ORIGINAL RESEARCH PAPER

Volume-9 | Issue-4 | April-2020 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

DETERMINATION OF RELATIONSHIP BETWEEN MAXILLARY INCLINATION AND NASAL MORPHOLOGY IN NORTH INDIAN FEMALES- A CROSS SECTIONAL CEPHALOMETRIC STUDY

Dental Science

Dr. Stuti Mohan* MDS, Associate Professor, Department of Orthodontics & Dentofacial Orthopedics, Subharti Dental College & Hospital, Swami Vivekanand Subharti University, Meerut.*Corresponding Author

Dr. Shalu Jain MDS, Associate Professor, Department of Orthodontics & Dentofacial Orthopedics, Subharti Dental College & Hospital, Swami Vivekanand Subharti University, Meerut.

Dr. Ridam Jain MDS, Associate Professor, Department of Orthodontics & Dentofacial Orthopedics, Rishiraj Dental College, Bhopal

Dr. Vishwas Bansal MDS, Assistant Professor, Department of Orthodontics & Dentofacial Orthopedics, Seema Dental College & Hospital,

Dr. Sushant BDS, Tutor, Department of Oral & Maxillofacial Surgery, Subharti Dental College & Hospital, Swami Vivekanand Subharti University, Meerut

Dr. Shalini Sharma Post-graduate student, Department of Oral Medicine & Dental Radiology

ABSTRACT

Context: Nasal morphology is one of the important component and prominent feature of facial form. Thus an ideal nasal form is the key part for obtaining good facial esthetics.

Aim: To evaluate the relationship between maxillary inclination and nasal morphology in females.

Materials and Methods: 44 females subjects were selected for the study (age: 19 to 30 years) and subjected to cephalometric radiography. The lateral cephalograms were traced and divided into three groups based on rotation of maxilla. The nasal features of these three groups were evaluated and compared using mean, standard deviation, Students't' test and ANOVA.

Results: The results suggested statistically significant correlation of nasal height, nasal bone length, nasal depth, nasal length, nasolabial angle and upper lip inclination angle in different maxillary inclination group.

Conclusion: The nasal height, nasal depth, nasal bone length, nasolabial angle, upper lip inclination angle, all had maximum value in retroinclination group.

KEYWORDS

Esthetics, Lateral Cephalograms, Maxillary Inclination, Nasal Morphology

INTRODUCTION:

A balanced face is largely dependent on the harmony between the lips, nose and chin. Earlier treatment was planned on the basis of correction of underlying malpositioned hard tissue but now the paradigm has been totally shifted to overlying soft tissue profile. As nose is located in the middle of the face and forms the most prominent part of face, thus along with the lips and chin it gives the characteristic unique facial appearance to every individual[1]. Thus this shows that together with its respiratory function, the configuration of the nose also has a strong impact on overall facial esthetics[2] which also greatly influences the degree of profile convexity.[3]Due to its esthetic significance, it has drawn the attention of orthodontic literature frequently over the period of times.[4-7]

Orthodontists should always consider the nose, its growth potential, and its shape changes in profile analysis and treatment planning.[8]Thus, it is imperative for an orthodontist to have a thorough knowledge and understanding of soft tissue changes, the changes expected during and after growth completion and incident on treatment,[9] with orthodontic and orthognathic surgery alone or in various combinations[7] which is essential to achieve the desired treatment goals by an orthodontist.[10]

Some of the most difficult orthodontic diagnostic and treatment problems are characterized by disproportionate nose development that produces a distortion of the face.[11]

Nehra and Sharma[1] studied that an upturned nose in an individual is significantly correlated with the inclination of palatal plane and anti-clockwise rotation of the maxilla. Gulsen[7] et al also observed an association between nasal morphology and growth of maxilla. There has been various comparative studies on maxillary position different growth patterns with nasal morphology but relationship of maxillary inclination with nasal morphology has still not been studied properly.

Thus, the objective of the this study was to assess and correlate the nasal morphology with different maxillary inclinations in North Indian females which may further help in improvement of profile either by orthodontic or surgical treatment.

Materials & Method:

Source of data-

44 female subjects within age group of 19 to 30 years were selected on random basis. The lateral cephalogram of each subject was obtained using a standardized cephalometric technique. Prior to taking cephalogram name, age and sex for each subject was recorded and written consent was taken.

