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Perception of facial esthetics in young North Indian population

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Abstract

INTRODUCTION: A person's ability to recognize a beautiful face is innate, but translating this into defined treatment goals is a challenge for clinicians.

AIM: To determine if faces considered esthetic and pleasing in the young North Indian population (both males and females) exhibit similar cephalometric measurements as used for ideal treatment and successful results.

MATERIALS AND METHOD: A panel of five judges evaluated a set of one frontal, one frontal during smiling, and one profile extra-oral photograph of 160 students (80 females and 80 males) on a five-point attractiveness scale. For each photographic set, the mean and final scores were calculated. Once the sample was assessed, 60 subjects (30 females and 30 males) with the highest final facial aesthetic score were selected and cephalometric analysis was performed. The obtained data were subjected to statistical analysis using SPSS 20 software.

RESULTS: Both males and females with class I skeletal jaw bases were found to be attractive. The females with short faces; mild facial convexity and lower lip closer to the esthetic line were found to be attractive. The males with a prominent chin, straight profile, prominent nose, increased upper lip thickness, upper lip length, and lower lip length were found to be attractive.

CONCLUSION: The faces considered attractive in this study fulfilled most of the cephalometric norms commonly used for the diagnosis and treatment planning except for a few inconsistencies which may be attributed to the gender and demographic origin.

Keywords:

Facial attractiveness, hard tissue, photographs, soft tissue

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Introduction

Both photographs and cephalograms have been used as adjuncts for identifying the changes required in orthodontic treatment. Improved facial esthetics is one of the prime aims of orthodontic treatment, and its correlation with the underlying skeletal and soft-tissue structures is very subjective.[1] But what makes a face attractive? "Is beauty al together in the eye of the beholder?" Many guidelines, norms, and ideal ratios and angles dealing with attractive faces have been proposed in the literature, mainly based on two-dimensional measurements.[2-5] A few investigators, however, have shown a scientific basis for their criteria; in general, the choice of the criteria themselves and their assumed optimal values are arbitrary. The soft and hard tissue profile features in various ethno-racial groups often overlap with each other because of a continuous process of racial admixture. Different authors have included various parameters in their facial analysis and have given their normal range but these norms (range) do not apply fully in the dentofacial and soft-tissue relationships in all the ethnic and racial groups.[6] The orthodontists used to rely on esthetic judgments from facial photographs. The correlation between the estimates of facial attractiveness made

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from clinical photographs and measurements from lateral cephalograms could be investigated for more understanding of beauty assessment.[3] Hence, the present study aims to determine if the faces considered esthetic and pleasing in the young North Indian population (both males and females) exhibit similar cephalometric measurements as used by the orthodontists to assess the ideal treatment and successful results.

Materials and Method

The subjects for the present cross-sectional study included 160 volunteers (80 males and 80 females; between 18 and 25 years) with pleasant faces. The convenience sampling method was used to select the samples. The approval for this study was obtained from the ethical clearance committee and all volunteers gave informed consent to participation. The volunteers were screened and a brief questionnaire was completed for all the subjects that included name, age, origin, history of any previous orthodontic treatment, and status of permanent dentition which included their informed consent for participation. The subjects having a history of past two generations from North Indian ancestry, age group of 18–25 years, no history of previous orthodontic treatment, no history of previous facial or dental trauma or any congenital defect, no missing permanent teeth except the third molars were included in the study. The exclusion criteria were gross facial asymmetry, missing tooth visible on smiling or prosthodontic/restorative work on tooth/teeth visible on smiling, visible periodontal disease, caries, excessive dental attrition, lip irregularities, or a history of lip surgery.

