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ORIGINAL ARTICLE

Association between Anterior Alveolar Dimensions and Different Vertical Facial Patterns

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ABSTRACT

Objective: To determine the association of anterior alveolar dimensions with different vertical facial patterns at a tertiary care Hospital.

Material and Methods: This Cross-sectional study took place in Orthodontic Department, Institute of Dentistry, Liaquat University of Medical and Health Sciences, Jamshoro, during 6 months form June 2018 to December 2018. Patients with age group 18-30 years and both genders were included. All the subjects were divided into three groups, Average face (Subjects with LAFH-TAFH ratio of 56% -58%), short face (Subjects with LAFH-TAFH ratio of <55%) and long face (Subjects with LAFH-TAFH ratio of >59%), The vertical facial pattern was calculated from TFH i.e., the LAFH and TAFH ratio All the data was recorded by the study proforma for the purpose of analysis.

Results: Total 90 patients were studied; their mean age was 21.12+3.47 years. Females were in majority 52.2% and males were 47.8%. Long face was 37.8%, short face 37.8% and average face were 24.4%. Mean upper posterior alveolus width was significantly higher in short face of vertical facial pattern, and mean of upper anterior alveolus height was higher in long face (p-<0.05). Mean of upper anterior alveolus width was significantly higher in average face of vertical facial pattern, and lower anterior alveolus height was markedly higher in long face of vertical facial pattern (p- 0.001). Though mean of l**ower** anterior alveolus width and lower posterior alveolus width were insignificantly associated with vertical facial pattern. Vertical facial pattern was statistically insignificant according to gender p-value 0.226.

Conclusion: There was a significant association between dimensions of anterior alveolar among different vertical facial patterns.

Kewords: Anterior alveolar dimensions, vertical facial pattern

INTRODUCTION

Increased facial convexity is common cause for extraction procedure, which requires anterior teeth to be retracted while orthodontic treatment. The location of the lower and upper incisors in center of their apical base enclosure, which correlates to the strengthened periodontal protection around such teeth, is usually maintained for esthetics and optimal stability.[1,2] The detection of soft tissue and potential hard limitations to OTM is needed for an orthodontically optimal location of teeth, which is both durable and aesthetically pleasing.[3] For work, stability, and aesthetics, such proclined incisors must be retracted and positioned inside the bone. Handelman emphasized the significance of maintaining cortical boundaries, which control incisor movement within anterior maxillary and mandibular alveolus, particularly if orthodontic treatment requires full retraction.[2] Any orthodontic patient diagnosis must include an evaluation of vertical facial trend. A vertical aspect is often a contributor in deciding to remove teeth or recommend an orthognathic surgery during orthodontic therapy planning.[1] As a result, anterior alveolar measurements tend to set limits for orthodontic care, and stretching such boundaries can hasten iatrogenic complications including dehiscence, root resorption, and fenestrations.[2] Orthodontic subjects have various vertical skeletal disparities.[5] Skeletal malocclusion usually correlates to dental malocclusion also. Therefore, a subject may present with a combination of sagittal and vertical dysplasia as well as dental characteristics of malocclusion.[4-6] During the vertical face-growth, the teeth erupt into the space thus provided to them by the established skeletal patterns.[9,10] Dentoalveolar segment has the innate capability of adapting to the primary established or developing skeletal dysplasia.[6,7] This has been referred to as dentoalveolar compensation. Some investigators believe that the face height is genetically determined and is established early in life. In the field of orthodontics, Sassouni categorized first facial types as per the vertical facial measurements in long, short and average faces. Orthodontic literature reveals many references in such facial patterns.[11,12] As vertical facial measurements are strongly associated with optimal facial aesthetics, the optimal vertical facial appearance of orthodontic therapy is one of the main goals.[9] In growing kids, this aim is typically achieved by different growth modifier instruments as well as corrective jaw operations for adults.[12,13] Several studies have shown that facial form and morphological characteristics of dental area of jaws have a significant correlation.[3] Dentoalveolar compensation was mostly due to changes to basal and alveolar incisor's heights among individuals with hypo- and hyper-divergent growth patterns.[3] No studies has been conducted on the association of anterior alveolar dimensions classification with vertical facial pattern. Thus, aim of current study was to evaluate association between anterior alveolar dimensions and vertical facial pattern.

MATERIALS AND METHODS

This cross-sectional study was conducted in Orthodontic Department, Institute of Dentistry, Liaquat University of Medical and Health Sciences, Jamshoro after taking ethical approval by the Ethical Committee of the hospital. Study duration was six months from June 2018 to December 2018. All Patients were divided into three groups, Average face, short face and long face, with age range of 18-30 years and both genders were included. Patients with congenital abnormalities, history of previous orthodontic treatment or growth modification therapy and history of trauma to the head/neck region were excluded. Every patient received an informed written consent. The vertical face pattern was calculated from TFH i.e., the LAFH and TAFH ratio, as per the criteria given below: Average face (Subjects with LAFHTAFH ratio of 56% -58%), short face (Subjects with LAFH-TAFH ratio of <55%) and long face (Subjects with LAFHTAFH ratio of >59%) Measuring the dimensions of anterior alveolus was followed by using the method described by Handelman.[14] This study includes pre-treatment digital lateral cephalometric radiographs. The lateral cephalometric radiograph was taken with patients Frankfort horizontal plane parallel to floor, lips at rest and mandible in centric occlusion. The X-rayed source is 150cm from object distance and the object is 15cm from the film plane. Each x 10-inch standard radiographic documentation, with the aid of a 0.5 plumb, had been traced on a standard 8 x 10-inch acetate plot paper with a transparent metric length box. The dimensions were used in various vertical facial

pattern as upper posterior alveolus width (UP), upper anterior alveolus width (UA), upper anterior alveolus height (UH), lower posterior alveolus width (LP), lower anterior alveolus width (LA) and lower anterior alveolus height (LH). All the data was recorded in the Performa for the purpose of analysis.

