ORIGINAL RESEARCH

Nasal Integument as an Indicator of Maxillary Skeletal Pattern

S.Krishnaveni[1], Y. Muralidhar Reddy[2], C. Sreekanth[3], B.VishnuVardhan Reddy[4], G.Kranthi Praveen Raj[5], B. Reddeppa Reddy[6]

1-P.G Student, Dept of Orthodontics and Dentofacial Orthopaedics, G.Pulla Reddy Dental College, Andhra Pradesh, India. 2-Professor and Head, Dept of Orthodontics and Dentofacial Orthopaedics, G.Pulla Reddy Dental College, Andhra Pradesh, India. 3-Professor, Dept of Orthodontics and Dentofacial Orthopaedics, G.Pulla Reddy Dental College, Andhra Pradesh, India. 4,5-Reader, Dept of Orthodontics and Dentofacial Orthopaedics, G.Pulla Reddy Dental College, Andhra Pradesh, India. 6-Senior lecturer, Dept of Orthodontics and Dentofacial Orthopaedics, G. Pulla Reddy Dental College, Andhra Pradesh, India.

Correspondence to:
Dr. S.Krishnaveni P.G Student, Dept of Orthodontics and Dentofacial Orthopaedics, G.Pulla Reddy Dental College, Andhra Pradesh, India,
Contact Us: www.ijohmr.com

ABSTRACT

Objectives: 1.To investigate the relationship between nasal morphology in relation to sagittal and vertical maxillary skeletal pattern and 2.To know the relationship between the degree of upturn of the nose and the inclination of the palatal plane. **Materials and Methods:** Pretreatment lateral cephalograms of 60 adults of age 18-27 years with no previous history of trauma, surgical intervention, and congenital disease are obtained from records of the department of Orthodontics and Dentofacial Orthopedics, G. Pulla Reddy Dental College, kurnool.10 facial skeletal parameters and 6 nasal parameters were measured on lateral cephalograms. Pearson correlation analysis was used for statistical analysis. **Results:** Facial heights, lengths, and the anteroposterior/vertical position of the maxilla were found to be correlated to nasal length and form. Nasal length is significantly positively correlated with anterior maxillary height ($r= 0.436$, $P<0.005$) and inclination of the palatal plane ($r=.344$, $P<0.03$). Nasal length is significantly positively correlated with maxillary length($r=0.39$, $P<0.012$). Upward nasal tip inclination showed a significant negative correlation with an inclination of the palatal plane($r =-0.345$, $p <0.018$). **Conclusion**: The clinical significance of this study is that Nasal length, prominence, and form are associated with height and length of the maxilla. Nasolabial angle in itself may not indicate a mid face vertical discrepancy; however its upper component, with decreased nasal length in an adult subject may indicate an underlying change in inclination of the palatal plane. This might be of value during orthodontic diagnosis and treatment planning.

KEYWORDS: Nasal length, Nasolabial angle, Sagittal and Vertical maxillary skeletal pattern, Upturned nose

INTRODUCTION

Now-a-days there is a shift of paradigm from Angles hard tissue to soft tissue profile as soft tissues largely determines the limitations of orthodontic treatment, from the perspectives of aesthetics, anchorage planning, function, retention, relapse and stability.[1,2] Nose dominates the middle portion of the face and in close harmony with lips and chin defines the characteristic facial appearance of an individual.[3,4] Orthodontists should consider the nose, its growth potential, and its shape changes in profile analysis and treatment planning. Because the forward growth of the nose is greater than that of the soft tissue chin, create an impression that the lips are receding within the facial profile. When nasal development is excessive, growth produces an even more convex profile. Thorough knowledge of the relationship between these facial structures, and the changes expected during and after growth, with orthodontic and surgical treatment is essential for an orthodontist to achieve the desired treatment goals.[5–11]

Nasal growth proceeds at a relatively constant rate into adolescence and is almost completed by the age of 16 in girls and 18 in boys.[12–17] However long term studies by Behrents[18] indicate a considerable amount of nasal growth during adulthood. Vertical growth of the facial skeleton, continues well after puberty both in males and females, even after the completion of growth in the sagittal and transverse dimensions.[19,20] Scott[21] suggested that the cartilaginous nasal septum is a primary growth center that pushes and thrusts the midface downwards and forward. Although this hypothesis is not unanimously accepted, numerous authors [22–25] have shown that prenatal and/or postnatal impaired growth of the nasal septum due to genetic or traumatic etiology causes maxillary hypoplasia in the sagittal dimension. The relationship between nasal morphology and the facial skeletal pattern has received attention in the orthodontic literature. [26–29] The primary purpose of this study was, therefore to study the relationship between maxillary and mandibular vertical and horizontal skeletal pattern and nasal morphology. The nasolabial angle depicts a close relationship between the lips and the nose and has been studied with great interest by various authors in the orthodontic literature.[30,31] Acuteness of the nasolabial angle may be due to a proclined maxillary dentition, a short nasal projection and/or a lower nasal tip. An acute

How to cite this article:
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.

