இல்லாதவர்களையும் TMJ சீர்குளைவு உள்ளவர்களை யும் நான்கு பிரிவுகளாகக்கொண்டு ஆராயப்படுகிறது. நான்கு பிரிவுகள் 1 லேசான சீர்குலைவு, 2 மிதமான சீர் குலைவு, 3. அதிகப்படியான சீர்குலைவு, 4. சீர்குலைவு இல்லாதவர்கள் இவ்வாய்வில் பயன்படுத்தப்பட்டுள்ள சே:ப லெமெட்ரிக் பகுப்பாய்வின் பெயர் தாம்சன் மற்றும் புரோடிஸ் பகுப்பாய்வு N மற்றும் ANS மற்றும் GN உள்ளதூர ம், N-Gn கோடில்அளவிடப்படுகிறது. A-B மற்றும் S-Go

மற்றும் TMJ சீர்குலைவு அளவிடப்படுகிறது. இதனுடன் எ.பி மற்றும் எஸ்.ஜி.ஒ கணக்கிடப்படுகிறது. N-Go-Gn and ANS-PNS-Gn

இன்டர் இன்சைசல் கோணமும் கணக்கிடப்படுகிறது. இவை சீர்குலைவு இல்லாதவர்களுடன் ஒப்பிட்டு பார்க்கப் படும்போது இதன் முடிவுகள் ஸ்டுடன்ட்-டி பகுப்பாய்வு மூலமாக கணக்கிடப்படுகிறது.

10. ஆய்வில் கலந்து கொள்பவர்களுக்கு எதிர்பார்க்கப்படும் ஆபத்துகள் ? எதுவும் இல்லை

11 . பங்கேற்பாளர்களுக்கு எதிர்பார்க்கப்படும் பயன்கள்?

இவ்வாய்வு மூலமாக பஙஒ- இன் சீரான நிலை மற்றும் சீர்குலைந்த நிலையை மருத்துவர்கள்நன்றாக அறிநதுக்கொள்ள முடியும்.

12 . மருத்துவ பதிவுகளை பராமரித்தல் ?

- தங்களின் மருத்துவ தகவல் பராமரிக்கப்படும்.

- இந்த விண்ணப்பத்தை ஒப்பிடுவதன் மூலம் ஆய்வாளரையும் அதனை சார்ந்தவர்களுக்கு முழு ஒத் துழைப் புகொடுக்கிறீர்கள்.
- இவ்வாய்வின் முடிவுகள் தங்களின் மருத்துவ பரிவுகளோடு சேர்க்கப்படுகிறது.
- இவ்வாய்வின் தகவல்கள் அறிவியல் கூட்டங்களில் வெளியிடப்பட்டாலும் தங்களை பற்றிய தகவல்கள் வெளிக்கொண்டுவரப்படமாட்டாது.

13. நான் ஏன் இந்த ஆய்விற்காக தேரந்தெடுக்கப்பட்டு இருக்கிறேன் ?

அ. தகுதியானவர்களான படியால்.

ஆ. சீரான மாதிரி தேவைப்படுவதால்

இ. எந்த சீர்கேடும் வராமல் நோய் கண்டறிதலுக்கு உதவுவதால்.

14. இந்த ஆய்வில் எத்தனைபேர் பங்கேற்கிறார்கள் ? 160

15. பங்கேற்பாளர்களுக்கு இழப்பீடு ஒப்பந்தம் (விளைவுகள் ஏதேனும் ஏற்பட்டால்) ?

எவ்வித விளைவகளும் ஏற்படாது. எவ்வாறு ஏதேனும் தென்பட்டால் வேண்டிய மருத்துவ சிகிட்சை அளிக்கப்படும்.

16. இந்த ஆராய்ச்சியில் பங்குபெறுவோருக்கு எவ்வித தொகையும் வழங்கப்படுமா ? இல்லை

17. நான் இந்த ஆராய்ச்சியிலிருந்து விருப்பப்பட்டால் எந்த காலகட்டத்திலும் விலகலாமா ?

ஆம் ஆனால் விலகுவதற்கு முன்னால் ஆய்வாளருக்கு தெரியப்படுத்தவேண்டும்.