RESULTS

Total 90 patients were selected; their mean age was 21.12+3.47 years. Out of total study participants females were in majority 52.2% and males were 47.8%. According to vertical pattern, long face was 37.8%, short face 37.8% and average face were 24.4%. **Table. 1**

Mean upper posterior alveolus width was significantly higher in the short face of vertical facial pattern, and mean of upper anterior alveolus height was higher in long face of vertical facial pattern, p-values 0.018 and 0.001 respectively. Mean of upper anterior alveolus width was significantly higher in average face of vertical facial pattern, and lower anterior alveolus height was markedly higher in long face of vertical facial pattern, p-value 0.001. Though mean of l**ower** anterior alveolus width and lower posterior alveolus width were insignificantly associated with vertical facial pattern. **Table. 2**

There was no significant difference in vertical facial pattern according to gender p-value 0.226. **Table. 3**

Table 1: Descriptive statistics of age, gender and vertical facial pattern n=90

Variables		Statistics	
Age (years)		21.12 +3.47 years	
Gender	Male	43	47.8%
	Female	47	52.2%
Vertical facial pattern	Short face	34	37.8%
	Average face	22	24.4%
	Long face	34	37.8%

Table 2: Mean anterior alveolus dimensions according to vertical facial pattern classification n=90

Dimensions of anterior alveolus	Vertical facial pattern			P-Value
	short face	average face	long face	
Upper posterior width	12.97 ± 4.57	10.95 ± 4.9	9.88 ± 3.95	0.018
Upper height	4.23 ± 2.09	6.77 ± 2.42	9.17 ± 3.9	0.000
Lower Anterior width	6.29 ± 2.49	6 ± 2.77	6.15 ± 2.11	0.906
Upper Anterior width	9.73 ± 2.96	12.13 ± 10.96	6.94 ± 2.63	0.007
Lower posterior width	5.26 ± 1.81	4.81 ± 2.1	4.47 ± 1.75	0.220
Lower height	20.35 ± 3.44	22 ± 3.55	24.82 ± 5.81	0.000

Table 3: Vertical classifications according to gender n=90

Vertical pattern	Gender		Total	p-value
	Male	Female		
Short face	18	16	34	0.226
Average face	7	15	22	
Long face	18	16	34	
Total	43	47	90	

DISCUSSION

Increased face convexity is a primary predictor of extraction procedure for orthodontic retraction of the previous teeth. When lower and upper incisors are placed upright in contrast to their apical cup foundations, optimum stability and aesthetics are typically achieved.[1] Several studies have shown that the facial form and the morphological characteristics of the dental area of the jaws have a significant connection Dentoalveolar adjustment was mostly due to changes to basal and alveolar incisor heights in individuals with hypo- and hyper-divergent growth patterns. The process for compensating dento-alveolars can be inferred by extending vertical sizes of the heights of frontal dentoalveolar to long-sided subjects and, alternatively, reducing them to short-sided subjects. In a research, the facial assessment, the first method of diagnostic hierarchy, gives a more acceptable view of examining and qualitating a long face, the deformity which is a 3-D expression, despite its vertical portion.[13] For observations of the anterior alveolar-basal-maxillary cross-section and the mandible, alveolar height, lateral cephalograms and zone dimensions, were utilized in some tests.[13,14-16] Only limited studies have used 3-D data to test morphology of alveolar bone and have primarily studied the mandible or the maxilla's anterior region.[17-19] In this study mean upper posterior alveolus width was significantly higher in the short face of vertical facial pattern, and mean of upper anterior alveolus height was higher in long face of vertical facial pattern, p-values 0.018 and 0.001 respectively. Mean of upper anterior alveolus width was significantly higher in average face of vertical facial pattern, and lower anterior alveolus height was markedly higher in long face of vertical facial pattern, p-value 0.001. In the study of Cardoso MD et al[20] reported that Persons with excess vertical facial interactions with mild and extreme levels have been identified as persons with long face trend. This study revealed an incidence of 14.06% of people with long face trend. This incidence is lower than that observed by Linder-Aronson and Woodside for long face trends (14.06 percent), which have not been identified in individuals with transient or posturative long face.[21] In this study, mean age was 21.12+3.47 years. Similarly, the study of Jeelani W et al[22] reported a mean age of 22.52±4.36 years. In this study according to vertical pattern, long face was 37.8%, short face 37.8% and average face were 24.4%. Bastos DR et al[23] the incidence of short face pattern was 3.15%. Cardoso MD et al[20] reported 13.38% prevalence in people with pattern of long face categorized as moderate subtype. Woodside and Linder-Aronson et al[21] reported that 18% of study subjects had vertical impairments. In this study there was no significant difference in vertical facial pattern as per gender p-value 0.226. Inconsistently Jeelani W et al[22] stated that there were significant variances in the nasolabial angle, incisal angle and extant of procumbence of lower and upper lips among both genders for three patterns in vertical facial.

CONCLUSION

There was a significant association between anterior alveolar dimensions among different vertical facial pattern. Due to several limitations of the study, especially small sample size and single center study, further large scale studies are recommended on this subject.

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