Inclusion criteria:

- Dental Class I molar relationship bilaterally with minimal crowding or spacing (<2 mm).
- Clinically normal arch shapes.
- Over jet should be 0 – 4 mm.
- No Skeletal discrepancy.
- No history of previous orthodontic treatment.
- No anterior or lateral cross bite.
- No pathologic periodontal condition.
- No temporomandibular disorders.
- No history of Orthognathic surgery and /or surgery for developmental disorders like cleft lip and palate.

Cephalometric Landmarks and Planes used were [4,10,11,12,13] (Fig. 1a & 1b):

- Point L- The most inferior point on the nasal floor anterior to the facial plane line.
- Point H- The point of intersection of a line from subnasale perpendicular to the constructed soft-tissue nasion (NS)-soft-tissue pogonion (Pg') line.
- Point SD- The point of intersection of a line from pronasale (Pr) perpendicular to the constructed soft-tissue nasion (NS)-soft-tissue pogonion (Pg') line.
- Point HD- The point of intersection of a line from pronasale (Pr) perpendicular to the nasion (Na)-pogonion (Pog) line.

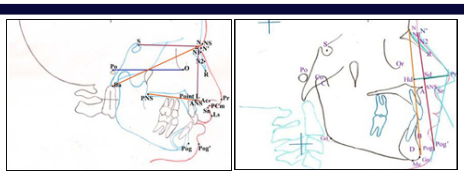

Figure 1a & 1b. Showing Cephalometric Landmarks and Planes

(N'- Soft-tissue nasion; N- Nasion; NS- Constructed Soft-tissue nasion; Pr- Pronasale; Sn- Subnasale; Ls- Labralesuperius; Ac- Alar curvature point; Pog'- Soft-tissue pogonion; PCm- Posterior columella point; Pog- Pogonion; R- Rhinion; A point- Subspinale; B point- Supramentale; S- Sella; Or- Orbitale; Po- Porion; Ba-Basion; ANS- Anterior nasal spine; PNS- Posterior nasal spine; Point L; Point H; Point SD; Point HD; SN-Sella - Nasion plane; Po-Or- Frankfort horizontal plane; ANS-PNS- Palatal plane; N-R- Nasion-Rhinion; Ba-N- Basion-Nasion; Ba-NS- Basion- Constructed soft-tissue nasion; N-L- Nasion-point L, NS-H- Constructed soft-tissue nasion-Point H; SD-Pr- Point SD- Pronasale; HD-Pr- Point HD-Pronasale)

Grouping

The collected samples were divided into 3 groups (Table 1) on the basis of three types of rotation of maxilla according to A. M. Schwarz[21](Fig. 2).

Table 1: Patient Distribution According To Maxillary Inclination

GROUPS	PARAMETERS	ANGLE
Group I (n=14)	Anteinclination	$>85^0$
Group II (n=15)	Normoinclination	85^0
Group III (n=15)	Retroinclination	<85°

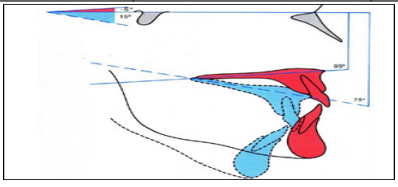

Figure 2. Showing Rotation Of Maxillary Base

The linear and angular nasal parameters used to assess the nose were [4,5,10,12,13]:- (Fig. 3a & 3b)

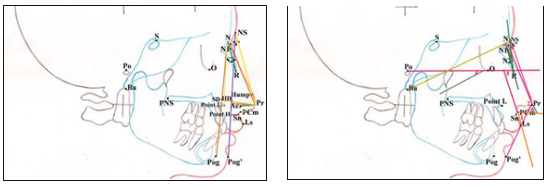

Figure 3a & 3b. Showing Linear & Angular Nasal Parameters

(Linear-N'-Pr- Nasal length; NS-Pr- Nasal Length NS; Ac-Pr- Nasal depth Ac; SD-Pr- Nasal depth SD; HD-Pr- Nasal depth HD; Sn-Pr- Nasal depth Sn ; N-H- Nasal depth H; N-L- Nasal height L, Hump; NBL- Nasal bone length; Angular- NLA- Nasolabial angle; NMA- Nasomental angle; NBA- Nasal bone angle; UNLA- Nasal upward tip angle; LNLA- Upper lip inclination; NTP- Nasal tip angle; BaNR- Cranial base angle; Ba-NS-Pr)

Statistical Analysis

The statistical analysis was done using SPSS (Statistical Package for Social Sciences)

Version 15.0 statistical Analysis Software. The values were represented in Number (%) and Mean ± SD. Double Determination for assessment of inherent error in measurement was done which showed statistically non-significant results between 1st & 2nd readings. The statistical formulas used were mean, standard deviation and analysis of variance (ANOVA).

