

Assessment of lower anterior face height in local Khyber Pakhtunkhwa population

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Abstract

Introduction: The soft tissue paradigm shift has changed the way orthodontists plan treat and execute treatment. It is important to establish norms of face in the three dimensions and then every effort must be made to get close to those norms with ones treatment. Hence the purpose of this research was to evaluate the lower anterior face height (LAFH) of local Khyber Pakhtunkhwa (KPK) population.

Material and Methods: Cephalograms of 114 young subjects (57 men and 57 women) with the age range 14 to 24 years were evaluated and compared with standard norms. Lower facial height (LAFH) was established by taking linear measurement from anterior nasal spine (ANS) to menton (Me) and Total anterior facial height (TAFH) via the measurement of nasion (N) to menton (Me). Three age groups were considered according to mean deviation of LAFH ratio from standard i.e. normal, above normal and below normal.

Results: *t* test showed statistically significant difference in the LAFH in KPK population having *p* value < .05. LAFH was insignificantly (*p* value > .05) higher in men than in women. Out of 114 subjects 40 had normal, 11 had below normal and 63 had above normal mean LAFH ratio.

Conclusions: Khyber Pakhtunkhwa population has proportionally larger LAFH when compared to standard norms.

Key words: face height; facial esthetics; ethnic differences

Introduction

Standards of facial esthetics have begun to change worldwide and orthodontists need a wide knowledge of skeletal and dental characteristics, specifically in untreated normal subjects. This valuable information assists in orthodontic treatment, correlates normal developmental changes and treatment objectives.^{1,2} In a multicultural society, ethnic differences are assuming greater importance. Metropolitan areas have diverse populations, with a need to recognize that a single standard of facial esthetics might not be appropriate when making treatment plans for patients from various racial and ethnic backgrounds.³

Facial height is an important factor in facial balance.⁴ Orthodontic treatment must be in equilibrium with the normal growth process to be effective, stable and to compensate for unpleasant facial patterns.^{4,5} For instance, African Americans have been characterized as high angle patients who are consequently prone to skeletal open-bite malocclusions. This characterization is based on relatively large values for frankfort mandibular plane angle (FMA) and lower anterior face height (LAFH).^{5,6} Such changes from norms must have an impact on the diagnosis and the eventual treatment offered.

Many previous studies attempted to apply cephalometric analyses to various ethnic and racial groups.^{3,7-10} There is a consensus in the literature that lower anterior facial height (LAFH) is the greatest contributor to total facial height of black subjects from different geographic populations.^{10,11} This increased LAFH in blacks is described as a compensatory mechanism to minimize the

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marked risk for Class III malocclusion because of the enlarged mandibular body.¹² As Cephalometric norms do not apply to all patients because of racial characteristics and miscegenation, individualized cephalometric norms are required for various ethnic groups. Hence the purpose of the study was to find out the lower anterior face height (LAFH) in adult KPK subjects and compare it with that of African Americans.

Material and Methods

Lateral cephalograms of 114 patients reporting to the orthodontic department were taken out of which 50% were males and 50% were females. These patients were untreated subjects fulfilling the inclusion criteria. The age range was 14 to 24 years. The sample consisted of local KPK population with normal occlusions and well-balanced faces. The sample was obtained from the Orthodontic Department, Khyber College of Dentistry, Peshawar. The decision to exclude each subject with an FMA greater than 30° was based on an earlier study by Dandajena and Nanda,¹³ whose criteria for subject selection was also used in this study. Subjects had all permanent teeth up to the second molars and normal occlusions. Inclusion criteria was patients with class I molar and canine relationships, no crowding or cross-bites, normal over-jet and overbite, well-balanced faces and no history of previous orthodontic treatment. Patients underwent history taking and thorough clinical examination to exclude any abnormalities or malformation.

Standard cephalogram was taken with fixed radiation level, distances between radiation source, head & X-ray film and head position for all participants. The cephalometric films were obtained using the same X-ray unit at natural head position, with teeth in maximum inter digitations and lips in a relaxed posture. Radiographs were traced on 8×10 inch standard translucent acetate paper over a standard illuminated view box with a lead

pencil (2 HB). Total anterior face height (TAFH) was measured as a linear measurement from the points nasion (N) to menton (Me). Similarly lower anterior facial height (LAFH) was measured from anterior nasal spine (ANS) to menton (Me-ANS)(Figure 1).

Lower anterior facial height was calculated as a ratio by measuring LAFH and TAFH and then dividing LAFH by TAFH. We then compared it with standard values and categorized the result into three groups i.e. normal, below normal and above normal according to deviation from standard value being 54 ± 1 .

