A COMPARATIVE STUDY OF CEPHALOMETRIC HARD TISSUE PROFILE ANALYSIS BETWEEN TWO ETHNIC POPULATION

(CAUCASIAN AND TAMIL)

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CERTIFICATE

This is to certify that this dissertation titled **"A COMPARATIVE STUDY OF CEPHALOMETRIC HARD TISSUE PROFILE ANALYSIS BETWEEN TWO ETHNIC POPULATION (CAUCASIAN AND TAMIL)"** is a bonafide record of work done by **Dr. S. SAKTHIVEL** under our guidance and to our satisfaction during his postgraduate study period **2008-2011.**

This Dissertation is submitted to **THE TAMILNADU Dr. M.G.R. MEDICAL UNIVERSITY,** in partial fulfillment for the award of the Degree of **MASTER OF DENTAL SURGERY– ORAL AND MAXILLOFACIAL SURGERY,BRANCHIII.** It has not been submitted (partial or full) for the award of any other degree or diploma.

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LIST OF ABBREVIATIONS USED

A	Subspinale
ANS	Anterior nasal spine
Ar	Articulare
B	Supermentale
Gn	Gnathion
Go	Gonion
HP	Horizontal reference plane
Me	Menton
MP	Mandibular plane
N	Nasion
NF	Nasal floor
OP	Occlusal plane
Pg	Pogonion
PNS	Posterior nasal spine
PTM	Pterygomaxillary fissure
S	Sella

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INTRODUCTION

India is composed of diverse ethnic groups and to do an acceptable orthognathic surgery treatment planning for every group of people is important. This study is a cross sectional study which is a gateway to conclude upon the normal hard tissue values of Tamil Nadu population. These values will give an edge in diagnosis and treatment planning for this prestigious population.

1931 Angles orthodontics - Broad Bent BH [1,] introduced Roentgenographic cephalometry, mainly as a tool to study craniofacial growth and development. Since that time cephalometric analysis have been routinely used to determine the relationships of the dentofacial complex[2]. Cephalograms also helps to determine the changes associated with growth and treatment[3].Facial appearance is of prime concern, and hence more people are opting for orthognathic surgery. The successful treatment of the orthognathic surgical patient is dependent on careful diagnosis and planning. Cephalometric analysis can aid in the diagnosis of skeletal and dental problems and is a tool for simulating surgery and orthodontics.

The first step in the diagnosis of Orthognathic surgical patient is to determine the nature of the skeletal and dental defects.

For this reason, a specialized cephalometric appraisal system called cepahlometric for orthognathic surgery (COGS) by Burstone CJ et al in 1978 was developed. This cephalometric analysis was based on the landmarks that can be altered by various surgical procedures.

Beauty has changed over the centuries and differs from one race to another but it has always been a subject of interest and importance to people of all culture . Cephalometric norms for different ethnic and racial groups have previously been established in many studies. Most investigators have concluded that there are significant difference between the diverse ethnic and racial groups and many cephalometric standards have been developed for different racial groups must be treated according to their own characteristics.

Various attempts have made to Investigate the differences in facial features among ethnic groups including American – blacks[6,] Australian Aboriginals[7], Chinese[8], Japanese[9],Koreans[10] and Indians. Further studies have been done among Indians[11 12 13] population and norms for Keralities [11]by Ashima Valatham and North Indians [12] by Nanda have been developed. From these review it could be concluded that there are differences in dentofacial relationships of various ethnic and racial group. In literature, a vast wealth of information is available concerning norms for Caucasians. Very

little information is available for this prestigious ethnic group, the Tamil population. So it has become persistent to determine cephalometric parameter for this ethnic group. In Ragas Dental College located in Uthandi, Chennai, Tamil Nadu.

The purpose of this study is to identify the normal values for hard tissue profile . The study was conducted on adults of Tamil Nadu state with about 54 patients in Ragas Dental College, Chennai.

It was difficult to differentiate Tamil population in Tamil Nadu as it had people from all over the Dravidian state like Andhra Pradesh, Karnataka and Kerala. So to be specific we had to stick on to the communities specific to this particular ethnic population. Pure Brahmins and other state communities were excluded. The candidate or the volunteer should be native of Tamil Nadu for 3 generations belonging to the same communites for all three generations. This details was confirmed by questionnaire set to the candidate.

AIM AND OBJECTIVES

AIM

- Is to study and compare, the cephalometric hard tissue profile values and analysis between Tamil and Caucasian population.

OBJECTIVE

- To create a better understanding in the facial proportions of Tamil nadu population.
- To have better diagnosis and treatment planning for orthognathic surgery for Tamil population in Tamil nadu

REVIEW OF LITERATURE

A study was conducted by (Bushra E.1948)[14] of the variations and relations of component of the craniofacial skeleton on 40 individuals with excellent dental occlusion using lateral cephalogram. This investigation showed that no plane, angle or relationship was invariable enough to be used as an infalliable diagnostic guide. It was concluded that tendencies noted should be helpful in establishing a tentative base for the analysis and prognosis of malocclusion.

A comparative study on three ethnic groups; (Cotton WN, October 1951)[15] the American Chinese, the Negroes and the Nisei (American born Japanese) to the Down's Caucasian standards was conducted. Each group constituted 20 individuals. The American Chinese had a higher mandibular plane angle, Y-axis and a vertical growth tendency followed by the Negro sample and Nisei sample. He found that in the Nisei group skeletal pattern only the angle of convexity and the Y-axis differed in mean value from that of white by significant amount. The denture was significantly more protrusive in the Nisei group than in the Caucasian group.

A method of direct integumental analysis, employing angular readings that describe profile components to the skull as a whole

(inclination angles) and to each other (contour angles) were presented(Burrstone CJ. 1958)[16] . These readings were made from oriented lateral head plates exposed to show both hard and soft tissue detail and also described the average morphology and variation of acceptable profiles. The hypothesis explored that average inclination, contour, and proportion is related to profile excellence. Graphic comparison of sample by use of the integumental profile grid expedites the analysis of malocclusion deformity and the study of soft tissue changes occurring during growth and treatment.

A study was conducted to compare cephalometric measurements of a living tribe of Central Australian Aboriginals with those of other living races. Lateral cephalograms of 56 Australian aboriginal children and young adults were obtained (Craven AH Jan 1953)[7]. They were divided into two age groups a young group with mean age of 7.5 years (12 males and 15 females) and an adolescent group with mean age of about 15 years (9 males and 20 females). Measurements from the Downs analysis of the Australian aboriginals was compared with Swede, American White, American Negro, Nisei and American Chinese and significant interracial variation was determined. It was concluded that the character of Australian aboriginal had pronounced alveolar prognathism.

A study was conducted (Altemus LA. October 1960)[17] on 80 North American Negro children to determine the frequency of the incidence of malocclusion in this race. Cephalometric x-rays were taken and Down's analysis was done. There were definite and measurable differences in the configurations or facial patterns of various North American racial groups, namely Negro Caucasian, Chinese and Japanese.The size of heads and faces of North American Negro Children seemed to be larger and they had dental prognathism compared to North American Caucasian children of same age. The facial pattern of Negro seems to have larger lower facial height than the upper facial height, the corpus of the mandible is larger than the anterior cranial base, the palatomandibular angle is larger than the palatosupraorbital angle. The differences in the craniofaciodental complex between Negroes, Caucasians and other racial groups have been pointed out and analysis of these differences seems to indicate that the norms and standards of one racial group cannot be used without modification for another racial group.

A study was conducted on cephalometric radiographs of fourty American Negro (Drummond RA. September 1968)[18]. Comparison of craniofacial values between the North American Negro and the Caucasian using the Salzmann's analysis was done. He concluded that the primary difference was bimaxillary dental

protrusion, the steep mandibular plane and the anterior placement of the maxilla in American Negro population compared to Caucasians

A study was conducted to establish norms for Indians (Nanda R, Nanda RS. January 1969)[12]. Since India is a subcontinent with a large number of racial subgroups and several religion and interracial mixtures. It was proposed to study only the individuals derived from a North Indian Hindu population. The study of dentofacial patterns in Lucknow group was done. They concluded that skeletal norms obtained on the Lucknow Hindus were almost similar to the American White, but the dental pattern were more protrusive than American White. Comparison of the means obtained on male and female groups of the present study revealed a protrusive skeletodental pattern in the females. The norms of the North Indian (Lucknow) Hindu females when compared with the norms from Gujrathi (Western India) females showed that Gujarati females had a more protrusive dental pattern although the skeletal patterns of the two samples were almost identical.

A study (Choy OWC. Apr 1969)[19] on lateral cephlograms of skulls of pure Hawaiian origin was conducted. Tracings were made and Bjork, Downs, Steiner and Tweed analysis was done. The Hawaian exhibited greater alveolar prognathism than the white groups in the study and less prognathism compared to non-white ethnic groups which included the Bantu of Africa, the Australian

aboriginal, the American Negro, the American Japanese, the American Chinese and the Japanese.

A cephalometric study was conducted on fifty new Mexican Americans with excellent occlusion by means of the Downs, Steiner and Alabama analyses(Garcia CJ. July 1975)[20]. Norms were established for this sample and then compared to the Caucasian norms. Skeletally it was protrusive, lower incisor was more labilally inclined, upper incisior was more procument and interincisal angle was more acute than that of the Caucasians.

A study was conducted on racial comparison of dentofacial cephalometric norms using Down's analysis(Valiathan A. Nov 1975)[13]. The comparison of the racial data showed considerable similarity in the skeletal patterns of the Caucasians, Indians, Japanes and the Negroes. The Chinese differed from the other groups in the retrusiveness of the Chin and a Class II skeletal pattern. The Indians Chinese, Japanese and the Negroes had more procumbent teeth, in general, than the Caucasians.

A study was performed (Fonseca RJ, Klein WD. February 1978)[6] on Forty American Negro women with an average age of 24.6 years and a class I molar and or Class I canine relationship. When measurements were compared to a control population of twenty

Caucasian women, using several standard analysis, significant differences were demonstrated between the sample population. Different cephalometric norms were found to be necessary for the treatment of Negro and Caucasian Population.

Cephalometric radiographs of 30 northern European people were analysed (Burstone CJ, April 1978)[4]. Cephalometric analysis was designed especially for this group who require maxillofacial surgery. Normative standards based on landmarks that can be altered by various surgical procedures was given. He concluded that these rectilinear measurements examine critical facial components that can be readily transferred to acetate overlays and study casts for detailed planning of treatment and postsurgical evaluation.

A study was conducted on 144 Caucasioid males and 124 Caucasoid females to examine sexual dimorphism in both angular and linear variables of the human skull (Bibby RE. September 1979)[21]. Lateral cephalometric radiographs were taken and were traced on acetate paper and the landmarks were recorded. All measurements were repeated to eliminate as far as possible the error of technique. The findings were than subjected to statistical analysis. It was concluded that female cranial dimensions were smaller than the corresponding dimensions in the male and the pattern of craniofacial morphology in males and females appeared to

be identical except in posterior facial height. In general, male skulls were 8.5 percent larger than female skulls.

A study was conducted 40 Caucasians (Legan HL, Burstone CJ. Oct 1980)[5] and designed soft tissue cephalometric analysis was designed for the patient who requires surgical orthodontic care. It was developed to complement a previously reported dentoskeletal analysis. They concluded that it a prime objective of orthognathic surgery is facial improvement, soft tissue analysis becomes paramount in treatment planning.

A comprehensive cephalometric analysis on normal adults were done by examining a carefully selected subject group (Selfeideman 1980)[23]. Fifty six adult Caucasians with Class I skeletal and dental relationships and good vertical facial proportions were analysed morphologically with a computerized craniofacial model. By the incorporation of a large number of soft tissue measurements, facial profile and proportionality were analysed and compared with methods that are presently used to evaluate facial esthetics. The data provide relevant measurements that are useful in the diagnosis and treatment of adults with dentofacial deformities. Horizontal soft-tissue chin prominence was nearly equal for males and females relative to subnasale, soft-tissue nasion and glabella.

A study was conducted on seventy-two subjects of native Japanese population ranging in age from 5 to 26 years(Engel G, July 1981)[24] Frontal and lateral cephalograms were taken and measurements wereanalysed. A new set of cephalometric and visual craniofacial norms for native Japanese patients between the ages of six and eighteen years was developed which could be used in diagnosis and treatment planning of the native Japanese population. Formulations of the Japanese norms allows for a comparison of cephalometric measurements between the Japanese and the Caucasian population and one of the major findings was that the Japanese people appear to have more protrusive dentition and also have longer and wider noses than their Caucasian counterparts.

A study was conducted (Hajighadimi M, February 1981)[26] on craniofacial characteristics of sixty-seven Iranian children (thirty five girls and thirty two boys). Lateral cephlograms were taken for children with teeth in centric occlusion. The tracing were done using Tweed and Steiner analysis. The skeletal pattern of the Iranian group was more retrusive than that of the American Caucasian group and had a straighter bony profile because of retrusion of the apical bases of the maxilla and mandible. The mandibular plane and the occlusal plane angle were higher in this racial group. Lastly, dental pattern was found to be more procumbent than Caucasians.

A study was conducted on basic anatomic relationships among the middle cranial fossa, the mandibular ramus, the maxillary and mandibular bony arches, and the nasomaxillary complex on180 Black people (Enlow DH, 1982)[25]. Anatomic relationships were evaluated in radiographic samples of 118 Class 1, 46 Class II and 16 Class III black individuals and compared with Caucasian craniofacial composites. Major differences were found especially in those underlying with Class III malocclusion.

A study was conducted to establish the cephalometric standard for Cameroonian Africans (Bacon W, Girardin P, 1983)[27]. Comparison was done between 40 young Cameroonian Africans and 40 white French students aged between 20 and 30 years, all of them had good Class I occlusion. Lateral cephalometric radiographs were taken and analysis based on Ricketts analysis was done. A factorial analysis of correlation was undertaken to detect the main discriminant factors in the two groups. Numerous variable characteristic of the lento maxillofacial architecture are significantly different in the two races. The position and the angulation of the incisors appeared to be the differentiating factor. Higher values for convexity, ANB angle, SNB angle and lower face height were representative racial characters in the Bantu.

A study was conducted on dentofacial cephalometric analysis in adult Greeks with normal occlusion (Haralabakis B, 1983)[28]. Subjects evaluated included 203 students in the dental, school of the University of Thessaloniki. There were 116 males and 87 females. Cephalometric radiographs were taken and average values of eight cephalometic angles were determined. The sex differences were small and not significant. The lower incisor angle and the interincisal angle in males were greater. The labial inclinaltion of the incisors were slightly greater in females than in males.

A study was conducted on (Valiathan A, John KK. 1984)[11] the applicability of Apollo profile line, Holdaway line and the Burstone soft tissue analysis of 50 Kerala people. The Burstone analysis showed a midfacial prominence of the soft tissue. The Holdaway line showed slight prominence of the lower lip. The Apollo line could not be used on adults from Kerala without modification. The upper lip, lower lip and the subnasale were prominent in the Kerala group. Norms were established for soft tissue cephalometric analysis of adults from Kerala.

A study was done to develop cephalometric standards for North Mexican male and female adolescents (Bishara SE, 1985)[3]. The subjects evaluated in the study included 81 North Mexican people (36 boys and 45 girls) and 35 people from Iowa (20 boys and

15 girls). Cephalometric radiographs were taken and the skeletal angular relationships, skeletal linear relationships, dental angular relationships, dental linear relationships and the soft tissue profile relationships were anlaysed and comparisons between the groups was done. Significant differences between boys and girls of two groups were present. In the North Mexican population, the boys had more convex soft tissue profile than the girls. When comparisons were made between the two populations, there was absence of significant differences in boys but adolescent North American girls had more protrusive mandible than the adolescent Iowa girl.

A study was conducted on 50 white adults and 50 black adults (Connor.AM, February 1985)[29] to establish orthognathic surgery norms for black patients in order to alleviate the inaccuracy of using white norms on these patients. Lateral cephalometric. radiographs were taken and comprehensive analysis was done to assess the differences. Lateral cephalometric measurements were established for adult blacks (male and female) to aid in the diagnosis of potential orthognathic surgery patients. These norms were also compared with previously established measurements.

A comparative cephalometric investigation (Argyropoulos E, 1986)[22] between modern and ancient Greeks to determine craniofacial characteristics was conducted and to examine the

significance of ethnic heritage. The modern sample was composed of 54 individuals chosen on the basis of ethnic background, normal occlusion and facial harmony. The ancient sample consisted of 40 skulls with normal occlusion dated back to the Minoan civilization (Ca 1,800-1,200 BC). Comparison was done by Sasouni's composite superimposition analysis. A remarkable similarity in craniofacial morphology was revealed between the two groups, suggesting a close genetic affinity between modern and ancient Greeks. The degree of similarity between the two Greek samples is greater than it has been between ancient Greeks and the other modem races of the Eastern Mediterranean, which were used as the control samples.