RESULTS:

On comparison of linear measurements (Table 2), statistically significant difference was found between Groups I and II (Table 2) for NL (p=0.039) and NBL (p=0.028) whereas between Groups I and III, SDPr (p=0.024), NL (p=0.002), NH (p=0.017) and NBL (p=0.008) was found to be statistically significant. Comparison between Group II and III linear measurements does not show any statistically significant difference.

Table 2: Comparison Of Linear Measurements Between Group I, Group Ii And Group Ii

S. No.	Parameter (Linear)	Group I (n=14)	Group II (n=15)	Group III (n=15)	Comparison of Gp I & Gp II ("t" & "p" values)	Comparison of Gp II & Gp III ("t" & "p" values)	Comparison of Gp I & Gp III ("t" & "p" values)	F (ANOVA)
1	Npr	45.57± 5.30	46.93± 3.22	47.40±3.92	-0.843 0.407	-0.356 0.724	-1.061 0.298	0.732
2	NSPr	52.29± 3.07	52.87± 2.97	54.13±3.18	-0.517 0.609	-1.127 0.269	-1.588 0.124	1.378
3	AcPr	27.86± 2.21	27.53± 3.11	28.13±1.30	0.321 0.751	-0.689 0.497	-0.413 0.683	0.249
4	SDPr	21.14± 3.30	22.93± 3.59	23.67±2.32	-1.394 0.175	-0.664 0.512	-2.395 **0.024***	2.496
5	HDPr	31.93± 3.05	32.73± 4.35	33.40± 2.59	-0.573 0.571	-0.510 0.614	-1.405 0.172	0.671
6	SNPr	19.50± 2.24	19.93± 2.09	20.67±2.94	-0.539 0.594	-0.787 0.438	-1.193 0.243	0.839
7	NL	50.50± 3.25	53.07± 3.13	54.00± 2.30	-2.166 **0.039***	-0.931 0.360	-3.365 **0.002***	5.552
8	NH	5.71± 2.97	7.33± 2.61	8.47± 2.85	-1.562 0.130	-1.136 0.266	-2.545 **0.017***	3.496
9	HUMP	1.93± 0.83	1.80± 1.42	2.07± 0.88	0.294 0.771	-0.616 0.543	-0.433 0.668	0.227

*** Level of significance: 'p' is the probability level of significance of test- 'p' < 0.05 = significant and 'p' > 0.05 is non-significant.**

On comparison of angular measurements (Table 3), statistically significant difference was found between Group I and II for LNLA (p=0.001), between Group II and III, NLA (p=0.016) and LNLA (p=0.001) was found to be statistically significant whereas on comparison between Group I and III, statistically no significant difference was observed.

Table 3: Comparison Of Angular Measurements Between Group I, Group Ii And Group III

S. No.	Parameter (Angular)	Group I (n=14)	Group II (n=15)	Group III (n=15)	Comparison of Gp I & Gp ("t" & "p" values)	Comparison of Gp II & Gp III ("t" & "p" values)	Comparison of Gp I & Gp III ("t" & "p" values)	F (ANOVA)
1	NLA	96.36 ±12.00	93.60 ±11.73	105.07 + 12.80	0.626 0.537	-2.557 **0.016***	-1.887 0.070	3.602
2	NMA	129.14 ±4.17	127.27 ± 3.86	126.47 + 5.15	1.258 0.219	0.481 0.634	1.531 0.137	1.379

3	NBA	10.21 ±6.73	10.73 ±6.85	12.53 ± 6.45	-0.206 0.839	-0.741 0.465	-0.948 0.352	0.488
4	UNLA	23.00 ±11.78	19.27 ±9.30	24.73 ± 8.66	0.951 0.350	-1.666 0.107	-0.454 0.654	1.178
5	LNLA	80.00 ±16.16	102.93 ± 15.24	83.60 ± 9.55	-3.933 **0.001***	4.162 **0.001***	-0.736 0.468	11.595
6	NTP	75.93 ±11.61	76.13 ±8.69	80.07 ± 7.56	-0.054 0.957	-1.322 0.197	-1.145 0.262	0.915
7	BaNR	95.00 ±5.67	93.60 ±5.59	92.67 ± 5.19	0.669 0.509	0.474 0.639	1.157 0.257	0.662

***Level of significance of test- 'p' < 0.05**

DISCUSSION:

Facial beauty is very important for an orthodontist as it led them to investigate the relationship among various parts of face. Orthodontists must consider the nose, its growth potential, and its shape changes in profile analysis and treatment planning.[14]

Subtenly[15] observed that forward and downward growth of nose occurs during maturity. He also concluded that nasal growth continues until 16 years in females and 18 yrs. in males thus in the present study the female subjects were taken within the age group of 19 – 30 yrs.

