THE CORRELATION BETWEEN SHAPE OF THE NOSE AND THE UNDERLYING HARD TISSUE STRUCTURES IN ADULTS: (Cephalometric Study)

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ABSTRACT:

Aim: *To evaluate the relationship between the nose shape and the underlying hard structures. This study was performed in Orthodontic Department, Damascus University.*

Methods: *The sample included 60 patients (48 male & 12 female) divided into 3 groups according to ANB ANGLE (20 class I, 20 class II, 20 class III). Seven skeletal parameters and 13 nasal parameters were measured on lateral Cephalograms by digital tracing) ORTHO-DAMASCUS 1996). Pearson correlation r was used for statistical analysis.*

Results: *There was a correlation between skeletal and nasal parameters. The Facial hight, anteroposterior and vertical position of the maxilla and mandible were correlated with the nose shape and length. In skeletal class I patients NMA, NLA were negatively correlated with the SNA, SNB ($r = -0.60$, $P < 0.05$), ($r = -0.52$, $P<0.05$). A positive correlate between B angle with NMA, Nbone Lenght ($r= 0.55$, $P<0.05$, $r= 0.52$, $P < 0.05$ respectivly) negative correlated with Cconv. ($r= -0.47$, $P<0.05$), positive correlation was found between SN-Go Me and NMA, NboneL ($r = 0.54$, $P < 0.05$,) ($r = 0.54$, $P<0.05$). In skeletal class II a negative correlated between SPP*

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and NMA (r= -0.53, P<0.05) and positively correlated with SFC (r = 0.60 , P < 0.01) and negatively correlated between S.Go/ N.Me and DConv. (r = - 0.47, P<0.05).In skeletal class III a positively correlated between ANB and NLA (r = 0.61, P < 0.01) and positively correlated NS- SPP and NL (r = 0.57, P < 0.05) and negatively correlated between NS- SPP and NBA (r = - 0.46 , < 0.05).

Conclusions: *In long faces, the nose appears convex and increase in length with the nose tip inclined downward while in short or normal face the nose appears convex or straight with shorter nasal bone and a nasal tip inclined upward.The nasal tip moves with the anterior part of the maxilla.*

INTRODUCTION

Facial beauty depends on the harmonious balance between all parts of the face (frontal bone, orbits, zygomatic bone, nose, lips, chin and throat)[1] which in turn promots the orthodontists and plastic surgeons to study the relationship between these different parts, taking into account the importance of growth.

Facial deformity can be improved through dentofacial Orthopedics[2], Orthognathic surgery[3], and plastic surgery on soft tissue and structure [4]. Operations can improve facial esthetic, through rhinoplasty or enlarging the lips or cheeks in order to give the patient a better facial consistency without any change in occlusion[5].

Analysis of soft tissue based on photographs and lateral cephalometry are used to evaluate the facial profile,[6-8] These analyses focus mainly on the relationship between the height of the nose, lips and chin.[9-12] Recent studies have made a full assessment of soft facial tissue evaluation, that considered the relationship between the forehead and nose, lips and jaws.[13-14]

Nose plays an important role in determining facial beauty because it is located exactly in the middle of the face.

Perfect nasal appearance requires a straight dorsum of the nose, and the nasal tip cartilage that is placed above the nasal tip (the peak of the nose) and an alar edge of the nose that is 1-2 mm superior to the columella [15].

Sheideman et al[16] in 1980 stated that the nasal projection should be a one-third of the nose length and the length of columella of the nose is 90% of the length of the upper lip. Horswell et al[17] in 1988 found that patients with (Blinder Syndrome) are characterized by normal height of the maxilla and nasal length and a decrease in the length of upper jaw and a decrease in depth of the nose, while Genecov et al[18] in 1990 reported that nose inclination and forward movement increases with age, and that the projection of the nose and a nasal hump are seen widely in class II patients.

On the other hand, Gulsen et al[1] have recently found a weak correlation between the presence of nasal hump and the anterioposterior position of the jaws and a strong correlation with of vertical height of the face. They noted that when growth of the face is downward and backward rather than forward the humps of the nose are presented, while when the growth is forward the hump of the nose is straight or concave moreover they. Stated that the skeletal classification has a significant influence on the three nasal features (NLA and NMA and SCF), while the vertical height affects one feature only (SCF). They Also found that the only nasal variable which is affected is the angle of nasal bone. In other words, the nasal bone angle differs in different skeletal classes and in anterior or posterior rotation of the mandible.