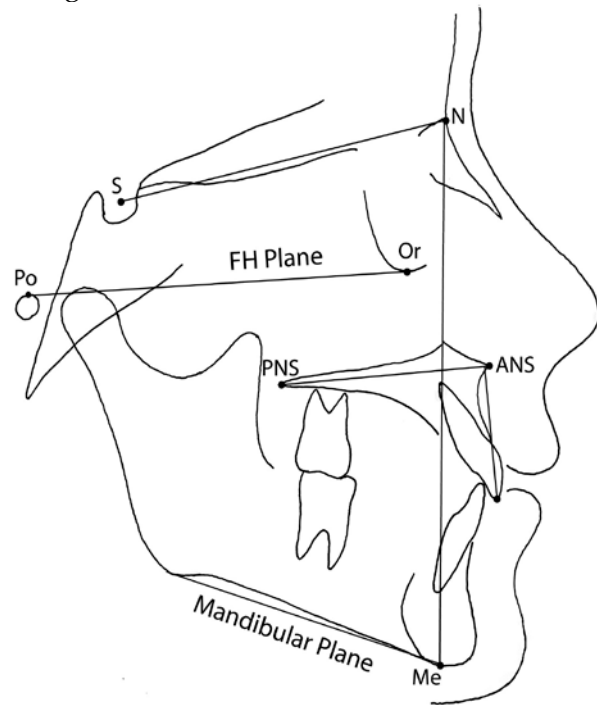


Figure 1. N = Nasion, Me = Menton, ANS = Anterior nasal spine, TAFH = Total anterior face height/ Measured from N to Me, LAFH = Lower anterior face height/Measured from Me to ANS

Results

The mean value of LAFH in was 55.99mm (Table I). The *t* test showed a statistically significant difference for the LAFH in KPK population (Table II)(*p* value < .05). Forty patients (35.1%) had normal LAFH, eleven

patients (9.6%) had low and sixty patients (55.3%) had increased LAFH ratios when compared to standard norms (Table III). Deviation from standard within the gender was not significant (p value > .05).

Table I. LAFH ratio of KPK population

	N	Mean	Std. Deviation	Std. Error Mean
RATIO	114	55.9912	3.58832	.33608

Table II. One sample t test

Test Value = 54						
	T	df	Sig. (2-tailed)*	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
RATIO	5.925	113	.000	1.99123	1.3254	2.6571

*Statistically significant at $P < .05$.

Table III. Deviation from Standard

			Gender		Total
			FEMALE	MALE	
Deviation from Standard	Normal	Count	23	17	40
		% within Gender	40.4%	29.8%	35.1%
	Below Normal	Count	4	7	11
		% within Gender	7.0%	12.3%	9.6%
	Above Normal	Count	30	33	63
		% within Gender	52.6%	57.9%	55.3%
Total		Count	57	57	114
		% within Gender	100.0%	100.0%	100.0%

Table IV. Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)*
Pearson Chi-Square	1.861 ^a	2	.394

Discussion

A single standard of facial esthetics is not appropriate for all racial and ethnic groups and normative data of facial measurements are essential for precise determination of the degree of variation from the normal.¹⁵ There are many studies on vertical dimensions in our population but none compares LAFH with standard norms.

The mean ratio of LAFH/TAFH shows significant difference when compared with standard norms hence proving that this sample belonging to a Pakistani province (KPK) has proportionally larger LAFH (Table I). 53.3% population had higher LAFH showing a significant difference.

Previous researches show that most blacks have high angle growth pattern and consequently higher LAFHs than whites.^{6,7,16} Bimaxillary dento-alveolar and soft-tissue protrusions in black subjects have been previously described by several authors who studied various ethnic groups.^{10,12,13,17} It has been proven that LAFH is the major contributor to TAFH in black subjects of various geographic origins.^{11,12,17,18}

LAFH was larger in African Americans because the measurement from ANS to Me is affected by the sagittal relationship between ANS and Me. Dandajena and Nanda¹³ previously showed that the Shona population has retruded chins with large SNA and SNB angles. A retro-positioned chin with an anteriorly placed maxilla can result in larger values for LAFH assessed from Me to ANS.¹⁰ In this study we measured LAFH as a direct measurement from ANS to Me regardless of the fact that the sagittal relationship can effect LAFH value, being a limitation of this study. A defining characteristic of open bite is increased lower face height when compared

with normal subjects.¹⁹ KPK population has significantly higher LAFH when compared with standard norms. Thus they could be characterized as “long faced”.

Absolute dimensions of the face might not reflect facial proportions. Hertzberg and Holic²⁰ reported differences in face heights across different ethnicities but equally distributed facial ratios. They made conventional direct measurements.

The results demonstrated that sample included in this research belonging to KPK have a raised vertical facial proportion when compared with the standard. This implies that the prognosis for treatment will not be as favorable and this fact must be considered during treatment planning for this ethnic group.¹¹ However, females have a lesser tendency for a vertical pattern than males according to the results. Orthodontically, features of the lower face are more important than upper face height because orthodontic changes are limited to this area.^{11,18}

Conclusions

Cephalometric norms cannot be applied to all patients because of difference in racial characteristics. Population specific cephalometric standards are required for individual ethnic backgrounds. Khyber Pakhtunkhwa population has proportionally larger LAFH. It can be inferred that there is a tendency for a slightly more vertical facial pattern. Males have a greater tendency for a higher vertical pattern than females.

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