Nasolabial angle due to a protrusive maxilla or maxillary incisors may be corrected with extraction of premolars and retraction of the maxillary anterior teeth.[32–35] The nasolabial angle has two components: the inclination of the upper lip (lower nasolabial angle-LNLA) and the upward nasal tip inclination (upper nasolabial angle-UNLA). While the change in inclination of the upper lip (LNLA) has demonstrated a strong correlation with the amount of retraction of the upper incisors and increase in the lower anterior facial height (LAFH), the UNLA has not been found to be correlated either with incisor retraction or sagittal skeletal parameters.[35,36] It is, however a clinical observation of the authors that an upturned nose is frequently associated with change in the inclination of the palatal plane

The aim of this study was thus twofold:

- To investigate the relationship between maxillary skeletal pattern and nasal morphology;
- To explore the relationship between the degree of the upturn of the nose and the inclination of the palatal plane.

MATERIALS AND METHODS

Pretreatment lateral cephalometric radiographs of 60 South Indian adults are obtained from records of the department of Orthodontics, G.Pulla Reddy Dental College.

Inclusion Criteria:

- Patients within the age group of 18 to 27 years.
- Patients with the full complement of permanent teeth (excluding third molars).

Exclusion Criteria:

- Patients who have undergone Orthodontic/ Orthopedic/ Orthognathic surgical treatment.
- Patients with the history of trauma.
- Patients with gross nasal deformity.

Cephalometric analysis:

10 facial skeletal parameters and 6 nasal soft tissue parameters identified on the standardized lateral cephalometric radiographs. Tracing of the cephalometric radiograph was made by hand using a sharp 3H pencil on acetate tracing paper.

The following vertical facial skeletal parameters were assessed (Figure 1)

1. GoGn-SN: The mandibular plane inclination to the cranium;
2. S-Go: Posterior facial height;
3. N-Me: Anterior facial height;
4. N-ANS: Anterior maxillary height;
5. ANS-Me: Lower Anterior Facial Height;
6. SN-Pp: The angle between the Sella-Nasion plane and the ANS-PNS line (inclination of palatal plane);
7. Angle of inclination: The angle between the perpendicular drawn from N' on Se-N' line (entry of sella to soft tissue nasion) and the palatal plane.

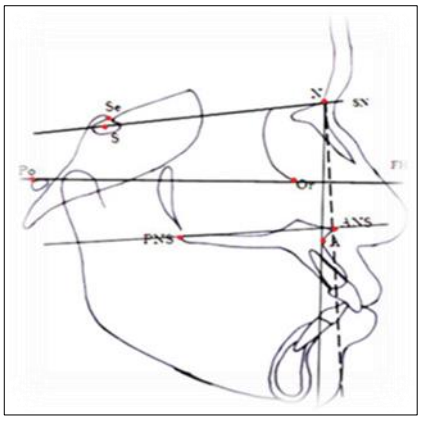

Figure 1: Vertical parameters

The following sagittal skeletal parameters were assessed (Figure 2):

1. SNA: Anterior maxillary position;
2. N per-A: Anterior maxillary position;
3. Co-A: Maxillary length

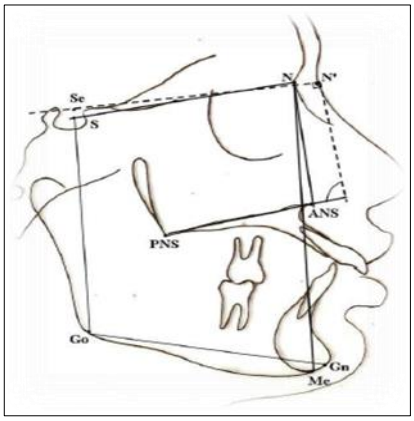

Figure 2: Sagittal parameters

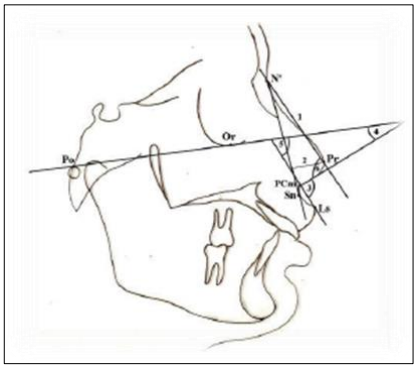

Figure 3: Nasal parameters

The following soft tissue landmarks were identified to assess the nose (Figure 3).

