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ANTHROPOMETRIC COMPARISON OF NASAL PARAMETERS IN MALE AND FEMALE STUDENTS-A CROSS-SECTIONAL STUDY

Acharya Sunita[1], Shrivastava Bhavana[2], Bharambe Vaishaly Kishore[3], Medatwal Bhupesh[4]*

[1]PhD Scholar, Department of Anatomy, Pacific Institute of Medical Sciences, Sai Tirupati University, Udaipur, Rajasthan, India
[2]Assistant Professor, Department of Anatomy, Pacific Medical College and Hospital, Udaipur, Rajasthan, India
[3]Guide and Professor, Department of Anatomy, Pacific Institute of Medical Sciences, Sai Tirupati University, Udaipur, Rajasthan, India
[4*]Assistant Professor, Department of Biochemistry, Pacific Medical College and Hospital, Udaipur, Rajasthan, India

***Corresponding Author:** Dr. Bhupesh Medatwal
*Email Id; medatwalbhupesh@gmail.com

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Abstract
Background: Nasal anthropometry is a study that deals with the measurements of the proportion, size and shape of nose. The variability in size and shape of human nose is huge and is influenced by factors like age, sex, environment, ethnicity and region. The nasal index is an important anatomical tool that can be used to figure out sexual, racial and ethnic differences. The knowledge about the dimensions of the nose viz length and width are important for the reconstructive, aesthetic surgeries and personal identification for forensic purpose. Aim: The aim of study was to measure and compare the nasal parameters in male and female students. Material and methods: This cross-sectional study was conducted on 100 healthy volunteers (50 males and 50 females) aged between 17-25 years, in the Department of Anatomy, Pacific Institute of Medical Sciences, Umarda, Udaipur, Rajasthan, India. The nasal height and nasal width were measured using digital vernier caliper and nasal index were calculated. Results**:** In the present study the mean values for the male students were significantly higher than that of female students (P value<0.05). The major type of nose in males was mesorrhine (56%) and in females most common type of nose was leptorrhine (58%). Conclusion**:** The findings of the present study concluded that there were statistically significant differences found in nasal height, width and nasal index of male and female students.

Keywords: Nasal index, Nasal anthropometry, Type of nose.

Introduction

The term Anthropometry is derived from the Greek word “Anthropos: A man” and “Metron: Measure” that collectively synonymized as measurement of the man (1). It is defined as a branch of morphometry that deals with the study of the different features of the human body parts (2).

Anthropology used for the identification and understanding of human physical features. It helps in the classification of races and the identification of human remains. Anthropometric measurements have a direct correlation between sex, age, shape, and various forms (3), (4).

In ancient times, anthropometry was used in criminology where criminals were identified by measuring parts of their body. During the early twentieth century, one of its principal applications was the endeavour to distinguish between distinctions in human races (5). The branch of anthropometry dealing with shape and size of the human nose across different populations is termed as Nasal Anthropometry (6). The nose is the first part of upper respiratory tract, and is responsible for warming, humidifying, and to some extent, filtering inspired air. The nose may be subdivided into an external nose, which opens anteriorly onto the face through the nostrils or nares and an internal chamber, divided sagittal by a septum into right and left cavities which open posteriorly into the nasopharynx through the posterior nasal apertures or choanae. The proportions of nose and face both from in front and side are of enormous significance to the rhino plastic surgeon. The shape of external nose varies considerably between individuals. It is pyramidal structure located in the midline of the midface and attached to the facial skeleton. Its upper angle or root is continuous with the forehead, and its free tip forms the apex which projects anteriorly. Its base contains two ellipsoidal apertures, the external nares or nostrils, which open onto its inferior surface, separated by the nasal septum and columella (7).

The different shapes of the nose are mainly determined through the environmental factors and climatic conditions (8). The narrower noses are favoured in cold and dry climates whereas broad and wide noses are seen in warm and moist regions indicating the climatic influence on the shapes of the nose (9). The nasal index is an important anatomical tool that can be used to figure out sexual, racial and ethnic differences. Nasal index is a ratio of nasal width to nasal height multiplied by 100 that helps in the classifying noses into different types. In anthropology and forensic medicine, the knowledge of nasal index is highly relevant in distinguishing the ethnic group and sex of individuals with unknown identity (11), (12). The nasal index is also useful in the analysis of fossil remains as well as the study of living populations (13).

Nasal index measurement in healthy individuals is also useful for dysmorphologists in the early diagnosis of some dysmorphic syndrome like cleft lip and cleft palate which are associated with nose disorder during human embryonic period (14). The present study was carried out to determine and compare the anthropometric parameters of nose in Male and Female students. This data will be of importance in forensic medicine to identify the people of different racial origin, for rhino plastic surgeons during reconstructive surgeries of the face and nose, for researchers and anthropological studies.

