

TO DETERMINE THE MEAN LIP THICKNESS IN DIFFERENT SKELETAL MALOCCLUSIONS IN LOCAL POPULATION- A STUDY

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ABSTRACT

Objective: To determine the mean lip thickness in different skeletal malocclusions in local population.

Material and Methods: A total of 190 consecutive patients cephalograms in age group 18-30 years were included. Patient with normodivergent, skeletal class I, II, and III assessed on basis of ANB and Wits appraisal. Age, gender, ANB, Wits appraisal, upper and lower lip thickness from cephalograms were measured and were noted in the attached proforma.

Results: The mean age in this study was 20 ± 2.72 years. Out of total 190 patients, 107 were females and 83 males. The mean upper lip thickness was 10.54 mm and lower lip thickness was 11.30 mm. Skeletal Class III patients had thicker lips than other skeletal classes. Females had more thickened lips than males in this study.

Conclusions: Females had more thick lips than males. Lip thickness by gender and skeletal class of malocclusion showed that females and skeletal class III had more lip thickness. In orthodontic treatment of patients having skeletal class III and female gender need special precautions in incisor retraction to maintain balanced profile.

Key words: Lip thickness, Malocclusion and soft tissue

INTRODUCTION

Facial harmony and symmetry are keys to orthodontic practice. In past, more emphasis was paid to the alignment of irregular teeth, irrespective of the facial profile. Since millennium shift of soft tissue paradigm and social values, improvement in the soft tissue appearance is the priority of orthodontic planning regardless the occlusal and skeletal relation^{1,2,3}. The esthetics of face depend on the morphology of the underlying skeletal and dental structures; however, soft tissues provide the appearance of face. Thus the field of orthodontics has started focusing more on appearance of face with specific emphasis on soft tissues around the mouth as the public heeds more on lip changes than on changes of the chin or nose⁴.

The study of facial beauty and harmony has been pivot to the practice of orthodontics, right from its

early infancy to date. Analysis of the soft tissue profile of the face is therefore a concern for the orthodontist. A balanced profile should be one of the key factors in deciding on the methods of treatment for any form of malocclusion, as good occlusion does not necessarily mean good facial balance⁵. In fact the adaptation of soft tissue over underlying skeletal pattern is of prime importance towards the overall appearance of face⁶.

As orthodontic treatment has the potential to alter dramatically the position and contour of the lips so the perioral profile of the lip form is a critical factor in achieving facial esthetics⁷. Ratios of maxillary incisor retraction to upper lip retraction has been documented to vary from 1.2:1 to 3.2:1 while ratios for the horizontal response of the lower lip falls within the range from 0.4:1 to 1.8:1^{7,8}. In addition to the amount of incisor retraction, lip structure itself influences the lip response. Analysis of Oliver suggested that thin lips or high strained lips follow incisor retraction more easily, whereas thick lips or low strained lip showed no such relation^{9,10}.

Previous studies in Turkish population have calculated mean upper lip thickness in males for skeletal

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class I (13.80 ± 2.81 mm), class II (12.93 ± 2.71 mm), class III (16.8 ± 3.29 mm) and in females for class I (10 ± 1.77 mm), class II (10.47 ± 2.88 mm) and class III (14.3 ± 1.99 mm). Whereas the lower lip thickness in males for skeletal class I (15 ± 2.83 mm), class II (16.87 ± 1.88 mm), class III (12.93 ± 2.74 mm) and in females for class I (11.93 ± 2.52 mm), class II (14.67 ± 2.49 mm) and class III (10.87 ± 2.09 mm). Different values have been reported for lip thickness of different population because researchers have shown significant differences between ethnic and racial groups¹¹.

The significance of conducting this study is that beside skeletal and dental problems lip thickness is also an important factor in extraction cases to make the profile more acceptable. This study will provide us mean lip thickness of our local population in all three skeletal malocclusions which will help us to be focused in treatment planning, decrease the time period of treatment and we will be able to present the realistic expectation of the treatment outcome to the patients. On the other hand, it is an established fact that thick lips respond minimum to the teeth movement with less improvement in profile so it will be easy to segregate the patients in advance whether to go for orthognathic surgery or to camouflage with conventional orthodontics.

METHODS AND MATERIALS

A cross sectional descriptive study conducted at the department of Orthodontics Khyber College Of Dentistry Peshawar. Sample size was 190, absolute margin of error 0.4 and mean lip thickness of 13.8 ± 2.8111 , 95% skeletal class I. Sampling technique was consecutive (Non-probability). Inclusion criteria was subjects with different skeletal malocclusion, normal vertical relationship (SN-MP angle, $32 \pm 5^\circ$, mean, $33.7 \pm 1.52^\circ$) and age greater than 18 years and less than 30 years. Exclusion criteria was no evidence of craniofacial syndromes/anomalies, no history of trauma and no previous orthodontic or prosthodontics treatment. The above mentioned conditions acted as confounders and if included would have introduced bias in the study results.

