ASSOCIATION OF MAXILLARY AND MANDIBULAR UNIT LENGTH WITH SKELETAL MALOCCLUSION

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ABSTRACT

To determine the association of maxillary & mandibular base lengths with skeletal class I, II and III. This cross sectional study was conducted from the data of 58 patients (females=43, males=15). Patients with the presence of class I, II or III malocclusion & presence of all fully erupted permanent teeth up to first molar were included in the study. Measurements were performed on pre-treatment lateral cephlograms. Anatomic tracings & location of dentoskeletal landmarks were manually conducted. Measurements were recorded on a predesigned Proforma. Stratified sampling was used to obtain the sample size for each class which was 21, 33 & 4 for class I, II & III respectively. Data were analyzed using SPSS 20.0. One Way analysis of variance was run to explore the effect of skeletal classes on mandibular & maxillary base lengths. There were no statistically significant differences found between the means of maxillary & mandibular base lengths & skeletal classes (F (2,55) = 0.940, p = 0.397) & (F(2,55) =1.983 , p = 0.147) respectively. Study sum up that maxillary & mandibular base lengths were not affected by the skeletal malocclusion.

Keywords: *Malocclusion, maxillary, mandibular, skeletal classes*

INTRODUCTION

Malocclusion is a condition which occurs when the mandible and maxilla are in off balance position from each other or it can be defined as a condition that is deviated from normal occlusion of teeth. Bad eating habits are one of the major causes resulting as skeletal malocclusion.[1] This variation is usually considered an unpleasant condition which is unusual.[2] One out of ten cases of patients is tracked with malocclusion by an orthodontist.

It affects the people physically and mentally as significant relationships were determined between bullying and certain occlusal traits, self-esteem and Oral Health Related Quality of Life by Jabindeer Sehra etal in their study.[3] It is basically classified into two types Skeletal and Dental Malocclusion. Skeletal and dental classification of malocclusion has an important role in diagnosis and treatment planning.[4] Skeletal malocclusion is caused by the distortion of the proper mandibular and/or maxillary growth during fetal development whereas Dental malocclusion is caused by tooth agenesis, crowding, missing teeth and abnormal tooth size. The key to the determination of the aetiology of malocclusion, and its treatability lies in the ability to differentiate the effect of genes and environment on the craniofacial skeleton in a particular individual.[5] The malocclusions are further divided into three classes. The classification of malocclusion was put forward by Edward Angle; he divided malocclusions into three classes, which were based on the relationship of the mesiobuccal cusp of the maxillary first molar and the buccal groove of the mandibular first molar.[6] The skeletal malocclusion Class I also known as neutroclusion occurs when the maxilla and mandible are in harmony with each other, Class II which is also known as distoocclusion occurs when the mandible is distally positioned in relation to maxilla and is further divided into two sub divisions and Class III which is also known as mesioocclusion occurs when mandible is mesially positioned in relation to maxilla. By means of Cephalometry, we classify skeletal malocclusion with the help of ANB angle that relates the maxilla and mandible with the cranial base. If ANB is between 0 and 4 degree it is taken as class I , if it is more than 4 degree it is taken as class II and if less than 0 degree it is taken as class III. Previously many studies have been done which have thrown light upon skeletal classes and sex differences in mandibular and maxillary growth. Jacob et al compared class I and class II sub division 1 malocclusion and found that boys had more prognathic mandibles as compared to girls and Class I had greater mandibular lengths comparatively to Class II sub division 1 in children of French Canadian at age of 15years.[7] Eduardo Bernabé et al in their study explored the three skeletal classes and results

from their study supported the concept that malocclusions have physical, psychological, and social effects on quality of life.[8] In this study the main focus of interest were three components which are cranial base, maxilla and mandible. Growth of cranial base is mainly due to endochondral ossification. With age the dental effect increases and skeletal effect decreases.[9] Present study targeted the patients with skeletal malocclusions. The aim of this study was to determine the association between mandibular and maxillary base lengths and skeletal classes.