Aim and Objectives: The aim of study was to measure and compare the nasal parameters in male and female students.

1. To measure the nasal parameters in male and female students.
2. To compare nasal index among male and female students.
3. To identify the different types of nose in male and female students

Material and Methods

Study design: Cross sectional study.

Source of data and sample size: Study was conducted after getting permission from the Research review board and Institutional Ethic committee, Pacific Institute of Medical Sciences, Umarda, Udaipur. Data were collected from the medical students who was reported in Anatomy Department of, Pacific Institute of Medical Sciences, Umarda, Udaipur. The present study was conducted on 100

students (50 males and 50 females) aged between 17-25 years. The data was collected from August 2021-August 2023.

Inclusion Criteria:

- Students between 17 to 25 years age of both sexes.
- Students who are willing to participate in the study.

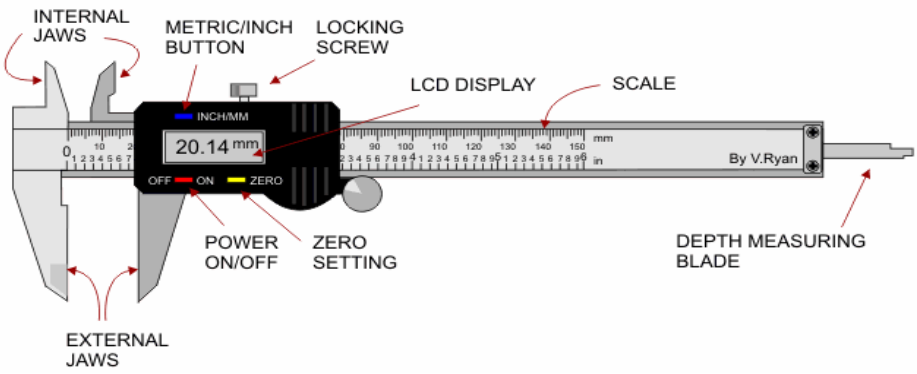
Exclusion Criteria:

- Students with history of trauma or surgery of the face and nose, with developmental anomalies of face and nose such as cleft lip, cleft palate also excluded.

Material Used:

a) Stainless steel digital Vernier caliper.
b) Anthropometric data sheet
c) Pencil
d) Consent form

Figure 1. Digital vernier caliper.



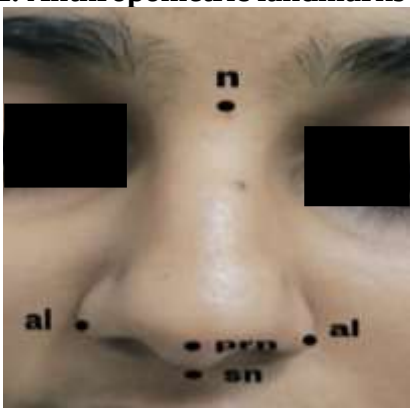
Data Collection Procedure:

Data was collected from all students who were reported to the anatomy department in the study duration was included in the study, considering the exclusion criteria. Participants was briefed on the objectives of the research and consent was taken prior to inclusion in the research. Socio-demographic data was taken by filling the structured proforma.

All measurements were taken on the subject sitting on a chair in a relaxed mood with head in Frankfurt's plane. Frankfurt's plane is defined as line connecting the lowest point infraorbital margin i.e. orbitale to upper edge of external acoustic meatus i.e. porion (15), (16). It was ensured that the calliper was placed properly and accurate readings were taken. It was also ensured that each subject did not smile or change facial expressions while taking measurement. Following relevant nasal surface landmarks were identified on the subjects with careful inspection and then marked on nose with black marker.

The landmarks were: 1. Nasion - The point on the root of the nose where the mid-sagittal plane cuts the naso-frontal suture.
2. Subnasale - The point at which the nasal septum merges with the upper cutaneous lip in the mid-sagittal plane.
3. Pronasale - The point at the tip of nose.

Figure 2. Anthropometric landmarks of nose.



Nose measurements:

1. **Nasal Height**: It was the distance measured from the nasion to the subnasale.
2. **Nasal width**: Measured from ala to ala (most lateral points on each alar contour).

3. Nasal Index: It was calculated by dividing the nasal breadth by nasal height multiplied by 100. On the basis of nasal index, human nose can be classified into: (17).