An ideal nose has harmonious relationship with the rest of facial features, despite the difference between the features of the nose and other facial characteristics[19-20]. This would raise the following question: Do features of nose change according to different anteroposterior and vertical skeletal relationships?

Aim of study: To evaluate the correlation between nose shape and the underlying hard structures.

MATERIALS AND METHODS

The sample consisted of 60 orthodontic patients (48 males and 12 females) aged between 18-30 who sought orthodontic treatment at Orthodontic Department, Dental Faculty, Damascus University, from 2010-2011 patients. The satisfied inclusion criteria of having no deformity, previous history of trauma, orthodontic treatment, or facial surgical operation. A written consent was taken from all patients, then a lateral cephalometric radiograph were taken in the Orthodontic Department University of Damascus, using (Arcodent 1992) cephalostat at 70 kV, 9 mA, and 1.25-second exposure.

Subjects were positioned in the cephalostat with the sagittal plane at right angle to the path of the x-rays, with Frankfort plane parallel to the horizontal plane, the teeth in centric occlusion, and lips in repose. The sample was divided into three skeletal categories depending on ANB angle:

• 20 patients skeletal classI: ANB: 1-5 degrees.

• 20 patients skeletal classII: ANB is greater than 5 degrees.

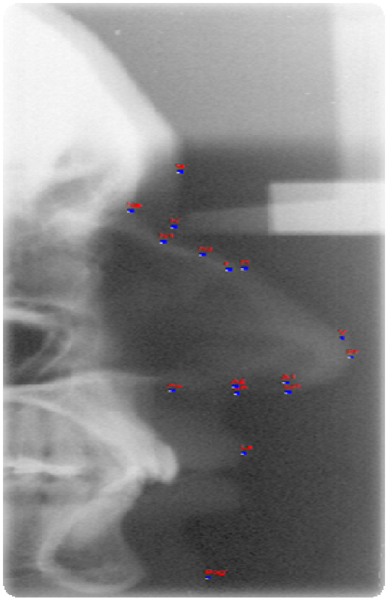
• 20 patients skeletal classIII: ANB is smaller than one degree.

All cephalometric measurements were performed using a software program (ORTHO-DAMASCUS 1996). First, the lateral Cephalogram was scanned by (COBRA SCAN), then the data was entered for each patient, after including a ruler to make 1:1.2 magnification of linear measurements for all patients. Ten images were randomly selected to test the reliability of the software by comparing manual tracing and computerized tracing using paired t test. No statistically significant differences were found between manual tracing and computerized tracing (at $P < 0.05$) and the correlation coefficient was more than 90% for SNA angle and (ANS-Me) linear measurement. Which is in accordance with the finding of Sultan[27] in 2005 and Azzam[28] in 2008.

Seven skeletal variables on the bony structure, and 13 variable on the nose were studied on the lateral cephalogram.

<u>The lateral cephalometric landmarks used to assess the nose were (Figure 1):</u>

1. Glabella (G): the most prominent point on the frontal bone.
2. Soft-tissue nasion (N): the point of greatest concavity in the midline between the forehead and the nose.
3. Midnasale (Mn): the halfway point on the nose length Pr-N, which divides the dorsum of the nose to upper and lower.
4. Supratip (St): the point located between midnasale and pronasale on the lower third of the nasal dorsum.
5. Nasion (N): the intersection of the frontal with the nasal bones.
6. Sella (S): center of sella turcica.
7. N1: the most concave point on the nasal bone.
8. N2: the most convex point on the nasal bone
9. Rhinion (R): the most anterior and inferior point on the tip of the nasal bone.
10. Pronasale (Pr): the tip of the nose.
11. Columella (Cm):the most convex point on the columella of the nose
12. Subnasale (Sn): the point at which the coumella merges with upper lip in the median sagittal plane.
13. Alar curvature point (Ac): the most convex point on the curvature of the nasal alar curvature
14. Labrale superior (Ls): the edge of the mucocutaneous border of the upper lip.
15. Soft-tissue pogonion (Pg): the anterior point on the chin in the mid sagittal plane.
16. (H): the most convex point on the upper part of the back of the nose.
17. (V): the most convex point on the bottom of the back of the nose.