18. ஏதேனும் புது தகவல்கள் கண்டுபிடிக்கப்பட்டால் தெரிவிக்கப்படுமா ? ஆம்

19. ஆய்வில் பங்குபெறும் கால அவகாசம் ? பனிரண்டு மாதம்

20. வேறு ஏதேனும் முக்கிய தகவல் ? இல்லை

21. இவ்வாராய்ச்சியைப் பற்றிய விவரங்களை யாரிடம் கேட்டு தெரிந்துக்கொள்வது ?

தலைமை ஆய்வாளர்:**டாக்டர். சஜிதா ஜாஸ்மின். எஸ்.எல்.**

முதுகலை மாணவி (MDS)

ஓரல் மெடிசின் மற்றும் ரேடியோளஜி

ஸ்ரீ மூகாம்பிகா இன்ஸ்டிட்யூட் ஆப் டென்டல் சயன்ஸஸ்,

குலசேகரம் - 629 161.

Mob : 9495245657

Email: sajithasljasmin@yahoo.co.in

இடம் :

தேதி :

முதன்மை ஆராய்ச்சியாளரின்

கையொப்பம்

பங்குகொள்பவரின் கையொப்பம்

ஒப்புதல் படிவம்

பாகம்- 2

இந்த ஆராய்ச்சியின் தகவல்கள் அனைத்தும் என்னிடம் தெளிவாக எழுத்துமூலம் வி ளக்கப்பட்டுள்ளது. இந்த ஆராய்ச்சியின் முடிவுகள் எனக்கு நேரடியாக பயன்பராவிட்டாலும் மருத்துவத்துறையின் முன்னேற்றத்திற்கு பயன்படும் என்பதை அறிவேன். இவ்வாராய்சி யைப் பற்றி நான் தெளிவாக புரிந்துக் கொண்டுள்ளேன். நான் தானாக முன்வந்து இதி ல் பங்குப் பெறுகிறேன். என்பதை அறிவேன். இதிலிருந்து எந்த நேரமும் எக்காரணமும் கூறாமல் வந்தாலும் இந்த மருத்துவமனையில் எனக்கு கிடைக்கும் மருத்துவ உதவி எவ் விதத்திலும் பாதிக்கப்படாது என்பதையும் அறிவேன்.

இவ்வாராய்ச்சியின் மூலம் வரும் முடிவுகள் மற்றும் தகவல்களை அறிவியல்துறை யின் பயன்பாடுகளுக்கு (மட்டுமே) உபயோகப்பட்டிக்கொள்ள சம்மதிக்கிறேன். எனக்கு இ வ்வாராய்ச்சியைப் பற்றிய விரிவான தகவல்கள் அடங்கிய படிவம் தரப்பட்டுள்ளது.

நான் ஷிம்பாஷி எண் மற்றும் சே:பாலெமெரிக் பகுப்பாய்வு பயன்படுத்தி செங்குத்து முக உயரம் குறைப்பு மற்றும் டெம்பரோமேன்டிபுலம் சீர்குலைவுகளின் கட்டுப்பாடு மற்றும் ஒப்பீட்டளவில் ஒப்பீட்டு மதிப்பீடு என்கிற ஆராய்ச்சியில் பங்கேற்க முழு மனதுடன் சம்ம திக்கிறேன்.

பங்கு கொள்பவரின் தொடர், மருத்துவ எண் :
பங்கு கொள்பவரின் பெயர் :

18 வயதிற்கு கீழ் உள்ளவர்களுக்கு பாதுகாவலரின் கையொப்பம்:

முகவரி

தொலை தொடர்பு எண் :

பங்கு கொள்பவர் பராமரிப்பவர் கையொப்பம்/பெருவிரல் சுவடு :

சாட்சி 1

சாட்சி 2

தேதி:

இடம்: குலசேகரம்

INDIVIDUAL DATA ENTRY SHEET

Title of the study: Comparative evaluation of vertical facial height reduction and severity of Temporomandibular Joint disorders versus controls using Shimbashi number and Cephalometric analysis

S.NO :

Date :

Name :

Age :

Gender :

TMJ Disorder/ No TMJ Disorder:

Measuring Shimbashi number:

Cephalometric measurements:

