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Correlation Between Naso Labial Angle and Effective Maxillary and Mandibular Lengths in Untreated Class II Patients

* Suja Ani G. [1]* and Babu E.C. [1]
1 Department of Orthodontics, Govt. Dental College, Thiruvananthapuram -11,India
*Corresponding Author: * Suja Ani G.

Abstract:

The soft tissue profile is one of the main concerns of orthodontic treatment. Naso labial angle (NLA) is one of the soft tissue cephalometric parameters being routinely analyzed in orthodontic diagnosis and treatment planning. A study is undertaken on the correlation of naso labial angle to effective maxillary and mandibular lengths, in patients with class II malocclusion. The mean NLA and maxillary and mandibular lengths in males and females with class II malocclusion and also the mean NLA for subjects in the different categories of crowding (Category 1 and Category 2) in patients with class II malocclusion is presented in the results. Positive correlations observed between NLA and maxillary and mandibular lengths were statistically not significant.

Key words: naso labial angle, class II malocclusion, untreated class II patients, cephalometric parameters, soft tissue analysis, class II patients, correlation study.

Introduction

Naso labial angle (NLA) is one of the soft tissue cephalometric parameters analyzed in detail in orthodontic and ortho surgical combination cases. The correlation of naso labial angle to effective maxillary and mandibular lengths, in patients with class II malocclusion will be discussed in detail, here in this article.

Cephalometric studies published on the Class II, orthodontically untreated patients in Kerala shows that the soft tissue parameter NLA has not been taken up in detail. Improvement of the facial profile is always a part of the general treatment protocol in the management of class II patients, NLA is a major determinant in the soft tissue profile, hence this study on the NLA in the untreated Class II patients.

This study was undertaken on untreated Class II patients. The data was collected from the dental casts, and cephalograms, which were among the diagnostic aids in treatment. Orthodontic treatment involves the analysis of a number of soft tissue

and hard tissue cephalometric parameters, which includes the NLA and effective maxillary and mandibular lengths. A correlation study between NLA and to effective maxillary and mandibular lengths is attempted.

Material and Methods

This study was conducted as a cross sectional study, in the dept: of orthodontics, Govt: Dental College, Thiruvananthapuram from January-June 2013. Considering the exclusion and inclusion criteria, and with an error of 6%, the sample size required for the present study was calculated as 72, and rounded off to 75 patients for the total study population. The data was collected from the cephalograms and study models available, for patients with Class II MO, reporting for treatment in the department of orthodontics. The sample belonged to the age group 15-29 years (mean age = 19.25 years) (Table 1). The study models were analyzed and the subjects were categorized into Category I (pretreatment mandibular anterior crowding <3mm) and Category 2(crowding >3mm).

The cephalograms were traced and linear and angular measurements were taken. The inter observer and the intra observer errors were checked for standardization. The data was analyzed statistically.

A total of 84 cephalograms (40.5% males and 59.5% females) were available for the present study (Table 2). The inclusion criteria were patients with bilateral Class II MO, with no openbite or crossbite, and with the presence of all permanent teeth up to the first molars, their cephalograms were included in the study. The exclusion criteria were dental anomalies, proximal decay and previous orthodontic therapy.

Mean of parameter NLA, and also the mean of the effective maxillary and mandibular lengths were calculated. The correlation between NLA and effective maxillary and mandibular lengths was done. The study duration was 6 months from Jan 2013 to June 2013. Studies on the correlation of NLA with the effective maxillary and mandibular lengths of the Kerala population has not been much cited in literature; hence this cephalometric study. The age group of the sample was 15-29 years. Another study on the adult Class II population is recommended.