Figure(1): Points used for nose evaluation

The reference linear measurements and angles used to assess the nose were as following (Figure 2):

1. The axis of dorsum: the line constructed through the depth of the soft tissue nasion to the supratip point.
2. Nasal length (N-Pr): the distance between N and Pr.
3. Nasal depth1 (ND1): the perpendicular distance between Pr and the line drawn through N to Sn.
4. Nasal depth 2 (ND2): the distance between points Ac and Pr.
5. Hump (H): the perpendicular distance between the axis of the dorsum and the most superior point of the upper part of the nasal dorsum.
6. Nasolabial angle (N LA): the angle formed by the intersection of Cm tangent and the Ls tangent.
7. Nasal- base angle (NBA): the angle formed between the G -Sn and the longitudinal axis of the nostrils.

8. Nasomental angle (NMA): the angle between the axis of the dorsum of the nose and the line (Pr-Pg).
9. Soft tissue facial convexity (SCF): the angle G-Sn-Pg (external angle).
10. Lower dorsum convexity (Dconv.): the vertical distance between the most convex point of the lower nasal dorsum and the Mn-Pr line.
11. Columella convexity (Cconv.): the perpendicular distance between the most convex point on the nose and the line Pr-Sn.
12. Nasal bone length (Nbone L): the distance N-R.
13. Nasal bone angle (Nbone A): the posterior angle formed between the N1-N2-line and the N2-R line.

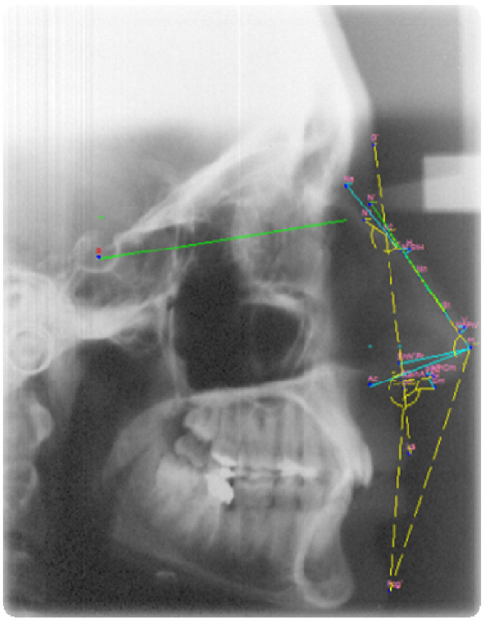


Figure (2): Reference planes and variables used to assess nose

Variables used to assess the Skeletal parameters (Figure 3):

- SNA angle: determines anteroposterior position of the maxilla relative to the anterior cranial base
- SNB angle: determines anteroposterior position of the mandible relative to the anterior cranial base.
- ANB angle: anteroposterior relation between the maxilla and mandible.
- NS: SPP: inclination of the palatal plane relative to the anterior cranial base.
- NS: GoMe: the rotation of mandibular plane relative to the cranial base.
- B: Intermaxillary angle.
- N-Me: S-Go: growth pattern according to Jarabak (total posterior facial height / total anterior facial height).

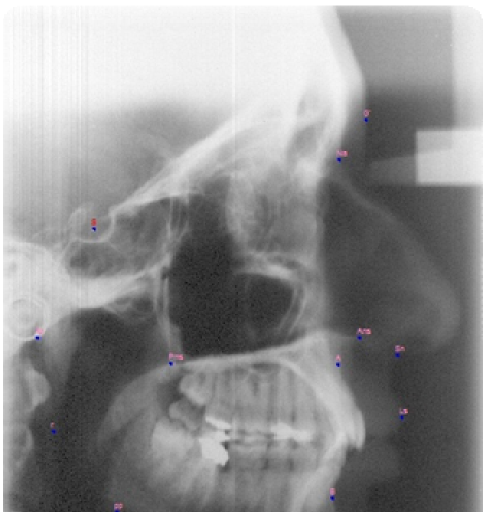


Figure (3) Variables used to assess the Skeletal parameter Figure

STATISTICAL ANALYSIS

The Statistical analysis was carried out using statistical analysis software (Stat View, SPSS17.0). Pearson correlation test was used to study the relationship between nasal features to the underlying hard-tissue structures.

