

AN ANTHROPOMETRIC STUDY OF NASAL INDEX AMONG INDIANS IN GUJARAT

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Abstract

Background: The nasal index exhibits sexual differences and different shapes of nose. This information will be highly important for plastic surgeons, forensic scientists, anatomists, human biologists, criminologists & physical anthropologists and some manufacture companies of spectacles, mask etc. **Materials and Methods:** The present study was performed on 510 living subjects of Gujarat (243 male and 267 female) of 18 to 30 years in the year of 2011 with the objective to study the sex differences in nasal index. Nasal index was investigated with the help of nose height and breadth with the use of sliding caliper. **Results:** The study showed that mean nose height and breadth were higher in males than in females and mean nasal index was also higher in males than in females. **Conclusions:** Predominant nose type was mesorrhine in both sexes and there was highly significant gender difference (p value < 0.01).

INTRODUCTION

Anthropometry is a study that deals with the measurement of the human body dimensions and its implication in medical science. The term anthropometry refers to a set of systematized measuring techniques for expressing quantitatively the dimensions of the human body and skeleton.^[1] In cases of unknown remains, anthropometry can assist law enforcement agencies in determining 'personal identity' through anthropometry and medical science. Measurement of nasal index is important for studies of human growth, population variation and aesthetic surgery. Nasal index is mostly conducted with the aim of obtaining the characteristics of ethnic groups inhabiting a particular geographic region, these assist in understanding the frequency distribution of human morphologies and also provide the basis for comparison among different races.^[2] The nose is an obvious important part of the facial features of a person.^[3] Particular attention by the surgeon to the facial morphology, when planning the rhinological operation, will benefit the patient in many respects.^[4] It is likely that a well-planned rhinologic procedure will not only enhance the function of the nose, but in all probability will also improve their physical appearance and, in some cases, their

psychological well-being. The favorable corrections of nasal deformities constitute one of the most challenging areas of facial aesthetic surgery. For such an important task baseline records and an understanding of their interplay are essential.^[5] The most important nasal dimensions are height and breadth of nose that determine the nasal index. This is used by western and also by Indian researchers in their studies. The nasal index is calculated with nasal height and breadth of nose. Nasal index = Nasal breadth / Nasal height x 100. This provides a data base of facial measurements useful for orofacial surgeons in facial reconstruction. In the present study, we have calculated nasal index in the persons from Gujarat region. This study aimed to prepare database of nasal parameter measurements and to find out sexual variation of nasal index in Gujarati population. The objective of this study is to discuss the sex difference of nasal index in Gujarat region and to compare the findings of the present study with similar studies done earlier.

MATERIALS AND METHODS

The present study has been carried out with the permission from ethical committee and consent of subjects in areas of Gujarat region on a total of 510 (243 males & 267 females) young individuals aged

between 18-30 years. The subjects taken for study were medical students, students of other faculties, staffs, patient's relatives from Sir T. Hospital, Bhavnagar and other persons belonging to different regions of Gujarat. The participants who volunteered in the study were healthy and without any obvious craniofacial abnormalities like congenital, developmental or acquired through any form of trauma and had no history of plastic or reconstructive surgery. The method used for assessing the nasal index in this study is in accordance with Hooton's [6]. The subject was asked to sit in a chair in a relaxed position keeping the mouth closed and teeth in central occluded position and head in anatomical position. Measurements which have been taken are, nasal height & nasal breadth. All the measurements were taken with digital sliding caliper. In the present study the landmarks used were standard landmarks which were used in the various craniofacial anthropometric studies. These landmarks were.

Nasion (n)	Point at the intersection of frontal and two nasal bones
Pronasale (pn)	Most protruded point of apex nasi
Ala (al)	Most lateral point on each alar contour

Nose height was taken from nasion (n) to pronasale (pn). Nose breadth was taken from lateral border of right ala to lateral border of left ala. The nasal index was calculated as the ratio of breadth to nasal height.

$$\text{Nasal Index} = \frac{\text{Nasal breadth} \times 100}{\text{Nasal height}}$$



Figure 1: A photograph showing measurement of nasal height



Figure 2: A photograph showing measurement of nasal breadth

RESULTS

Study was done on 510 living subjects. The statistical data which were extracted from the calculation and analysis were tabulated in Table-1 to [Table 3] to show different parameters at a glance. The gender wise distribution of nasal parameters and nasal index is shown in [Table 1]. This shows the highly significant difference in nasal height and breadth in both sex, and also in nasal index there is statistically highly significant difference in gender.