An acetate sheet was placed on top of the X-ray film, which will be mounted on an illuminator in a dark room. Profile of soft and bony tissue was traced by a lead pencil. ANB angle was measured to identify the skeletal class. Measurements for lip thickness were taken with the help of standard ruler. All cephalometric

radiographs were traced by single operator to avoid intra observer variability and were reviewed by other colleague for accurate landmark identification (Fig 1).

RESULTS

The mean age in this study was 20 ± 2.72 years. The age ranged from 18 to 30 years (Table 1). The female to male ratio was 1.3:1. Out of total 190 patients, 107 females and 83 males. The mean upper lip thickness was 10.54 mm and lower lip thickness was 11.30 mm (Table 2). Skeletal Class III patients had thicker lips than other skeletal classes (Table 3). Females had more thickened lips than males in this study (Table 4). Lip thickness by gender and skeletal class of malocclusion showed that females and skeletal class III had more lip thickness. The mean lip thickness in both lips is higher

Table 1: Descriptive statistics of patient age

Parameter	Statistics
n	190
Mean	20.5632
Std. Deviation	2.72820
Range	10.00
Minimum	17.00
Maximum	27.00

Table 2: Descriptive statistics of lip thickness

Statistics	Upper lip thickness (mm)	Lower lip thickness (mm)
n	190	190
Mean	10.5421	11.3000
Std. Error of Mean	.15030	.14850
Std. Deviation	2.07168	2.04694
Variance	4.292	4.190
Range	8.00	10.00
Minimum	7.00	7.00
Maximum	15.00	17.00

Table 3: Lip thickness of patients by skeletal class of malocclusion

Skeletal Class of Malocclusion	Upper lip thickness (mm)	Lower lip thickness (mm)
	Mean±SD	Mean±SD
Class I	10.16±1.578	10.94±1.7511
Class II	10.05±2.066	11.1±1.788
Class III	11.41±2.2685	11.84±2.441
p-value*	0.000	0.029

*ANOVA test

in 27-30 age group and statistically significant by age (Table 5).

DISCUSSION

Table 4: Quantification of lip thickness(upper & lower) with regard to genders

Gender	Lower lip thickness(mm)	Upper lip thickness(mm)
	Mean±SD	Mean±SD
Male	10.93±2.204	10.52±2.09
Female	11.58±1.88	10.56±2.06
p-value*	0.028	0.919

*t-test

Table 5: Quantification of lip thickness(upper & lower) with regard to age

Age (years)	upper lip thickness	lower lip thickness
	Mean±SD	Mean±SD
18-22	10.14±2.1343	11.17±2.088
23-26	11.63±1.563	11.61±2.031
27-30	11.00±0.5	12.00±0.5
p-value*	0.000	0.53

*ANOVA test

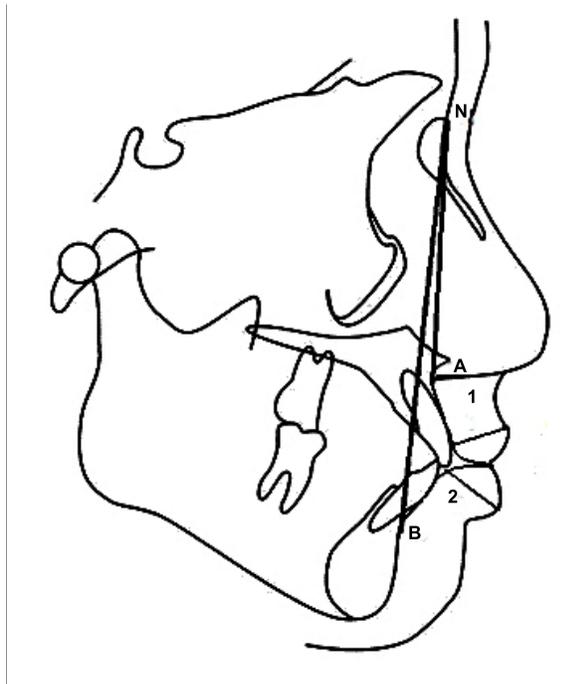


FIGURE 1. The measurement points used in the study

- 1: Upper lip thickness
- 2: Lower lip thickness
- N: Nasion
- A: Subspinale
- B: Supramentale

One of the most important components of orthodontic diagnosis and treatment planning is the evaluation of the patient’s soft tissue profile. Major components of soft tissue profile are nose, lips and chin. Among this, position of lips profoundly alters the choice of treatment. Moreover, orthodontic treatment plan can also alter the lip positions. Lip thickness has become one of the most important soft tissue analyses as it influences the occlusion, tooth stability and facial aesthetic¹². Investigators have developed numerous methods of analysis to interpret the diagnostic information that the lateral cephalogram provides¹³. In orthodontic practice, a diagnosis is determined, in part, by comparing a patient’s cephalometric measurements to standard values. Lateral cephalometric norms, however, may be specific to an ethnic group and cannot always be applied to other ethnic types. In spite of possible ethnic differences, most classical cephalometric standards are based on sample populations of people with European-American ancestries.