RESULTS

Table 1, 2 ,3 show the minimum ,maximum, average and standard deviation values for skeletal and nasal variables in class I , class II, class III .

Skeletal class I (table4):

As shown in table 4, A negative significant correlation was found between the positions of the maxilla SNA and the mandible SNB with the Nasomental angle NMA (r = - 0.60 at P < 0.05), and (r = - 0.52 at P < 0.05) respectively. A positive significant correlation between B angle with Nasomental angle NMA, and the length of nasal bone NboneL (r = 0.55 at P <0.05) and (r = 0.52 at P <0.05), respectively, and a negative significant correlated with the columella convexity Cconv. (r = - 0.47 at P <0.05), There was a positive significant correlation between SN-GoMe with Nasomental nasal angle NMA (r = 0.54 when P <0.05), and with the length of nasal bone Nbone L (r = 0.54 when P <0.05).

Skeletal class II (table5):

As shown in table 5, a negative significant correlation was found between the NS-SPP and Nasomental angle NMA (r =0.53 at P <0.05) and a positive significant correlation was found between NS-SPP with Soft facial tissue convexity SFC (r =0. 65 at P < 0.01) and a negative significant correlation between S - GO / N- Me convexity of the lower dorsum of the nose DConv (r =-0 . 47 when P <0.05).

Table 1, 2, 3:

Parameter	Min.	Max.	Mean	Std. Deviation	N	parameter	Min	Max	Mean	Std. Deviation	N	Parameter	Min	Max	Mean	Std. Deviation	N
SNA	76.7	91.1	82.045	3.25859	20	SNA	78.50	88.10	83.8158	3.20646	20	SNA	71.90	86.90	79.0421	4.45650	20
SNB	73.5	87.1	79.085	2.9644	20	SNB	70.80	81.00	75.7632	3.03648	20	SNB	73.20	89.20	82.9737	4.88943	20
ANB	1.2	4.8	2.955	1.12413	20	ANB	7.00	10.70	8.0526	1.03836	20	ANB	-12.80	1.30	-3.8316	3.05542	20
NSSPP	2.6	14.8	6.68	2.90129	20	NSSPP	1.90	13.60	7.8526	2.95285	20	NSSPP	-60	14.50	5.3579	4.17177	20
NS.Go.Me	20.1	52	29.36	7.38094	20	NS.Go.Me	14.70	52.00	32.8947	8.25500	20	NS.Go.Me	9.80	53.10	29.4474	10.79369	20
B	11.3	42.1	22.7	6.45609	20	B	13.40	65.00	26.5905	11.59574	20	B	8.70	47.20	24.8211	9.99292	20
S.Go/N.Me	50.2	113.3	71.22	12.86495	20	S.Go/N.Me	55.50	81.20	66.0684	6.49872	20	S.Go/N.Me	52.80	87.40	69.6000	9.85269	20
NL	43	81.5	69.975	11.86804	20	NL	44.00	89.20	72.9053	9.19363	20	NL	34.90	91.20	74.3000	12.04459	20
ND1	14.5	32.7	26.345	5.0071	20	ND1	18.20	32.40	27.6263	3.31660	20	ND1	13.50	33.10	28.4737	4.46789	20
ND2	15.2	50	40.04	9.66695	20	ND2	25.40	48.00	41.8789	5.81813	20	ND2	36.50	52.70	44.2895	3.83824	20
HUMP	0.3	4.2	2.2	1.28841	20	HUMP	50	9.10	3.2895	2.10737	20	HUMP	-30	29.50	4.9579	6.27529	20
NLA	74.7	121.1	98.55	10.01827	20	NLA	76.00	116.30	101.2737	12.54099	20	NLA	58.70	114.50	93.8105	12.85236	20
NBA	80.7	114.9	99.04	9.00406	20	NBA	82.50	125.10	99.7158	12.10965	20	NBA	61.90	121.30	101.1842	13.69819	20
NMA	116.9	135.7	125.3	4.72541	20	NMA	113.00	129.90	119.7526	4.06439	20	NMA	124.80	146.10	131.4474	4.83648	20
SFC	183.9	203	194.34	4.86766	20	SFC	188.50	210.20	201.7421	5.98603	20	SFC	170.90	194.40	185.9368	5.16486	20
DConv	1.8	8.7	4.15	1.59951	20	DConv	1.40	6.30	4.0895	1.38199	20	DConv	2.40	7.50	4.6158	1.47055	20
CConv	0.6	7.1	3.615	1.40311	20	CConv	1.60	6.60	3.9474	1.21444	20	CConv	.80	27.50	5.2211	5.62332	20
Nbonel	19.4	153.3	39.496	31.73631	20	Nbonel	18.50	154.20	37.0842	28.98153	20	Nbonel	23.50	170.00	47.1000	39.84227	20
]NboneA	29	176.6	147.83	43.1218	20	NboneA	77.10	178.50	161.0579	22.15687	20	NboneA	73.80	173.20	147.0737	28.77773	20