1. Soft tissue nasion (N'): the point of greatest concavity in the midline between the forehead and the nose;
2. Pronasale (Pr): the tip of nose (nasal tip);
3. Posterior columella point (PCm): the most posterior point of the lower border of the nose at which it

begins to turn inferiorly to merge with the philtrum of the upper lip;
4. subnasale (Sn): the deepest point at which the columella merges with the upper lip in the midsagittal plane;
5. labrale superius (Ls): the point is indicating the mucocutaneous border of the upper lip.
6. The following reference planes and variables were used to assess the nose (Figure 2)
7. Nasal length (N Lth): the distance between N' and Pr;
8. Nasal depth (N Dpt): the perpendicular distance between Pr and the line drawn through N' to Sn;
9. Nasolabial angle (NLA): the angle formed by the intersection of the PCm tangent (a tangent drawn from PCm along the lower border of the nose at the approximate middle third) and the PCm-Ls line;
10. Nasal upward tip angle (UNLA): the posteroinferior angle formed when PCm tangent is extended anteriorly to intersect the Frankfurt horizontal plane/lower border of the nose to Frankfurt horizontal plane;
11. Upper lip inclination (LNLA): the anteroinferior angle formed by the PCm-Ls line extended superiorly to intersect the Frankfurt horizontal plane/ inclination of upper lip to Frankfurt horizontal plane;
12. Nasal tip angle (NTP): the angle formed by the axis of the dorsum and PCm tangent.

Statistical Analysis: To determine whether the soft tissue nasal parameters add a linear correlation with the facial skeletal measurements in this sample, pair-wise Pearson product-moment correlation coefficients are calculated between the 10 skeletal measurements and the 6 nasal soft tissue parameters, and also in between 6 nasal parameters

RESULTS

Table 1 shows the descriptive data for the facial skeletal and nasal parameters. The Pearson product-moment correlation coefficients between the facial skeletal pattern and the soft tissue nasal parameters are listed in Table 2.

Sl. N	Para meters	Mean	S.D	Confidence Interval (95%)	Min	Max
1	N Lth	44.420	5.995	42.51-46.34	35	70
2	N Dpt	16.220	1.804	15.65-16.8	12	20
3	NLA	88.620	14.09	84.12-93.13	60	118
4	UNLA	24.000	8.482	21.29-26.71	1	36
5	LNLA	65.720	9.427	62.71-68.74	40	83
6	NTP	80.900	7.598	78.47-83.33	61	94
7	GoGn-SN	31.320	6.577	29.22-33.43	14	43
8	S-Go	74.650	7.478	72.26-77.04	58	95
9	N-Me	113.900	7.537	111.49-116.31	98	126
10	Nans	49.320	3.778	48.12-50.53	39	60
11	Lafh	66.700	5.576	64.92-68.48	54	76
12	AOI	85.850	5.021	84.24-87.46	65	98
13	Snpp	6.950	2.531	6.14-7.76	0	11
14	Sn-A	82.950	2.136	82.27-83.63	77	87
15	N perp A	0.100	2.629	-0.74 - 0.94	-7	5
16	Max Lth	86.780	5.731	84.94-88.61	74	99

