CORRELATION OF NASOLABIAL ANGLE WITH MAXILLARY INCISOR INCLINATION AND UPPER LIP THICKNESS

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ABSTRACT

Nasolabial angle (NLA) is a key indicator of facial esthetics and plays an important role in extraction decision in clinical orthodontics. The aim of this study is to evaluate correlation of NLA with maxillary incisor inclination (SN-UI) and upper lip thickness (ULT).

Pretreatment cephalometric records of 200 patients with skeletal class I and average vertical proportions were taken after sample size calculation. NLA, ULT and SN-UI were measured on acetate paper sheet attached to lateral cephalogram. Descriptive statics were generated for all the variables involved in the study. Pearson correlation was used to evaluate association between SN-UI and ULT with NLA. A p value < 0.05 was taken as significant.

Mean age of the total sample in this study was 20.28+3.860 years. Sn-UI was 106.90°+8.640° while NLA was 97.62°+9.899°. ULT was found to be 13.20+7.57 mm. A correlation coefficient of -.116 was found between NLA and SN-UI while correlation coefficient of 0.089 was found between NLA and ULT. Both correlations were greater than 0.05 p value.

Maxillary incisor inclination and upper lip thickness show weak and statistically insignificant correlation with nasolabial angle.

Key Words: Nasolabial angle, Upper lip thickness, Maxillary incisor inclination, Facial esthetics

INTRODUCTION

Esthetics concerns are the most potent force behind many patients seeking orthodontic treatment. Traditionally ideal occlusion was planned as the only final outcome to get the best esthetic results for the patients.¹ However, in contemporary orthodontics soft tissue analysis have taken over hard tissue measurements for compressive diagnosis and final treatment planning.² The soft tissue paradigm is based on getting the best soft tissue esthetic results with stable functional occlusion.

Profile outlines of the patients are used in orthodontic treatment planning as any skeletal or dental changes either by growth or orthodontic treatment are reflected and can be measured in profile analysis of the patients.³ Lateral cephalogram is universally used in orthodontics for measuring soft and hard tissue relations as dental, skeletal and soft tissue profile view is visible on this two-dimensional x-ray.⁴

A frequently used soft tissue profile parameter to determine the facial harmony is the NLA. There is no unified definition of NLA and is reported in the literature in the range of 90° to 120°.^{5,6} Various studies have been conducted to emphasize the role of NLA in facial esthetics.⁷⁻⁹ NLA is greatly influenced by inclination of the upper incisors and thickness of upper lip.¹⁰ The decision for orthodontic management like extraction versus non extraction, maxillary advancement and set back all depends on the assessment of NLA.^{11,12} Nandini⁹ advocated that NLA should be placed within acceptable limit of its variations by planning the treatment mechanics according to get the best esthetic profile result.

NLA is composed of two components. The upper component of NLA depends on columella inclination while the lower component is related to upper lip. Non-surgical orthodontic treatment effects the lower compartment of NLA. Fitzgerald¹³ suggested that measurement of this angle alone provides inadequate information as it does not reveal which component is responsible for the variability. The aim of this study was to determine the effect of incisor inclination and lip thickness on nasolabial angle in Pakistani population. This will help the orthodontist to better plan their cases

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and use treatment mechanics that have no detrimental effects on NLA.

METHODOLOGY

A sample of 200 patients seeking orthodontic treatment with equal proportion of both genders having skeletal and dental class I relationships was taken from orthodontic department of institute of dentistry CMH medical college between the years 2015-2017. Sample size was calculated at 95% confidence level and by taking 89.45% incidence of class I malocclusion that was reported in studies.¹⁴ All the lateral cephalograms were taken in natural head position of the patient by a single operator.

Inclusion criteria include patients having orthognathic profile with dental molar relations class I, ANB angle of $0^{a}-4^{a}$ and a SN-mandibular plane angle (SN-Mand) of $32^{a} \pm 4^{a}$. Exclusion criteria were subjects with cranio-facial syndrome, history of trauma or pathology leading to facial deformities.