Table 1: Gender - wise distribution of nasal parameters and nasal index

Parameters (cm) & index	Mean		Standard Deviation		p value
	M (243)	F(267)	M (243)	F (267)	
Nose height	4.6241	4.3799	0.3518	0.3419	0.000*
Nose breadth	3.7468	3.3363	0.3082	0.2911	0.000*
Nasal index	81.2474	76.4915	6.6296	7.5318	0.000*

(*p < 0.01, highly significant statistically, M = Male, F = Female)

With the help of nasal index the study group is divided into different phenotypes of nose. This classification (Table – 2) is used by western and also by Indian researchers in their studies.^[2,3]

Table 2: Classification of nose shape according to nasal index

Sr. No.	Nose shape	Range of Nasal Index
1	Leptorrhine	Up to 69.9
2	Mesorrhine	70 - 84.9
3	Platyrrhine	>= 85

Leptorrhine = fine nose (long and narrow)

Mesorrhine = medium nose

Platyrrhine = broad nose

[Table 3] shows in present study most predominant nose shape is mesorrhine in both male and female which is highly significant statistically

Table-3 Distribution of Nasal Index (Nose Shapes of Present Study)

Sr. No.	Phenotype	Sex		Total
		Male	Female	
1	Leptorrhine	15	46	61
		24.59%	75.41%	11.96%
2	Mesorrhine	170	184	354
		48.02%	51.98%	69.41%
3	Platyrrhine	58	37	95
		61.05%	38.95%	18.63%
Total		243	267	510
Chi square		p = 0.000		

DISCUSSION

Racial and ethnic differences in craniofacial traits of various races have been reported by many researchers. One of the biggest comparative data on various ethnic groups/races in the world was

published in 2005 by the late Professor Farkas.^[7] The comparison between present study and the study in Malaysian Indians by Ngeow W C Aljunid.^[8,9] and previous Indian study by Farkas.^[7] is shown in [Table 4].

Table 4 Comparison of the craniofacial anthropometric norms between different studies and present study

Sr. No.	Parameter	Sex	Present study Mean cms. + SD	Malaysian Indians[8,9] Mean cms. + SD	Indian[7] (Farkas's study) Mean cms. + SD
1	Nose height	Male	4.6241+ 0.35184	5.19+ 0.36	4.72+ 0.37
		Female	4.3799+ 0.34191	5.04+ 0.32	4.37+ 0.36
2	Nose breadth	Male	3.7468+ 0.30820	3.95+ 0.26	3.79+ 0.35
		Female	3.3363+ 0.29119	3.53+ 0.28	3.38+ 0.24

[Table 5] shows the Comparison of Nasal Indices between different studies and present study. Oladipo G. et al (2007).^[10,11] in their study with 165 subjects in southern Nigeria found mean nasal index of 94.1 + 0.37 in Igbos; 89.2 + 0.30 in Yorubas and the Ijaws community having 96.37 + 1.06. These values were higher as compared to present study. The result

for gender difference found in this study is consistent with the present result. Priyanka Singh and Ruma Purkait (2006).^[12] found mean nasal index of 82.9 in males and 90.7 in females in Madhya Pradesh. These values are very high as compared to present study.

Table 5: Comparison of Nasal Indices between different studies and present study

Sr. No.	Workers	Race	Sample size	Mean nasal index	
				Male	Female
1	Oladipo G.S., Olabiyi A.O., Oremasu A.A., Noronha C.C. [11]	(Southern Nigeria) Igbos, Yorubas, Ijaws	1675	Igbos 95.9 Yorubas 90.0 Ijaws 98.6	Igbos 90.8 Yorubas 88.1 Ijaws 94.2
2	Priyanka Singh and Ruma Purkait [12]	Dangi and Ahirwar (Madhya Pradesh)	245	Age (above 20 years) Dangi 76.5 Ahirwar 81.0	Dangi 76.5 Ahirwar 82.4
3	Ngeow W.C. Aljunid [8,9]	Malaysian Indian	100	76.6	70.3
4	M.B.T. Umar, R.Singh and A.I. Shugaba [13]	Nigerians	409	67.4	67.4
5	Present Study	Indian Population	510	81.2474	76.4915

A number of studies have indicated racial and ethnic differences in nasal index among different

populations. German's nasal index is similar to that of the general western Europeans with average nasal

index of 71 i.e. Mesorrhine type.^[14] These studies showed significantly higher nasal index in males. This is in accordance with the findings in present study.

Variables that determine the shape of the nose include race, tribe and environmental climatic conditions (Last 1981).^[15] with narrower noses being favored in cold and dry climates and broader noses in warmer, moist ones as a consequence of natural selection in human evolution.^[16,17] Hence this is useful index to classify different races. Also the importance of nasal morphometric parameters is recognized in aesthetic or reconstructive naso – facial surgery.^[18]

CONCLUSION

There is a highly significant difference found between either sexes with values being higher for males than for females. Nasal index shows the statistically highly significant values for males as compared to females. Distribution according to nose shape, shows most predominant type is mesorrhine in both male and female. This study will be highly important for Plastic surgeons, Forensic Scientists, Anatomists & Physical Anthropologists.

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