Table 1 : Mean, S.D and Confidence Interval Minimum and Maximum Value

		Nlth	Ndpt	Nla	unla	Lnla	Ntp
GoGn-Sn	R	0.211	0.132	-0.008	-0.079	0.078	-0.08
	p va	0.191	0.417	0.962	0.628	0.634	0.624
S Go	R	-0.073	0.23	-0.23	-0.089	-0.05	-0.17
	p val	0.653	0.153	0.154	0.585	0.723	0.281
N Me	R	0.131	.464 (**)	-0.225	-0.135	-0.019	-0.221
	p val	0.421	0.003	0.163	0.406	0.908	0.171
Nans	R	436 (**)	.463 (**)	-0.122	-0.162	0.151	-0.136
	p val	0.005	0.003	0.454	0.317	0.353	0.401
Lafh	R	-0.066	0.287	-0.047	0.015	-0.005	-0.106
	p val	0.686	0.072	0.771	0.929	0.978	0.515
AOI	R	-0.212	-0.107	-0.029	.412(*)	-0.042	0.216
	p val	0.19	0.513	0.859	0.002	0.797	0.53
SnPp	R	.344(*)	0.188	-0.041	.345(*)	0.021	-0.219
	p val	0.03	0.246	0.803	0.018	0.898	0.175
Sn A	R	0.102	-0.024	-0.264	0.112	-0.23	-0.11
	p val	0.532	0.885	0.1	0.492	0.14	0.489
N perp A	R	0.183	-0.016	-0.182	0.041	-0.251	-0.055
	p val	0.259	0.924	0.262	0.8	0.118	0.738
Max Lth	R	.392(*)	0.146	-0.118	0.149	-0.227	0.068
	p val	0.012	0.368	0.47	0.36	0.159	0.678

Table 2 : Correlations of Nasal Parameters with vertical facial skeletal parameters . * Correlation is significant at the 0.05 level (2-tailed) ** Correlation is significant at the 0.01 level (2-tailed).

Table 3 shows the Pearson product-moment correlation coefficients between the nasal variables. Significant correlations were seen between the following skeletal and soft tissue nasal variables.

		N Lth	N Dpt	NLA	UNLA	LNLA	NTP
N Lth	Correlation	1	.389(*)	-0.133	-.388(*)	0.243	-.320(*)
	p value	.	0.013	0.412	0.013	0.13	0.044
N Dpt	Correlation		1	-0.102	-.323(*)	0.266	-.438(**)
	p value		.	0.529	0.042	0.097	0.005
NLA	Correlation			1	.466(**)	.674(**)	.577(**)
	p value			.	0.002	0.000	0.000
UNLA	Correlation				1	-0.033	.886(**)
	p value				.	0.840	0.000
LNLA	Correlation					1	0.109
	p value					.	0.504
NTP	Correlation						1
	p value						.
* Correlation is significant at the 0.05 level (2-tailed).							
** Correlation is significant at the 0.01 level (2-tailed).							

Table 3: Table 3: Correlation between nasal parameters

Nasal length (Nlth, mean 44.4 SD 5.99 mm) depicted a high positive correlation with three variables, inclination of palatal plane (SNPp, r 0.344), upper anterior facial height (NAns, r 0.436) and maxillary length(r 0.392). Within the nasal variables: nasal length had a high positive correlation with nasal depth (N Dpt, r 0.389) however a negative correlation was observed with the upper nasolabial angle (Unla, r -0.388) and nasal tip(Ntp r -0.320).

Nasal depth (N Dpt, mean 16.22 SD 1.80 mm) depicted a highly significant correlation with upper anterior facial height (NANS, r 0.463) and anterior facial height (NMe, r 0.464). With in the nasal variables Nasal depth shows

moderately significant negative correlation with upper nasolabial angle(r -0.323), highly significant negative correlation with nasal tip(r -0.438).

Nasolabial angle (NLA, mean 88.62 SD 14.09) did not show any significant correlation with skeletal parameters. However it showed a highly significant correlation with nasal tip(r 0.577), upper Nasolabial angle(r 0.466), inclination of upper lip (LNLA r 0.674).

Upper Nasolabial angle shows positive correlation with Angle of inclination(r 0.412) and SN pp inclination(r 0.345). Within the nasal variables: upper Nasolabial angle had a significant positive correlation with the nasal tip(r 0.866).

Lower Nasolabial angle shows no correlation with skeletal patterns and within the nasal variables

Nasal tip shows no correlation with skeletal variables, within the nasal variables positive correlation with Nasolabial angle (r 0.577) and upper Nasolabial angle(r 0.866), highly significant negative correlation with nasal length (r -0.320) and depth(r -0.438).

DISCUSSION

When nasal length was correlated with sagittal skeletal parameters [Table 2], nasal length depicted an insignificant, weak positive correlation with SNA, and similar findings were also noticed. when it is related to N perpendicular to A. This is contradicted by the findings of Gulsen et al[29] who demonstrated a significant weak negative correlation of nasal length with SNA and N perpendicular to A. Nasal length also showed a significant low positive correlation with the length of the maxillary base. When correlated with vertical skeletal parameters [Table 2], it depicted a significant and high positive correlation with anterior maxillary height, which was in accordance with the findings of Gulsen,[29] Karan Nehra, and Vineet Sharma. Nasal length is highly influenced by the anteroposterior length of maxilla than its position.