Three photographs (right profile, frontal relaxed, and frontal posed smile) of all the volunteers were taken and considered together as the triplet for facial attractiveness assessment [Figure 1] The camera (Nikon, model D3200 18-55 mm; Shimomaruko, Tokyo, Japan) was used in its autofocus position; the shutter speed was 1/200/s, and the opening of the diaphragm f/3.5–5.6. The subjects were seated on the adjustable stool and instructed to hold the head in a natural head position by looking straight into a mirror hung on the wall at eye level. An effort was also made to keep the interpupillary line parallel to the horizontal ruler. The tripod stand of the camera was fixed at a 3 ft distance from the stool to avoid magnification error. The same illuminations were used for the photography of each volunteer. The best photographs were selected of each volunteer depending upon their picture quality. The photographs (JPEG format) were standardized using Adobe Photoshop CS version 8.0software of the size of 3.33 in. × 5 in. These photographs were then compiled in a folder on the computer (for male and female volunteers) with the serial number given to the volunteers during the photography. The privacy and confidentiality of each volunteer were maintained. An initial sample size of 160 volunteers would constitute the primary selection. A panel of judges comprising an orthodontist, a general dentist, a painter, an artist, and a photographer scored the photographs (right profile, frontal relaxed, and frontal maximum smiling) of 160 volunteers (80 males and 80 females). The rating of facial esthetics was performed on a five-point attractiveness scale with values from 1 (very unattractive) to 5 (very attractive).[7] Digital photographic display (right profile, frontal relaxed, and frontal maximum smiling) of 160 volunteers (80 males and 80 females) considered together as the triplet was shown to each judge for 15 s.[8] The judges were asked to score the face according to their preference on a rating scale of 1–5. The scoring was not biased as the judges were unaware of the subject volunteers.

Figure 1: Photographic triplet: Frontal relaxed, frontal maximum smiling, and profile photographs.

The mean and standard deviation (values indicating the final facial esthetic score by adding scores given by each judge for each volunteer) were calculated. A total of 60 young volunteers (30 males and 30 females) with pleasant-looking faces were shortlisted for further study. Standardized lateral head radiographs were taken and evaluated for skeletal and soft-tissue cephalometric parameters [Table 1]. All analyses were performed on Statistical Package for Social Sciences (SPSS) version 20. Data were summarized as mean ± SD with standard error of mean (SEM) and confidence interval. Gender differences were compared by Independent Student's t-test and one sample t-test was used to compare the mean of a group against cephalometric norms (known mean.) The level of significance in the data of the present study was noticed at P value <0.05.

Results

Among the skeletal parameters [Table 1], a significant difference was seen for lower facial height and Sella-Nasion-Point B angle (SNB angle) between genders which was higher in the male volunteers ($P < 0.05$)

Although the mean values of Point B to Pogonion distance, Sella-Nasion-Point A angle (SNA angle),

SNB angle, and facial angle were higher in the males, the upper facial height, Point A Nasion and Point B angle (ANB asngle), Y-axis angle, and facial convexity angle were higher in the females but the difference was statistically not significant ($P > 0.05$).

Among soft-tissue measurements [Table 2], the mean values for E-line to lower lip and soft-tissue facial angle were higher in the males whereas the mean values for facial convexity and nasolabial angle were higher in females ($P > 0.05$). Highly significant differences were seen for lower lip length, upper lip thickness, nose prominence, and upper lip length between genders which were higher in the male subjects ($P < 0.001$).

The comparison of the skeletal cephalometric measurements of the study groups with ideal cephalometric values [Table 3] shows a highly significant difference for the upper facial height, lower facial height ($P < 0.001$) in both the genders while for B-Pog highly significant difference was found in the males and significant difference in the females. The mean, standard deviation, and level of significance (*P*-value) for both the genders for soft-tissue parameters are mentioned in Table 4. Statistically significant difference was found for lower lip length, upper lip thickness, E-line to lower lip, facial convexity angle, and nose prominence for both the genders ($P < 0.05$). Only females showed a significant difference in the nasolabial angle.