DATA SHEET

CONTROL

Sl. No	Age	Gender	Shimbashi Number	CEJ-CEJ in Radiograph	A-B	ANS-Gn	N-Gn	S-Go	Angle. N-Go- Gn	Angle. ANS-PNS-Mandibular plane(Go-Gn)	Interincisal Angle
1	17	M	18	19.8	33.7	63.4	112.7	69.7	73.4	27.31	108.3
2	13	F	17.9	19.5	34.7	60.7	107.4	69	73.04	25.89	116.51
3	14	M	18.9	20.3	34.9	54.6	102.4	67.6	72.73	26.85	93.91
4	21	F	17.5	19.6	37.6	64.3	110.2	73	75.75	23.54	98.63
5	24	M	18.5	20.2	37.2	61.1	106.4	76.7	66.31	19.2	105.43
6	19	F	18.2	20.1	33.2	60.1	106.1	63.4	72.81	27.59	104.87
7	27	M	18.2	20	38.2	65.5	112.8	80.7	69.88	23.21	107.77
8	13	F	18.4	20.3	38.5	65.6	109.9	65.9	79.38	29.66	116.26
9	12	F	18	19.6	34.1	57.2	99.1	61.1	69.79	27.6	107.81
10	21	F	18.3	20.3	37.9	60.6	104.8	65.2	69.76	21.02	108
11	12	M	18	19.9	34.3	60.9	109	63.2	75.06	28.91	94.58
12	15	M	19.4	21.4	37.9	64.7	107.5	70.5	73.29	29.01	113.68
13	20	M	18.6	20.6	42.3	70.8	117.7	76.6	69.31	31.46	116.83
14	19	F	18.2	19.9	35.2	55.8	104.1	63	76.42	25.15	107.54
15	18	F	18	19.6	35	58.7	104.7	72.6	69.45	20.19	100.46
16	13	F	18	19.6	34.2	61.6	106	64.2	73.66	27.39	109.31
17	14	M	18.7	20.4	37.7	60.9	105.3	66.9	72.03	28.71	95.86
18	20	F	18.8	20.7	37	60.7	110.9	72.3	74.23	23.29	101.13
19	17	F	18.3	19.9	36.4	61.5	102.4	68.1	72.07	27.81	98.52
20	16	F	18.5	20.3	30.8	54.9	101.5	69	65.55	17.4	113.86
21	17	M	19.5	21.6	39.5	65.3	115.8	76.9	75.28	25.99	10.66
22	17	F	19.4	21.2	39.3	65.2	112.9	68.2	82.19	27.74	105.2
23	17	F	19	20.9	36.5	62.9	112	68.5	75.17	30.6	110.31
24	17	M	18	19.7	41.5	65.7	107	70.8	73.18	25.99	99.59
25	15	F	19.2	21.2	37.9	61.4	108.3	73.8	73.8	32.51	103.12
26	19	F	19.9	21.7	40.9	67.4	117.2	80.1	73.98	26.06	98.35
27	18	F	18	19.8	36.1	57.4	104.5	70.9	74.41	25.37	105.05
28	17	M	18.1	20	37.3	65.7	108.5	76	72.74	21.17	104.61
29	13	M	18.3	20.1	36.1	61.6	103	69.9	69.81	22.57	106.38
30	13	M	18.1	20	33.3	61.6	105.9	76.7	68.51	22.12	109.21
31	14	M	18.5	20.3	39.5	68.9	117.4	73.9	76.86	32.54	118.33
32	21	M	19.3	21.3	40	65	119.7	78.8	72.81	21.67	114.42
33	21	F	18	20.1	32	59.3	102.5	71	68.72	22.25	101.57
34	18	F	18	19.8	38.8	66.7	106.8	70.4	76.1	29.46	102.12
35	22	F	18	19.7	34.5	59.1	106.1	65.3	72.62	22.49	110.06
36	21	F	18.2	19.7	35.8	59.7	106.4	69.5	73.67	24.54	98.07
37	28	F	18	19.8	35.7	58.1	106.4	67.7	72.68	25.11	107.6
38	21	F	18.5	20.2	32.6	57.1	99.4	65.6	70.94	23.56	116.52
39	20	M	19	21	38.9	68	117.9	79.4	73.09	26.79	96.87
40	25	M	18	19.8	37.2	60.9	112.3	78.5	70.99	19.87	116.19