Table (1): Nasal and skeletal parameter in skeletal class I

Table (2): Nasal and skeletal parameter in skeletal class II

Table (3): Nasal and skeletal parameter in skeletal class III

Skeletal Class III (Table6):

As shown in table 6 there was a positive significant correlation between ANB and NLA ($r = 0.61$ at $P < 0.01$), and a positive significant correlation between NS-SPP and the length of the nose NL) ($r = 0.57$ at $P<0.05$), and negative significant correlation with Nasal basal angle (NBA) ($r = -0.46$ at $P <0.05$).

		NboneA	Nbonel	CConv	DConv	SFC	NMA	NBA	NLA	HUMP	ND2	ND1	NL
SNA	**Pearson Correlation**	-.027	-.343	.248	.381	.433	**-.596(*)**	.122	.135	.006	.348	.320	.309
	Sig. (2-tailed)	.911	.139	.292	.097	.057	.006	.608	.570	.982	.133	.168	.185
SNB	**Pearson Correlation**	.063	-.435	.203	.415	.394	**-.516(*)**	.228	.123	.067	.242	.221	.237
	Sig. (2-tailed)	.791	.055	.390	.069	.086	.020	.333	.605	.780	.303	.349	.313
ANB	**Pearson Correlation**	-.261	.166	.176	.009	.230	-.382	-.251	.077	-.146	.360	.339	.257
	Sig. (2-tailed)	.267	.484	.459	.969	.330	.096	.286	.747	.538	.119	.143	.274
NS-SPP	**Pearson Correlation**	.292	.155	-.038	-.063	.116	.151	-.053	-.096	-.137	-.058	-.061	.169
	Sig. (2-tailed)	.212	.514	.872	.791	.627	.526	.825	.686	.565	.808	.800	.476
NS-Go.Me	**Pearson Correlation**	-.149	**.517(*)**	-.426	-.039	-.044	**.543(*)**	-.185	.272	-.338	-.189	-.187	.056
	Sig. (2-tailed)	.532	.020	.061	.870	.854	.013	.435	.246	.145	.425	.429	.816
B	**Pearson Correlation**	-.302	**.520(*)**	**-.472(*)**	-.013	-.099	**.552(*)**	-.189	.357	-.325	-.189	-.188	-.013
	Sig. (2-tailed)	.196	.019	.036	.955	.679	.012	.424	.123	.162	.424	.428	.958
S.Go/N.Me	**Pearson Correlation**	.155	-.380	.144	.155	.130	-.300	.118	-.116	.319	.254	.068	.092
	Sig. (2-tailed)	.515	.098	.544	.515	.583	.199	.621	.626	.171	.280	.775	.701
	N	20	20	20	20	20	20	20	20	20	20	20	20

Table (4): The correlation between skeletal parameter and nasal features of the nose in skeletal class I

Correlation coefficient r

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

DISCUSSION

This article studied the relationship between the nasal features and skeletal classification in a sample of patients aged between 18-30 years, because the effective nasal growth occurs under the age of 18 years.

It was found in this study that the anteroposterior and vertical classification does not affect the majority of the nasal features except for NMA, NboneL, Cconv, SFC, DConv, NL, NBA (Tables 4,5,6).

