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Can we use Caucasians norms on Pakistani population?

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Abstract

Introduction: Most Orthodontists use Cephalometric norms for orthodontic diagnosis. The Caucasian norms are used for the said purpose. It is often hypothesized that norms valid for one particular population are not applicable to another population. Hence this study was devised to establish cephalometric norms for Pakistani adult population and to find out the difference between the Pakistani and Caucasian norms.

Material and Methods: 250 Cephalograms were analyzed for linier and angular measurements. The sample was derived from two different cities of Pakistan so that it represents the entire Pakistani population. Mean and standard deviations was derived for all variables. Student t-test was applied to evaluate the difference of values between males and females. Unpaired t-test was used to evaluate the difference of means between Pakistani and Caucasians populations.

Results: No statistically significant difference was found between Pakistani males and females. Statistically significant differences were found between the two populations.

Conclusions: For years, Caucasian norms were used for diagnosis in Pakistani population. The differences found in this study indicated the need to use population-specific norms for orthodontic diagnosis and treatment planning.

Keywords: Cephalometry; standard values; Pakistani decent

Introduction

Orthodontists learn to critically evaluate the face from various aspects and as a result have subjective opinions regarding an esthetic profile. These are partly influenced by an orthognathic profile which is usually used as a norm or goal of the orthodontic treatment. Definition of esthetics differs amongst populations. One of the crucial aspect upon which opinions and perception of social acceptability is conceived is facial esthetics.[1,2]

Cephalometric diagnosis is a useful diagnostic tool for identifying facial growth patterns or growth direction. Orthodontists and surgeons have widely used cephalometric radiography as a diagnostic tool since its introduction by Broadbent.3 It is a key for skeletal, dental and soft tissue relationship assessment a s well as individual varying patterns resulting from particular ethnic and racial backgrounds. There have been various cephalometric analyses carried out using different landmarks and planes.4

Past researches of Cotton, Takanon, Wong, Haralanakis, Altemus and Kotak[5,6] have demonstrated norms devised on one population that cannot be considered normal for another. To provide finest orthodontic treatment results, facial and cephalometric analysis of patient should be considered particular to his/her ethnic background. The cephalometric norms of different races and ethnic groups concluded in different studies demonstrated that normal measurements for 1 group cannot be applicable to another group and every group should be treated

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according to its own characteristics. For the said purpose different norms have been developed for various racial and ethnic groups.[5,7,8] It is crucial that cephalometric evaluation of a patient should be compared with the norms established on his or her population, while determining treatment goals.

Cephalometric radiography has been used as an orthodontic diagnostic tool for years.[9] To establish ideal facial proportions and occlusion, many analyses have been made suggesting average measurements and ranges of skeletal and dental parameters. Up till now, Caucasian's norms have been used for the Pakistani population because of unavailability of Pakistani data and norms. Formerly no evidence has reported cephalometric standards for Pakistani population. In this modern era, adult population of Pakistan is approaching for orthodontic treatment and there is an urge to define cephelometric norms for them. The intent of this study is to develop hard and soft tissue norms for Pakistani adults and to identify if any gender differences exist.

Material and Methods

250 adults comprised the sample out of which 150 Lateral Cephalograms were taken from the archive files of Orthodontic department at Dr Ishrat-ul-Ebad Institute of Oral Health Sciences Karachi. While 100 lateral Cephalograms were derived from the archive file of Islamic International Dental Hospital Islamabad. The sample was derived from two different cities of Pakistan so that the it represents Pakistani population.

Selection criteria were Pakistani ancestry , esthetically pleasing profile, class I occlusal relationship, overjet no more than 3 mm, age range of 18 -25 years, no previous history of orthodontic treatment or trauma and no apparent skeletal deformity.

All radiographs were obtained with the teeth in centric occlusion and natural head position. Cephalograms were traced on a cellulose acetate sheet. Landmarks were identified and following measurements were done;

SNA: angle formed between Sella - Na and Na- point A

SNB: angle formed between Sella – Na and Na- point B

ANB: Angle formed between point A-Na and Na- point B

Upper incisor inclination (U1–NF): an angle between the lines from the upper incisal edge through the tip of the root to NF.

Lower incisor inclination (L1–MP): an angle between the lines from the lower incisal edge through the tip of the root to MP

MMA: angle between maxillary and mandibular plane

SNMP: angle between Sella nasion and mandibular plane

E-line to upper lip: distance between the esthetic line and the most prominent part of upper lip

Lower lip to E line: distance between the esthetic line and the most prominent part of lower lip

Nasolabial angle: the angle formed by a line tangent to the base of the nose and a line tangent to the upper lip SPSS version 21 was used for statistical analysis. Basic descriptive analysis included means and standard deviation. Student T-test was used to assess the gender differences in the measured values. Unpaired t-test was applied to find the difference between the means of Pakistani population and Caucasian adults. P value less than 0.05 was considered as significant

Results

The results using descriptive analysis for skeletal, dental and soft tissue measurements were ascertained (Table I) which represent the norms established in the study. Sexual dimorphism (Table II) showed no statistical significant difference between males and females. The means were described as Pakistani standards and were compared with the Caucasian standards and a significant

difference was found in skeletal, dental linear and angular measurements (Table III).