METHODOLOGY

Cross Sectional study was conducted from a data set of 68 patients (female=48, male=20) which were examined at department of orthodontics, Karachi Medical and Dental College. From the data of 68 patients a sample size of 58(female=43, male=15) was calculated with the help of Rao soft calculator, with 95% of confidence interval and margin of error ±5%. The patients with the presence of class I, II or III malocclusion and presence of all fully erupted permanent teeth up to first molar were included in the sample. Patients with orthodontic treatment in past, presence of any fractured restoratins or crowns, any tooth anomaly of number, size, form and position and Craniofacial anomalies/syndromes were excluded from the sample. Maxillary base length was measured as a linear distance in millimeters from condylion (most superior posterior point on head of mandibular condyle) to point A (deepest midline point on the contour of pre-maxilla between anterior nasal spine and incisor tooth) whereas mandibular base lengths were measured as a linear distance in millimeters from condylion (most superior posterior point on head of mandibular condyle) to gnathion (centre of inferior point on the mandibular symphysis). Skeletal class I was taken as ANB = 2 ± 2 degree when maxilla and mandible were in linear relation, skeletal class II was taken as ANB > 4 degree when maxilla and mandible were in distal relation and skeletal class III was taken as ANB < 1 when maxilla and mandible were in mesial relation. All Measurements were performed on pre-treatment lateral cephlograms. Anatomic tracings and location of dentoskeletal landmarks were manually conducted. All measurements were recorded on a pre-designed Performa. Skeletal class which was further divided into three classes(I,II,III). Probability sampling technique was used the sample of each group was calculated by means of Stratified sampling. Appropriate sample sizes were calculated for each group which was chosen by the means of stratified sampling. A sample of 21(female=14, male=7), 33(female=27, male=6) and 4(female=2, male=2) patients was chosen from skeletal class I, II and III respectively. Data was analyzed using SPSS 20.0. Mean and standard deviation of age, maxillary and mandibular base lengths was calculated.

One Way analysis of variance was run in order to test effect of skeletal classes on mandibular and maxillary base lengths.

RESULTS

There were no statistically significant differences found between the means of maxillary and mandibular base lengths and skeletal classes as determined by One-way ANOVA. The F-statistics and p-value for three skeletal classes and maxillary base length was found to be ($F_{(2,55)} = 0.940$, $p = 0.397$) and F-statistics and p-value for three skeletal classes and mandibular base length was found to be ($F_{(2,55)} = 1.983$, $p = 0.147$) which are p>0.05 which shows that there are no statistically significant differences obtained by this study and we fail to reject the null hypothesis.(See table 1)

In this study each group of skeletal class was independently identically distributed. Mean age of patients found between the three classes was 16.57±3.272years. Mean age in each skeletal class I, II and III was found to be 16.19±3.108years, 16.76±3.410years and 17±3.651years respectively. In terms of age all three classes were found to be comparable. The table 2 represents the mean maxillary and mandibular base lengths found in Skeletal Class I, II and III. The maximum mean maxillary base length was found in skeletal class II which was 84.70±7.187mm and the maximum mean mandibular base length was found in skeletal class III which was 112.25±6.449mm.

The table 3. shows the mean maxillary and mandibular base lengths found in Skeletal Class I, II and III with respect to gender and it shows the number of males and females included in each skeletal class. In skeletal class I mean maxillary and mandibular base lengths were found to be higher in females than males whereas in skeletal class II and III mean maxillary and mandibular base lengths were found to be higher in males than females.

DISCUSSION

Many researches[3,8,10] have made before in order to determine the factors which play a major part for occurrence of malocclusions. Present study targeted the patients with skeletal malocclusions. The aim of this study was to determine the association between mandibular and maxillary base lengths and skeletal classes. Dental crowding is one of the most frequently encountered problems for an orthodontist. In this study the maxillary and mandibular base lengths were compared with skeletal classes to explore that whether maxillary and mandibular base lengths contribute to the cause of malocclusions in people or not. The most found skeletal class among reported patients in KMDC included in this study was skeletal class II and the least patients were found to be under the category of skeletal class III.

TABLE 1: THE TABLE REPRESENTS THE SPSS OUTPUT OF ONE WAY ANALYSIS OF VARIANCE.