		NboneA	Nbonel	CConv	DConv	SFC	NMA	NBA	NLA	HUMP	ND2	ND1	NL
SNA	**Pearson Correlation**	-.187	.272	.251	-.220	-.169	.166	-.146	-.152	.011	-.035	-.097	-.096
	Sig. (2-tailed)	.444	.260	.301	.366	.488	.498	.552	.535	.965	.887	.693	.697
SNB	**Pearson Correlation**	-.254	.353	.164	-.239	-.296	.215	-.087	-.152	-.089	-.082	-.129	-.199
	Sig. (2-tailed)	.293	.138	.502	.325	.219	.377	.724	.535	.717	.739	.599	.413
ANB	**Pearson Correlation**	.168	-.192	.301	.028	.354	-.131	-.202	-.027	.303	.135	.082	.289
	Sig. (2-tailed)	.491	.432	.211	.908	.137	.594	.407	.913	.207	.582	.739	.229
NS.SPP	**Pearson Correlation**	-.016	-.099	-.169	-.110	.651(**)	-.533(*)	-.039	.430	-.045	.016	.055	.131
	Sig. (2-tailed)	.947	.688	.490	.655	.003	.019	.873	.066	.855	.948	.822	.594
NS.Go.Me	**Pearson Correlation**	.205	-.025	.306	.180	.455	-.231	-.098	-.082	-.248	-.019	.073	.163
	Sig. (2-tailed)	.399	.918	.202	.461	.050	.340	.690	.738	.307	.938	.767	.505
B	**Pearson Correlation**	.190	-.041	.248	.071	.259	.019	.056	-.075	-.235	-.011	-.009	.169
	Sig. (2-tailed)	.437	.867	.306	.774	.285	.938	.820	.761	.334	.964	.971	.489
S.Go/N.ME	**Pearson Correlation**	-.246	.010	-.366	-.472(*)	-.222	.370	.213	.223	.120	.006	-.238	-.065
	Sig. (2-tailed)	.309	.967	.123	.041	.361	.119	.380	.359	.626	.980	.326	.791
	N	20	20	20	20	20	20	20	20	20	20	20	20

Table (5): The correlation between skeletal parameters and nasal features of the nose in skeletal class II

Correlation coefficient r

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

		NboneA	Nbonel	CConv	DConv	SFC	NMA	NBA	NLA	HUMP	ND2	ND1	NL
SNA	**Pearson Correlation**	.314	-.060	.032	-.174	.268	.296	.087	.289	-.008	.054	.034	-.076
	Sig. (2-tailed)	.191	.806	.896	.476	.267	.219	.724	.231	.975	.327	.889	.759
SNB	**Pearson Correlation**	.439	-.210	.129	-.162	-.347	.310	.241	-.150	-.099	-.035	.216	.013
	Sig. (2-tailed)	.060	.388	.598	.507	.145	.197	.320	.540	.687	.886	.374	.957
ANB	**Pearson Correlation**	.262	.346	.268	.145	.200	-.089	-.387	**.607(**)**	.167	.007	-.296	-.058
	Sig. (2-tailed)	.279	.310	.268	.553	.411	.218	.101	.006	.493	.979	.219	.314
NS.SPP	**Pearson Correlation**	.202	.257	-.083	.362	.200	-.145	**-.476(*)**	.140	-.026	.021	.146	**-548(*)**
	Sig. (2-tailed)	.437	.289	.736	.128	.413	.550	.048	.565	.917	.931	.550	.011
NS.Go.Me	**Pearson Correlation**	-.236	.006	.065	-.042	.337	-.403	.118	.393	-.150	-.212	.239	.120
	Sig. (2-tailed)	.330	.979	.791	.365	.158	.087	.632	.096	.540	.383	.324	.624
B	**Pearson Correlation**	-.295	.088	.088	-.200	**.476(*)**	-.363	.140	.345	-.146	.209	-254	-.130
	Sig. (2-tailed)	.215	.720	.844	.412	.039	.127	.566	.149	.550	.391	.299	.596
S.Go/N.ME	**Pearson Correlation**	.284	.025	.059	-.058	-.366	.411	.143	-.274	.117	.148	.200	-.140
	Sig. (2-tailed)	.238	.919	.811	.313	.123	.080	.558	.256	.636	.545	.412	.517
	N	20	20	20	20	20	20	20	20	20	20	20	20

Table (6): The correlation between skeletal parameter and nasal features of the nose in skeletal class III

Correlation coefficient r

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

In skeletal class I There was a negative correlation between the position of the maxilla and the mandible with nasaomental angle NMA, which was similar to Gulsen et al[1] in 2006. The location of the tip of the nose is controlled by this angle, thus, when the maxilla is protruded, the midface will be protruded as well leading to protrusion of the nose. Similary the retrusion of the mandible leads to an increase in the(NMA) angle (Table 4).