A comprehensive cephalometric comparison between 12 year old Southern Chinese and Caucasian 12 year old male children in natural head position was conducted (Cooke MS, Weishy.1989)[8]. By superimposing on true vertical they concluded that there is significant intergroup differences in both dentoskeletal and soft tissue profile variables.

A study was conducted (Argyropoulos E, Sassouni V. 1989)[30] to compare Greek and American-Caucasian dentofacial patterns and provide information on the facial characteristics of Greek adolescents. The cephalometric radiographs of 54 Greek subjects which included 30 girls and 24 boys and 57 American-Caucasian

subjects which included 29 boys and 28 girls were analysed using downs and Sassouni's analysis and composite superimposition method was used The Greek dentoskeletal configuration is characterized by a prognathic profile. The entire degree of prognathism was located in the mandible with mandibular protrusion.

A study was conducted to determine normal values for the cephalometrics for orthognathic surgery (COGS) analysis for American black adults (Fynn TR, Ambrogio RI, Zeichner SJ. 1989)[31]. The cephalometric radiographs of 33 black American adults with ideal dentitions were analysed, and a statistical description of their hard and soft tissue cephalometric measurements were compared with those of white American adults. In black subjects, there was greater maxillary skeletal prognathism, skeletal lower facial height, skeletal facial convexity, lower incisor proclination, anterior dental heights, upper and lower lip lengths, and soft tissue thickness of the lips and chin than in white subjects. There was less nasal depth and projection, less bony chin depth and a smaller nasolabial angle in black subjects.

A study was conducted on a group of 32 North American black patients (Jones OG. 1989)[32] with open bite and compared them to the North American black norms established by Altemus

and Drummond and to white population norms established by Steiner. In addition, values were established for black patients by use of the overbite depth indicator of Kim. The method involved tracing of lateral cephalometric radiographs of all patients with anterior open bite using the analyses of Tweed, Steiner and Kim. Evaluation of cephalometric features of North-American black patients showed that the maxilla was normally positioned but the mandibular position tended to be retrusive to the cranial base. The upper and lower incisors were procumbent with an acute interincisal relationship and the lower facial height was greater and the mandibular plane angle was smaller than the white population standards. The overbite depth indicator of Kim was smaller for this group than for the white population studied.

A study was conducted to develop cephalometric standards for the Egyptian adolescent boys (Bishara SE, Abdalla EM, Hoppens BJ . 1990)[33] and to compare them to a matched Iowa adolescent sample. The Egyptian sample consisted of 39 boys and 51 girls and Iowa sample consisted of 33 boys and 22 girls. Basic descriptive statistics were calculated on 35 Cephalometric dentofacial parameters. Comparisons between the Egyptians and the Iowans indicated that the Egyptian boys have a tendency toward bimaxillary dental protrusion and a decreased overbite as compared with the Iowa boys. The Egyptian girls have a relatively convex profile and a

tendency toward mandibular dental protrusion. It was eluded that there is a similarity in the overall facial morphology between the Egyptian and the Iowa populations.

The submentovertex cephalograms of 32 healthy Chinese male subjects of mean age 20.1 ± 1.9 with no significant medical and dental histories were selected randomly for the study (Lew KKK, Tay DKL. 1993)[34]. These subjects had a Class I dental occlusion with no symptoms related to the temporomandibular joints. The 5 angular and 10 linear measurements of the Lew-Say Submentovertex cephalometric analysis provided norms for men of the Chinese racial type with the horizontal and vertical reference planes derived from the right and left foramina spinosum. This new submentovertex cephalometric analysis could provide clinically relevant information in the treatment of dentofacial orthopedics and facilitate in the diagnosis of mandibular asymmetry.

Cephalometric radiographs of 217 Japanese adults (Alcalde RE, Jinno T, Pogrel MA, Matsumara T. 1998)[9] were analysed and compared with normative value given by Burstone CJ et al. It was concluded that cephalometric norms are specific for the racial group but these values should not interpreted as treatment goals. Treatment planning of orthognathic surgery has to be made according to the needs and expectations of each individual patient.

Study was conducted (Anderson AA, Anderson AC, Hornbuchie AC, Hornbuckle K. 2000)[35] to determine normal range of anteroposterior apical base differences and concomitant interincisor inclinations and locations. It was derived from a sample of American children of African descent with age ranging from 12 to 16 years with normal occlusion. Standard cephalometric radiographs of 40 boys and 40 girls were traced and the Steiner Analysis performed. In addition to the ANB angle, six supplemental anteroposterior apical base separation estimators were measures, mean values established. The range anteroposterior apical base difference was -0.5° to 9.5° estimated by the ANB angle or a linear distance of ±6.5 mm using the Wits Appraisal. The angular and linear distance of the upper incisor to NA line (compensations) ranged from 12° and 3 mm to 39° and 14 mm. The angular and linear distance of the lower incisor to the NB line ranged from 17° and 3 mm to 47.5° and 17.5 mm. The results suggested a wide range of equally acceptable sagittal apical base relationships and associated compensations in upper and lower incisor inclinations, viewing normal occlusion as the reference point.

A study (Erbay EF, Caniklioglu CM. 2002)[36] was conducted to examine the soft tissue analyses of Steiner. Rickett, Burstone, Sushner, Holdaway and Merrifield and evaluate orthodontist's perception of Anotolian Turkish adults beauty. The material

consisted of lateral cephalometric radiographs and coloured slides of the facial profiles of 44 adults (21 females and 23 males) who were originally from Anatolia and were living in Republic of Turkey. The results demonstrated that persons having a high mandibular plane angle, a small nose, protrusive lips, and a retrusive profile were selected as attractive. Among the seven esthetic lines used to evaluate the soft tissue profile, only Rickett's norms for upper and lower lip corresponded to the values found for attractive profiles.

A study was conducted to analyse facial features of 60 Korean and 42 European - American adults. Comparison of soft tissue profiles obtained by two groups with normal occlusion and well balanced faces was made (Hwang HS, Kim WAS, McNamara JA. 2002)[37]. They concluded that differences between ethnic group should be taken into consideration when formulating an orthognathic treatment plan for patients of varying ethnic background.

A study was conducted to determine Holdaway soft tissue standards for Antaolian Turkish adults (Basciftci FA, Uysal T, Buyukermen A. 2003)[2]. Lateral cephalometric radiographs of 175 patients, 90 men and 85 women, selected from the dental students at Selcuk University, Konya, Turkey. After analysing these

radiographs, 105 subjects (55 men, mean age 22.61 and 50 women, mean age 22.14) with normal anteroposterior and vertical skeletal relationships were selected for the study. Ten linear and two angular measurements were analyzed on each radiograph. The landmarks were located according to the definitions of Holdaway. For each variable, the arithmetic mean and standard deviation were calculated. For statistical evaluation, an independent samples test was performed. Most tissue measurements were similar to Holdaway norms. Some differences for soft tissue chin thickness and basic upper lip thickness were noticed. The comparisons were made between the sexes, some significant differences between men and women were noticed. On average, men have relatively prominent and soft tissue chins and greater upper lip thickness than do the women. According to these results, new Anatolian Turkish soft tissue norms are recommended to Turkish orthodontists for diagnosis and treatment planning.

A study was conducted (Johannsdottir B, Thordarson A, Magnusson TE. 2004)[38] to describe the craniofacial characteristics of Icelandic adults on lateral skull cephalograms. The material consisted of 155 males and 169 females. The mean ages were 35.5 and 34.2 years respectively. Twenty two skeletal reference points and eleven soft tissue points were digitized and processed by standard methods with the Dentofacial Planner® computer software

program. The 45 variables calculated were both angular and linear. Two samples t-tests were used to study the differences between sexes. Mandibular prognathism was significantly greater in males ($P \leq 0.05$), but the incliniation of both the upper and lower jaws was greater in females ($P \leq 0.01$), Linear measurements were usually larger for females. The lips were less protrusive in males ($P \leq 0.01$), but the thickness was greater compared with females ($P \leq 0.001$). The nose was significantly more protrusive in males ($P \leq 0.001$). When the Icelandic sample was compared with closely related ethnicgroups, such as the Swedes and the Danes, it was interesting to note that the Icelanders seem to be more like the Swedes than the Danes.

A study was conducted to provide description of the craniofacial morphology of Singaporean Chinese children and to compare gender differences (Yeong P, Huggare J. 2004)[39]. Lateral cephalometric radiographs were obtained of 81 Singaporean Chinese children (31 boys and 50 girls) with Class I incisor relationship. The radiographs were traced and landmarks were digitized and the analysis were done using the Neodigiplot computerized cephalometric analysis software. A comparison of the gender showed that girls had greater maxillary and mandibular protrusion, but the upper and lower incisor inclinations were reduced. In addition, girls showed reduced facial convexity and reduced upper

lip prominence. Pogonion to nasion perpendicular was greater for boys. Girls showed tendency towards a Class III skeletal pattern. The boys had longer cranial base lengths and anterior and posterior face heights. The data provide useful reference cephalometric values for Singaporean Chinese children.

A study was conducted (Soh J, Chew MJ, Wong HB. Orthop 2005)[40] to compare the perception of male and female Chinese facial profile esthetics between dental professionals, dental students, and laypersons. The sample comprised 31 dental professionals (20 orthodontists, 11 oral surgeons), 92 dental students and 152 laypersons in an Asian community. The facial profile photographs and lateral cephalometric radiographs of a Chinese man and a woman, each with a normal profile, a Class I incisor relationship, and a Class I skeletal pattern, were digitized. The digital images were modified to obtain seven facial profiles for each sex. The seven profiles were bimaxillary protrusion, protrusive mandible, retrusive mandible, normal profile (class I incisor with Class I skeletal pattern), retrusive maxilla, protrusive maxilla and bimaxillary retrusion. Normal and bimaxillary retrusion Chinese male and female profiles were perceived to be highly attractive by all three groups. Profiles with a protrusive mandible were perceived to be the least attractive. Dental professionals, dental students, and laypersons were highly correlated for the perception of male and

female profile esthetics. All correlation coefficients were found to be significant for the perception of female profiles, but for male profiles, only the correlation coefficient between dental students and laypersons was significant. Chinese male and female profiles that were normal or had bimaxillary retrusion were perceived to be highly attractive by dental professionals, dental students, and laypersons, and profiles with a protrusive mandible were perceived to be the least attractive. Dental students and laypersons were more tolerant of a male profile with a retrusive mandible than were dental professionals, and all groups were more tolerant of bimaxillary protrusion in women than in men. Dental professionals, dental students and laypersons had a similar trend in male and female esthetic preferences. The perception of female profiles by all three groups was highly and significantly correlated. Only the perception of male esthetics by dental students and laypersons was not significantly correlated with dental professionals.

A study was conducted to compare the assessments of Chinese facial profile attractiveness by orthodontists and oral surgeons (Soh J, Chew MJ, Wong HB. 2005)[41]. The sample comprised 31 dental professionals (20 orthodontists, 11 oral surgeons) in an Asian community. Facial profile photographs and lateral cephalometric radiographs of 2 Chinese adults (1man, 1woman) with normal profiles. Class I incisor relationships, and Class I skeletal patterns

were digitized. The digital images were modified by altering cephalometric skeletal and dental hard tissue Chinese normative values in increments of 2 standard deviations in the anteroposterior plane to obtain a 7 facial profiles for each sex. The images were bimaxillray protrusion, protrusive mandible, retrusive mandible, normal profile (Class I incisor with Class I skeletal pattern), retrusive maxilla, protrusive maxilla, and bimaxillary retrusion. The Mann-Whitney U test was used to determine professional differences in assessment. Multiple regression analysis was performed with age, professional status, sex and number of years in practice as independent variables. A strong correlation was found in the profile assessment between orthodontists and oral surgeons. Normal and bimaxillary retrusive Chinese male and female profiles were judged to be highly attractive by orthodontists and Oral surgeons. Chinese male and female profiles with protrusive mandible was judged the least attractive. There was a difference in professional opinion about the most attractive male profile ($P< .05$), with orthodontists preferring a flatter profile and oral surgeons preferring a fuller normal Chinese profile. Sex of dental professionals and number of years in clinical practice were found to affect profile rankings.

A study was conducted to establish cephalometric norms from submentovertex (SMV) radiographs for young Anatolian Turkish

adults and to identify possible sex differences between men and women (Uysal T, Malkoc S 2005)[42]. SMV cephalograms were taken of 50 nongrowing Turkish adults which included 25 men with mean age of 23.06 ± 2.30 years and 25 women with mean age of 22.10 ± 2.04 years. All had normal occlusions and well-balanced faces. Five angular and 10 linear measurements were made one each radiograph. For each variable, arithmetic mean and standard deviation minimum and maximum values were calculated. Independent sample t tests were performed for the sex comparisons. Cephalometric angular and linear norms for Turkish adults were determined by using the Lew-Tay SMV cephalometric analysis. SMV cephalometric standards for Turkish adults were also developed. Most Turkish SMV cephalometric measurements showed statistically significant sex differences. Comparison between Turkish men and women indicated larger measurements for men in all investigated linear measurements. SMV cephalometric norms are useful in the diagnosis of mandibular asymmetries and' the treatment of dentofacial orthopedics in Turkish patients.

MATERIALS AND METHODS

METHODOLOGY

Source and Method of Collection of Data:

This study was conducted in Ragas Dental College & Hospital Chennai Tamil Nadu. The patients and their attendants who reported to Ragas Dental College & Hospital in the period between 1st November 2008 to 31st October 2010 were selected.

Sample constituted 54 individuals which included 28 males and 26 females with age ranging from 18 to 35 years were enrolled for the study consecutively who met inclusion and exclusion criteria. They were selected on the basis of their class I molar occlusions and well balanced facial profile. The adults of Tamil Nadu origin residing in Tamil Nadu were included in the study. Lateral cephalograms were taken for each subject included in study with their consent.

A prestructured proforma was used to collect the relevant information and record cephalometric measurements for each subject.

CRITERIA FOR THE SELECTION OF THE SAMPLE:

The subjects were selected for the present study based on the following criteria.

Inclusion Criteria:

- Person who were native of Tamil Nadu.
- Class I occlusion with acceptable profile.
- Full complement of permanent teeth with proper intercuspation.
- Normal limits of overjet and overbite.
- Presence of only negligible crowding, rotations and spacings.
- The candidate should be in Tamil Nadu and should be settled in Tamil Nadu for three generations who belongs to the communities of Tamil Nadu.

Exclusion Criteria:

- Person with major dental and skeletal discrepancy like syndromic patients and gross class II and class III skeletal and dental patterns.
- History of trauma, fracture in maxillofacial region.
- History of orthodontic treatment, orthognathic or plastic surgery.
- People belonging to other state communities like Reddy from Andhra Pradesh, Nairs from Kerala , Goudas from Karnataka where excluded.

Lateral cephalometric radiographs were taken for 54 people who were native of Tamil Nadu and met the above mentioned criteria. Radiographs were taken in natural head position with the teeth in maximum intercuspation and lips in repose.

STANDARDIZATION OF THE CEPHALOMETRIC TECHNIQUE : ARMAMENTARIUM:

Standardized 8”x10” Kodak TMX-5 lateral radiographic head films with intensifying screen were used for each subject on Orthoralis – Model 9200 advanced panoramic and cephalometric equipment, Gendez Dental Systems, Italy, which is a class I and type B electromedical X-ray equipment according to IEC 601-1 (1998).

The X-ray source to subject distance was kept at a constant distance of 5 feet. The film was kept at a constant distance of 16 cm away from the midsagittal plane of the subject oriented in Natural Head Position.

A rectangular mirror was hung on the wall facing the cephalostat at a distance of 5 feet from subject and at a height of 6 feet from the ground.

METHOD OF OBTAINING THE LATERAL CEPHALOGRAM IN NATURAL HEAD POSITION:

The subject was made to stand on the raised cephalostat with feet at a comfortable distance apart and slightly diverging. The subject was asked to look into the reflection of the subject's own eyes in the mirror, located on the wall facing the cephalostat at a distance of 5 feet. The midsagittal plane was aligned so that sagittal plane is parallel to the cassette. The cephalostat was then brought down into position and locked. Both the ear rods were then lightly placed into the external auditory meatus of the subject. This ensures the stability of the transverse plane. The Nasion holder of cephalostat was gently placed on the bridge of the nose to stabilize the head in the vertical plane. The vertical and horizontal alignment of the film cassette were checked. The subjects were then asked to swallow and bite into centric occlusion with lips in the relaxed position.

The film was exposed while operating the cephalostat at 70 KV for small statured patient. 74KV for medium statured patient and 78 KV for well built patient. Film exposure time was kept constant at 0.8 seconds. The subject was then released from the cephalostat. All the exposed films were developed and fixed manually by a single technician using standard procedure.