Discussion

In contemporary orthodontic practice, greater emphasis on appearance and facial attractiveness has evolved as

Table 1: Skeletal cephalometric measurements (both linear and angular) for pleasing young North Indian population (mean±SD)

Hard tissue measurement	Variables	Male (*n*=30)	Female (*n*=30)	*P*
Linear (mm)	Upper facial height	57.97±4.11	58.17±4.54	0.859
	Lower facial height	66.90±6.55	62.60±4.85	0.005
	B-Pog	6.42±1.54	6.20±1.45	0.576
Angular (degree)	SNA angle	80.40±3.76	79.73±3.99	0.508
	SNB angle	81.27±3.67	79.00±3.64	0.019
	Facial angle	88.47±3.19	87.47±4.22	0.305
	Y-axis angle	66.13±4.54	66.47±3.13	0.742
	Facial convexity angle	-2.63±4.79	-0.83±4.44	0.137

Table 2: Soft-tissue cephalometric measurements (both linear and angular) for pleasing young North Indian population (mean±SD)

Soft-tissue measurement	Variables	Male (*n*=30)	Female (*n*=30)	*P*
Linear (mm)	Nose prominence	16.57±2.39	15.07±1.34	0.004
	E-line to lower lip	-1.17±2.67	0.07±2.65	0.077
	Upper lip length	23.97±2.54	21.67±2.47	0.001
	Lower lip length	51.47±4.49	44.68±2.81	<0.001
	Upper lip thickness	19.63±2.27	15.40±1.59	<0.001
Angular (degree)	Facial angle	92.60±3.08	92.40±4.23	0.835
	Facial convexity angle	166.47±4.38	166.53±3.40	0.948
	Nasolabial angle	96.77±11.42	100.60±7.67	0.132

Table 3: Comparison of skeletal cephalometric measurements (both linear and angular) for pleasing young North Indian population with normal cephalometric values (mean±SD)

Skeletal cephalometric measurements	Male			Female		
	Study sample values	Normal values	*P*	Study sample values	Normal values	*P*
Linear (mm)						
Upper facial height	57.97±4.11	45.7±4.9	<0.001	58.17±4.54	45.3±4.6	<0.001
Lower facial height	66.90±6.55	55.2±5.6	<0.001	62.60±4.85	56.7±6.5	0.005
B-Pog	6.42±1.54	8.9±1.7	<0.001	6.20±1.45	7.2±1.7	0.042
Angular (degree)						
SNA angle	80.40±3.76	82±2	0.877	79.73±3.99	82±2	0.923
SNB angle	81.27±3.67	80±2	0.928	79.00±3.64	80±2	0.867
ANB angle	-0.80±2.28	2±2	0.878	-0.07±2.24	2±2	0.899
Facial angle	88.47±3.19	87.8±3.57	0.826	87.47±4.22	88.3±4.11	0.893
Y-axis angle	66.47±3.13	66.5±2.4	0.837	66.13±4.54	66.0±2.0	0.708
Facial convexity angle	-2.63±4.79	0.03±5.09	0.142	-0.83±4.44	0.06±3.61	0.570

Table 4: Comparison of soft-tissue cephalometric measurements (both linear and angular) for pleasing young North Indian population with normal cephalometric values (mean±SD)

Soft-tissue cephalometric measurements	Male			Female		
	Study sample values	Normal values	*P*	Study sample values	Normal values	*P*
Linear (mm)						
Nose prominence	16.57±2.39	19±5 (11)	0.041	15.07±1.34	17±3 (11)	0.007
E-line to lower lip	-1.17±2.67	-1.5±2 (454)	<0.001	0.07±2.65	-2±2 (546)	0.030
Upper lip length	23.97±2.54	24.4±2.5 (20)	0.558	21.67±2.47	21±1.9 (20)	0.310
Lower lip length	51.47±4.49	54.3±2.4 (20)	0.013	44.68±2.81	46.9±2.3 (20)	0.005
Upper lip thickness	19.63±2.27	16.9±3.1 (9)	0.006	15.40±1.59	13.2±2.7 (9)	0.004
Angular (degree)						
Facial angle	92.60±3.08	91±7 (21)	0.378	92.40±4.23	92±4 (21)	0.548
Facial convexity angle	166.47±4.38	169.4±3.2 (20)	0.014	166.53±3.40	169.3±4.4 (20)	0.016
Nasolabial angle	96.77±11.42	106.4±7.7 (20)	0.002	100.60±7.67	103.5±6.8 (20)	0.177