Enlow and Hans[24] in 1996 reported that people who have long and narrow faces, had as well a prominent nose, a convex dorsum of the nose, and a tilted down nasal tip, while people who have short and broad faces the nose was found to be straight and less prominent and the tip of the nose was tilted up. This study found a positive correlation between both the intermaxillary angle (B), mandibular angle to the cranial base (SN-GoMe) with Nasomental angle (NMA) and Nasal bone length (Nbone L), and negative relationship with the columella convexity angle of the nose (Cconv). It is reasonable to expect that people with long faces would have long noses, and on the contrary, people who have short faces have the noses less protruded. In long faces, the nasal bone is longer than in the cases of short or normal faces. However, our finding revealed in skeletal class II, a negative correlation between inclination of the maxilla to the skull base (NS-SPP) and the Nasaomental angle (NMA), and positive correlation between the (NS-SPP) angle and soft facial tissue convex (SFC). Similar findings were found by Gulsen et al[1], who stated that when the anterior part of the maxilla moved upward, the tip of the nose would move upward and thus leading to an increase in Nasal base angle (NBA) and soft tissue facial convexity. Buschang et al[25] in 1992, concluded that the dorsum of the nose can be divided into upper and lower parts, the lower part being responsible for the vertical changes. This study found negative correlation between (S-GO / N- Me) and convexity of the lower dorsum of the nose (DConv). Hence, when the anterior face is longer than the posterior the convexity of the lower dorsum of the nose is bigger and the tip of the nose tilted downward and this agrees with the findings of Gulsen et al [1]and Enlow and Hans[24].

In skeletal class III, there is was a positive correlation between the (ANB) and (NLA), a positive correlation between (NS-SPP) and the length of the nose NL, and positive correlation with Nasal basal angle (NBA), which agrees with the findings of Gulsen et al[1] (Table 6).

The increase in the convexity of the lower dorsum of the nose was found to correlate with a decrease inclination of the base of the nose, and this means that as the nose moves downward the tip of the nose moves downward too and vice versa. When the anterior part of the upper jaw moves upward, the Nasobasal angle increases, and the tip of the nose moves upward which leads to an increase in Nasobasal angle. No differences were found between anteroposterior and vertical classification with the presence of the hump, and this agrees with the findings of Gulsen et al [1] who found no relationship between the presence the hump of the nose and growth pattern. However there was disagreement between our findings and those reported by Genecovetal[18].

CONCLUSIONS

This study showed that the shape of the nose is correlated with other craniofacial structures.

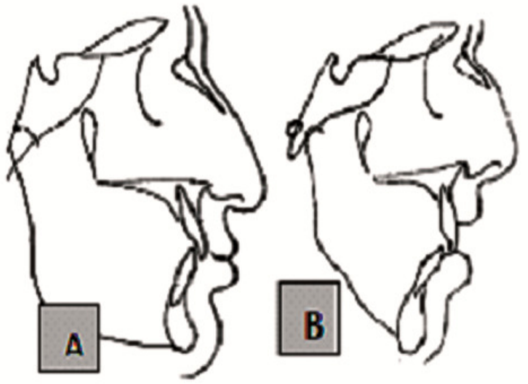


Figure (4) Nose tip move with the anterior part of the maxilla
A: With posterior inclination of maxilla, nasal tip move downward.
B: With anterior inclination of maxilla. Nasal tip move upward.

1- The skeletal classification does affect most of the nasal features. 2- In class I patients, the anteroposterior position of upper and lower jaws correlate with Nasomental and Nasolabial angles, while in the vertical plane, the increase in rotation of the lower jaw, the nose is longer. 3- In the skeletal class II, an increase in maxillary inclination will cause an increase in both Nasomental angle and the angle of convexity of the nose and vice versa for any decrease. 4- In Class III, a relationship between the increase in the inclination of the upper jaw and the increase in the length of the nose and Nasobasal angle was found.

It is important to take into account the shape of the nose in diagnosis and in a orthodontic and surgical treatment planning to get a satisfactory aesthetic results for patients.

It is recommended to study the interrelationship between the various features of the nose and the impact of gender and race differences on the shape of the nose.

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