Results

The study sample belonged to the age group 15-29 years. 60.7 % were of 15-19 yrs, 33.3% were of 15-19yrs and 6.0% in 25-29yrs. 32% of the sample had pretreatment mandibular anterior crowding <3mm and 68% pretreatment mandibular anterior crowding >3mm. The mean effective maxillary length of patients with class II malocclusion was 96.65±6.741 and the mean effective mandibular length was 119.52±8.572. The mean NLA of the patients with class II malocclusion was 101.33±12.947 (Table 1). There was no statistically significant difference between males and females. ($p>.05$). The mean NLA in male patients with class II malocclusion was 100.66±12.853 and that of the female patients was 101.78±13.122 (Table 2). The mean NLA for patients with class II malocclusion in Category I (pretreatment mandibular anterior crowding <3mm) was 99.8±14.2 and that for patients in the Category 2(crowding >3mm) was 102.0±12.4 (Table 3). 32% of the sample belonged to category 1and 68% to category 2 (Table 3) ($p>.05$). There was statistically significant difference between males and females in the mean effective maxillary and mandibular lengths (Table 2). No statistically significant correlation was observed between the NLA and the apical base lengths in Class II subjects (Table 3). There was no statistically not significant correlation between NLA and SL, SE, Co-A and Co-Gn ($p>.05$) (Table 4).

Discussion

The subjects included in the study sample, 34 males and 50 females were in the age group 15-29 years. The purpose of the present study was to find out the relationship between maxillary and mandibular effective lengths and NLA in patients with untreated Class II malocclusion. Combinations of variations in skeletal lengths and inclinations of the nose and the lip, can lead to variations of the facial assessments in orthodontic diagnosis. The effective apical base lengths and also the soft tissue parameters like the naso labial angle are to be taken into consideration during orthodontic treatment planning. The Class II malocclusion is taken up here in detail.

Janson et al[1] reported an inverse correlation between the apical base effective lengths and dental crowding, and also a positive correlation between maxillary and mandibular effective lengths. The mean mandibular effective length for females in the present study was 115.30±7.728 mm (Table 2); Sayin and Turkkahraman[2] had reported a value of 113.25 ± 4.74mm. The mean maxillary effective length for females in this study 93.11±5.104mm (Table 2) was greater than the values reported for the females in the study on non-growing females (88.48 ± 4.48mm) conducted by them. Turkkahraman and Sayin[3] observed a shorter maxillary and mandibular length in patients with incisor crowding. Karlsen and Krogstad[4] reported that a smaller mandibular length was seen in patients with class II malocclusion than in class I malocclusion and normal subjects. Some class II relationships resulted from a small mandibular body according to Braun[5]. Baccetti et al [6] had concluded that patients with class II malocclusion had smaller mandibular lengths than subjects with class I malocclusion or normal occlusion. Carter[7] also concluded that patients with class II malocclusion had a smaller mandibular length than subjects with class I malocclusion or normal occlusion. Berg R[8] found subjects with dental crowding to show a significantly smaller mandibular length when compared to subjects with normal occlusion. Fushima et al[9] reported a retruded smaller mandible in adult females included in their study. Rosenblum[10] found that the dominant skeletal pattern observed was maxillary protrusion with a normal mandible, in contrast with other studies that showed more mandibular retrusion and less maxillary protrusion in class II subjects. Karlsen[11] concluded that children with Angle class II malocclusion with deep bite had smaller mandibular length. Leighton and Hunter[12] showed that crowded mandibular dentition existed in a morphologically distinct supporting structure, with a relatively deficient amount of growth; they also found that mandibular length is smaller in crowded cases; the mean of mandibular length was only 57.9 in the moderately crowded group and 58.1 in the severely crowded group in his study, where as in the spaced group it was 61.83.

The lip to nose relationship was established and reported by Ricketts[13], as early as 1957. Satravahas et al[14] had reported on the significance of the integumentary profile as early as in 1987. Fitzgerald et al[15] reported on the evaluation of the nasolabial angle and the relative inclinations of the nose and upper lip in 1997. The NLA ranges from 90-120 according to Graber[16] (Graber 4th ed. Pg 36). Legan & Burstone[17] reports a value of 102 ± 8 (Athanasiou[18]). According to Arnett[19], it can range from 103.5 ± 6.8 in Females and in Males from 106.4 ± 7.7(Arnett AJO 116 no: 3). The NLA for males in Class II malocclusion in this present study was 100.66±12.853, and in females it was101.78±13.122, this difference was statistically not significant. It was more in Group 2 than in group 1, though statistically not significant.