The objective of this study was to determine lip thickness among different skeletal malocclusion assessed on basis of ANB angle and normal vertical facial pattern in patient presenting to Khyber College of Dentistry, Peshawar. The mean age in this sample was 20±2.7 years. The possible reason for this may be that most of the patients in our community present for fixed orthodontics treatment in late teen age. In this study age above 18 years was taken to ensure adequate growth completion of lips and other soft tissues.

In this sample females are more in number than males as they are more concerned about there-self. Tang et al¹⁴ identified four main factors based on how adult female patients ranked statements. (1) patients who focus on their self-perception of their appearance; (2) patients who are concerned about the esthetics and function of their teeth; (3) patients who are easily influenced by others; (4) patients who want to improve their confidence and avoid negative thoughts caused by their teeth. The remaining patients who had other views did not match any of the above four groups.

In this study, lateral cephalograms was used for lip thickness measurement. Although cephalograms is two dimensional image of three dimensional structure (lip) but its accuracy is well established and is used extensively in research⁴. Arnett and Gunson⁵ suggested that the patient should be positioned in a relaxed lip position while evaluating the soft tissue profile since

this position demonstrates the relationship of soft tissues to hard tissues without muscular compensation for dentoskeletal abnormalities. In a recently published study, the relaxed lip position was also used for standardization of the method, when taking the cephalograms for accurate assessment of the soft tissues. In agreement with those studies^{6,7} the relaxed lip position was also used in the present study when taking the cephalograms in order to ensure accurate assessment of soft tissue thickness.

Generally, the lip thickness is affected by the skeletal and dental relationship and differ in thickness between genders. So the upper and lower incisor inclination relative to the palatal and mandibular planes respectively and the lip thickness were taken into consideration⁸. The nasal projection relative to H-line was shown that the nasal projection had an effect on the position of the lips as E and S1 lines pass through the nose¹¹. In the current study was investigated mean lip thickness in different skeletal malocclusion in vertically normal patients.

In the Korean's study¹⁰, all soft tissue thicknesses in men were greater than those in women. However, statistically significant gender differences were not determined for all of the points in each skeletal class. According to Uysal et al¹¹ statistically significant gender differences were determined for the thickness of the labrale superius, labrale inferius, pogonion, and menton measurements. In the current study sexual dimorphism was found for lip thickness. Genetic, ethnic and environmental factors may play a role. Utsuno H et al¹⁵ carried on the Chinese population and reported a statistically different lip thickness among genders and skeletal classes. In the current study skeletal class III have thicker lips as compared to class I and II. Kamalet al¹⁶ in study on Korean population reported that the thickness at labrale superius and stomion points among each skeletal type was significantly the greatest in Class III for both males and females. The Kamak results are similar to the current study.

Pithonet al¹⁷ evaluated the variation in facial soft tissue thickness in young North Eastern Brazilian individuals according to gender and skeletal class. Measurements were obtained from digitized teleradiographs of 300 children, aged from 8 to 12 years, using the SidexisXg program. Data of mean, standard deviation, maximum and minimum soft tissue thickness values of the faces of Angle's Class I, II and III individuals,

were evaluated. The results demonstrated that there was no difference in soft tissue thickness among the skeletal classes for most of anthropological points. For the Class I, statistical differences were found ($P < 0.05$) between the genders in the rhinion point, subnasal and upper lip. It was concluded that there was no difference in soft tissue thickness among the skeletal classes, except for the points: Stomion, Bottom lip and Pogonion, allowing definition of parameters of this population for the purpose of facial reconstruction. The current study differs from Pithon et al in the sense that no comparison were made on basis of genders and Angle's classification. Piton's results are in agreement as far as stomion point is concerned.

This study only included patients with normal vertical pattern patients. Further studies are needed which should involve all sort of vertical patterns and improved methodologies to obtained norms for lip thickness in Pakistani population for helping the clinicians in diagnosis and treatment planning.

CONCLUSION

- Females had more thickened lips than males.
- Lip thickness by gender and skeletal class of malocclusion showed that females and skeletal class III had more lip thickness.
- In treatment planning of patients having skeletal class III and female gender need special precaution in incisor retraction to maintain balanced profile.

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