CEPHALOMETRIC ANALYSIS:

Cephalometric analysis for orthognathic surgery for hard tissue given by Burstone is used.

- Sella (S), the center of the pituitary fosse.
- Nasion (N), the most anterior point of the nasofrontal suture in the midsagittal plane.
- Articulare (Ar), the intersection of basisphenoid and the posterior border of the condyle mandibularis
- Pterygomaxillary fissure (PTM), the most posterior point on the anterior contour of the maxillary tuberosity.
- Subspinale (A), the deepest point in the midsagittal plane between the anterior nasal spine and prosthion.
- Pogonion (Pg), the most anterior point in the midsagittal plane of the contour of the chin.
- Supramentale (B) the deepest point in the midsagittal plane between infradentale and Pg, usually anterior to and slightly below the apices of the mandibular incisors.
- Anterior nasal spine (ANS), the most anterior point of the nasal floor; the tip of the premaxilla in the midsagittal plane.
- Menton (Me), the lowest point of the contour of the mandibular symphysis.
- Gnathion (Gn), the midpoint between Pg and Me, located by bisecting the facial line N-Pg and the mandibular plane (lower border).

- Posterior nasal spine (PNS) the most posterior point on the contour of the palate.
- Mandibular plane (MP), a plane constructed from Me to the angle of the mandible (Go).
- Nasal floor (NF), a plane constructed from PNS to ANS.
- Gonion(Go), located by bisecting the posterior ramal plane and the mandibular plane angle.

PLANES:

- Horizontal Plane (HP) is a surrogate Frankfort plane constructed by line 7° from the line S to N.
- S-N Plane : A line joining sella and nasion.
- Nasal floor (NF) : A line passing from anterior nasal spine to posterior nasal spine.
- Mandibular plane (Go-Gn) : A line passing from gonion to gnathion.
- Functional Occlusal Plane (OP) : A line extending from buccal groove of first molar to 1 mm above incisal edge of the central incisor.
- Long axis of upper incisors (U_1)
- Long axis of lower incisors (L_1)

SKELETAL MEASUREMENTS:

CRANIAL BASE :

- Posterior cranial base :Measured parallel to HP from articulare to Pterygomaxillary fissure (Ptm).
- Anterior cranial base : Measured parallel to HP from Pterygomaxillary fissure (Ptm) to Nasion.

HORIZONTAL (SKELETAL) :

- Angle of facial Convexity : It is the angle formed between Nasion - Point A and pogonion.
- Apical base of maxilla to Nasion : Measured from Nasion to Point A parallel to HP.
- Chin prominence : Measured parallel to HP from nasion to pogonion.

VERTICAL (SKELETAL, DENTAL) :

Anterior Component :

- Middle third facial height : Measured perpendicular to HP from nasion to anterior nasal spine.
- Lower third facial height : Measured perpendicular to HP from ANS to gnathion.

Posterior Component :

- Posterior vertical height : Measured perpendicular to HP from PNS to nasion.

- Posterior facial diversions : It is the angle formed between mandibular plane (Go-Gn) to HP.

DENTAL:

Anterior Component :

- Anterior maxillary dental height : Measured from a perpendicular line dropped from the incisal edge of upper central incisor to the nasal floor.
- Anterior mandibular dental height : Measured from perpendicular line dropped from incisal edge of mandibular anterior teeth to the mandibular plane.

Posterior Component :

- Posterior maxillary dental height: Measured from the mesiobuccal cusp tip of the maxillary first molar to the nasal floor.
- Posterior mandibular dental height : Measured from the mesiobuccal cusp tip of mandibular first molar to the mandibular plane.

MAXILLA AND MANDIBLE :

- Maxillary Length : Distance between ANS and PNS.
- Mandibular Ramal Length : Measured from articulare to gonion.

- Mandibular body length : Measured from gonion to pogonion.
- Gonial angle : Angle formed between articulare gonion and gnathion.
- Chin position : Measured from point B to pogonion.

DENTAL:

- Occlusal Plane Angle : Angle formed between OP and HP
- Relation of maxilla and mandible to OP : Measured from the distance Point A to Point B dropped perpendicularly to OP.
- Upper Incisor Position : Determined by measuring the angle formed between the nasal floor and the long axis of upper central incisor.
- Lower incisor position : Determined by the angle between mandibular plane and the long axis of the lower central incisor.

Statistical Analysis :

Mean, Standard deviation and range values were determined for the total sample male and female groups. The mean and standard deviation of each group and the values originally obtained by Burstone were subjected to student `t' test using Excel program (Microsoft Corporation, Redmond WA) and the level significance was set at 0.05.