- Hyperleptorrhine (excessively long and narrow) with NI of 54.9 and less.
- Leptorrhine (moderately long and narrow nose) with NI between 55 and 69.9.
- Mesorrhine (medium nose) with NI between 70 and 84.9.
- Platyrrhine (moderately broad nose) with NI between 85 and 99.9.
- Hyperplatyrrhine (very broad nose) with NI 100 and above.

Figure 3. Measurement of nasal height.

Figure 4. Measurement of nasal width.

Finally, the measurements were taken using digital vernier calliper and all measurements were in millimetres. All readings were taken twice and the average was recorded to reduce the error of measurements. To eliminate inter observer bias all the measurements were taken by one author.

Statistical Analysis: All the data was measured using digital vernier calliper (sensitivity: 0.1mm) in millimetres; documented, analysed with Microsoft excel & presented as mean, standard deviation, range and percentage distribution. t-test was applied and the results with $p<0.05$ were considered statistically significant.

Observations and Results

Table:1 Descriptive statistics of different nasal parameters in total students.

Descriptive statistics	Height of nose (In mm)	Width of nose (In mm)	Nasal index
Minimum	39.22	27.44	52.28
Maximum	58.91	41.45	97.52
Mean	47.68	34.24	72.41
SD	3.62	3.49	9.73
SEM	0.3627	0.3495	0.9731
Coefficient of variation	7.59%	10.10%	13.43%

Table 1, Shows that mean nasal height for total students was 47.68±3.62mm, mean nasal width was 34.24±3.49mm and mean of nasal index was 72.41±9.73mm.

Table:2 Statistical analysis of different nasal parameters of male and female students.

	Height of nose (In mm)		Width of nose (In mm)	
Descriptive statistics	**Male**	**Female**	**Male**	**Female**
Minimum	41.03	39.22	29.92	27.44
Maximum	58.91	54.80	41.45	39.16
Mean	48.46	46.90	36.44	32.04
SD	3.730	3.382	3.016	2.388
SEM	0.5275	0.4783	0.4266	0.3377
Coefficient of variation	7.70%	7.20%	8.26%	7.42%
P value	0.0307		0.0001	

Table 2, Shows that mean nasal height for males was found to be 48.46±3.73mm, which was slightly higher than females, that was 46.90±3.38mm. The mean nasal height in males and females was statistically significant (P value<0.05).

The mean nasal width observed in males was 36.44±3.01mm which was slightly higher than females that was 32.04±2.38mm. The mean nasal width in males and females was highly statistically significant (P value<0.05)

Table:3 Statistical analysis of nasal index between male and female students.

	Nasal index (NI)	
Descriptive statistics	**Male**	**Female**
Minimum	56.50	52.28
Maximum	97.52	95.84
Mean	76.02	68.81
SD	9.442	8.696
SEM	1.3354	1.2298
Coefficient of variation	12.41%	12.62%
P value	0.0001	

Table 3, Shows that the mean nasal index in male was 76.02±9.44mm and in female was 68.81±8.69mm. There were extremely statistically significant differences found between nasal index of male and female students (P value<0.05).

Table:4 Distribution of different types of nose in male and female students.

Type of nose	Male		Female		Total	
	(n=50)	(%)	(n=50)	(%)	(n=100)	(%)
Hyperleptorrhine	0	0	1	2	1	1
Leptorrhine	13	26	29	58	42	42
Mesorrhine	28	56	16	32	44	44
Platyrrhine	9	18	4	8	13	13
Hyperplatyrrhine	0	0	0	0	0	0

Table 4, Shows that most prominent type of nose in all study population was mesorrhine 44 % followed by leptorrhine 42% and platyrrhine 13%. The major type of nose in males was mesorrhine 28(56%), followed by leptorrhine 13(26%) and least common type was platyrrhine type 9(18%). In females most common type of nose was leptorrhine 29 (58%), followed by mesorrhine 16(32%) and platyrrhine 4(8%). The least common type of nose was hyperleptorrhine 1(2%).