MILD

Sl.No	Age	Gender	Shimbashi Number	CEJ-CEJ In Radiograph	A-B	ANS-Gn	N- Gn	S-Go	Angle N-Go-Gn	Angle ANS-PNS-Mandibular plane(Go-Gn)	Interincisal Angle
1	13	F	15.5	17.1	34.3	54.8	99.2	63.3	73.47	24.69	105.49
2	15	F	14.7	16.1	27.5	54.5	96.8	68.8	65.39	23.61	129.72
3	19	F	15.5	17.1	37.5	64.1	100.9	76.9	72.43	24.45	100.72
4	17	F	15.1	16.7	29.5	53.7	102.2	75.1	65.9	17.51	112.8
5	21	M	15.5	16.9	32.5	63.8	110.8	84.5	63.9	20.15	119.28
6	21	F	15.4	16.9	36.8	60.9	105.9	75.8	67.92	18.94	116.12
7	22	F	15.5	17	31.8	57	103.2	78.8	65.12	17.75	119.1
8	22	M	15	16.6	32.1	58.4	101.3	66.4	68.71	20.25	109.59
9	32	F	15.1	16.6	31.3	59.4	101.1	62.52	73.29	26.64	112.46
10	24	F	15.2	17.7	35.8	59.1	106.9	64.6	71.57	19.94	107.59
11	23	F	15.8	17.3	32.5	59.4	105.5	67.7	72.42	25.47	119.01
12	23	F	15	16.5	35.3	61.7	104	73.1	72.05	22.51	109.47
13	25	M	15.9	17.3	33.7	60.6	99.7	67.8	71.47	22.72	98.99
14	13	F	15	16.2	34.3	62.4	103.8	69	72.71	21.21	110.1
15	31	F	14.6	16.1	39	69.1	115.9	78.4	75.69	26.53	110.49
16	34	F	13.5	14.7	33.4	57.9	101.3	71.3	68.22	18.08	104.96
17	14	M	16	17.5	33.4	58.6	107.5	72.3	70.36	22.96	94.27
18	21	F	13.5	14.9	30.6	55.4	102.8	66.3	69.05	23.11	117.19
19	13	F	15.8	17.1	32.2	52.8	96.1	60.6	64.14	17.77	105.57
20	23	F	14.5	16	35.2	59.9	106.7	69.5	73.79	23.77	98.94
21	23	F	16.2	17.9	32.9	57.9	107.5	82.8	64.1	18.78	117.01
22	18	F	15.1	16.5	31.4	58.9	102.1	62.9	69.18	27.47	93.97
23	16	M	15.5	17	34.7	57.1	101.8	65.2	69.54	22.16	108.23
24	18	F	13.3	14.5	32.3	57.9	99	65.9	68.25	19.35	109.73
25	20	F	15.1	16.6	31.1	57.5	98.3	61.9	71.37	23.93	118.46
26	30	F	15.2	16.7	33.4	58.4	102.7	75.6	68.26	19.64	114.43
27	14	M	15	16.5	37.3	66.2	109.9	74.5	72.3	26.22	101.33
28	25	F	15.2	16.6	33.5	58.1	107.7	65.5	72.85	25.31	107.02
29	15	F	14.9	16.2	30.4	54.1	102.9	71.2	70.9	18.54	103.07
30	16	M	15	16.4	32.5	56.8	101. 4	65.3	69.71	25.32	107.4
31	20	F	15.2	16.6	37.5	61.1	109.1	65.3	70.82	24.32	127.31
32	21	F	15.2	16.7	35	63.6	109.1	69.9	70.81	23.72	115.24
33	24	F	15	16.3	32.5	58.9	106.8	67.7	62.66	20.98	118.7
34	20	F	14.9	16.1	35.4	60.8	107.4	67.1	69.9	21.71	113.4
35	24	F	14.7	16	27	49.7	94.8	65	62.11	16.24	118.29
36	21	F	15	16.1	35.3	60.5	106.7	67.2	70	22.3	108.5
37	24	F	14.5	15.9	32.3	58.9	100.5	69.7	73.37	22.01	98.78
38	20	F	16	17.4	34.8	60.8	100.7	66.1	70.4	25.1	102.94
39	22	F	15.5	17	34.6	55.5	102.9	71.7	63.38	18.24	111.78
40	21	F	16.7	18.3	32.3	60.2	104.7	68.3	70.13	20.19	105.28