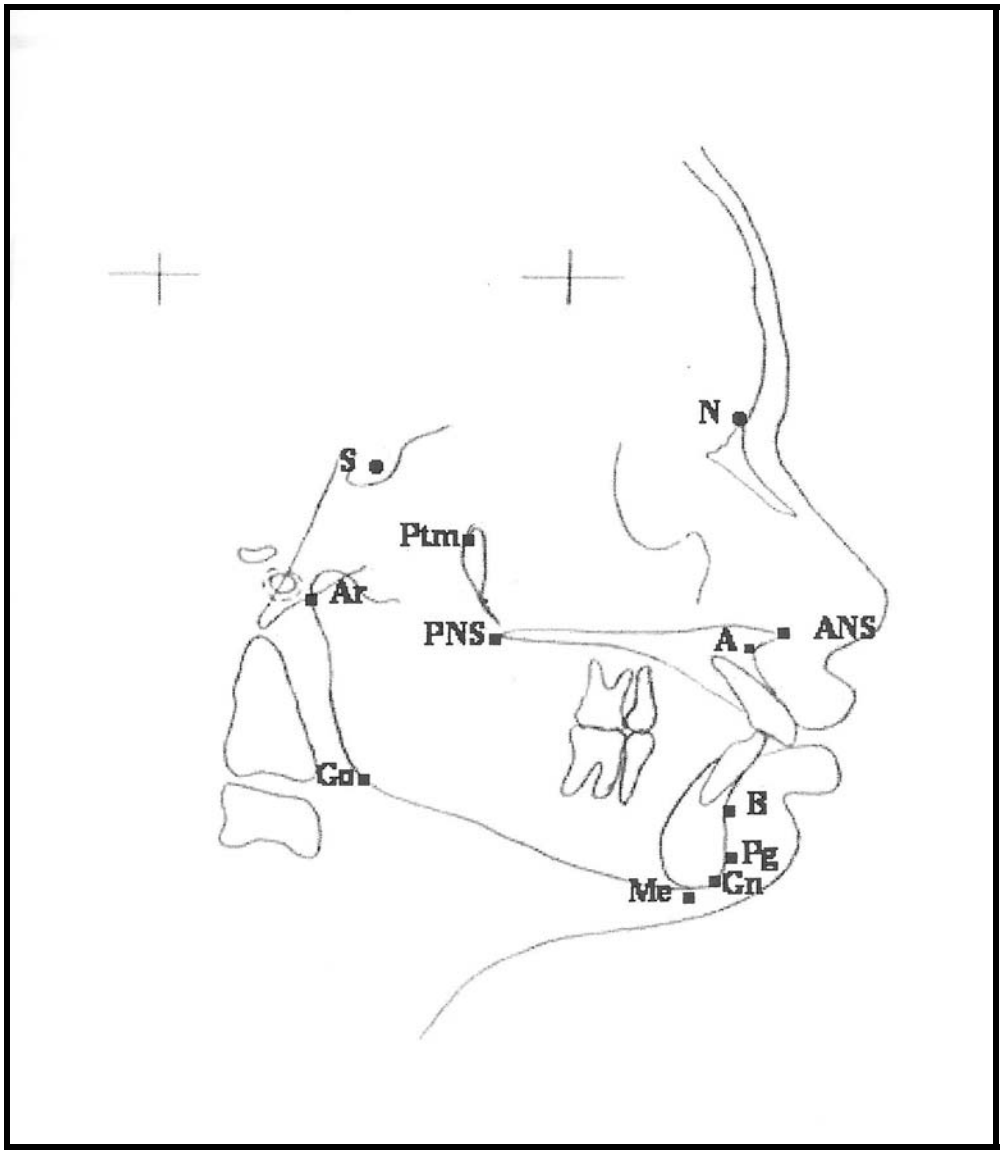


Fig 1: Cephalometric land marks in hard tissue

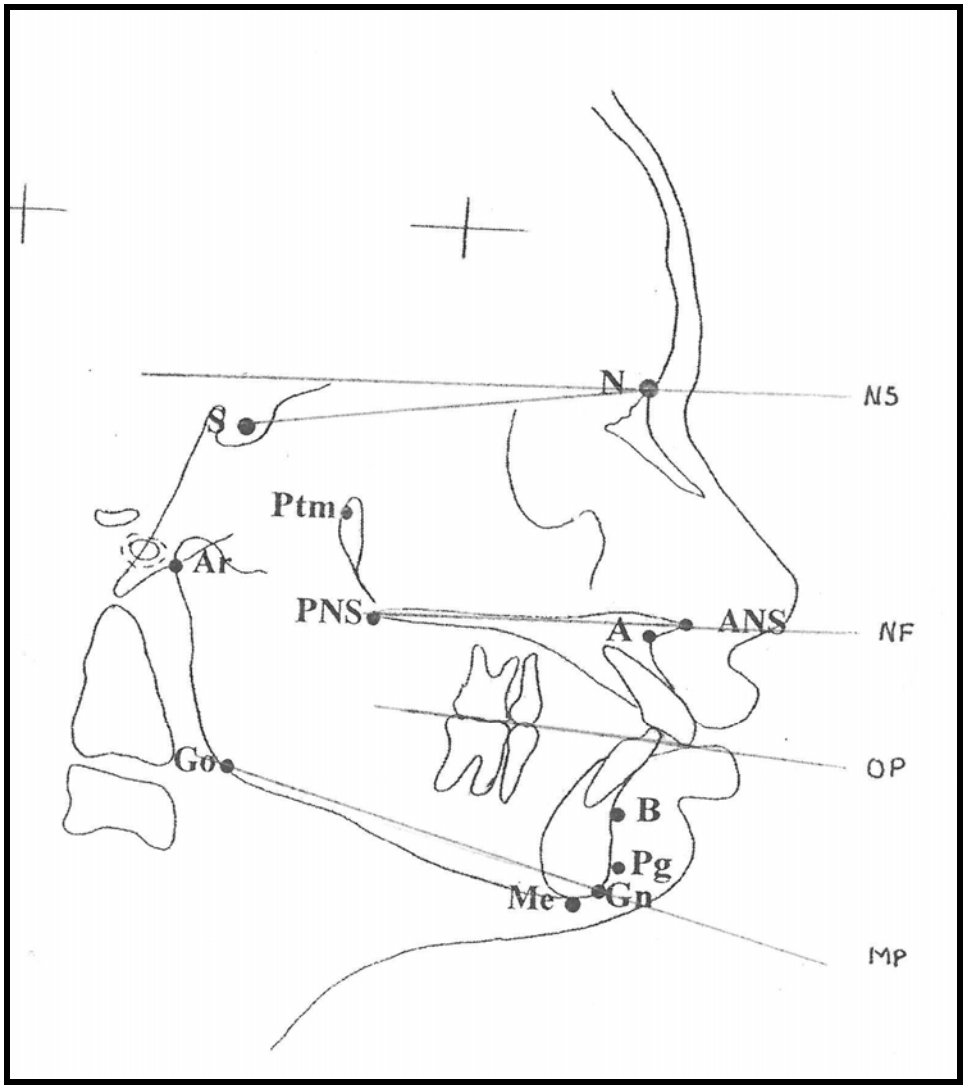


Fig 2: Reference planes used

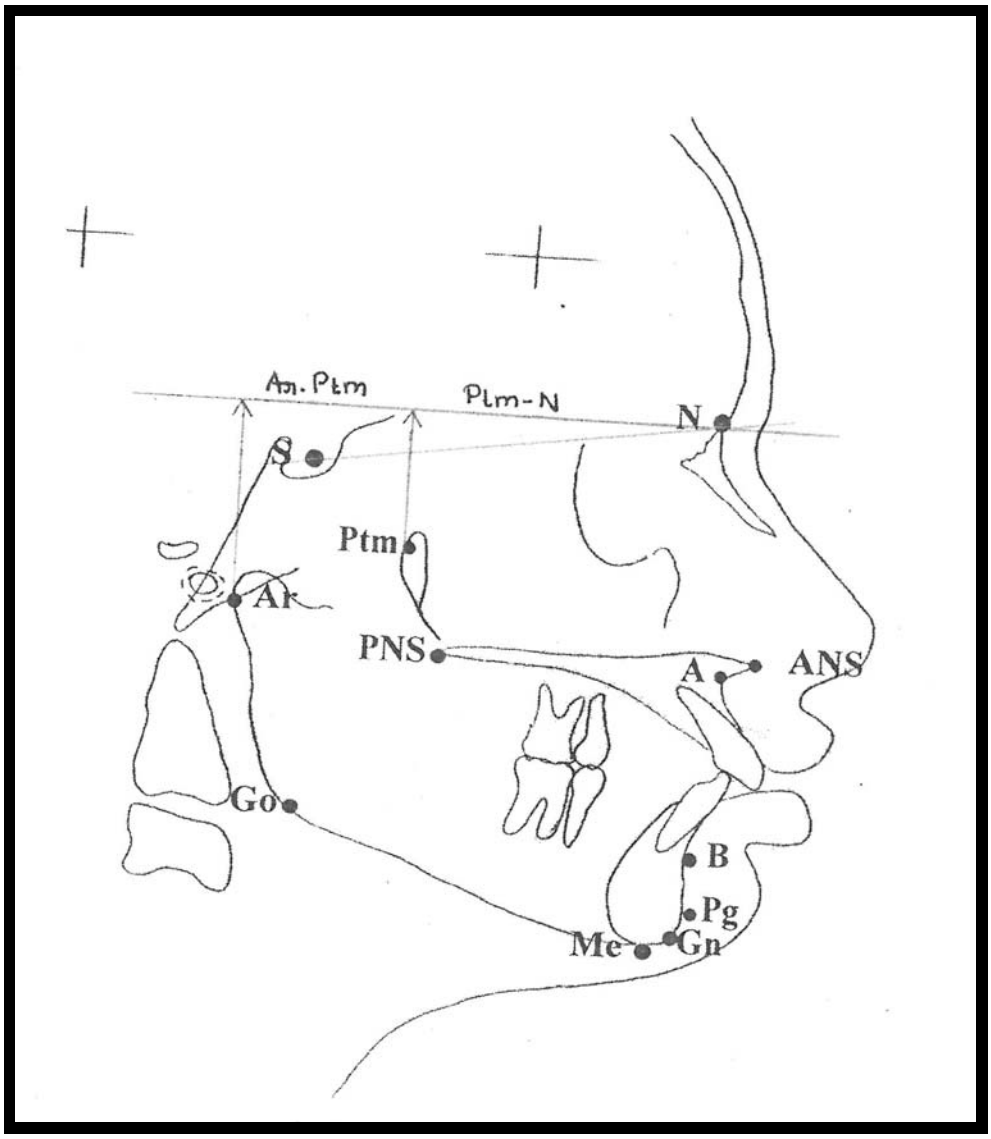


Fig 3: Cranial base measurements

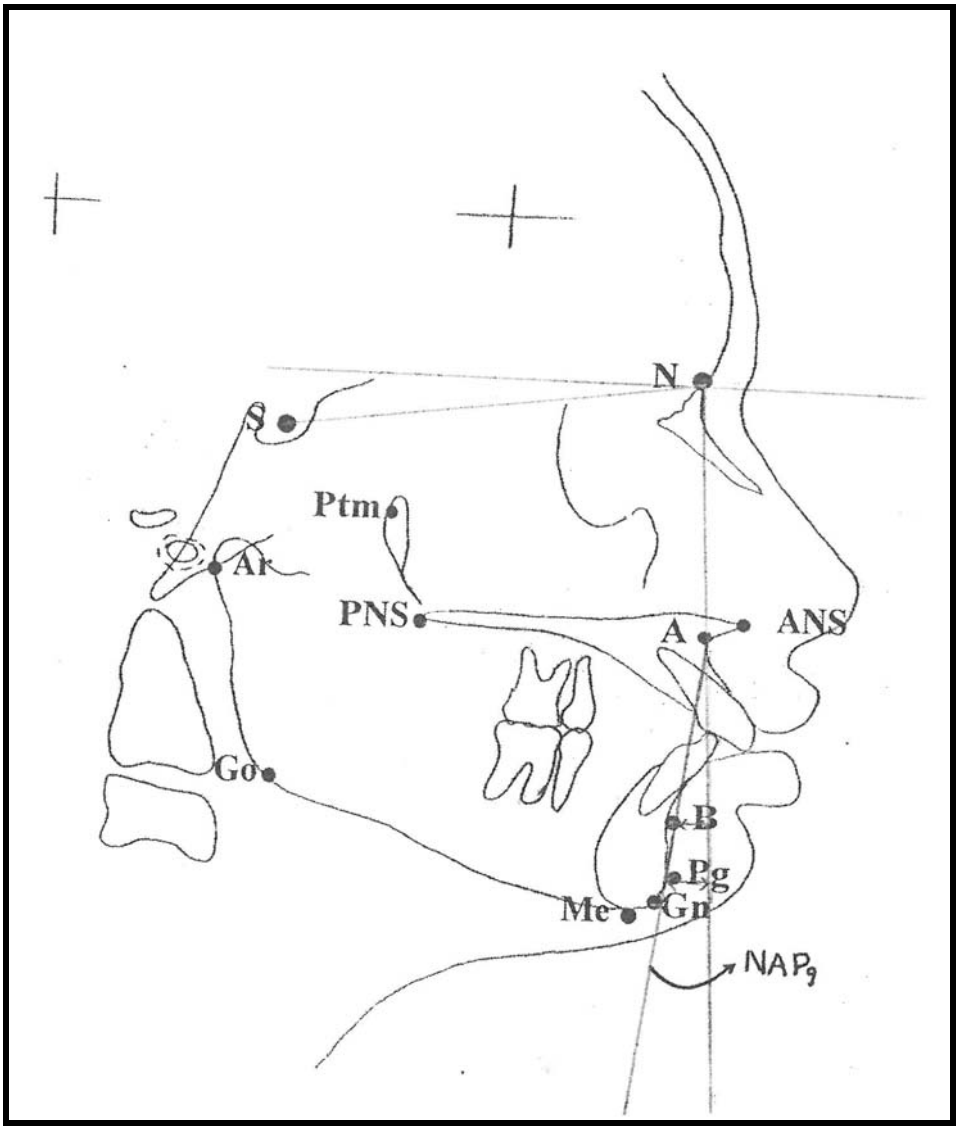


Fig 4: Facial Convexity

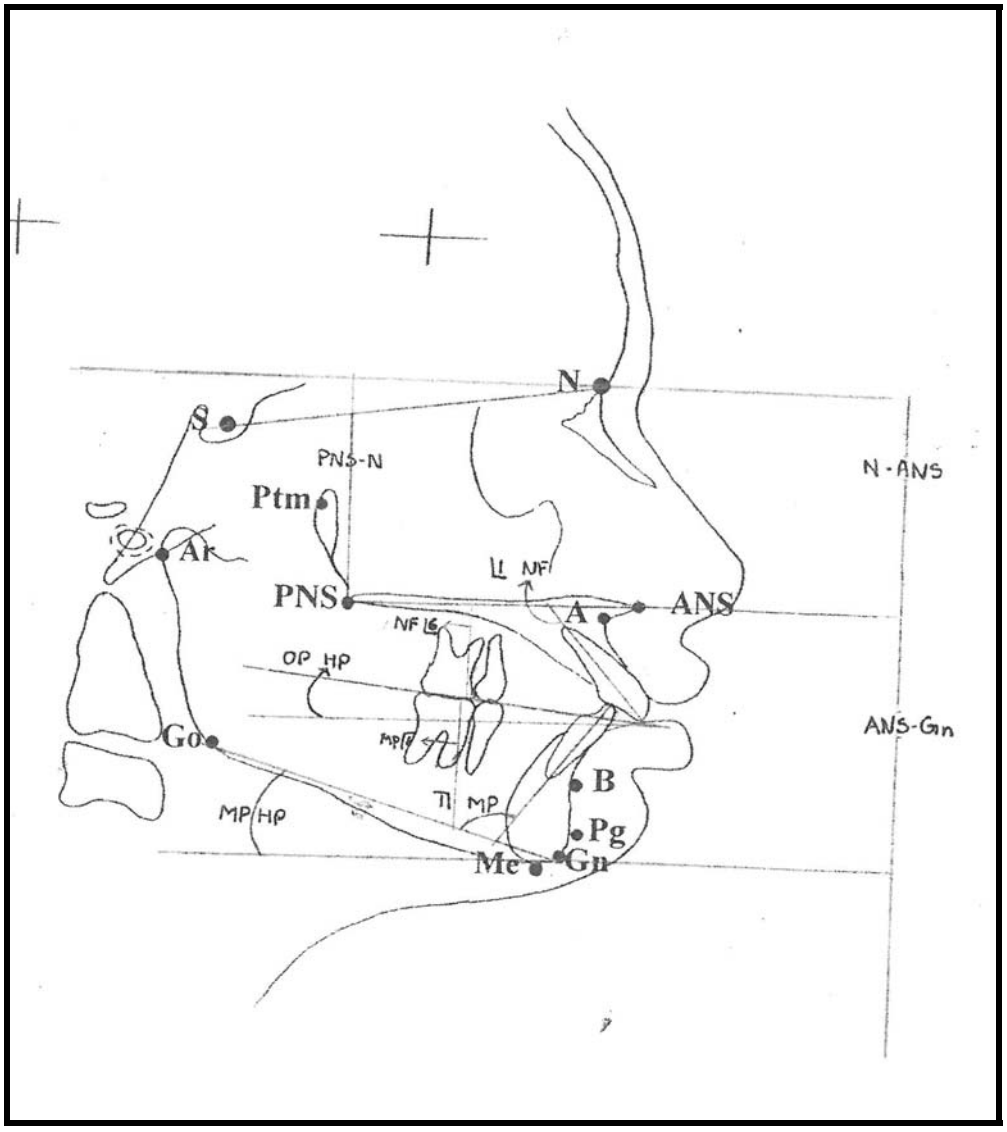


Fig 5: Vertical Measurements

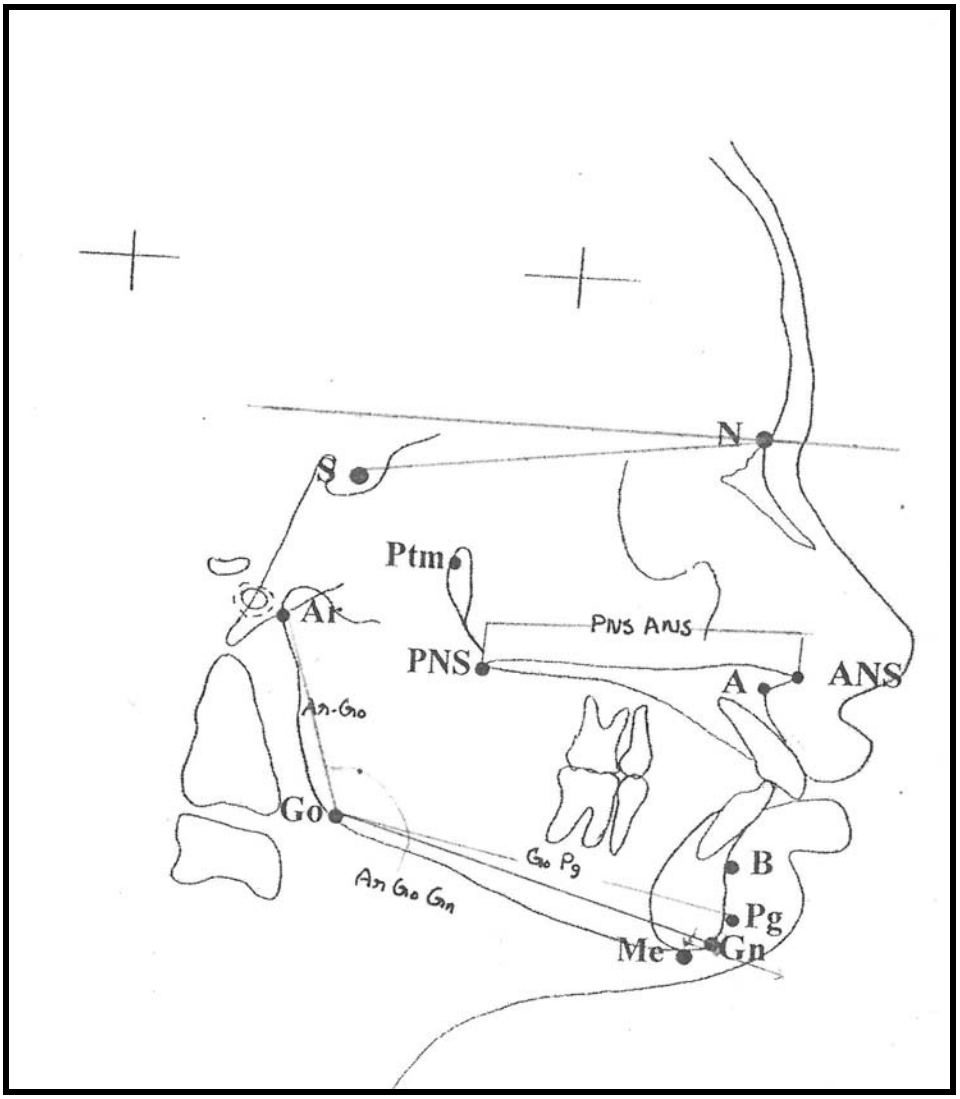


Fig 6: Maxilla - Mandible

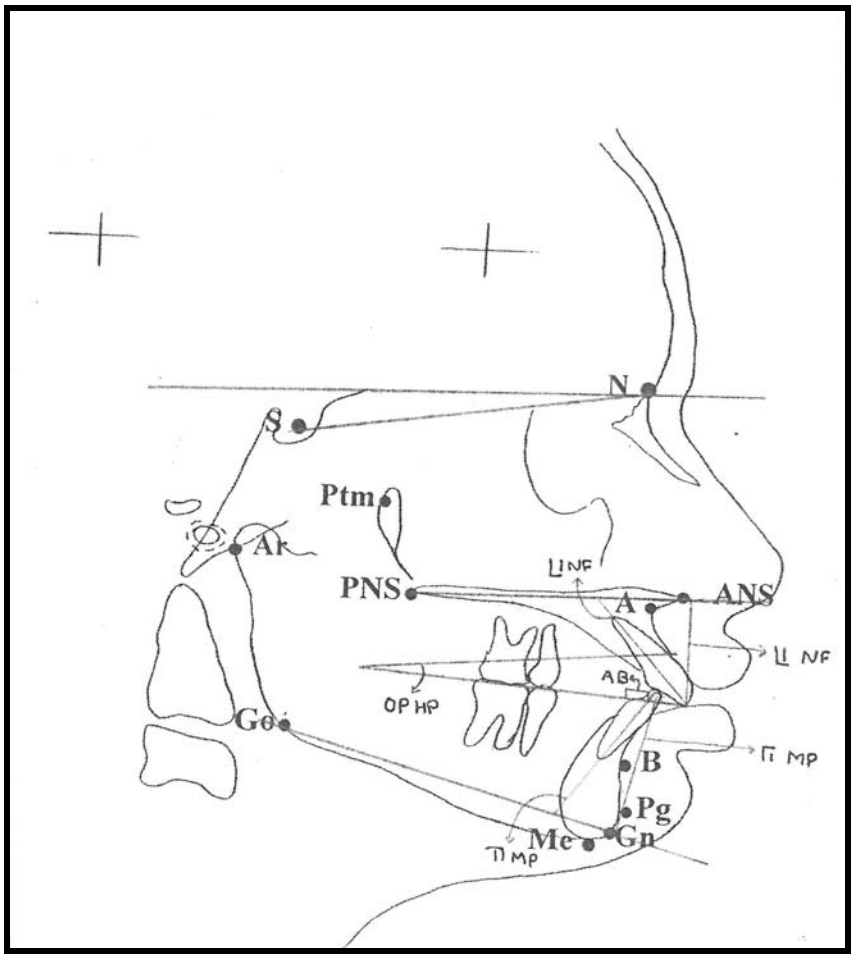


Fig 7: Dental measurements

EXTRA ORAL PHOTOGRAPHS

Frontal View

3/4th View

Lateral View

INTRA ORAL PHOTOGRAPHS

EXTRA ORAL PHOTOGRAPHS

Frontal View

3/4th View

Lateral View

INTRA ORAL PHOTOGRAPHS

ARMAMENTARIUM USED

RESULTS

The present study was undertaken in the Department of Oral and Maxillofacial Surgery, Ragas Dental College & Hospital, Chennai

54 individuals (28 males and 26 females) with age ranging between 18 to 35 years were enrolled for the study consecutively. They were selected on the basis of their excellent occlusions angles class I molar relation and well balanced facial pattern.

The patients who reported to Ragas Dental College & Hospital, Chennai in the period between 1st November 2008 to 31st October 2010 were selected. Sample constituted adults of Chennai origin residing in Tamil nadu . Lateral cephalograms where taken for each subject.

Various angular and linear measurements for hard tissues in both males and females were obtained and were tabulated. All the reading thus obtained were subjected to statistical analysis. Mean, standard deviation and range values were determined for the total sample, male and female groups. The mean and standard deviations of each group and the values originally obtained by Burstone and Legan were subjected to a students t-test using Microsoft Excel program and the level of significance was set at 0.05.

Table 1 and 2 shows results of hard tissue measurements for males and females Table 3 and 4 shows comparison of hard tissue norms between Tamil nadu population and Caucasian population for males and females.. The individual measurements which has shown significant difference as compared to standard norms of hard tissues are depicted in a graphical form from graph 1-12.

HARD TISSUE MEASUREMENTS :

S-N length :

S-N length for men shows a mean of 79.04 with a SD of ± 3.24 and for women a mean of 73.27 and SD of ± 2.52

Cranial Base:

The Ar-Ptm value for males show a mean of 39.89 with a SD of ± 2.72, for females a mean of 35.58 with a SD of ±2.87. These values are more than Caucasian population and suggest increased posterior cranial base length in males of Tamil population ($P<0.05$).

The Ptm-N value for males in Burrstone show a mean of 52.8 with a SD of ± 4.1 and for Tamil population mean is 56.77 ± 3.57, for females a mean of 50.9 with a SD of ± 3,and in Tamil population 53.92 ± 3.06 which shows that there is increased anterior cranial base length in Tamil population compared to other studies($P< 0.05$).

Horizontal Skeletal Relations :

The N-A-Pg value for males show a mean of 2.95 with a SD of ± 5,2, for females a mean of 3 with a SD of ± 6.11, these values are similar to Caucasians samples which is (P= 0.5) suggestive of no significant difference.

The N-A value for males show a mean of -0.04with a SD of ± 6.49, for females a mean of -2.22 with a SD of ± 2.72, which shows no significant difference males and females.

The N-B value for males show a mean of –5.64 with a SD of ± 6.66, for females a mean of -7.69 with a SD of ± 6.04.

The N-Pg value for males show a mean of -4.41 with a SD of ± 8.31, for females a mean of -7.15 with a SD of ± 6.69 which is suggestive that there is not a significant difference in the horizontal skeletal relation ship between the Caucasians and the Tamil population

Vertical Skeletal and Dental Relations :

The N-Ans value for males show a mean of 56.04 with a SD of 3.87(P=0.2) ,which is suggestive of no significant difference in males but in females a mean of 52.60 with a SD of ± 3.29 (P<0.05)., which is suggestive of significant difference.

The ANS-Gn value for males show a mean of 68.25 with a SD of ± 4.34(P=0.7) ; no significant difference , for females a mean of 65.12 with a SD of ± 4.64(P<0.05), which shows significant difference.

The PNS-N value for males show a mean of 56.20 with a SD of ± 3.30(P<0.05). for females a mean of 52.67 with a SD of ± 3.27(P<0.05)., which is suggestive of significant difference.

The MP-HP (angle) value for males show a mean of 19.11 with a SD of ±6.05 (P<0.05). with significant difference, for females a mean of 23,65 with a SD of ± 3.88, which is suggestive of no significant difference.

The Upper 1-NF value for males show a mean of 29.39 with a SD of ±.2.90, which is suggestive of no significant difference, for females a mean of 29.52 with a SD of ± 2.19(P<0.05), which is suggestive of significant difference.

The lower 1-MP value for males show a mean of 44.75 with a SD ± 2.62 of females a mean of 41.81 with a SD of ± 2.72, which is suggestive of no difference.

The upper 6-NF value for males show a mean of 24.34 with a SD of ±2.24 (P<0.05) shows significant differences, for females a

mean of 23.62 with a SD of ± 2.42, which is suggestive of no significant difference

The Lower 6-MP value for males show a mean of 38 with a SD of ± 3.22 ($P<0.05$) for females a mean of 33.65with a SD of ± 2.40($P<0.05$) , which is suggestive of significant difference.

