CORRELATION BETWEEN NASOLABIAL ANGLE AND MAXILLARY INCISOR INCLINATION

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ABSTRACT

Objective: To find out the relationship between nasolabial angle and maxillary incisor inclination

Study Design: Cross sectional study

Patients and Methods: On the basis of inclusion criteria; 208 good quality lateral cephalograms were traced. Nasolabial angle and maxillary incisor to S-N plane were drawn. Correlation was done by using Pearson correlation coefficient (r). Bivariate analysis was done. p value was also determined. A p value of less than 0.05 was considered to be statistically significant.

Results: Out of a total study sample (N=208) 41% were male whereas 58.2% were female. Regarding the class of occlusion, 40.4% of our population was Class I, 47% was class II and 12.5% was Class III. The mean age of patients in our sample was 17.15 years with a range between 11 to 35 years. The mean nasolabial angle (NLA) was 102 degrees (50 to 148 degrees). The mean maxillary incisor to S-N plane (iSN) angle was 105, with a minimum of 57 and maximum of 138 degrees and standard deviation of 12.02. Pearson correlation coefficient test (r=-0.97) showed that the relationship between pre-treatment nasolabial angle and pretreatment maxillary incisor inclination was not present.

Conclusions: Pretreatment relationship between maxillary incisor inclination and nasolabial angle is statistically insignificant.

Keywords: Maxillary Incisor inclination, Nasolabial angle, Relationship.

INTRODUCTION

Evaluation of the face in the profile view is an integral part of comprehensive orthodontic diagnosis. Different methods for evaluation of profile have been proposed including traditional cephalometrics and soft-tissue analysis. Nasolabial angle gives an indication of protrusion of upper lip. Traditional cephalometrics uses internal osseous landmarks to define points, lines, and/or planes, which in turn are used to quantify anteroposterior (AP) jaw and incisor positions. One of the chief concerns of patients reporting for orthodontic treatment is unacceptable/abnormal maxillary Incisor position in sagittal plane. Planned Maxillary Incisor Position (PIP) is thus one of the requirements to achieve ideal orthodontic results.

Clinicians consider maxillary incisor protrusion to be the prime reason for reduced nasolabial angle but interestingly there is little evidence both in international and local literature about the relationship between maxillary incisor inclination and nasolabial angle, so there was a need to find out about this relationship.

MATERIAL AND METHODS

This was a cross sectional study. All the patients were randomly selected from Orthodontics department, Armed Forces Institute of Dentistry (AFID). The sampling was based on convenience model. Pretreatment lateral cephalometric radiographs of patients reporting to AFID from January 2014 till December 2014 were used.

The inclusion criteria of the patients for this study were based on the fact that the patients had never gone through orthognathic surgery or orthodontic treatment. Our sample included patients without any restorations in the anterior teeth and patients without impacted, missing teeth.
Exclusion criteria included Patients with cleft lip/palate and patients with supernumerary teeth.

This study used the pretreatment cephalometric radiographs of 208 subjects. Good quality cephalometric radiographs were taken with patients lips in relaxed position showing a more precise anatomy of the lip. These were traced on 0.003 inch matte acetate tracing paper. The nasolabial angle was formed by drawing a line tangent to the base of the nose and a line tangent to the upper lip. To evaluate the inclination of upper incisor, S-N plane was drawn as a reference plane. According to Steiner, the advantage of using these two midline points (S and N point) is that they are moved only a minimal amount whenever the head deviates from the true profile position and this plane remains true even if the head is rotated in the cephalostat.

SPSS 22 was used for statistical analysis. Frequencies and percentages were determined for gender and class of occlusion. Minimum and maximum value, mean and SD were determined for age, nasolabial angle (NLA) and Upper Incisor to S-N plane (I-SN). Pearson correlation coefficient (r) was applied for comparison. To find the correlation, Bivariate analysis was performed on Nasolabial angle and Upper Incisor to S-N plane. The significance was judged by a p value of <0.05.

RESULTS

The results showed that 4.8% of our study population was male and 58.2% were female. The frequency was 87 and 121 between male and female patients respectively. Regarding the class of occlusion, 40.4% of our population was class I, 47% was class II and 12.5% was class III. The frequency for class I, Class II and class III were 84, 98 and 26 respectively. The mean age of the patients in our sample was 17.15 years. The range of age was between 11 to 35 years. The Standard deviation for age was 3.94. In our study population, the mean nasolabial angle (NLA) range was 102 degrees. The range was from 50 to 148 degrees. The standard deviation for NLA was 16.45. The mean maxillary incisor to S-N plane (I-SN) angle was 105, with a minimum of 57 and maximum of 138 degrees. The standard deviation for I-SN was 12.02.