The present study was conducted only on females of north Indian origin as nasal pattern differs from race to race, gender to gender and from individual to individual. It is in accordance with the study that concluded that nasal morphology and anatomy along with other facial morphologies varies between different ethnic and racial groups and consists characteristic shape and size.[16-17]

Females were observed to be more concerned for their looks and overall facial esthetics especially the Nose. It is in accordance with the study conducted by Khansa[18] who concluded that female patients has undergone rhinoplasty more than males and they showed a higher satisfaction rate than the males. Riveiro et al[19], Enlow and Hans[20] concluded in their study that female has less protrusive, proportionally smaller, shorter and less prominent nose than males prominent nose than males.

On comparing linear measurements between Group I-II and between Group I-III (Table 2) NL (nasal height) and NBL (nasal bone length) both was found to be statistically significant whereas between Group II-III, these parameters showed statistically non-significant difference. NL depicts the nasal height and is measured from point N to point L whereas NBL being the nasal bone length measured from point N to point R. NL and NBL both showed maximum value in Group III (retroclination) and minimum value in Group I (anteinclination) which suggests that nasal height and nasal bone length increases with clockwise rotation of maxilla and decreases with anti-clockwise rotation. It is in contrast to the study conducted by Gulsen et al[7] who found a low negative correlation of nasal bone length with maxillary position in their study whereas in this study a positive correlation was found with maxillary rotation.

On comparing linear measurements between Group I-III (Table 2) SDPr and NH was also found to be statistically significant whereas in other two groups it showed statistically non-significant difference. NH is the nasal depth measured from point H to subnasale (Sn) whereas SDPr being the nasal depth to the facial soft tissue. Both parameters showed highest value in retroclination and lowest in anteinclination group that means nasal depth increases with clockwise rotation of maxilla and decreases with anticlockwise rotation of the maxilla. SDPr showed a low positive correlation between the two extreme groups i.e. anteinclination and retroinclination. Though it was statistically significant, clinically these values were not very much differentiable and it can be attributed to the zero degree range in the normoinclination by A.M. Schwarz[21] because of which the significant changes in nasal depth came only between Group I and Group III.

The mean value for SDPr and HDPr (nasal depth) was 22 mm and 32 mm respectively. The mean value for SDPr was in the range of 22-32 mm as stated by Begg and Harkness[22] whereas mean value of HDPr i.e. nasal depth from hard tissue was observed to be less than 34mm(Table 3). The values for both parameters was found to be very constant in all the three maxillary inclination groups. The value of SDPr showed statistically significant difference whereas HDPr showed statistically non-significant difference but it was found to be increased with increase in the maxillary inclination. This probably explains that with retroinclination of maxilla, the nasal depth increases and vice versa. It is in accordance to the study conducted by Nehra and Sharma[1] who found an upturned nose in an individual from the Indian subcontinent which may indicate a deficient descent of the anterior palatal plane manifesting as a counter clockwise rotation of the maxilla.

On comparing angular measurements between Group I-II and between Group II-III (Table 3), LNLA (upper lip inclination) was found to be statistically significant whereas between Group I-III it was observed to be statistically non-significant with highest value in Group II and the least value in Group I. It is in accordance with the study conducted by Nehra and Sharma.[1] No particular pattern was followed by LNLA so it was suggested that it's a very variable parameter and must not be trusted upon.

On comparison between Group II-III (Table 3), NLA (nasiolabial angle) was found to be statistically significant. It was found to be increased with retroinclination of maxilla and reduces with decrease in maxillary rotation angle. This result is similar to that of the study of Nehra & Sharma[1] who also found the same results.