Maxilla and Mandible :

The PNS-ANS value for males show a mean of 60.20 with a SD of ± 3.09($P<0.05$) for females a mean of 56.46 with a SD of ± 3.37($P<0.05$) which is suggestive of significant difference.

The Ar-Go value for males show a mean of 54.82 with a SD of ± 4.96($P<0.05$) , for females a mean of 48.94 with a SD of ± 4.42($P<0.05$) , which is suggestive of significant difference.

The Go-Pg value for males shows a mean of 82.57 with a SD of ± 5.69 which is suggestive of no significant difference, for females a mean of 78.21 with a SD of ± 5.34($P<0.05$), which is suggestive of significant difference.

The B-Pg value for males show a mean of 6.18 with a SD of ± 3.24($P<0.05$) for females a mean of 5.06 with a SD of ± 4.43($P<0.05$) which shows less prominence of chin related to mandibular denture base as compared.

The Ar-Go-Gn (Angle) value for males show a mean of 119.50 with a SD of ± 7.25for females a mean of 120.02 with a SD of ±7.02 which is suggestive of no significant difference.

Dental :

The OP-Upper-HP value for males show a mean of 5.09 with a SD of ±3.64 for females a mean of 7.27 with a SD of ± 3.14, which is suggestive of no significant difference.

The A-B value for males show a mean of 1.13 with a SD of ± 2.70 ($P<0.05$) suggestive of significant difference, for females a mean of 0.60 with a SD of ± 3.42, which is suggestive of no significant difference.

The Upper1-NF (Angle) value for males show a mean of 117.14 with a SD of ± 6.26($P<0.05$) suggestive of significant difference , for females a mean of 114.58 with a SD of ± 6.21, which shows of no significant difference.

The Lower1-MP (Angle) value for males show a mean of 104.32with a SD of ± 8.3($P<0.05$) suggestive of significant difference, for females a mean of 100.77 with a SD of ±7.06($P<0.05$) suggestive of significant difference.

Cephalometric comparison of Caucasian men and Tamil men

Cranial base :

- Tamil men have increased anterior and posterior cranial base length

Horizontal (skeletal) relationship:

- Tamil men have reduced convex profile than Caucasian men
- No significant difference in the horizontal relationship between both the population.

Vertical(skeletol) relationship:

- Posterior maxillary skeletal height is increased for Tamil men than the Caucasian men
- Mandibular plane angle is low in Tamil population when compared with Caucasian men.

Vertical (dental) relationship :

- Posterior dental height in maxilla is reduced when compared with Caucasian men
- Posterior dental height in mandible is increased for Tamil men when compared with Caucasian men

Maxillary mandibular relationship :

- Maxillary body length is increased in Tamil men .
- Ramus length is increased in Tamil men.
- Chin is less prominent when compared with Caucasian men.

Dental relationship:

- Maxillary and mandibular incisal angulation is more in Tamil men.

Cephalometric comparison of Caucasian women and Tamil women

Cranial base :

- Anterior and posterior cranial base for Tamil women is more compared with Caucasian women .

Horizontal (skeletal) relationship:

- No significant difference found when compared with Caucasian women.

Vertical (skeletal)relationship :

- Anterior maxillary height is increased in Tamil women than Caucasian women (or) increased anterior middle third facial height.
- Increased lower third facial height in Tamil women than in the Caucasian women.
- Increased posterior maxillary skeletal height in Tamil women than Caucasian women.

Vertical (dental) relationship:

- Maxillary anterior dental height is increased in Tamil women.
- Mandibular posterior dental height is increased in Tamil women than in Caucasian women.

Maxillary and mandibular relationship:

- Maxillary body length is increase in Tamil women.
- Mandibular ramus height is increased in Tamil women .
- Mandibular body length is increased in Tamil women.
- Chin prominence is reduced in Tamil women.

Dental relationship:

- Mandibular incisal angulation is increased in Tamil women

Table 1: STUDY RESULTS OF HARD TISSUE MEASUREMENTS IN MALES

Measurements		Min	Max	Mean	SD	Mean-2SD	Mean+2SD
	S-N	73	85	79.04	3.24	72.56	85.51
	AR-PTM	34	46	39.89	2.72	34.45	45.34
Cranial Base	PTM-N	51	65	56.77	3.57	49.62	63.91
	NA-PG	-6°	17°	2.95°	5.26°	-7.57°	13.46°
	N-A	-12	25	-0.04	6.49	-13.03	12.95
Horizontal	N-B	-20	6	-5.64	6.66	-18.95	7.67
(Skeletal)	N-PG	-19	11.5	-4.41	8.31	-21.02	12.20
	N-ANS	48	62	56.04	3.87	48.30	63.78
	ANS- Gn	62	75	68.25	4.34	59.56	76.94
	PNS -N	49	62	56.20	3.30	49.61	62.79
Vertical	MP-HP	10°	29°	19.11°	6.05°	7.00°	31.21°
(Skeletal,denta)l	1 NF	24	35	29.39	2.90	23.60	35.19
	1 MP	40	50	44.75	2.62	39.51	49.99
	6 NF	21	29.5	24.34	2.24	19.87	28.81
	6 MP	33	46	38.00	3.22	31.56	44.44
	PNS-ANS	55	68	60.20	3.09	54.02	66.37
	Ar-Go	48	70	54.82	4.96	44.90	64.74
Maxilla,	Go - PG	68	91	82.57	5.69	71.20	93.94
Mandible	B-PG	-7	11	6.18	3.24	-0.30	12.66
	Ar-Go-Gn	109°	133°	119.50°	7.25°	105.00°	134.00°
	OP - HP	1°	13°	5.09°	3.64°	-2.19°	12.37°
	A-B	-5	6	1.13	2.70	-4.28	6.53
Dental	1 NF	104°	130°	117.14°	6.26°	104.63°	129.66°
	1 MP	86°	116°	104.32°	8.30°	87.72°	120.92°

Table 2: STUDY RESULTS OF HARD TISSUE MEASUREMENTS IN FEMALES

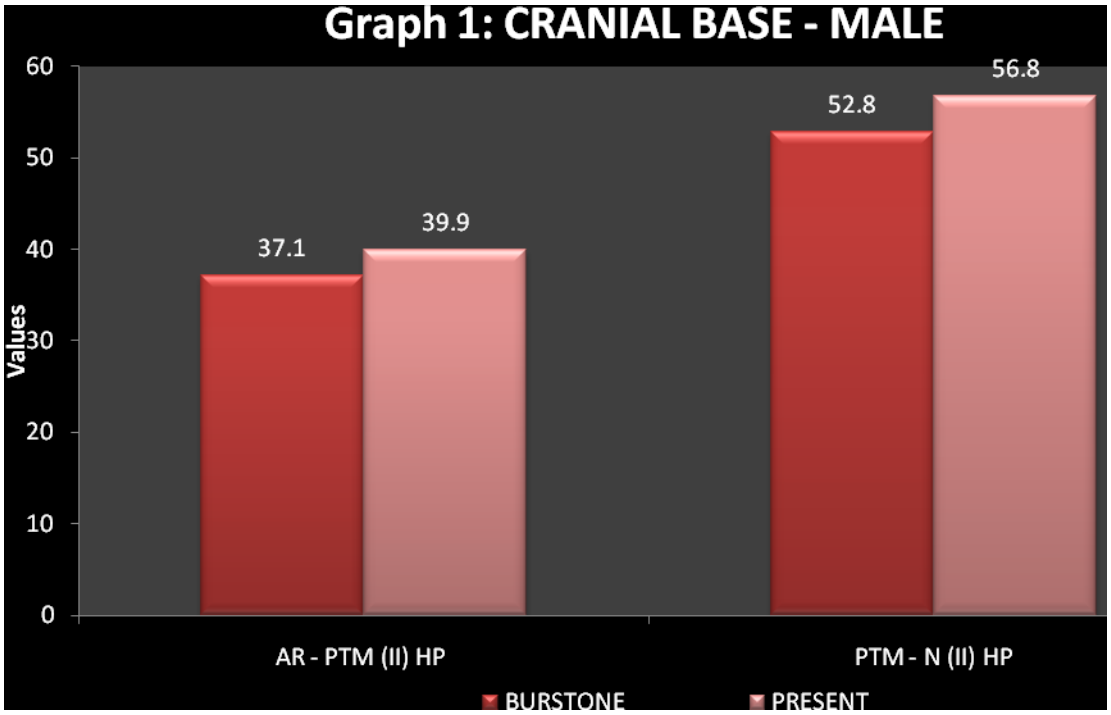
Measurements		Min	Max	Mean	SD	Mean-2SD	Mean+2SD
	S-N	69	79	73.27	2.52	68.22	78.31
	AR-PTM	31	42	35.58	2.87	29.84	41.32
Cranial Base	PTM-N	49	62	53.92	3.06	47.81	60.03
	NA-PG	-10°	19°	3.00°	6.11°	-9.22°	15.22°
	N-A	-6	4	-2.22	2.72	-7.67	3.23
Horizontal	N-B	-21	3.5	-7.69	6.04	-19.78	4.39
(Skeletal)	N-PG	-20	6.5	-7.15	6.69	-20.53	6.22
	N-ANS	46	59	52.60	3.29	46.02	59.17
	ANS- Gn	56	76	65.12	4.64	55.83	74.40
	PNS -N	45	60	52.67	3.27	46.13	59.22
Vertical	MP-HP	17°	31°	23.65°	3.88°	15.90°	31.41°
(Skeletal,denta)l	1 NF	26	36	29.52	2.19	25.13	33.91
	1 MP	37	47	41.81	2.72	36.37	47.24
	6 NF	19	28	23.62	2.42	18.78	28.45
	6 MP	29	39	33.65	2.40	28.86	38.45
	PNS-ANS	51	64	56.46	3.37	49.72	63.21
	Ar-Go	41	58	48.94	4.42	40.10	57.78
Maxilla,	Go - PG	71	96	78.21	5.34	67.53	88.89
Mandible	B-PG	-8	9	5.06	4.43	-3.81	13.93
	Ar-Go-Gn	107°	136°	120.02°	7.02°	105.97°	134.07°
	OP - HP	2°	14°	7.27°	3.14°	0.98°	13.56°
	A-B	-5	8	0.60	3.42	-6.24	7.43
Dental	1 NF	101°	128°	114.58°	6.21°	102.16°	127.00°
	1 MP	89°	112°	100.77°	7.06°	86.65°	114.89°

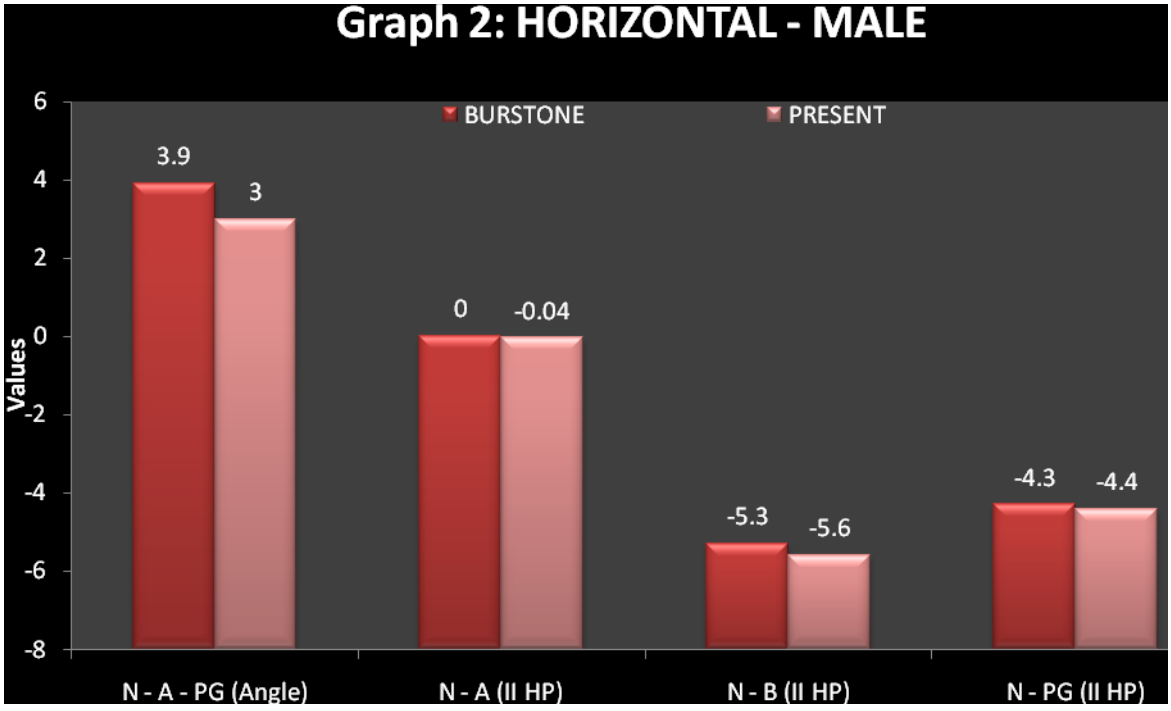
Table 3: COMPARISON OF HARD TISSUE NORMS IN MALES

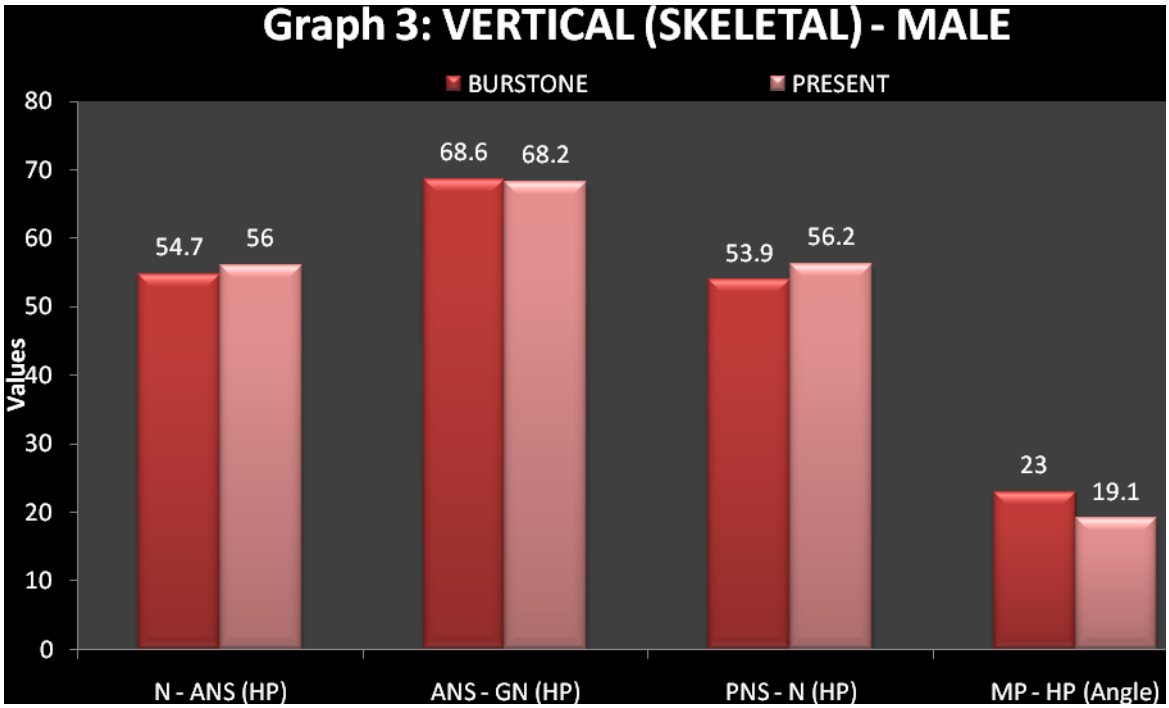
	Burstone study		Present study		P-Value
	Mean	**SD**	**Mean**	**SD**	
Cranial base			79.04	3.24	
AR-PTM	37.1	2.8	39.89	2.72	0.001
PTM-N	52.8	4.1	56.77	3.57	0.001
Horizontal (Skeletal					
NA-PG	3.9°	6.4°	2.95°	5.26°	0.576
N-A	0.0	3.7	-0.04	6.49	0.979
N-B	-5.3	6.7	-5.64	6.66	0.863
N-PG	-4.3	8.5	-4.41	8.31	0.964
Vertical (Skeletal, dental)					
N-ANS	54.7	3.2	56.04	3.87	0.211
ANS- Gn	68.6	3.8	68.25	4.34	0.773
PNS -N	53.9	1.7	56.20	3.30	0.003
MP-HP	23.0°	5.9°	19.11°	6.05°	0.031
1 NF	30.5	2.1	29.39	2.90	0.152
1 MP	45.0	2.1	44.75	2.62	0.726
6 NF	26.2	2.0	24.34	2.24	0.005
6 MP	35.8	2.6	38.00	3.22	0.015
Maxilla,Mandible					
PNS-ANS	57.7	2.5	60.20	3.09	0.005
Ar-Go	52.0	4.2	54.82	4.96	0.044
Go - PG	83.7	4.6	82.57	5.69	0.467
B-PG	8.9	1.7	6.18	3.24	0.000
Ar-Go-Gn	119.1°	6.5°	119.50°	7.25°	0.845
Dental					
OP - HP	6.2°	5.1°	5.09°	3.64°	0.383
A-B	-1.1	2.0	1.13	2.70	0.003
1 NF	111.0°	4.7°	117.14°	6.26°	0.001
1 MP	95.9°	5.2°	104.32°	8.30°	0.000