When nasal depth was correlated with sagittal skeletal parameters [Table 2], it showed an insignificant, weak negative correlation with SNA, and with N perpendicular to A. Nasal depth when correlated with vertical skeletal parameters [Table 2] depicted a significant and high positive correlation with anterior maxillary height and anterior facial height, which is similar to that of the findings of Gulsen et al.[29]

Nasal depth has also shown a significant low negative correlation with the angle of inclination. Based on these findings, one can expect long nose with an increased nasal prominence (nasal depth) in sagittal and vertical maxillary excess and a short nose with decreased nasal prominence in sagittal and vertical maxillary deficiency.

Nasolabial angle showed no significant correlation with sagittal and vertical maxillary skeletal parameters. When nasolabial angle was correlated with sagittal skeletal parameters [Table 2], it showed an insignificant low negative correlation with SNA, with N perpendicular to A, and with the length of the maxillary base. With respect to vertical skeletal parameters [Table 2].Nasolabial angle showed an insignificant low negative correlation with anterior maxillary height, anterior facial height and an insignificant low negative correlation with Angle of inclination.

Nasal tip angle (N -Pn- Cm) studied in relation with sagittal skeletal parameters [Table 2] depicted an insignificant low negative correlation with SNA, with N perpendicular to A. when related with vertical skeletal parameters [Table 2], it showed an insignificant low negative correlation with maxillary anterior

height and with anterior facial height which was

in agreement with the previous studies. When related to the angle of inclination, it showed an insignificant (0.34) low positive correlation which was similar to the findings of Karan Nehra and Vineet Sharma.

Lower Nasolabial angle studied in relation with sagittal skeletal parameters [Table 2] showed an insignificant low negative correlation with SNA and N perpendicular to A. This is similar to the findings reported by Gulsen et al.[29] When related with vertical skeletal parameters [Table 2] showed insignificant low positive correlation with both anterior maxillary height

Upper Nasolabial angle depicted an insignificant and a weak positive correlation with all of the maxillary skeletal parameters. Which is similar to the findings of Gulsen et al. When related with vertical skeletal parameters [Table 2], Upper Nasolabial angle showed an insignificant low negative correlation with anterior maxillary height. It also showed significant low positive correlation with the angle of inclination and significant negative correlation with palatal plane inclination.

Within the nasal parameters, [Table 3], nasal length showed significant positive correlation with nasal depth. The nasal length and nasal depth show significant negative correlation with nasal tip and upper Nasolabial angle. Nasolabial angle shows highly significant positive correlation with nasal tip, upper and lower Nasolabial angle.

The results of our study demonstrated a strong relation between the UNLA and the vertical maxillary skeletal pattern. The highly significant negative correlation between the UNLA and the inclination of the palatal plane indicated that the nose tends to get more upturned as the maxilla rotates anticlockwise, thereby decreasing the upper anterior facial height. This fact was further supported by an increase in the AOI with an increase in UNLA. All these findings strongly suggest that if an adult patient presents with an upturned nose during the clinical examination, then it might indicate that the maxillary plane is tipped anticlockwise.

In an adult patient presents with increased nasal length and depth during the clinical examination, then it might indicate that the increased sagittal maxillary length and

increased vertical maxillary height is observed but does not have a significant influence on the position of the maxilla.

CONCLUSION

Nasal length was seen to be significantly positively correlated to maxillary length, and maxillay height and inclination of palatal plane. An upturned nose in an adult individual was significantly positively correlated with anti-clockwise rotation of maxilla.

