

THE CEPHALOMETRIC MEASUREMENT OF “L1-APo DISTANCE” IN A PAKISTANI SAMPLE

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ABSTRACT

Knowledge of the normal dentofacial patterns of various ethnic groups is important for clinical and research purposes. The objective of this study was to measure the norm for the “L1-APo distance” in a hospital based Pakistani sample. The obtained data was also compared with the already existing White American mean of the “L1-APo distance”. It was a descriptive cross sectional study which was carried out in KRL Hospital; Islamabad. 100 lateral cephalometric radiographs (50 females & 50 males) were obtained and traced for the above mentioned measurement. The database was developed in SPSS10.0 for windows. Results showed that subjects in the present sample have more labial inclination of the lower incisors over the basal bone as compared to the White Americans. (p value .00) And the females of the sample have slightly more labial inclination as compared to the males although this difference is not significant. (p value .083)

Key words: “L1-APo distance”, Lateral Cephalograms, Class I Occlusion

INTRODUCTION

While treating a malocclusion, our aim is not only to align teeth, but also to attain a state of balanced dentition which fits well with the profile. Treatment objectives in orthodontic treatment planning are based on the lower arch while the upper arch is wrapped around the lower one; hence the lower arch plays an extremely imperative role in determining the shape and position of both the arches and attaining a well balanced profile. In view of the fact that lower incisor is the most important component of the lower arch, the position of this tooth has a critical effect on facial esthetics.

Holdaway, Ricketts, McNamara and Downs realized the importance of this tooth and established analyses of relating lower incisor with maxilla and mandible.¹ “L1-APo distance” in millimeters (as proposed by Ricketts) determines the relation of lower dentition with upper and lower jaw. Here “L1” (tip of lower incisor) is a landmark on the lateral cephalogram, which represents lower incisor, “A” (deepest point on

the pre-maxilla) and “Po” (most anterior point on the bony chin) are the cephalometric landmarks representing both upper and lower jaws respectively.² To set a harmonious lip balance “L1” must be brought at or very near to the “APo” line so that the linear horizontal distance from “L1-APo” should be in the range of -1 to +3 mm, with the mean value of 0 mm. This is the standard set by Ricketts on the ideal profiles of White Americans.

This measurement in millimeters is a measure of the spatial position of the lower incisors and helps us decide whether the case falls in extraction or non-extraction criteria.² At present the “L1-APo” cephalometric norms for White/Black/Mexican American and Europeans as well as for Far Easterns are available.^{1,3,4,5} Up till now there has hardly been any study carried out on the Pakistani Populations analyzing the position of lower incisors in relation to the “APo” plane.^{6,7,8,9,10}

METHODOLOGY

This study was carried out in the KRL Hospital Islamabad. 100 subjects participated in the study,

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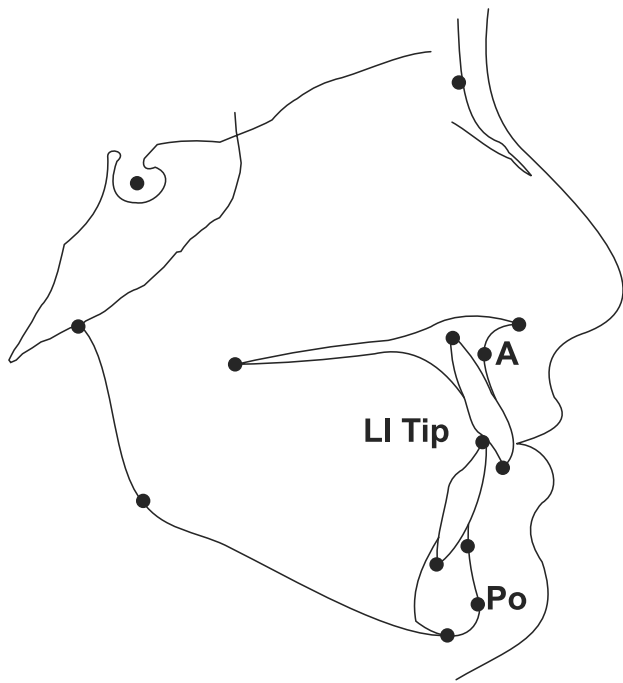


Fig1: Cephalometric tracing of "L1-Apo"

between age ranges of 18-40 years, 50 of them were males and 50 females. Non-probability convenience sampling technique was applied. Subjects were selected on the basis of having harmonious profiles without any dentofacial deformity and being Pakistanis for at least two generations. Those with history of orthodontic treatment and dentofacial deformity were excluded. All the patients were explained about the study and consent was taken. Patients were informed for the dose of radiation exposure related to cephalometric radiography. The standardized radiograph technique was applied to take lateral ceph of all the subjects. Lateral ceph were manually traced on acetate paper, as shown in fig 1. Data was analyzed on SPSS version 10. The mean, range and standard deviation for all the quantitative variables were obtained along with

the maximum and minimum limit of the value. Independent sample "t test" was used to compare the male and female value of "L1-APo distance" of the sample. One sample t test was used to compare the obtained value of "L1-APo distance" with the already existing White American norm at 5% level of significance.