ANOVA		Sum of Squares	df	Mean Square	F	Sig.
Maxillary Base Lengths	Between Groups	90.126	2	45.063	.940	.397
	Within Groups	2635.529	55	47.919		
	Total	2725.655	57			
Mandibular Base Lengths	Between Groups	241.560	2	120.780	1.983	.147
	Within Groups	3350.715	55	60.922		
	Total	3592.276	57			

TABLE 2: COMPARING THE MEAN MAXILLARY AND MANDIBULAR BASE LENGTHS FOUND IN SKELETAL CLASS I, II AND III.

Skeletal Classes	n=58	Maxillary Base Length		Mandibular Base Length	
		Mean± Standard Deviation	Range	Mean± Standard Deviation	Range
Class I	21	82.10±6.707	31	105.52±6.408	34
Class II	33	84.70±7.187	36	104.09±8.669	39
Class III	4	82.75±5.252	12	112.25±6.449	14

TABLE 3: COMPARING THE MEAN MAXILLARY AND MANDIBULAR BASE LENGTHS FOUND IN SKELETAL CLASS I, II AND III WITH RESPECT TO GENDER

	Gender	n=58	Maxillary base lengths	Mandibular Base lengths
			Mean± Standard deviation	Mean± Standard deviation
Class I	Female	14	83.00± 4.019	107.14±3.880
	Male	7	80.29±10.452	102.29±9.268
Class II	Female	27	84.07±7.369	103.22±8.050
	Male	6	87.50±6.058	108.00±11.027
Class III	Female	2	81.50±2.121	104.88±4.950
	Male	2	84.00±8.485	106.00±9.899

Whereas in the study of Afeef Umar Zia etal the most reported cases were of skeletal class I and least reported cases of patients were from skeletal class III.[11] May be the differences in findings are due to different sample sizes and different research limitations. Similarly in study of Hasnain Sakrani et al Skeletal class II was the most frequently seen malocclusion whereas class III was least frequently seen.[12] In different studies it is observed that skeletal class II is the most reported case in patients.[13]

In a study by Adil khan etal the Mean mandible and maxilla length for skeletal class II was found to be 124 ± 7.208 and 91.60± 6.772 respectively.[14] In other studies as well mandibular and maxillary base lengths were found to be larger in skeletal class II such as in a study carried out by Aisha Khoja et al maxillary and mandibular base lengths were found to be largest in skeletal class-II and class-III malocclusions respectively & mandibular base lengths were found to be larger in males as compared to females.[15] Similarly mandibular base lengths with skeletal class II malocclusion were found to be larger in males as compared to females in study of Wasim Ijaz etal.[16]

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maxillary and mandibular base lengths were found to be largest in skeletal class-II and class-III malocclusions respectively & mandibular base lengths were found to be larger in males as compared to females.[15] Similarly mandibular base lengths with skeletal class II malocclusion were found to be larger in males as compared to females in study of Wasim Ijaz etal.[16] The maximum mean maxillary and mandibular base lengths were found in Skeletal class II in males which was 87.50±6.058mm and 108.00±11.027mm respectively; whereas the minimum mean maxillary and mandibular lengths were found in skeletal class I in males which was 80.29±10.452mm and 102.29±9.268mm respectively.(See table 3)The result output of One way ANOVA is listed in table 1.

CONCLUSION

The study sum up as follows:

- By means of age all the skeletal classes were found to be comparable.

- The maximum maxillary and mandibular base lengths were found in skeletal class II and the minimum maxillary base lengths were found in skeletal class I.

- Maxillary base lengths of males were larger than females in skeletal class II and III but in skeletal class I the case was vice versa.

- The mandibular base lengths of females were larger than males in skeletal class II and III and the case for skeletal class I was vice versa.

- A moderate positive uphill relation was found between the maxillary and mandibular base lengths in each skeletal class but no association was found between the maxillary and mandibular base lengths with skeletal classes.

- The most found skeletal class among patients was skeletal class II whereas skeletal class III was rarely seen among patients with malocclusion.

- In light of this study results maxillary and mandibular base lengths are not affected by the skeletal malocclusion.

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