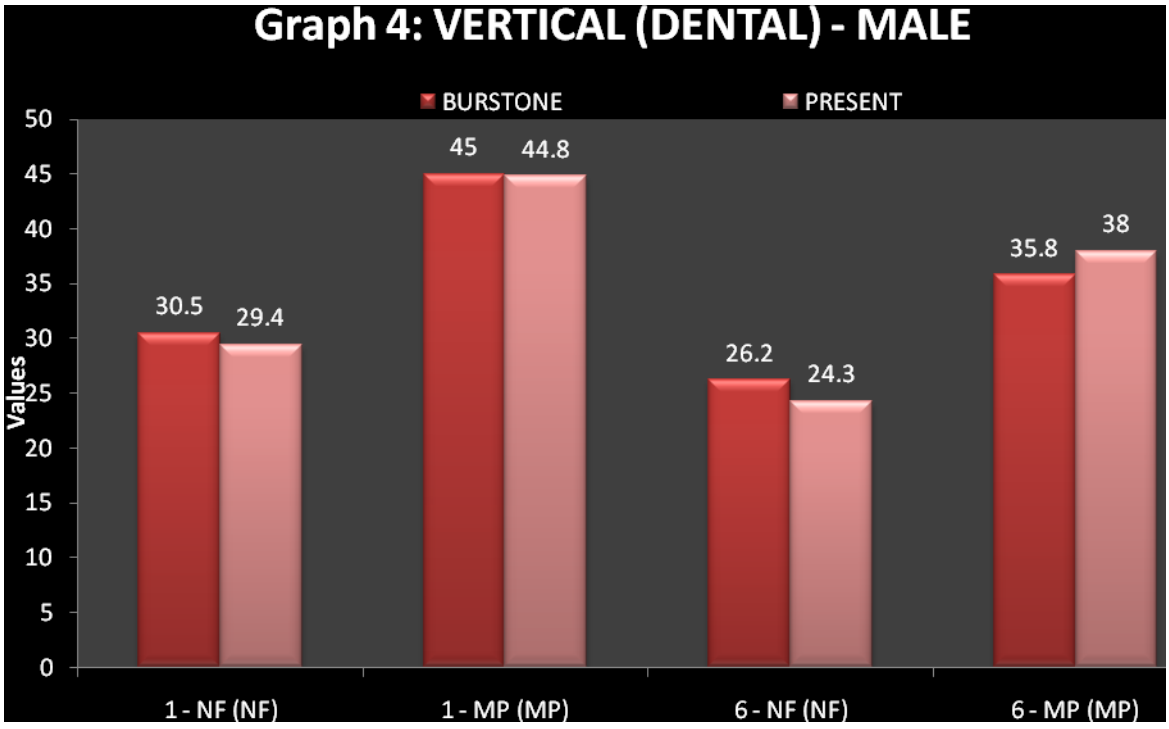
Table 4: COMPARISON OF HARD TISSUE NORMS IN FEMALES

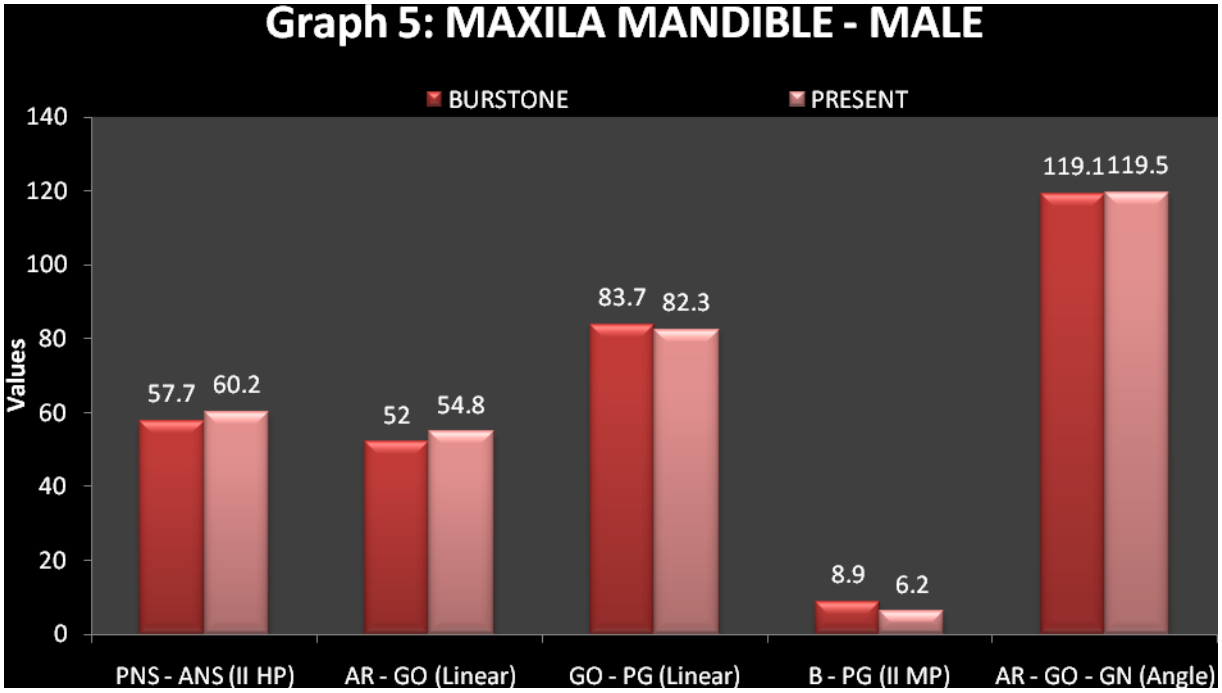
	Burstone study		**Present study**		**P-Value**
	Mean	**SD**	**Mean**	**SD**	
Cranial base			73.27	2.52	
AR-PTM	32.8	1.9	35.58	2.87	0.000
PTM-N	50.9	3.0	53.92	3.06	0.001
Horizontal(Skeletal)					
NA-PG	2.6°	5.1°	3.00°	6.11°	0.812
N-A	-2.0	3.7	-2.22	2.72	0.813
N-B	-6.9	4.3	-7.69	6.04	0.619
N-PG	-6.5	5.1	-7.15	6.69	0.717
Vertical(Skeletal,dental)					
N-ANS	50.0	2.4	52.60	3.29	0.004
ANS- Gn	61.3	3.3	65.12	4.64	0.003
PNS -N	50.6	2.2	52.67	3.27	0.012
MP-HP	24.2°	5.0°	23.65°	3.88°	0.670
1 NF	27.5	1.7	29.52	2.19	0.001
1 MP	40.8	1.8	41.81	2.72	0.129
6 NF	23.0	1.3	23.62	2.42	0.259
6 MP	32.1	1.9	33.65	2.40	0.021
Maxilla,Mandible					
PNS-ANS	52.6	3.5	56.46	3.37	0.000
Ar-Go	46.8	2.5	48.94	4.42	0.039
Go - PG	74.3	5.8	78.21	5.34	0.020
B-PG	7.2	1.9	5.06	4.43	0.028
Ar-Go-Gn	122.0°	6.9°	120.02°	7.02°	0.337
Dental					
OP - HP	7.1°	2.5°	7.27°	3.14°	0.842
A-B	-0.4	2.5	0.60	3.42	0.272
1 NF	112.5°	5.3°	114.58°	6.21°	0.231
1 MP	95.9°	5.7°	100.77°	7.06°	0.014

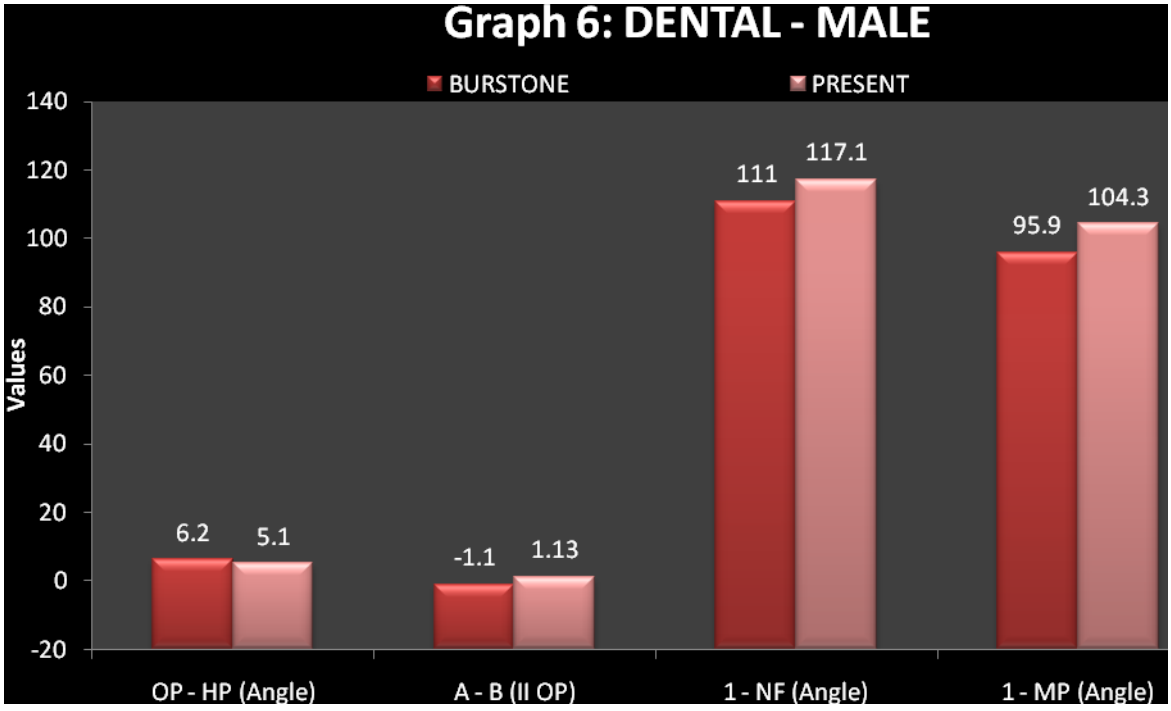

Graph 1: CRANIAL BASE - MALE
60
50
40
30
20
10
0
Values
37.1
39.9
52.8
56.8
AR - PTM (II) HP
PTM - N (II) HP
BURSTONE
PRESENT

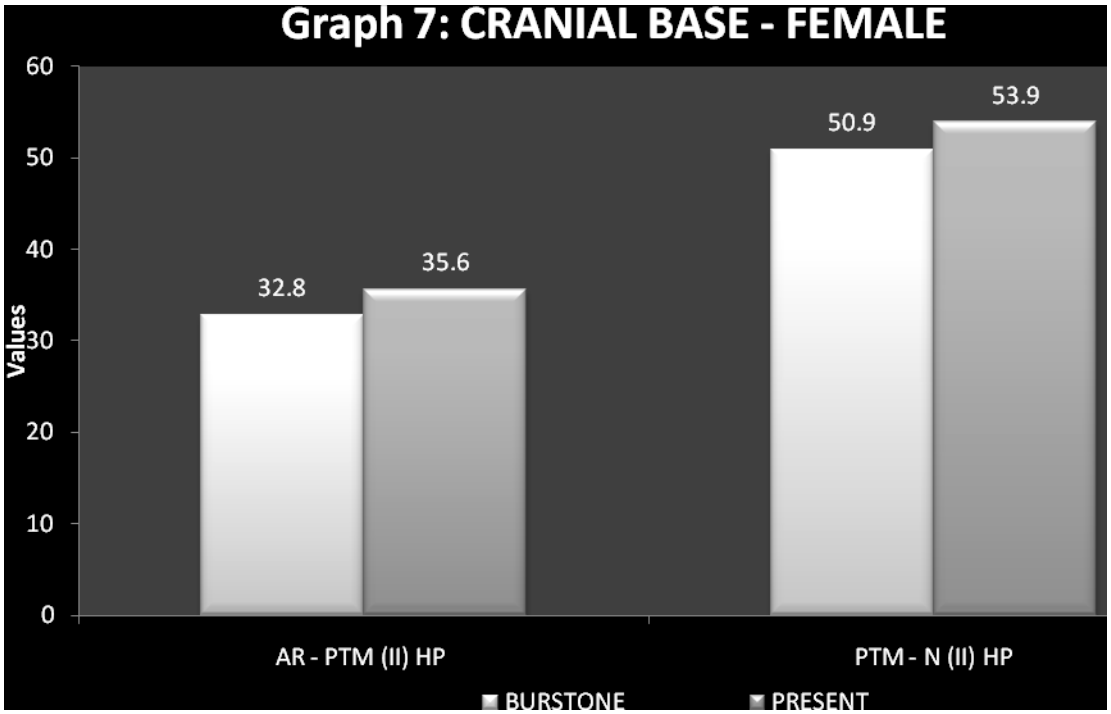

Graph 2: HORIZONTAL - MALE
6
4
2
0
-2
-4
-6
-8
Values
BURSTONE
PRESENT
3.9
3
0
-0.04
-5.3
-5.6
-4.3
-4.4
N - A - PG (Angle)
N - A (II HP)
N - B (II HP)
N - PG (II HP)

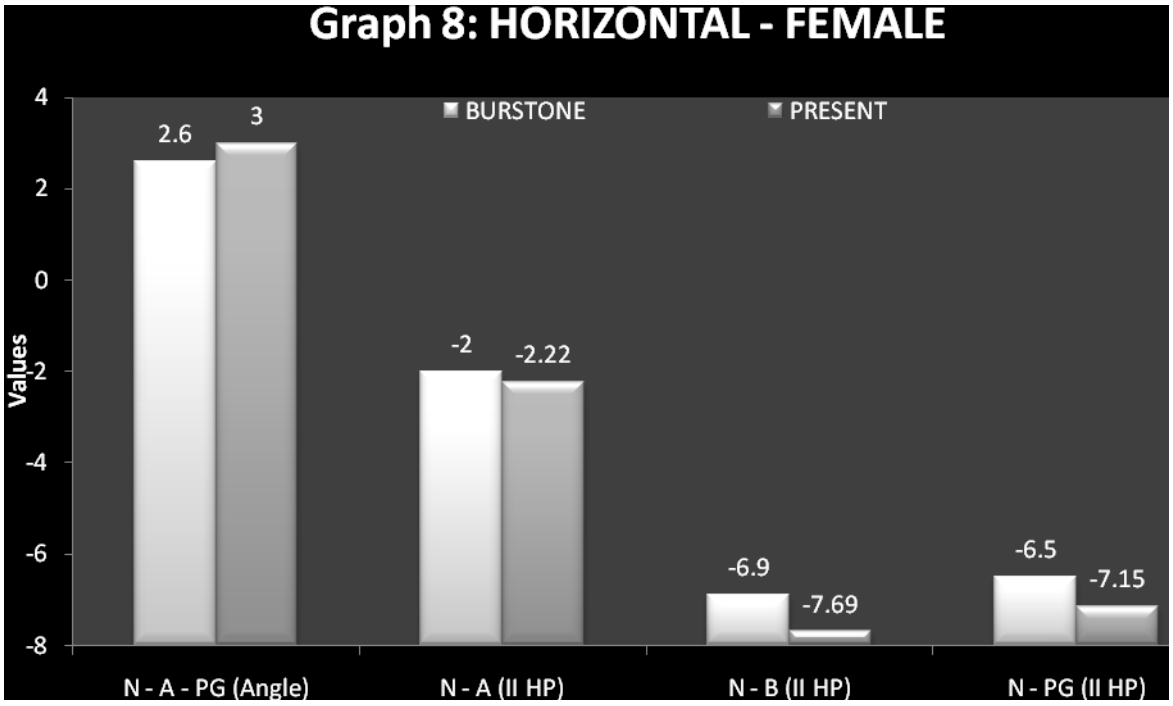

Graph 3: VERTICAL (SKELETAL) - MALE
BURSTONE
PRESENT
Values
80
70
60
50
40
30
20
10
0
54.7
56
68.6
68.2
53.9
56.2
23
19.1
N - ANS (HP)
ANS - GN (HP)
PNS - N (HP)
MP - HP (Angle)