CONCLUSION:

From the analysis and results obtained following conclusions can be drawn:

1. On comparing different maxillary inclination with linear nasal parameters statistically significant difference was observed for NL, NBL, NH and SDPr. All these parameters followed a similar pattern with the highest value in retroinclination group and gradually decreases as the inclination progresses towards normoinclination and further towards anteinclination.
2. On comparing the different maxillary inclination groups with angular nasal parameters statistically significant difference was noted for NLA and LNLA. The NLA was found to be maximum in retroinclination and least in normoinclination group whereas LNLA was found to be highest in normoinclination and lowest in anteinclination group.

REFERENCES:

1. Nehra K, Sharma V. Nasal morphology as an indicator of vertical maxillary skeletal pattern. J Orthod 2009; 36:160-6.
2. Ferrario VF, Sforza C, Poggio CE, Schmi JH. Three-dimensional study of growth and development of the nose. Cleft Palate Cranio fac J 1997; 34:309-17.
3. Wisth PJ. Nose morphology in individuals with Angle Class I, Class II, or Class III occlusions. Acta Odontol Scand 1975; 33:53-7.
4. Buschang PH, Viazis AD, Delacruz R, Oakes C. Horizontal growth of the soft-tissue nose relative to maxillary growth. J Clin Orthod 1992;26:111-8.
5. Clements BS. Nasal imbalance and the orthodontic patient. Am J Orthod 1969;55:477-98.
6. Robison JM, Rinchuse DJ, Zullo TG. Relationship of skeletal pattern and nasal form. Am J Orthod 1986;89:499-506.
7. Gulsen A, Okay C, Aslan BI, Uner O, Yavuzer R. The relationship between craniofacial structures and the nose in Anatolian Turkish adults: A cephalometric evaluation. Am J Orthod Dentofacial Orthop 2006;130:131.e15-25.
8. S.Krishnaveni, Reddy YM, Sreekanth C, Reddy BVV, Raj GKP, Reddy BR. Nasal Integument as an Indicator of Maxillary Skeletal Pattern. Int J Oral Health Med Res 2017;3(6):31-35.
9. Bhardwaj A, Maurya R, Nehra K, Mitra R, Kamat U, Nakra O. Comparative evaluation of various nasal parameters in different malocclusion and growth patterns: A cross-sectional study. J Indian Orthod Soc 2018;52:243-7.
10. Chaconas S J, Bartroff JD. Prediction of normal soft tissue facial changes. Angle Orthod 1975; 45: 12–25.
11. Buck D.L. and C.M. Brown. A longitudinal study of nose growth from ages 6 to 18. Ann Plast Surg. 1987; 18 (4): 310-3.
12. Neger M. A. quantitative method for the evaluation of the soft tissue facial profile. Am J Orthod. 1959; 45(10):738-51.
13. Burstone C.J. The integumental profile. Am J Orthod. 1958; 44 (1):1-25.
14. Bhushan R, Kumar S, Chauhan AK, Mohan S, Shekhar M and Narnoly A. Assessment of relationship between maxillary rotation and nasal morphology in males. Contemp Clin Dent. 2015 Mar;6 (Suppl 1): S12-7.
15. Subtelny JD. A longitudinal study of soft tissue facial structures and their profile characteristics, defined in relation to underlying skeletal structures. Am J Orthod 1959; 45: 481–507.
16. Ochi K, Ohashi T. The effects of an external nasal dilator and nasal dimensions in Asians. Otolaryngol Head Neck Surg 2002;126:160-3.
17. Uzun A, Akbas H, Bilgic S, Emirzeoglu M, Bostanci O, Sahin B, et al. The average

values of the nasal anthropometric measurements in 108 young Turkish males. Auris Nasus Larynx 2006;33:31-5.
18. Khansa I, Khansa L, Pearson Gregory D. Patient satisfaction after Rhinoplasty: A social media analysis. Aesthet Surg J 2015; 36 (1): NP1-5.
19. Fernandez-Riveiro P, Smyth-Chamosa E, Suarez-Quintanilla D, Suarez-Cunqueiro M. Angular photogrammetric analysis of the soft tissue facial profile. Eur J Orthod 2003;25:393-9.
20. Enlow DH, Hans MG. Essentials of facial growth. Philadelphia: W. B, Saunders; 1996.
21. Rakosi T, Jonas I and Graber T.M. Color Atlas of Dental Medicine - Orthodontic Diagnosis. New York: Thieme; 1992. pp 220-225.
22. Begg R.J. and Harkness M. A lateral cephalometric analysis of the adult nose. J Oral Maxillofac Surg. 1995; 53:1268-1274.