Following measurements were taken by a single operator on acetate paper sheet attached to lateral cephalogram ANB angle, Sella nasion line to mandibular plane angle (SN-MP), Sella nasion line to upper incisor angle (SN-UI), Nasiolabial angle (NLA) and upper lip thickness (ULT). Measurements used in the study are shown in Figure 1.

Data attained from the study was analyzed by SPSS version 21. Descriptive statics were generated for age, gender, ANB, SN-MP, SN-UI, NLA and ULT. Pearson correlation was used to evaluate association between SN-UI and ULT with NLA. A p value ≤ 0.05 was taken as significant.

RESULTS

Descriptive statics for various variables involved in the study are given in table 1. Mean age of the total sample in this study was 20.28 ± 3.860 years. SN-UI was $106.90^{\circ}\pm8.640^{\circ}$ while NLA was $97.62^{\circ}\pm9.899^{\circ}$. ULT was found to be 13.20 ± 7.57 mm.

The results of Pearson correlation (r) are given in table 2. NLA show weak negative correlation (r=-.116) for SN-UI plane angle. The negative correlation means when SN-UI angle would increase the NLA would decrease. However, this correlation was statistically insignificant with p value >0.05. Correlation between NLA and ULT was also weak and statistically insignificant with p value = 0.212. However, this correlation was positive meaning when NLA increases ULT would also increase.

DISCUSSION

NLA has been taken as an important tool for mea-



Fig 1: SN-UI plane angle. 2: SN-MP angle. 3: ANB angle. 4: NLA .5: ULT

TABLE 1: DESCRIPTIVE STATISTICS FOR DIFFERENT VARIABLE INVOLVED IN THE STUDY

	Ν	Mean	Std. Devi- ation
Age	200	20.28	3.860
ANB	200	2.86	1.052
SN-UI	200	106.90	8.640
NLA	200	97.62	9.899
ULT	200	13.20	7.573
SN- Mand plane	200	31.70	2.486

TABLE 2: CORRELATION OF NLA WITH UPPERINCISOR ANGULATION AND LIP THICKNESS

		SN-UI	ULT
NLA	Pearson Correla- tion (r)	116	.089
	p value	.101	.212
	Ν	200	200

suring the facial esthetics.⁸ Planning for optimum NLA is important in clinical orthodontics. A decreased NLA will lead to prominent upper lip while over retraction of soft tissue upper lip will result in obtuse nasolabial angle and a dished in profile.

The mean NLA found in present study was $97.6^{\circ}\pm9.89^{\circ}$. Higher value for NLA greater than 100° were reported in two studies on Pakistani population.

 15,16 The difference in NLA from these two studies can be due to different type of sample size selected. In present study only skeletal class I patients were selected while in previous studies 15,16 all type of skeletal relations were selected randomly. The findings of present study on NLA are similar to Dua ⁸ findings of nasolabial angle 96.1° ± 9.7°. NLA reported in Caucasian population is 114°±10° showing a racial variation in NLA. ¹³

In present study a statistically insignificant weak negative correlation was found between SN-UI and NLA. Similar findings were put forward in other studies on Pakistani and Indian population with a similar study settings where no intervention on patient teeth was carried out.^{15, 17}

Siddiqui ¹⁶ also found weak negative correlation but which was statistically significant between upper incisor inclination and NLA. But in Siddiqui ¹⁶ study upper incisor inclination was taken from palatal plane rather than SN plane. Many international studies have reported that when the upper incisors are retracted there is increase in NLA.¹⁸⁻²⁰

Weak positive correlation between ULT and NLA which was statistically insignificant was found in present study. No correlation between ULT and NLA was measured in any previous study. It is suggested that future community based studies should be done which should include other skeletal and soft tissue variables to have better understanding of different factors effecting NLA.

CONCLUSION

Both SN-UI angle and ULT was found to have insignificant weak correlation with NLA. There was weak negative correlation of SN-UI with NLA while ULT show a positive correlation.

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