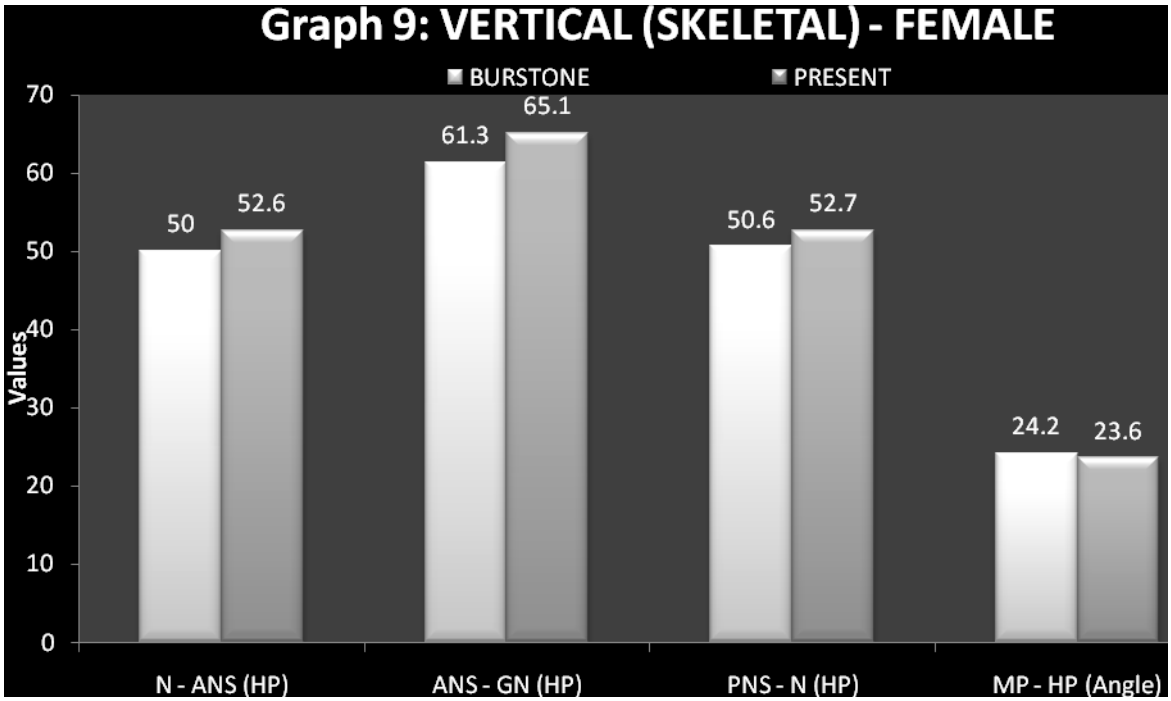

Graph 4: VERTICAL (DENTAL) - MALE
BURSTONE
PRESENT
Values
50
45
40
35
30
25
20
15
10
5
0
30.5
29.4
45
44.8
26.2
24.3
35.8
38
1 - NF (NF)
1 - MP (MP)
6 - NF (NF)
6 - MP (MP)

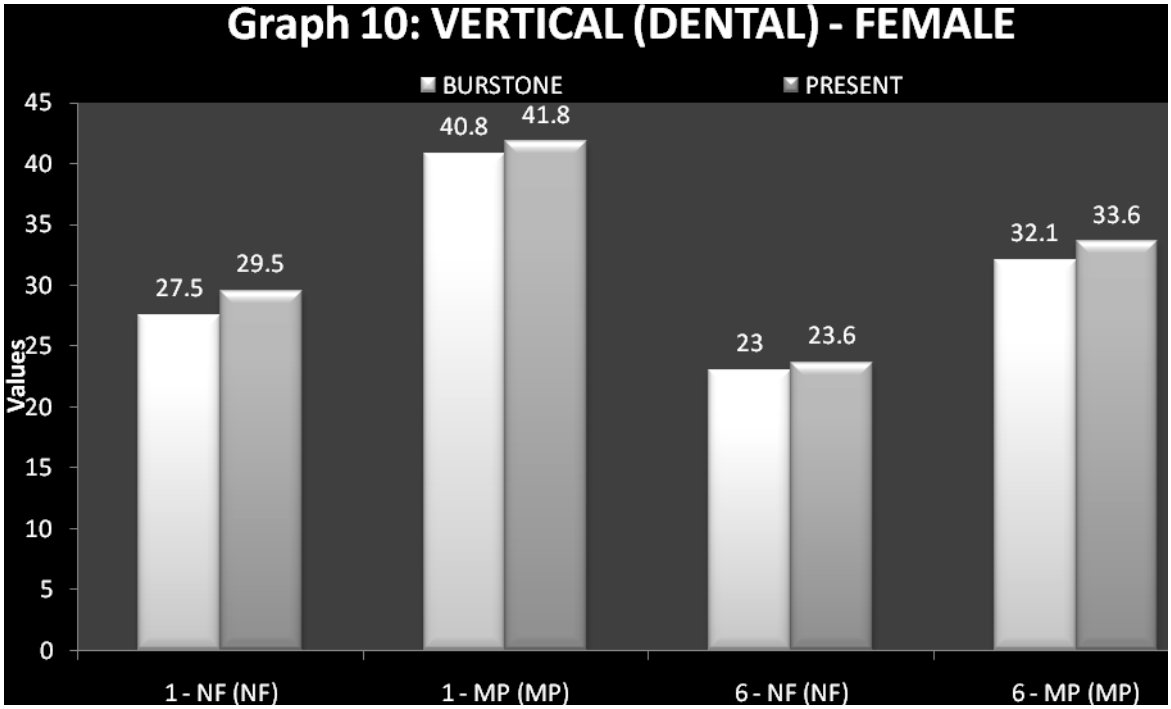

Graph 5: MAXILA MANDIBLE - MALE
BURSTONE
PRESENT
Values
140
120
100
80
60
40
20
0
57.7
60.2
52
54.8
83.7
82.3
8.9
6.2
119.1
119.5
PNS - ANS (II HP)
AR - GO (Linear)
GO - PG (Linear)
B - PG (II MP)
AR - GO - GN (Angle)

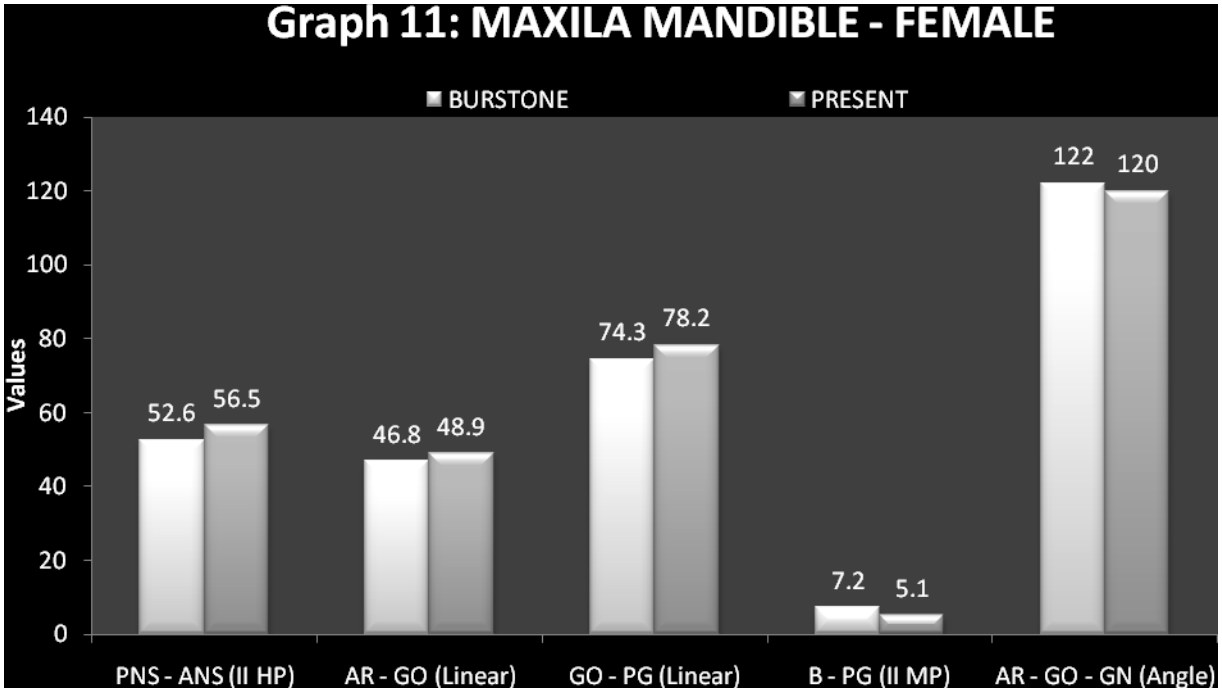

Graph 6: DENTAL - MALE
BURSTONE
PRESENT
Values
140
120
100
80
60
40
20
0
-20
6.2
5.1
-1.1
1.13
111
117.1
95.9
104.3
OP - HP (Angle)
A - B (II OP)
1 - NF (Angle)
1 - MP (Angle)

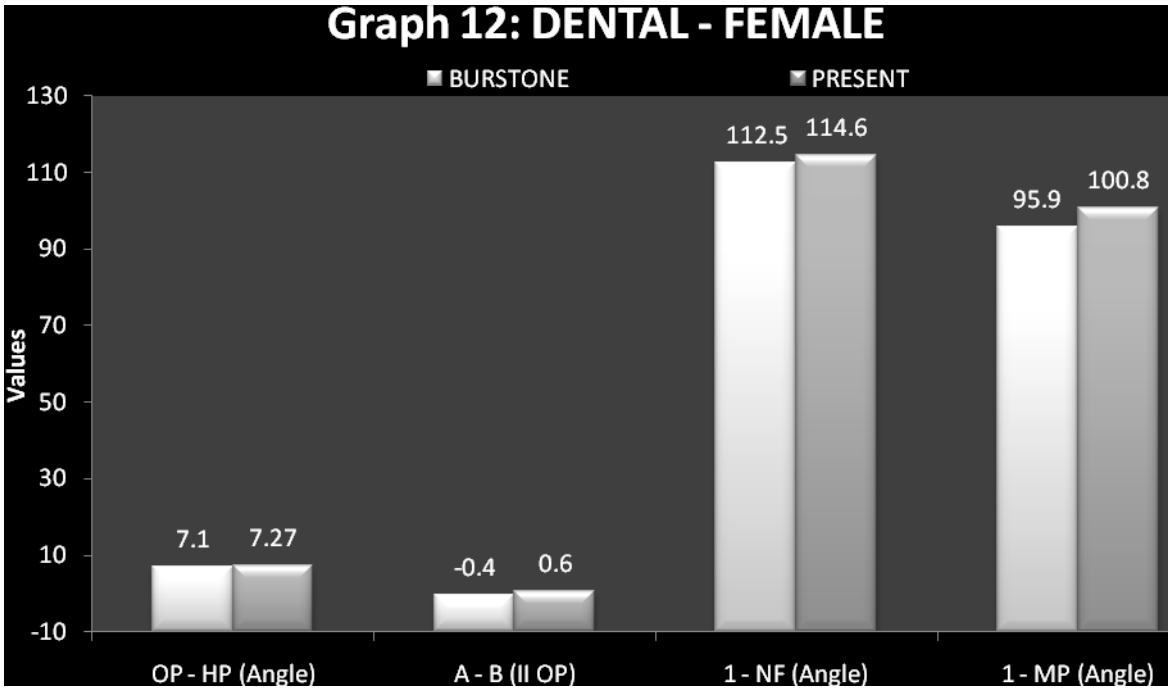

Graph 7: CRANIAL BASE - FEMALE
60
50
40
30
20
10
0
Values
32.8
35.6
50.9
53.9
AR - PTM (II) HP
PTM - N (II) HP
BURSTONE
PRESENT


Graph 8: HORIZONTAL - FEMALE
4
2
0
-2
-4
-6
-8
Values
BURSTONE
PRESENT
2.6
3
-2
-2.22
-6.9
-7.69
-6.5
-7.15
N - A - PG (Angle)
N - A (II HP)
N - B (II HP)
N - PG (II HP)


Graph 9: VERTICAL (SKELETAL) - FEMALE
BURSTONE
PRESENT
Values
70
60
50
40
30
20
10
0
50
52.6
61.3
65.1
50.6
52.7
24.2
23.6
N - ANS (HP)
ANS - GN (HP)
PNS - N (HP)
MP - HP (Angle)


Graph 10: VERTICAL (DENTAL) - FEMALE
BURSTONE
PRESENT
Values
45
40
35
30
25
20
15
10
5
0
27.5
29.5
40.8
41.8
23
23.6
32.1
33.6
1 - NF (NF)
1 - MP (MP)
6 - NF (NF)
6 - MP (MP)


Graph 11: MAXILA MANDIBLE - FEMALE
BURSTONE
PRESENT
Values
140
120
100
80
60
40
20
0
52.6
56.5
46.8
48.9
74.3
78.2
7.2
5.1
122
120
PNS - ANS (II HP)
AR - GO (Linear)
GO - PG (Linear)
B - PG (II MP)
AR - GO - GN (Angle)


Graph 12: DENTAL - FEMALE
BURSTONE
PRESENT
Values
130
110
90
70
50
30
10
-10
7.1
7.27
-0.4
0.6
112.5
114.6
95.9
100.8
OP - HP (Angle)
A - B (II OP)
1 - NF (Angle)
1 - MP (Angle)

DISCUSSION

Roentogenographic cephalometry was first introduced to the Oral and maxillo facial surgical speciality by Broadbent in 1931, mainly as a tool to study cranio-facial growth and development. Gradually it was used to study facial forms, development of norms, assessment of treatment prognosis and growth prediction for the individual patients.

The successful treatment of the orthognathic surgery patient is dependent on careful diagnosis. Cephalometric analysis can be used as an aid in the diagnosis of skeletal and dental problem as well as a tool for simulating surgery by the use of acetate overlays. The first step in the diagnosis of the orthognathic surgical case is to determine the nature of skeletal and dental deformities, thereby helping in the decision making with regard to compensations and decompensations. Cephalometric analysis tempered with good clinical judgement, can be a valuable tool in establishing the most appropriate treatment plan.

Prime objectives of orthognathic surgery are improvement in the appearance and functions of the dentofacial structures. Patients who require orthognathic surgery usually presents with a variation in facial bones as well as tooth position that must be modified by a combined orthodontic surgical treatment. Therefore a specialized

cephalometric appraisal system should be incorporated into treatment planning.

Various cephalometric analyses are put forward by various authors. Those that gained importance in orthognathic surgery are Burstone hard and soft tissue analysis, Grummon's analysis Arnett and Bergmann analysis and Tomac analysis. These were originated by Caucasians, for their ethnic groups. In our study,we are using cephalometric analysis for hard tissue given by Burstone CJ

. Burstone CJ in 1978 designed a Cephalometrics for Orthognathic Surgery (COGS) especially for the patient undergoing maxillofacial surgery with use of landmarks and measurements that can be altered by common surgical procedure. It was developed at the university of Connecticut. This appraisal was based on a system of cephalometric analysis that was developed at Indiana University with the addition of clinically significant new measurements. The standards are based on a sample obtained from the Child Research Council of the University of Colarado School of Medicine, which included the sample of 16 females and 14 males.

COGS has the following characteristics, which make it particularly adaptable for the evaluation of surgical orthognathic problems.

- The chosen landmarks and measurements could be altered by various surgical procedures.
- The comprehensive appraisal includes all of the facial bones and a cranial base reference.
- The rectilinear measurements could be readily transferred to a study cast for mock surgery.
- Critical facial skeletal components are examined.
- Standards and statistics are available for variations in age and sex from age 5 to 20 on the basis of developmental age and a systemized approach to measurement that can be computerized and used.

Flynn TR, Ambrogio RJ and Zeichner SJ in 1989 conducted a study to determine cephalometric norms for orthognathic surgery in Black American Adults in addition they compared the values obtained with White American adults. When compared with black subjects, there was greater maxillary skeletal prognathism, increased skeletal lower face height, increased skeletal facial convexity, lower incisor proclination, increased anterior dental heights than in white subjects.

Craven All in 1958 conducted cephalometric study of the central Australian Aborginals. They compared the results with American Whites. They concluded that significant differences are present. The Australian Aboriginal had a greater degree of alveolar

prognathism. Inter-racial variation was evident in the degree of mandibular basal prognathism.

Park J, Bowman D,.Klapper in 1989 conducted a cephalometric study of Korean adults. They concluded that facial convexity is slightly larger and maxillary and mandibular incisors are more protrusive in Koreans. The ratio of lower molar height and lower incisor height is larger and also upper and lower lips of Koreans are more protruded than those of Caucasians.

