

A Cephalometric Assessment of Ideal Nasolabial Angle Range for South Indian Population

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How to cite the article:

Kommi PB, Venkatesan R, Keerthi N, Kumar AN, Kumar A, Gopinath V. A cephalometric assessment of ideal nasolabial angle range for South Indian population. J Int Oral Health 2016;8(2):205-207.

Abstract:

Background: Soft tissue diagnosis in orthodontics plays an important role in treatment planning and the mechanics involved. Evaluation of nasolabial angle is considered to be an essential in orthodontic diagnosis and treatment planning. In this study, we would like to assess the normal range of nasolabial angle in the South Indian population. As the people in South Indian may present craniofacial characteristics which differ from those of other races, whose cephalometric analysis are usually considered as the standard in routine orthodontic diagnosis and treatment planning. Further studies are therefore needed to ensure values of optimal range for an accurate diagnosis for this group. The purpose of this study is to establish norms for evaluation of nasolabial angle for the South Indian population.

Materials and Methods: 102 lateral cephalometric radiographs (41 males and 61 females) were collected from Tamil Nadu, Pondicherry, Andhra Pradesh, and Karnataka. The average age ranged between 18 and 28 years. The radiographs are manually traced, and the nasolabial angle, lower border of the nose to the FH plane (N/FH), and upper lip to the FH plane (L/FH) of these subjects were measured and after statistical analysis results were obtained.

Results: The mean value of 99.76° with standard deviation (SD) ± 15.35° was established for the entire sample, no statistically significant difference was observed between male and female value, although males recorded a more obtuse nasolabial angle of 101.73° with SD ± 12.57 and the females who recorded 98° with SD ± 16.85.

Conclusion: The mean nasolabial angle of 99.76° with SD ± 15.35° was observed in the South Indian population, the sexual difference

was not observed. However, the values obtained in this study differ from the studies reported for Caucasian and other racial group, but it is accordance with the other Asian population.

Key Words: Cephalometric analysis, facial esthetics, nasolabial angle, nose, soft tissue, upper lip

Introduction

Knowledge of facial structure is important as an orthodontist as, our goal is to achieve ideal facial profile with esthetic harmony. Recently, soft tissue of the face has been given more important in planning for ideal orthodontic diagnosis and treatment rather than giving importance only to the hard tissue. In the orthodontic diagnosis of nasolabial angle is an essential component as it indicates the position of maxillary skeletal and dental components. So, the understanding of the soft tissue structure like lip and nose is necessary. The growth and maturation of the lips in girls mature early than boys, upper lip growth completes at the age of 14 for females, and lower lip continues to grow vertically until the age of 16.^{1,2} Whereas for males, growth continues until late teens.^{3,4} Morphological and craniofacial characteristics change depending on different geographical locations and races. Hence, studies are needed to obtain standard range to achieve optimal orthodontic results for the particular race. So, in this present study, we would like to assess the range of nasolabial angle in the South Indian population, which helps the Orthodontic practitioners for better diagnosis and treatment planning.⁵

Materials and Methods

The samples examined in the present study were made of 102 adults (41 men and 61 females). The age criteria were between 17 and 28 years, as most of the vertical growth of upper lip and nose is achieved by 16 years. The cephalograms were collected from the pretreatment records of the patient, who exhibited class I skeletal and dental occlusion with good facial harmony. The other criteria's for sample collection was to have all the 28 permanent teeth, no prior history of orthodontic treatment and patients having ideal over jet, overbite with symmetrical faces and no craniofacial deformity and prior history of trauma, the patient with the South Indian ethnicity was only taken into consideration.

Radiographic evaluation was done manually. ANB angle measurement was done for all the samples to confirm class I skeletal bases. A three-step approach has suggested by Fitzgerald was used for nasolabial angle evaluation.⁶

Statistical analysis

The measurements obtained from the samples of 102 cephalometric radiographs were tabulated. The mean and standard deviation (SD) were calculated for each measurement to establish normative data.

Among 102 subjects, 61 Females and 41 Males, age range between 18 and 28 years were evaluated. The nasolabial angle measurement for the study population was between 73° and 125° with the means value of 99.76° with SD ± 15.35°, the mean value obtained for female was 98 ± 16.85° with mean standard error of 2.15 and for males 101.73 ± 12.7° with mean standard error of 1.96° (Table 1). There were no statistically significant differences between both sexes (P = 0.05). Thus, the male and female data pooled together in comparing the mean nasolabial angle obtained in this study, with that reported for other population for other studies.

In our study, N/FH angle had a mean value of 28.54° SD ± 9.6° the males had a mean value of 28.95° SD ± 10.59° and

Table 1: Difference in nasolabial angle among male and female in Pondicherry populations.

Gender	N	Mean	SD	SEM
Female	41	98.00	16.85	2.158
Male	61	101.73	12.57	1.96

SD: Standard deviation, SEM: Standard error mean

Table 2: N/FH angle recorded in Pondicherry populations.