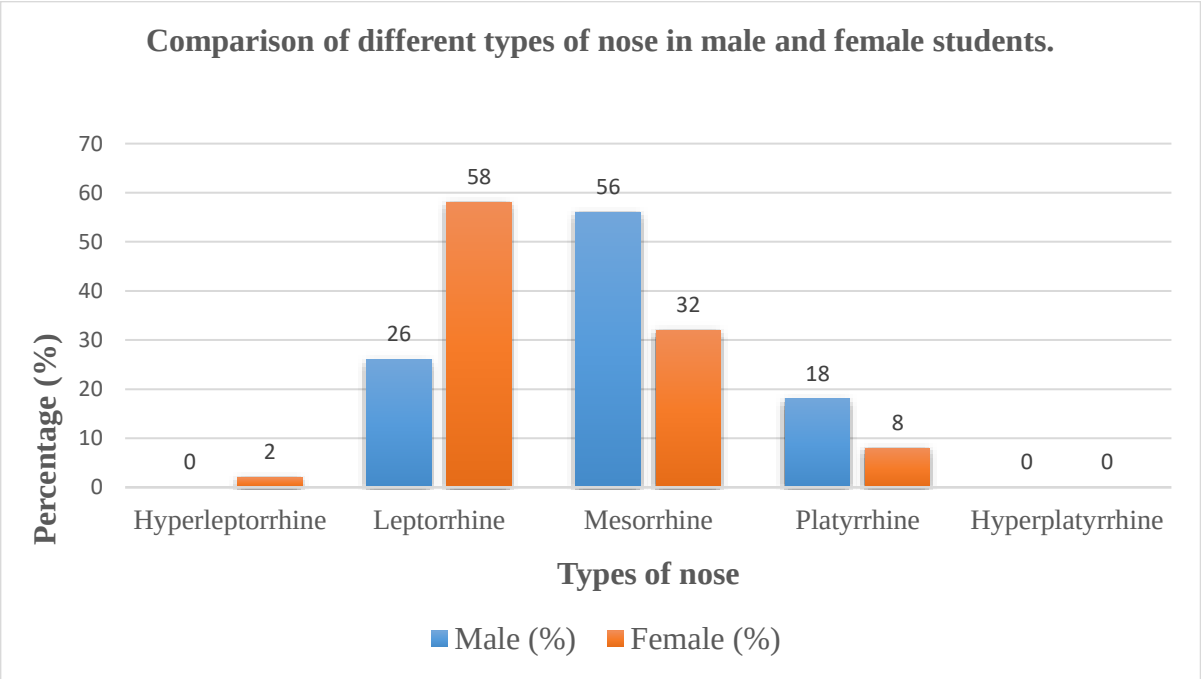


Figure 5. Comparison of different type of nose in male and female students.

Discussion

In present study the mean nasal height for total students was 47.68±3.62mm, mean nasal width was 34.24±3.49mm and mean of nasal index was 72.41±9.73. The mean nasal height for males was found to be 48.46±3.73mm which was slightly higher than females that was 46.90±3.38mm respectively. The mean nasal width observed in males was 36.44±3.01mm which was slightly higher than females that was 32.04±2.38mm. The mean nasal index in male was 76.02±9.44mm and in female was 68.81±8.69mm. There were significant differences found between nasal index of males and females (p value-0.001). The major type of nose in males was mesorrhine 28 (56%), followed by leptorrhine 13 (26%) and least common type was platyrrhine type 9 (18%). In females most common type of nose was leptorrhine 29 (58%), followed by mesorrhine 16 (32%) and platyrrhine 4 (8%). The least common type of nose was hyperleptorrhine 1 (2%).

Gandrade PR and Babel H observed the mean nasal index of 81.36 which belongs to Mesorrhine type of nasal form (17), Which was similar to the present study. On the contrary the mean nasal indices among male and female are observed to be differ by Ukoha et al 89.95+11.26 and 85.71+10.76(9). The study done by Patil GV on nasal index of South Indian population comprised 250 subjects who were in the age group of 18-32yrs showed mean nasal index in males as 84.91 and in female as 67.75

which indicates the dominant nasal form in males as mesorrhine and females was leptorrrhine (18). These finding was similar to present study.

In present study most prominent type of nose in whole study population was mesorrhine 44% followed by leptorrhine 42% and platyrrhine 13%. Ray et al who also observed mesorrhine type to be the commonest among population of western Uttar Pradesh (19). Patil et al observes mesorrhine type being the commonest in males and leptorrhine type in females in south India which relate to the results of present study (18). Asharani S K et al, clearly revealed that Indian population (both South Indians & North Indians) belongs to Mesorhinae in 50%, then Leptorhinae in 29.54% & Platyrhinae in 20.45% of the subjects. The study also highlighted the total absence of Hyperleptorhinae & Hyperplatyrhinae. The statistically significant differences were found between male and female students in medium type of nose (20), these findings were similar to current study.

Summary and Conclusion: The multitude of factors influences size, shape, and length of the nose such as genetics, sex, racial origins and environmental conditions. Our study indicates the significant difference among the nasal indices in males and females. After conducting the research, it was concluded that the dominant nose type in male was mesorrhine and leptorrhine in females, respectively. There is multiplicity in the various measurements of nose and its understanding can be used in reconstructive surgeries, forensic anthropology and scientific research and also it helps the physical anthropologists to recognize and make out the migration pattern of early civilisation.

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