In our sample the Bivariate analysis for correlation was done. One would predict a strong and one would indicate a weak correlation. For p value the significance was assumed at a value of <0.05.

DISCUSSION

Clinicians are often of the opinion that reducing the maxillary incisor inclination by extractions can also increase the nasolabial angle. This in turn will reduce the prominence of upper lip in patients with protrusive lips. It is rather well accepted by clinicians that the extraction of four first premolars can be effective in the treatment of bimaxillary protrusion. Whether evidence based approach to treatment is being followed is still controversial. It is surprising that there is relatively little in the literature providing concrete evidence on the efficacy of extraction of teeth for reducing the lip protrusion.

Scheideman et al reported a normal mean nasolabial angle of 111.48 with a small decrease in this angle expected with age, primarily because of the downward growth of the nose. Fitzgerald et al emphasized continued nasal development in any analysis of nasolabial angles. In this study, the mean pretreatment values for the nasolabial and labial angles of

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>Coefficient of correlation (r)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>NLA</td>
<td>102</td>
<td>16.45</td>
<td>-.097</td>
<td>0.165</td>
</tr>
<tr>
<td>I-SN</td>
<td>105</td>
<td>12.02</td>
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</tr>
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both groups were slightly less than the normals.

Angle suggested that the soft tissues would assume a harmonious position, only when the dentition was intact and arranged in an ideal occlusion, while Tweed proposed the use of a hard tissue diagnostic and treatment planning with the assumption that an upright mandibular incisor over the basal bone was stable and esthetic. Reidel stated that the ultimate goal of orthodontics is magnificence, which includes ideal form, function and esthetics.

The results of our study show that the two variables i.e. Nasolabial angle (NLA) and Incisor to SN plane (I-SN) are weakly and negatively correlated i.e. $r = -0.097$. This confers that when NLA increases, the S-N to maxillary incisor angle will decrease. Similarly the $p$ value of 0.165 is not significant statistically. Our study was different from the other local studies since no treatment intervention was carried out.

Fida et al reported the skeletal and dental characteristics of Pakistani population with lip strain. Increased value of maxillary incisor inclination (I-SN) were found, with a mean value of 118 degrees. There were no statistical significant correlation of skeletal convexity at point A and maxillary incisor inclination with upper lip inclination as evaluated by Pearson’s correlations of point A to facial plane, I-FH and ISN with upper lip inclination.

Similarly Chaudhry tried to find Upper incisor to SN plane (I-SN) value for a Pakistani population. I-SN value was found to be 118 degrees for patients with bimaxillary protrusion. In this study however statistical correlations between lip procumbency and incisor inclination were not made.

In another study patients were treated with the extraction of four premolars and the retraction of anterior teeth in an attempt to correct their bimaxillary protrusion. The results of this study demonstrated a significant increase in interincisal angle, a significant decrease in upper and lower incisor inclination and a significant decrease in the anteroposterior position of the upper and lower incisors ($p = 0.001$). These findings suggest that this treatment modality is effective in decreasing the incisor proclination.

In a study by Saxby and Freer it was concluded that lip position may be affected by incisor position and skeletal convexity at point A, but this study did not try to find out a statistical correlation.

Changes in the nasolabial angle of the soft-tissue profile were assessed quantitatively in a serial cephalometric study of fifty treated subjects and forty-three untreated subjects, all of whom had Class II, Division 1 malocclusions. Correlations, simple and multiple regression analysis and multifactorial analysis of variance were used to examine the changes in the nasolabial angle owing to incisor superius retraction and associated skeletal displacements. There were no significant changes in nasolabial angle because of growth. However, the greater the maxillary incisor retraction, the greater was the increase in nasolabial angle. However another study reported results in non-concordance with the above studies. It was proved that there is no correlation between the nasolabial angle and upper incisor inclination and between the upper incisor inclination and lower compartment of nasolabial angle.

There are some limitations of our study. The patients selected did not go through any orthodontic treatment. Only pretreatment lateral cephalograms were traced. If there were patients who had been treated solely by extraction or non extraction the results may have been different.

**CONCLUSION**

There is a weak and negative correlation between Nasolabial angle and maxillary incisor inclination. However, the pre treatment correlation between Nasolabial angle (NLA) and upper incisor inclination to S-N plane (I-
SN) is not statistically significant. Further studies need to be done to assess the effects of treatment (extraction or non extraction) on the nasolabial angle and maxillary incisor inclination.

**CONFLICT OF INTEREST**

This study has no conflict of interest to declare by any author.

**REFERENCES**