REFERENCES

1. Ackerman JL, Proffit WR, Sarver DM. The emerging soft tissue paradigm in orthodontic diagnosis and treatment planning. Clin Orthod Res. 1999 May; 2(2): 49-52.
2. Proffit, WR.; White, RP.; and Sarver, DM. Contemporary Treatment of Dentofacial Deformity, Mosby, St. Louis, 2003.
3. Burstone CJ. The integumental profile. Am J Orthod 1958;44: 1–25.
4. Sarver DM. Esthetic orthodontics and orthognathic surgery. St Louis, MO: Mosby, 1998.
5. Chaconas S J, Bartroff JD. Prediction of normal soft tissue facial changes. Angle Orthod 1975; 45: 12–25.
6. Rakosi T, Jonas I, Graber TM. Orthodontic diagnosis. New York: Thieme Medical Publishers, 1993.
7. Stephan CN, Henneberg M, Sampson W. Predicting nose projection and pronasal position in facial approximation: a test of published methods and proposal of new guidelines. Am J Phys Anthropol 2003; 122: 240–50.
8. Bell WH, Proffit WR, White RP. Surgical correction of dentofacial deformities, Vol. I. Philadelphia, PA: WB Saunders, 1980, 137–50.
9. Proffit WR, White RP, Sarver DM. Contemporary treatment of dentofacial deformity. St Louis, MO: Mosby, 2003.
10. Mommaerts MY, Lippens F, Abeloos JV, Neyt LF. Nasal profile changes after maxillary impaction and advancement surgery. J Oral Maxillofac Surg 2000; 58: 470–75.
11. Arnett GW, McLaughlin RP. Facial and dental planning for orthodontists and oral surgeons. London: Mosby, 2004.
12. 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.
13. Meng HP, Goorhuis J, Kapila S, Nanda RS. Growth changes in nasal profile. Am J Orthod Dentofac Orthop 1988; 94: 317–26.
14. Posen JM. A longitudinal study of the growth of the nose. Am J Orthod 1957; 53: 746–56.
15. Chaconas SJ. A statistical evaluation of nasal growth. Am J Orthod 1969; 54: 403–14.
16. Genecov JS, Sinclair PM, Dechow PC. Development of the nose and soft tissue profile. Angle Orthod 1990; 60: 191–98.
17. Buschang PH, De La Cruz R, Viazis AD, Demirjian A. Longitudinal shape changes of the nasal dorsum. Am J Orthod Dentofacial Orthop 1993; 104: 539–43.
18. Behrents RG. Growth in the aging craniofacial skeleton. Craniofacial growth series. Ann Arbor, MI: Needham, 1985.
19. Enlow DH, Hans MG. Essentials of facial growth. Philadelphia, PA: WB Saunders, 1996.
20. Bishara SE, Peterson LC. Changes in facial dimensions and relationships between the ages of 5 and 25 years. Am J Orthod 1984; 85: 238–51.
21. Scott JH. The cartilage of the nasal septum (a contribution to the study of facial growth). Br Dent J 1953: 95: 37–43.
22. Kemble JV H. Importance of the nasal septum in facial development. J Laryngol Otol. 1973; 87: 379–86.
23. Grymer LF, Pallisgaard C, Melsen B. The nasal septum in relation to the development of the nasomaxillary complex: a study in identical twins. Laryngoscope 1991; 101(8): 863–68.
24. Grymer LF, Bosch C. The nasal septum and the development of the midface: a longitudinal study of a pair of monozygotic twins. Rhinology 1997; 35: 6–10.
25. Howe AM, Hawkins JK, Webster WS. The growth of the nasal septum in the 6–9 week period of foetal developmentwarfarin embryopathy offers a new insight into prenatal facial development. Aust Dent J 2004; 49(4): 171–76.
26. Buschang PH, Viazis A, Delacruz R, Oakes C. Horizontal growth of the soft-tissue nose relative to maxillary growth. J Clin Orthod 1992; 24: 111–18.
27. Clements BS. Nasal imbalance and the orthodontic patient. Am J Orthod 1969; 55: 477–98.
28. Robison JM, Rinchuse DJ, Zullo TG. Relationship of skeletal pattern and nasal form. Am J Orthod 1986; 89: 499– 506.
29. 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–e25.
30. Elias AC. The importance of the nasolabial angle in the diagnosis and treatment of malocclusion. Int J Orthod 1980; 18: 7–12.
31. Magnani MB B De A, Nouer DF, Nouer PR A, Neto JS P, Garbui IU, Bo¨ eck EM. Assessment of the nasolabial angle in young Brazilian black subjects with normal occlusion. Braz Oral Res 2004; 18(3): 233–37.
32. Garner LD. Soft tissue changes concurrent with orthodontic tooth movement. Am J Orthod 1974; 66: 367–75.
33. Hershey HG. Incisor tooth retraction and subsequent profile change in post adolescent female patients. Am J Orthod 1972; 61: 45–53.
34. Jacobs JD. Vertical lip changes from maxillary incisor retraction. Am J Orthod 1978; 74: 396–404.
35. Lo FD, Hunter WS. Changes in nasolabial angle related to maxillary incisor retraction. Am J Orthod 1982; 82: 384–91.
36. Fitzgerald JP, Nanda RS, Currier GF. An evaluation of the nasolabial angle and the relative inclinations of the nose and upper lip. Am J Orthod Dentofacial Orthop 1992; 102: 328–34.

Source of Support: Nil
Conflict of Interest: Nil