MODERATE

Sl.No	Age	Gender	Shimbashi Number	CEJ-CEJ In Radiograph	A-B	ANS -Gn	N- Gn	S-Go	Angle N-Go-Gn	Angle ANS-PNS-Mandibular plane (Go-Gn)	Interincisal Angle
1	13	F	15.5	17.1	34.3	54.8	99.2	63.3	73.47	24.69	105.49
2	15	F	14.7	16.1	27.5	54.5	96.8	68.8	65.39	23.61	129.72
3	19	F	15.5	17.1	37.5	64.1	100.9	76.9	72.43	24.45	100.72
4	17	F	15.1	16.7	29.5	53.7	102.2	75.1	65.9	17.51	112.8
5	21	M	15.5	16.9	32.5	63.8	110.8	84.5	63.9	20.15	119.28
6	21	F	15.4	16.9	36.8	60.9	105.9	75.8	67.92	18.94	116.12
7	22	F	15.5	17	31.8	57	103.2	78.8	65.12	17.75	119.1
8	22	M	15	16.6	32.1	58.4	101.3	66.4	68.71	20.25	109.59
9	32	F	15.1	16.6	31.3	59.4	101.1	62.52	73.29	26.64	112.46
10	24	F	15.2	17.7	35.8	59.1	106.9	64.6	71.57	19.94	107.59
11	23	F	15.8	17.3	32.5	59.4	105.5	67.7	72.42	25.47	119.01
12	23	F	15	16.5	35.3	61.7	104	73.1	72.05	22.51	109.47
13	25	M	15.9	17.3	33.7	60.6	99.7	67.8	71.47	22.72	98.99
14	13	F	15	16.2	34.3	62.4	103.8	69	72.71	21.21	110.1
15	31	F	14.6	16.1	39	69.1	115.9	78.4	75.69	26.53	110.49
16	34	F	13.5	14.7	33.4	57.9	101.3	71.3	68.22	18.08	104.96
17	14	M	16	17.5	33.4	58.6	107.5	72.3	70.36	22.96	94.27
18	21	F	13.5	14.9	30.6	55.4	102.8	66.3	69.05	23.11	117.19
19	13	F	15.8	17.1	32.2	52.8	96.1	60.6	64.14	17.77	105.57
20	23	F	14.5	16	35.2	59.9	106.7	69.5	73.79	23.77	98.94
21	23	F	16.2	17.9	32.9	57.9	107.5	82.8	64.1	18.78	117.01
22	18	F	15.1	16.5	31.4	58.9	102.1	62.9	69.18	27.47	93.97
23	16	M	15.5	17	34.7	57.1	101.8	65.2	69.54	22.16	108.23
24	18	F	13.3	14.5	32.3	57.9	99	65.9	68.25	19.35	109.73
25	20	F	15.1	16.6	31.1	57.5	98.3	61.9	71.37	23.93	118.46
26	30	F	15.2	16.7	33.4	58.4	102.7	75.6	68.26	19.64	114.43
27	14	M	15	16.5	37.3	66.2	109.9	74.5	72.3	26.22	101.33
28	25	F	15.2	16.6	33.5	58.1	107.7	65.5	72.85	25.31	107.02
29	15	F	14.9	16.2	30.4	54.1	102.9	71.2	70.9	18.54	103.07
30	16	M	15	16.4	32.5	56.8	101. 4	65.3	69.71	25.32	107.4
31	20	F	15.2	16.6	37.5	61.1	109.1	65.3	70.82	24.32	127.31
32	21	F	15.2	16.7	35	63.6	109.1	69.9	70.81	23.72	115.24
33	24	F	15	16.3	32.5	58.9	106.8	67.7	62.66	20.98	118.7
34	20	F	14.9	16.1	35.4	60.8	107.4	67.1	69.9	21.71	113.4
35	24	F	14.7	16	27	49.7	94.8	65	62.11	16.24	118.29
36	21	F	15	16.1	35.3	60.5	106.7	67.2	70	22.3	108.5
37	24	F	14.5	15.9	32.3	58.9	100.5	69.7	73.37	22.01	98.78
38	20	F	16	17.4	34.8	60.8	100.7	66.1	70.4	25.1	102.94
39	22	F	15.5	17	34.6	55.5	102.9	71.7	63.38	18.24	111.78
40	21	F	16.7	18.3	32.3	60.2	104.7	68.3	70.13	20.19	105.28