Cooke MS and Wei Shy in 1987 conducted a comparative study of Southern Chinese and British Caucasian cephalometric standards. They concluded that dentoskeletal form of Chinese was found to have a shorter cranial base, a shorter maxilla and a more obtuse angle between the mandibular ramus and the posterior skull base. Maxillary and mandibular incisors were more proclined. Alveolar protrusion was also greater. The nasal bone was longer and less prominent in Chinese compared to Caucasians. The Chinese soft tissue profile displayed a less prominent, nose and chin but more protrusive upper and lower lips. The columella was shorter and the upper lip longer with a more acute angulation between them than found in the Caucasians.

Alcade RE, Jinno T, Pogrell MA and Matsumara in 1998 conducted a study to compare cephalometric norms between

Japanese and Caucasians. They concluded that Japanese had a shorter maxilla, larger upper anterior face height and lower posterior dental height than Burstone's white sample. Soft tissue analysis of the Japanese subjects showed a retrognathic maxilla and mandible in relation to the soft tissue glabella and bilabial protrusion when compared with the white adult standards.

Hajighadimi M, Dougherty HL, Garakani F in 1981 conducted a study on Iranian children. They concluded that skeletal pattern of the Iranian group was more retrusive than that of American Caucasian group. The Iranian group had a straighter bony profile with more procumbent dental pattern. The mandibular plane angle and the occlusal plane angle were higher in the Iranian racial group than the Caucasian group.

Argyropoulous E, Sassouni V, Xenioteu A in 1986 conducted an interesting study of comparative cephalometric investigation of the Greek craniofacial pattern through 4000 years. They concluded that the degree of similarity between the two Greek samples is greater than it has been between ancient Greeks and the other modern races.

Bishara SE, Abdalla EM, Hoppens BJ in 1990 conducted a study to compare the dentofacial parameters between Egyptians and North American adolescents. They concluded that Egyptians have a

tendency toward a maxillary dental protrusion and have more convex skeletal profile compared to Caucasians. Caucasians have greats posterior facial height than Egyptian boys.

Bishara SE and Fernandez AG in 1985 conducted a study on cephalometric comparisons of dentofacial relationships between Mexicans and Caucasians. They concluded that adolescent Mexican girl had a relatively more protrusive mandible than the adolescent Caucasian girl.

It has been concluded that significant difference in the dentofacial relationships of various ethnic groups are present. It is evident that cephalometric norms of one ethnic group need not necessary apply to other ethnic group because, of noticeable variation of the craniofacial morphology, in different ethnic groups.

Further studies have been done among Indian population. Valiathan A, 1975 did a study on racial comparison of dentofacial cephalometric norms between Caucasians, and Indian. Indians had more procumbent teeth compared to Caucasians. The comparison of the racial data showed considerable similarity in skeletal patients of the Caucasians. Indians had more procumbent teeth in general than the Caucasians.

Ravindra Nanda and Ram Nanda in 1969 conducted a study to establish norms for Indians. Since India is a subcontinent with a large number of racial subgroups and several religion and interracial mixtures. It was proposed to study only the individuals derived from a North Indian Hindu population. The study of dentofacial patterns in Lucknow group was done. They concluded that skeletal norms obtained on the Lucknow Hindus were almost similar to the American White, but the dental pattern were more protrusive than American White. Comparison of the means obtained on male and female groups of the present study revealed a protrusive skelotodental pattern in the females. The norms of the North Indian (Lucknow) Hindu females when compared with the norms from Gujarati females (Western India) showed that Gujarati females had a more protrusive dental pattern although the skeletal patterns of the two samples were almost identical.

Ashima Valiathan and John KK in 1984 conducted a sturdy on soft tissue cephalometric analysis of adults from Kerala. He studied the applicability of Apollo profile line, Holdaway line and the Burstone soft tissue analysis in Kerala population. It was concluded that the upper lip, lower lip and subnasale are prominent in the Kerala group. The Burstone analysis showed a midfacial prominence of the soft tissue. The lower lip was also more prominent than the upper lip.

John KK and Ashima Valiathan in 1991 conducted a study to evaluate the dentoskeletal facial characteristics of subjects in adults of Kerala and to establish cephalometric norms for this sample with normal occlusion and acceptable facial profile. Adults of Kerala had more protrusive incisor. It was evident from this study that there was significant differences in dentofacial characteristics compared to Caucasian population.

Grewal H, Siddu SS and Kharabanda OP in 1994 conducted study to describe the dentofacial and soft tissue pattern of Indo-Aryans and to compare it with accepted standards for Caucasians and other North Indian population groups. Indo-Aryans have shown a mild convex dental pattern as compared to Caucasians but similar to North Indians. Their soft tissue pattern is characterised by increased thickness of upper lip and a thin lower lip.

India is a subcontinent with a large number of racial subgroups and several religion and interracial mixtures. Study conducted by Ashima Valithan on Indians and Ravindra Nanda and Ram S. Nanda on North Indian population and Ashima Valiathan on Kerala Population, Grewal H, Siddu SS, Kharabanda OP on Indo-Aryans has shown that there is significant difference in values. Hence there is a need to make different norms for racial subgroups in India.

Having recognized, the fact that, the norms prescribed for one ethnic group need not be suitable for others, an attempt was made in this study to establish the cephalometric norms using COGS analysis for population of Chennai which is situated in Tamilnadu. It was thought that the norms established will be helpful in treatment planning to attain better results.

In this study, the inclusion criteria and methodology were oriented to identify formative values that can assist in the diagnosis and treatment planning of adults of Tamil nadu seeking orthognathic surgery.

Adults of both sexes were included in the sample because most of the orthognathic surgeries are performed in non-growing patients. Bibby RE in 1979 conducted a cephalometric study of sexual dimorphism. It was concluded that female cranial dimensions are smaller than the corresponding dimensions in the male. The pattern of craniofacial morphology in males and females appeared to be identical except in posterior facial height. In general male skulls were 8.5 percent larger than female skulls. Hence, the data were separated according to gender to obtain a more specific and useful cephalometric normative values and because the sexual dimorphism was found to be significant, especially for linear measurements.

We intended to obtain a representative sample of normal Tamil population; hence, we did not include patients who have received orthodontic or any kind of cranial or facial surgical treatment or people from other states or pure bramins who are vaishnavites. Most patients presenting for orthognathic surgery are young adults. Due to the facial growth and development, cephalometric studies whose samples included predominantly or exclusively children may not be useful for prospective orthognathic surgery cases. Similarly, patients of advanced age may show changes due simply to the aging process such as loss of vertical dimension between the jaws caused by attrition and loss of teeth. Keeping this in mind in the present study the sample was limited to young adults with a range of 18-35 years.

The study by Cotton et al was based on only 20 subjects. Altemus selected the 80 adolescents with the most ideal dentitions from a group of 3,289. Alcade RE, on the other hand studied a large sample of 217 subjects. To eliminate inter examiner variability, a single investigator traced and analysed all radiographs.

Our study showed that males of this Tamil population had increased posterior cranial base length and increased anterior cranial base length was present in both the sexes. There is less convex profile in the males and more convex profile in the female when compared to the Caucasians with similar prognathic mandible

and less prominent chin compared to Caucasians. And also, increased maxillary and mandibular incisor proclination was noticed.

It was inferred from our study that a separate norms for normal ethnic Tamil adults contemplating orthognathic surgery was needed. Table 5 shows hard tissue norms.

Last but not the least as the study size is only 54 members from Tamil nadu population we would like to extend our next study as a multi centered study with more number of volunteers across the state and extend it to other parts of the world where ethnic Tamils reside to arrive at a more comprehensive values for this prestigious ethnic group.

With the available newer techniques in computed tomography, 3 dimensional reconstructions and 3 dimentional cephalometric analysis and predictions, our diagnosis and treatment planning for Tamil population will be taken to the next level.

Our sincere thanks to Dr Burrstone for his invaluable prediction for orthognathic treatment planning which is a precedent in cephalometric analysis for the ethinic population, Caucasians, which has paved way for the construction of new cephalometric norms for every individual ethnic group.

TABLE – 5

HARD TISSUE NORMS FOR TAMILNADU POPULATION

	MALES		FEMALES	
	Mean	**SD**	**Mean**	**SD**
Crainal base	79.04	3.24	73.27	2.52
Ar-PtM (11 HP)	39.89	2.72	35.58	2.87
PTM -N (11 HP)	56.77	3.57	53.92	3.06
Horizontal (Skeletal)				
N-A-Pg (angle)	2.95°	5.26°	3.00°	6.11°
N-A (11 HP)	-0.04	6.49	-2.22	2.72
N-B (11 HP)	-5.64	6.66	-7.69	6.04
N-Pg (11 HP)	-4.41	8.31	-7.15	6.69
Vertical (Skeletal, dental)				
N-ANS (HP)	56.04	3.87	52.60	3.29
ANS -Gn (HP)	68.25	4.34	65.12	4.64
PNS -N (HP)	56.20	3.30	52.67	3.27
MP HP (angle)	19.11°	6.05°	23.65°	3.88°
1-NF (NF)	29.39	2.90	29.52	2.19
1-MP (MP)	44.75	2.62	41.81	2.72
6- NF (NF)	24.34	2.24	23.62	2.42
6- MP(MP)	38.00	3.22	33.65	2.40
Maxilla, Mandible				
PNS - ANS (11 HP)	60.20	3.09	56.46	3.37
Ar-Go (linear)	54.82	4.96	48.94	4.42
Go- Pg (linear)	82.57	5.69	78.21	5.34
B-Pg (11 MP)	6.18	3.24	5.06	4.43
Ar-Go-Gn (angle)	119.50°	7.25°	120.02°	7.02°
Dental				
OP-HP (angle)	5.09°	3.64°	7.27°	3.14°
A-B (11 OP)	1.13	2.70	0.60	3.42
1-NF (angle)	117.14°	6.26°	114.58°	6.21°
1-MP (angle)	104.32°	8.30°	100.77°	7.06°

CONCLUSION

A cephalometric appraisal is only one step in diagnosis and planning of treatment. If surgery is planned to produce cephalometric changes that make the facial proportions , approach the normative standards, it might not be acceptable to patients. One should also question the goal of trying to make everyone fit a cephalometric standard which was based on Caucasians. One must be sure that the patient desires the facial characteristics of the Northern European population. It should be kept in mind that surgical treatment should be planned according to the individual needs and expectations of each patient, using the radiographs only as a guide along with the clinical examination and patient records.

In the present study, surgically useful cephalometric norms for hard in the diagnosis and treatment planning of orthognathic surgery in adult Tamil population have been determined. **There was significant difference in the values of Tamil and Caucasian population.** These difference should be considered when formulating the diagnosis and treatment plan for patients of Tamil nadu contemplating surgery.

SUMMARY

The present study was undertaken in the Department of Oral and Maxillofacial Surgery, Ragas dental college and hospital, Chennai.

Evaluation of cephalometric analysis for orthognathic surgery for hard tissue for ethnic Tamil population was done on 54 volunteers between 1st November 2008 to 31st October 2010 were selected

The study was conducted with two objectives. Firstly, to determine lateral cephalometric standards of Tamil nadu adult with balanced facial esthetics and normal occlusion using the Burstone comprehensive cephalometric analysis that are specific for orthognathic surgery. Secondly, to compare the mean value of soft and hard tissue measurements obtained with normative standards given by Burstone.

There was significant difference in the measurements of given Tamil nadu population and norms for Tamil population was determined. Table 6 shows hard tissue norms. These readings can be used for ethnic Tamil population who is undergoing orthognathic surgery.

TABLE – 6

HARD TISSUE NORMS FOR TAMILNADU POPULATION

	MALES		FEMALES	
	Mean	**SD**	**Mean**	**SD**
Crainal base	79.04	3.24	73.27	2.52
Ar-PtM (11 HP)	39.89	2.72	35.58	2.87
PTM -N (11 HP)	56.77	3.57	53.92	3.06
Horizontal (Skeletal)				
N-A-Pg (angle)	2.95°	5.26°	3.00°	6.11°
N-A (11 HP)	-0.04	6.49	-2.22	2.72
N-B (11 HP)	-5.64	6.66	-7.69	6.04
N-Pg (11 HP)	-4.41	8.31	-7.15	6.69
Vertical (Skeletal, dental)				
N-ANS (HP)	56.04	3.87	52.60	3.29
ANS -Gn (HP)	68.25	4.34	65.12	4.64
PNS -N (HP)	56.20	3.30	52.67	3.27
MP HP (angle)	19.11°	6.05°	23.65°	3.88°
1-NF (NF)	29.39	2.90	29.52	2.19
1-MP (MP)	44.75	2.62	41.81	2.72
6- NF (NF)	24.34	2.24	23.62	2.42
6- MP(MP)	38.00	3.22	33.65	2.40
Maxilla, Mandible				
PNS - ANS (11 HP)	60.20	3.09	56.46	3.37
Ar-Go (linear)	54.82	4.96	48.94	4.42
Go- Pg (linear)	82.57	5.69	78.21	5.34
B-Pg (11 MP)	6.18	3.24	5.06	4.43
Ar-Go-Gn (angle)	119.50°	7.25°	120.02°	7.02°
Dental				
OP-HP (angle)	5.09°	3.64°	7.27°	3.14°
A-B (11 OP)	1.13	2.70	0.60	3.42
1-NF (angle)	117.14°	6.26°	114.58°	6.21°
1-MP (angle)	104.32°	8.30°	100.77°	7.06°

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COMPARITIVE STUDY-BURSTONE HARD TISSUE VALUES OF CAUCASIAN POPULATION WITH TAMIL POPULATION

Name : age /sex:

Address : Blood group:

Occupation:

Community : Phone no:

General examination:

CVS:

RS:

ENDOCRINE:

GIT:

BLEEDING DISORDER:

CNS:

GROWTH STATUS:

PALLOR:

ICTERUS:

CLUBBING:

CYNOSIS:

LYMPHADENOPATHY:

EDEMA:

VITALS:

BP:

PR:

HR/HS:

BR/BS:

TEMP:

HT:

WT:

EXAMINATION OF HEAD, NECK, FACE:

POSITION OF THE HEAD:

SYMMETRY OF THE FACE:

LIP POSTURE:

INTRA ORAL EXAMINATION:

MAX MO:

NO.OF TEETH PRESENT:

NO. OF MISSING TEETH:

OCCLUSION(MOLAR):

OCCLUSION (CANINE):

OVERJET:

OVERBITE:

MIDLINE:

ARCH RELATIONSHIP :

TONGUE:

EXTRAORAL EXAMINATION:

SOFT TISSUE ABNORMALITIES:

LIP COMPITENCE:

INCISAL EXPOSURE AT REST:

INCISAL EXPOSURE AT SMILE:

TMJ EXAMINATION:

PHOTO AND X-RAY REQUISITION

Frontal : frontal x-ray:

Frontal(smile):

Lateral: lateral x-ray:

3/4th :

Occlusion:

Frontal :

Molar(R&L):

Max occ:

Mad occ:

No of photos:

No of x-rays:

CONSENT FORM

I _____, undersigned here by give my consent for the required x-ray procedure on myself for the study of craniofacial proportion in comparison with the mean hard tissue values of burstone being conducted by Dr.S.Sakthivel under the guidance of Dr. Malini Jayaraj, professor, Dept of oral maxillo facial surgery, Ragas dental college and hospital. I have been informed and explained about the procedure and technique of the study.

I also accept this as part of study protocol thereby voluntarily unconditionally,freely give my consent without any form of pressure in mentally sound and conscious state to participate in the study

Signature

COMPARITIVE STUDY-BURSTONE HARD TISSUE VALUES OF CAUCASIAN POPULATION WITH TAMIL POPULATION

Name : age /sex:

Address : Blood group:

Occupation:

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OVERJET:

OVERBITE:

MIDLINE:

ARCH RELATIONSHIP :

TONGUE:

EXTRAORAL EXAMINATION:

SOFT TISSUE ABNORMALITIES:

LIP COMPITENCE:

INCISAL EXPOSURE AT REST:

INCISAL EXPOSURE AT SMILE:

TMJ EXAMINATION:

PHOTO AND X-RAY REQUISITION

Frontal : frontal x-ray:

Frontal(smile):

Lateral: lateral x-ray:

3/4th :

Occlusion:

Frontal :

Molar(R&L):

Max occ:

Mad occ:

No of photos:

No of x-rays:

CONSENT FORM

I _____, undersigned here by give my consent for the required x-ray procedure on myself for the study of craniofacial proportion in comparison with the mean hard tissue values of burstone being conducted by Dr.S.Sakthivel under the guidance of Dr. Malini Jayaraj, professor, Dept of oral maxillo facial surgery, Ragas dental college and hospital. I have been informed and explained about the procedure and technique of the study.

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Signature