a part of the overall treatment goal settings. People's perceptions of attractiveness could widely vary regarding age, gender, and demographic origin. All the subjects in the present study were above 18 years of age to ensure no component of growth would thereafter alter the facial esthetics. The previous studies[9,10] included adolescent subjects in which growth may affect the overall outcome. Jen *et al*.[11] involved three different groups of judges; laypersons, orthodontists, and dental students to rank the attractiveness of their sample and found that all groups of judges demonstrated similar trends in ranking. Similar results were seen in our study, where a professional artist, painter, general dentist, and photographer in conjunction with an orthodontist participated in the study. Most of the beauty scales in the literature ranged from 1 to some value with the majority using a five-point scale.[2,12] However, Stevens *et al*.[13] used a scale which ranged from −4 to +4. The ranking method used in this study was a scale with five points from 1 (the least attractive) to 5 (the most attractive). Although quantification of facial esthetics is certainly not the principal use of cephalograms in orthodontics, many cephalometric measurements have been proposed as reliable indices of facial attractiveness.[9] So, it seemed reasonable to correlate between the "objective" angular and linear measurements of X-ray cephalometry and the "subjective" ranking of facial photographs for attractiveness.

In the males, the skeletal cephalometric parameters showed an increase in lower facial height and chin prominence (B-Pog), which was in concordance with Foster,[14] who found that the males with straighter profiles and prominent chins are considered more attractive than females. Late mandibular growth and the development of the chin complete earlier in the females resulting in less prominent chins than in the males. When analyzing the face-height ratio, the lower facial height was found to be more in the males than in the females. Similar data were observed on measuring the Y-axis angle which showed a positive correlation for the males and a negative correlation for the females. Female with short faces were found to be more attractive than long faces. This was in agreement with the study done by Johnston *et al*.[6] Also, Lundström *et al*.[15] found that the horizontal growth pattern corresponded to increased facial attractiveness for the females. Though, the females presented with a decreased lower anterior facial height than the males in the present study, the difference was found to be statistically insignificant.

The present study concluded that the SNA angle was more than the SNB angle in the female subjects which was similar to the study done by Matoula *et al*.,[16] Sforza *et al*.,[17] and Marcias Gago *et al*.[2] who suggested a prominent maxilla related to a feature of female facial attractiveness. An increase in the facial convexity in the female subjects was found in our study owing to a convex soft-tissue profile in comparison to the males with a straight/concave facial profile. The SNB angle was increased for the males resulting in a prominent lower jaw base. The SNB values were slightly diminished for the females. This result was in agreement with a study[6] that represented low SNB values to be a feature of facial attractiveness in the females. Similar data were observed on measuring the facial angle which showed a positive correlation for the males and a negative correlation for the females.

The ANB angle in the male and female subjects in our study was within the normal cephalometric value, that is, 2 ± 2-degree, indicative of a skeletal class I jaw base. This is in agreement with the previous research where it has been suggested that a skeletal class I jaw base has a more attractive profile.[1]

The soft-tissue cephalometric parameters showed an increase in E-line to lower lip distance, upper lip thickness, upper lip length, lower lip length, and nose prominence. A negative correlation between the lower

lip and E-line with female attractiveness was found in agreement with the study by Matoula and Pancherz.[16] The increase in the upper lip length, lower lip length, and upper lip thickness in the males than females may be attributed to the ethnic factor or sample size, which is in agreement with the reports of Arnett *et al*.[18] The present study reveals a prominent nose in the males which is in concordance with a previous study. Studies[17] confirmed that attractive female subjects have a convex soft-tissue profile in comparison to the males with a straight/concave facial profile. There was a correlation between the skeletofacial cephalometric measurements and facial patterns considered esthetic and pleasing in a young North Indian population, but the attractiveness of a face cannot be completely explained by the cephalometric variables alone. Other non-metric factors, for example, face color, hair, facial expression, and ethnic facial pattern, also influence the decision.

Conclusion

The present study on esthetic pleasing young North Indian population concluded that the faces considered attractive fulfill most of the cephalometric norms commonly used for the diagnosis and treatment planning. Increased lower facial height, SNB angle, nose prominence, upper lip length, lower lip length, and upper lip thickness in the male subjects were found to be attractive whereas females of short facial height with convex profiles were more attractive. There was a significant difference in the cephalometric parameters compared with cephalometric norms.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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