Table I: Descriptive Statistics

	Mean	Std. Deviation
SNA	81.63	3.265
SNB	78.84	3.480
ANB	2.90	1.979
maxilomandibular plane angle	24.06	5.512
upper incisor to palatal plane	115.08	10.238
incisomandibular plane angle	98.26	8.574
E-line to upper lip	-3.18	2.775
E-line to lower lip	-1.23	2.482
Nasolabial	100.08	10.842

Table II: Statistical comparison of cephelometric values of Pakistani male and female

Group Statistics				
	gender	Mean	Std. Deviation	P value
SNA	Male	81.21	3.053	0.66
	female	81.79	3.334	
SNB	Male	78.42	3.262	0.74
	female	79.00	3.552	
ANB	Male	2.79	1.562	0.16
	female	2.93	2.114	
maxilomandibular plane angle	Male	24.34	5.029	0.17
	female	23.95	5.688	
upper incisor to palatal plane	Male	114.42	6.832	0,19
	female	115.32	11.237	
incisomandibular plane angle	Male	100.16	8.368	0.59
	female	97.56	8.565	
E-line to upper lip	Male	-2.88	2.722	0.73
	female	-3.29	2.793	
E-line to lower lip	Male	-1.21	2.579	0.22
	female	-1.23	2.451	
Nasolabial	Male	100.24	11.032	0.83
	female	100.02	10.802	

*P value<0.05

Table III: Comparison of Caucasian norms with Pakistani population

	Pakistani population		Caucasians populations[11]		
	Mean	S.D	Mean	S.D	P-value
SNA	81.63	±3.26	80.74	±3.06	0.001
SNB	78.84	±3.48	78.10	±2.55	0.001
ANB	2.90	±1.97	2.46	±1.16	0.007
UI-PP	115.08	±10.2	113	±7.3	0.012
IMPA	98.26	±8.57	90	±7.55	0.0001
U-lip to E-line	-3.18	±2.77	-4.31	±1.77	0.0001
L-lip to E-line	-1.23	±2.48	-2.96	±1.96	0.0001
Nasolabial	100.08	±10.84	95.45	±7.06	0.0001

*P value<0.05

Discussion

Improved facial esthetics is the demand of this modern era and an objective of orthodontic treatment and the concept of

normal has been imperative for an orthodontist. It is essential to define norms of a particular population as dental, soft tissue and skeletal structures exhibit differ patterns for different ethnic groups. Most existing Cephalometric analyses are based on norms for Caucasian ethnic groups.[1,2,10] Therefore, those norms cannot be applied to Pakistani patients. Ethnic variations in the normally positioned maxilla and mandible reshape and change the diagnosis and treatment plan for each of the different types of malocclusions.

For years, norms of Caucasians were being used in Pakistan for orthodontic diagnosis and treatment planning because of a lack of availability of data for our own population. In this analysis, both linear and angular measurements were analyzed to aid in diagnosis and treatment planning for both orthodontic and orthognathic surgery cases and then compared with the Caucasian data previously reported.[11] Although, all subjects of Pakistani and Caucasian populations fall within the confines of normal occlusion and balanced faces, some integral variations in the craniofacial structures of the Pakistani population were evident. The maxilla and mandible were relatively positioned forward as compared to the Caucasian adults. The same was not found when comparison of Asian and Caucasian population was done and similar values of SNA and SNB were found.[12]

The incisors of Pakistani adults were found to be proclined as compared with the Caucasian adults. The bi-maxillary proclination has been proved to be a feature of Asians by different studies done in Japan, China and India.[13,14] Soft tissue analysis demonstrated more protrusive upper and lower lips as compared to the Caucasian adults (Table III). Japanese, Indian, Bangladeshi and Irani populations also demonstrated protrusive upper and lower lips.[15-18] To demonstrate significant gender differences, a comparison was made. It showed no significant difference in male and female faces and these findings were in accordance with the previous studies done for different ethnicities.[19] Most of the cephalometric values were analogous to Bangladeshi and Indian groups showing same ethnic origin of South Asian region.[15]

Conclusions

Pakistani population revealed protruded mandible and decreased lower facial height and bi-maxillary dental protrusion. These values are benchmark for Pakistani population and should be considered while planning orthodontic treatment or orthognathic surgery.

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