Gender	N	Mean	SD	SEM
Male	41	28.114	7.95	1.018
Female	61	28.95	10.59	1.65

SD: Standard deviation, SEM: Standard error mean, N/FH: Nose to the FH plane

Table 3: UL/FH angle recorded in Pondicherry populations.

Gender	N	Mean	SD	SEM
Male	41	71.96	10.05	1.28
Female	61	72.39	8.73	1.36

SD: Standard deviation, SEM: Standard error mean, UL/FH: Upper lip to the FH plane

Table 4: A comparison of the nasolabial angle recorded in this study with that reported for other populations by different authors.

Author (s)	Years of publication	Population studied	Nasolabial angle (degs)
Shalhoub et al	1986	Saudi Arabians	115.90
Flynn et al	1992	Black Americans	91.30
Lew et al	1992	Chinese	95.00
Zylinski et al	1992	Adult white males	111.5
Fitzgerald et al	1992	Caucasians	114.0
Naidoo and Miles	1997	Black South Africans	82.6
Alcalde et al	2000	Japanese	102.34
Magnani et al	2004	Brazilian Blacks	88.14
Al Gunaid et al	2007	Yemeni males	106.4
Al Azemi et al	2008	Kuwaitis	107.24
Dua et al	2010	Indians	96.1
Isiekwe GI et al	2011	Nigerian	84.35
Present study	2015	Pondicherry	99.76

for females 28.11° SD ± 7.95° with no statistically significant difference between the males and females (Table 2).

The mean value for L/FH angle was found to be 72.06° SD ± 9.36° the males had a mean value of 72.39° SD ± 8.73° and for females 71.96° SD ± 10.05° with no statistically significant difference between the males and females (Table 3).

Discussion

Nowadays, the orthodontist is more obsessed with angulations and inclinations for their diagnosis and treatment planning to attain professional perfection and also to address increased esthetic demands of the patients.

Examination of soft tissue and its adaptation to the dentoskeletal complex plays a major role as there has been a significant shift toward soft tissue evaluation and treating the underlying hard tissues in accordance with that diagnosis as it benefits the patient functionally and esthetically.¹

Evaluation of nasolabial angle is crucial as it indicates the position of the maxilla, dentition, thickness of upper lip and the inclination of the alar border of the nose, nasolabial angle range given by Fitzgerald is been used as the diagnostic tool for treatment planning. However, facial profile and facial forms change in different races according to geographical location. Employing the standards specified by Fitzgerald would not be applicable.

In this study, we would like to assess the nasolabial angle in the South Indian population and to establish the standards for effective diagnosis and treatment planning which can help the clinicians for better patient management.

The lower age limit for the study was set at 18 years to ensure that facial, skeletal maturity had been achieved in both males and females.³ The error of measurement was minimal, and individual measurement of the nasolabial parameter was recorded and statistically evaluated.^{6,7} The mean value of the nasolabial angle in this sample for female was 98° with SD ± 16.85° and the nasolabial angle for males was 101.73° with SD ± 12.57° (Table 1) which was contradictory to the nasolabial angle range given by both Fitzgerald and Nanda et al., (Table 4).⁶

In our study, N/FH angle had a mean value of 28.54° SD ± 9.6° the males had a mean value of 28.95° SD ± 10.59° and for females 28.11° SD ± 7.95° with no statistically significant difference between the males and females (Table 3).

The mean value for L/FH angle was found to be 72.06° SD ± 9.36° the males had a mean value of 72.39° SD ± 8.73° and for Females 71.96° SD ± 10.05° with no statistically significant difference between the males and females (Table 2).

A comparison of the male and female nasolabial angle values showed no statistically significant gender difference with the value of $99.76^\circ \text{ SD} \pm 13.35^\circ$. Indicating the absence of sexual dimorphism. The mean value of the nasolabial angle recorded in this study is obtuse compared to study done on the Caucasian population by Fitzgerald *et al.*⁶ Hence, adapting the range of nasolabial angle parameter given by these authors may not give a precise diagnosis for this ethnic South Indian population. These results show the maxilla and its associated dental structures are placed posterior in compared with the other studies done on different races such as Caucasian population.⁸

The nasolabial angle values reported for this study is in accordance with other Asian countries such Chinese population ($95 \pm 3^\circ$) and Japanese population ($102.34 \pm 11.02^\circ$) thus, indicating the relative maxillary retrognathism in this population in comparison to the Caucasian population sample studies. Thus, findings highlight the fact that cephalometric reading most importantly soft tissue reading should not be generalized for all the races and geographical locations.^{8,9}

Conclusion

Based on the result obtained in this study, the mean nasolabial angle of $99.76^\circ \text{ SD} \pm 13.35^\circ$ was observed for the South Indian population and there was no sexual difference observed. However, the values observed in this study differ from that reported for Caucasian and other racial group, but it is accordance with the other Asian population.¹⁰

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