SEVERE

Sl. No	Age	Gender	Shimbashi Number	CEJ-CEJ in Radiograph	A-B	ANS-Gn	N-Gn	S-Go	Angle N-Go-Gn	Angle ANS-PNS-Mandibular plane(Go-Gn)	Interincisal angle
1	20	F	13.7	15.2	31.8	51.7	92.4	65.4	64.96	19.01	106.22
2	24	F	11.5	12.5	31	57.1	102	72.8	67.3	20.89	137.57
3	22	F	14.1	15.6	34	59.8	111.9	67.8	69.59	20.34	113.11
4	37	F	13.1	14.5	31.3	55.4	96	62.1	68.06	21.57	103.17
5	55	F	13	14.3	30.6	53.4	98.7	70.7	65.97	17.37	121.84
6	41	F	14.5	16	36.3	59.1	109.1	70.8	74.86	27.63	120.16
7	45	F	14.58	15.9	32.3	50.7	97	60.2	69.37	21.62	89.22
8	24	F	14	15.4	34.5	56.5	99.5	67	66.88	18.58	104.04
9	22	F	12.6	13.8	31.3	57.7	101.5	68.1	65.44	21.41	139.94
10	40	F	13	14.2	35.3	57.1	97.4	59.6	72.08	26.26	103.32
11	15	F	10	11	30.3	52.7	100.2	68	65.89	19.33	118.37
12	34	F	15	16.6	34.8	65.3	107.6	70.6	73.13	31.08	109.99
13	18	F	14	15.5	35.5	62.1	110.9	72.2	73.83	28.86	144.54
14	47	F	13.8	14.7	38.3	64.6	103.6	72.2	67.63	26.72	123.99
15	19	F	15.5	16.9	31.5	54.5	100.5	65.6	70.8	23.74	128.92
16	20	F	14.7	16.2	31.9	55.1	102.8	69.7	72.17	20.54	118.66
17	20	F	14	15.6	29.7	54.1	103.7	72.9	68.16	17.19	120.92
18	53	F	15.03	16.6	34.1	60.9	106.5	62.5	72.87	29.6	103.52
19	23	F	13	14.3	33.6	63	111.3	77.9	71.73	25.29	139.26
20	19	M	12.3	13.6	34.4	61.3	110.6	78.9	67.63	25.66	120.7
21	54	F	12.9	14.1	29.9	54.5	96	66.3	62.77	20.73	125.96
22	60	F	12.39	13.5	32.2	55.9	100	67.2	68.07	20.05	130.63
23	45	F	14.2	15.7	38.8	64.5	105.1	67.7	77.68	32.51	128.1
24	16	F	14.1	15.6	30.9	52.2	92.6	65.8	62.88	16.23	120.95
25	35	F	14.4	15.7	31.9	61	102.3	63.6	72.68	31.28	112.33
26	44	F	13	14.3	34.5	59.7	103.8	71.6	70.27	24.23	130.74
27	24	F	13.7	14.8	26.5	52.8	93.2	66.6	67.13	18.06	120.79
28	20	F	14.2	15.7	28.6	55	94.9	80.1	58.06	17.58	117.38
29	22	F	14.5	16.1	35.4	63	112.3	70.9	75.27	23.94	111.85
30	24	F	14.6	16.1	38.4	62.2	106.8	66.8	70.4	23.57	117.32
31	55	M	12.9	14.1	29.9	54.5	96	66.3	62.77	20.73	125.96
32	46	F	12.39	13.5	32.2	55.9	100	67.2	68.07	20.05	130.63
33	33	F	14.2	15.7	38.8	64.5	105.1	67.7	77.68	32.51	128.1
34	48	F	14.1	15.6	30.9	52.2	92.6	65.8	62.88	16.23	120.95
35	31	F	14.4	15.7	31.9	61	102.3	63.6	72.68	31.28	112.33
36	50	F	13	14.3	34.5	59.7	103.8	71.6	70.27	24.23	130.74
37	30	F	12.6	13.8	31.3	57.7	101.5	68.1	65.44	21.41	139.94
38	35	F	13	14.2	35.3	57.1	97.4	59.6	72.08	26.26	103.32
39	23	F	13.7	15.2	31.8	51.7	92.4	65.4	64.96	19.01	106.22
40	32	F	14	15.5	35.5	62.1	110.9	72.2	73.83	28.86	144.54