Baccetti [20] in his study showed significantly larger increments in maxillary protrusion in the Class II group included in his study. According to him the upper jaw becomes more protruded during the transition from deciduous to

mixed dentition. The finding of Lundstrom[21] and Ronnerman and Thilander[22] that crowding occurred more frequently in less prognathic persons were confirmed by Leighton and Hunter's[12] work. Hitchcock[23] in his study concluded that "the cephalometric differences that manifested in Class II Division 1 malocclusion were found in the upper tooth positions and the lower jaw position". Hitchcock concluded that "the clue to successful treatment of Class II Division 1 malocclusion must be found mostly in modifying upper dental area and if possible in skeletal pattern, specifically the mandible".

When modifying the upper dental area with orthodontic treatment procedures, the NLA measurement changes. In this context, the study on correlation between nasolabial angle and effective maxillary and mandibular lengths in untreated class II patients was done, and no statistically significant correlation could be established between the NLA and the apical base lengths in Class II subjects.

Conclusion

1. The mean NLA of the patients with class II malocclusion was 101.33±12.947 (Table 1).
2. The mean NLA of the male patients with class II malocclusion was 100.66±12.853 and that of the female patients was 101.78±13.122 (Table 2). ($p>.05$).
3. The mean NLA of the patients with class II malocclusion in Category I (pretreatment mandibular anterior crowding <3mm) was 99.8±14.2 and that in Category 2(crowding >3mm) was 102.0±12.4 (Table 3). ($p>.05$).
4. There was statistically significant difference between males and females in SE, Co-A, Co-Gn (Table 2). ($p<.05$). The mean Co-A of the male patients with class II malocclusion was 101.87±5.345 and that of females was 93.11±5.104 (Table 2). ($p<.05$). The mean Co-Gn of the male patients with class II malocclusion was 125.74±5.418 and that of females was 115.30±7.728 (Table 2). ($p<.05$). The mean SE of the male patients with class II malocclusion was25.91±8.992 and that of females was 20.42±6.649 ($p<.05$).
5. A positive Correlation between NLA and SL, SE, Co-A and Co-Gn was observed, this was statistically not significant ($p>.05$). (Table 4).

The results of the present study remain to be evaluated for the adults of our population.

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Table 1: Mean±SD of cephalometric measurements SL, SE,…..NLA

	N	Mean	SD	Minimum	Maximum
SL	84	50.96	10.946	16	72
SE	84	22.64	8.099	12	64
Co-A	84	96.65	6.741	80	111
Co-Gn	84	119.52	8.572	93	140
NLA	84	101.33	12.947	68	131

Table 2: Mean±SD of cephalometric measurements SL, SE,…..NLA among males and females

	Gender	N	Mean	SD	t	p
SL	Male	34	51.72	11.999	.520	.605
	Female	50	50.45	10.262		
SE	Male	34	25.91	8.992	3.218	.002
	Female	50	20.42	6.649		
Co-A	Male	34	101.87	5.345	7.573	.000
	Female	50	93.11	5.104		
Co-Gn	Male	34	125.74	5.418	6.811	.000
	Female	50	115.30	7.728		
NLA	Male	34	100.66	12.853	-.387	.700
	Female	50	101.78	13.122		

Table 3: Mean±SD of cephalometric measurement NLA in category 1 and 2

	Categroy	N	Mean	SD	t	p
NLA	1	27	99.8	14.2	-.735	.465
	2	57	102.0	12.4		

Table 4: Correlation between NLA and other parameters

	Pearson's Correlation - r	p
SL	-.071	.523
SE	.010	.930
Co-A	.028	.803
Co-Gn	-.098	.376