RESULTS

The mean value of "L1-APo distance" in both the male and female subjects of the sample is +1.185 with SD of 1.6 (Table 1). Mean value of "L1-APo distance" of the female portion of the sample is +1.37 with the SD of 0.9. Mean value of "L1-APo distance" of the male portion of the sample is +1mm with the SD of 1.16. The comparison of the mean (both males and females) with the White American mean shows the p value is less than 0.05 making the difference significant between the Pakistani mean and the White American mean. The comparison of the mean of "L1-APo distance" of the

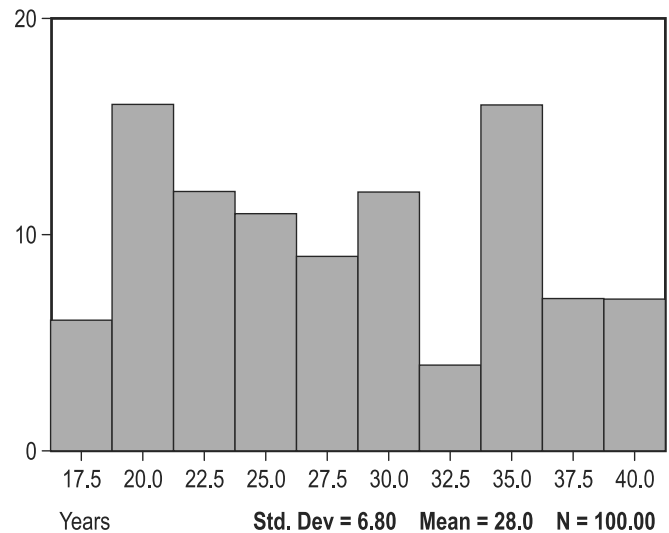


Fig 2: Histogram showing age distributions of male and female components of the sample

TABLE1: RESULTS OF THE STUDY

Value of L1-APo in mm	Mean of Pakistani sample (both males & females)	Mean of female subjects of Pakistani sample	Mean of male subjects of Pakistani population	Comparison b/w "MEAN" of white Americans & Pakistani sample by using t test	Comparison b/w female MEAN & white American MEAN by using t test	Comparison b/w male MEAN & white American MEAN by using t test	Comparison b/w female & male MEAN of our sample by using t test
	+1.185	+1.370	+1.0	.000	.000	.000	.083

female sample with the White American mean shows the p value is less than 0.05 showing a significant difference between the two means. The comparison of the mean value of the male with the mean of the White Americans shows the p value is less than 0.05 showing significant difference between the two means. The comparison between the mean value of males and females of the Pakistani sample shows p value is more than 0.05, which depicts that there is not a significant difference between the two means. (Table 1)

DISCUSSION

Position of lower incisors has an important role not only in diagnosis and treatment planning, but also in long-term retention and stability of results achieved towards the end of treatment. The linear distance of "L1-APo" is one of the most important factors influencing the position of lower incisors and it is with the help of the cephalometrics that we can evaluate this measurement. The mean age of the sample was 28 years. The age range was favorable for the study since negligible amount of growth is expected and there won't be much change in the facial profile as well as the dentition of an individual.

The mean value of "L1-APo distance" of this study (+1.185 mm) suggests the forward placement of the tip of lower incisors with reference to the "APo" plane. This forward placement of teeth in turn gives a fuller look to the profile. This value is different from the Ricketts mean value for White Americans, which is 0mm.

Since the White Americans have straighter profiles, their incisors are more upright and lie on the "APo" plane. The significant difference between the mean of Pakistani sample with that of American sample is attributed to the difference in ethnic origin of the two groups. The White Americans exhibits straighter profile as compared to the Asians, who have less straight profile.

The mean of this study when compared with other studies of different ethnic groups also showed difference. This includes the study of Cook and Wei on Chinese population, who determined the mean value of "L1-APo distance" of +5.5 mm.¹¹ The mean value of "L1-Apo" measured by Ito, Diaz and Fuenten on Hispanic population turned out to be + 3.1 mm.³ The mean

nature of "L1-Apo" in Norwegians as determined by Platour, Bjorn and Zachrisson were +2.5 mm \pm 1.7 mm.¹²

Uysal found the mean value of +2.43 mm \pm 1.7 mm in Turkish population.¹³ The mean determined by Hamdan for British population shows the value of - 0.86 mm.¹⁴ This value shows the backward placement of the lower incisors with reference to the "APo" plane. Miyajima, Kimura and McNamara found the mean value of + 4.0 mm in their Japanese sample.¹⁵

Kuwaiti mean of "L1-APo" distance showed the value of +4 mm as determined by Behbehani, Hick, Beeman, Kleumper & Rayens. Mean of this study is lesser than the Kuwaiti mean, showing lingual inclination of this sample.¹⁶ Thilander measured the value of "L1-APo" distance in Swedish sample & found the mean value +3.5 mm, this shows the labial inclination of incisors over basal bone.¹⁷

The mean value of Pakistani female sample being more than male indicates slightly more labial inclination of our female population. The difference between the female mean values of this sample is much greater when compared with the black female mean (+ 7.6mm) of Aloisio and Kubersh on North Americans.¹⁸ Blacks having bi-maxillary proclination as a socially acceptable norm; show much increased value of "L1-Apo" resulting in much more labial inclination of lower incisors with reference to the basal bone.

Likewise the mean of male Pakistani sample more than White American mean also shows that Pakistani males have more labial inclination of the lower incisors. The comparison of mean values for males and females of this sample showed the difference greater than .05 which suggests that the divergence between the two genders is not significant. Although the mean female value is slightly more than the mean male value and this is attributed to the slightly fuller profile of females as their dentitions are more labially placed over the underlying basal bone.

The significant difference of means of "L1-APo" of this study with that of White Americans as well as with the other groups of different ethnic origins is a clear indication of the fact that people from different ethnic groups show multi-dimensional orientation of facial profiles and what is considered as a normal facial

profile and dental pattern for one ethnic group might not be normal and acceptable for the other.

CONCLUSION

This study showed that there was a difference in norms of the labial inclination of the lower incisors between the Caucasians and Pakistani population. This difference is statistically significant. And also there is a difference between the males and females of this sample but this difference is not statistically significant. It is recommended that there should be more research oriented studies regarding the establishment of normative data for other cephalometrics norms already present in the literature.

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