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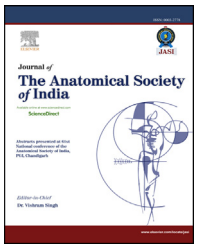

Original Article

A comparative study on nasal ergonomics of Madhya Pradesh & Uttar Pradesh males

Suresh K. Sharma [a,*], *Massarat Jehan* [a], *Rajlaxmi Sharma* [b], *Akhilesh Trivedi* [a]

[a] *Department of Anatomy, Gajra Raja Medical College, Gwalior, Madhya Pradesh, India*
[b] *Department of Pathology, Gajra Raja Medical College, Gwalior, Madhya Pradesh, India*

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ABSTRACT

Introduction: Nasal index is an ethnic sensitive anthropometric index. It is an important anthropometric parameter for classifying the race and sex of an individual whose identity is unknown. The present study was undertaken to observe the midline nasal ergonomics of MP & UP males.

Materials and Method: A random sample of males of 18–28 years age group was chosen for examination. Nasal breadth (NB), nasal height (NH) and nasal depth (ND) were measured with the help of Digital Vernier Caliper. Nasal index (NI) and nasal elevation index (NEI) of each group were calculated as NB/NH × 100 & ND/NB × 100.

Result: The result was analyzed statistically using Unpaired Student *t*-test with significant relationship ($p < 0.001$) of NI & NEI between the two groups. The result showed that the MP males had mean NI of 68.73 ± 8.25 while that of UP males had NI of 76.91 ± 6.25 ($p < 0.001$).

Discussion: The NI of MP males is <70 and so fall within the classification leptorrhine while the UP males had a NI between 70.00 and 84.9 so fall within the mesorrhine nose type. The NEI of MP males is 51.08 ± 7.33 which was greater than UP males which had 44.13 ± 6.54 which indicates that MP males have a significance protruded longer & more elevated nose than UP counterpart. The data obtained showed difference in nose types. Thus the data of this study is recommended in anthropological studies and reconstructive surgery amongst the ethnic groups under study.

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1. Introduction

The human nose can be found in many shapes and sizes and ethnic influences can result in different appearances of the nose.[1] Nasal anthropometry is the study concerned with the measurements of the proportion, size and shape of the human nose. Dimensions obtained have a great potential to guide clinical decision, public health policy, relevant in esthetic and reconstructive surgery, forensic investigation as well as studying variation in humans.[2]

* *Corresponding author*. Tel.: +91 9826766889.
E-mail address: drrajsuresh@gmail.com (S.K. Sharma).
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The knowledge of the nasal anthropometry is employed in forensic science and physical anthropology, as one of the tools used in identification of different races, ethnicity and the gender of an individual.[1,3,4]

Over the centuries, there have been remarkable changes in anthropometric measurements due to geographical, cultural, genetic and environmental factors as well as worldwide mingling of races. Therefore, isolation of pure races has proved to be a difficult problem. However, anthropometric studies continue to play an important role in distinguishing pure race and local mingling of races.[5]

The shape of the nose can be determined by environmental climate condition.[6,7] The narrower noses are favored in cold and dry climates while broader noses in warmer, moister ones as a consequence of natural selection in human evolution.[8]

Craniofacial anthropometry also includes nasal height, nasal width, and nasal index. It is very important for the study of human growth and variation in different races and also for clinical diagnosis and treatment.[9,10]

Nasal index is very useful in anthropology in distinguishing racial and ethnic differences.[11,12] It is one of the methods anthropologists have used to differentiate living race and subspecies of man.[13] It also exhibits sexual differences.[14]

On the basis of nasal height and breadth index, Martin and Sallar (1957)[15] divided noses into the following categories:

Categories	Size of nose	Nasal index		
		On living head	On Skull	On statistical basis (by Hajnis, 1986)[16]
Hyperleptorrhine	Long narrow nose	40–54.9	–	−2SD to −1.5SD
Leptorrhine	Moderately narrow nose	<70	<47	−1.5SD to −0.5SD
Mesorrhine	Moderate or medium size	70–84.9	47–50.9	−0.5SD to +0.5SD
Platyrrhine	Moderately wide nose	85–99.9	51–57.9	+0.5SD to +1.5SD
Hyperplatyrrhine	Very wide nose	100 or more	58 or more	+1.5SD to +2SD

The purpose of this study is to provide baseline data on males of the two north Indian communities i.e. from U.P. and M.P. and the comparisons that emerge there in and to determine the nasal index and nasal elevation index and to classify their nose type. The present study will provide a normative data of nasal index, which will be relevant in physical anthropology, forensic medicine and rhinoplastic and facial reconstruction surgery.

2. Material and methods

2.1. *Selection criteria*

A random sample of 260 male MBBS undergraduate students of first year to final year of Gajra Raja Medical College and general population, in the age group of 18–28 were selected. This age group was selected, as age negligibly affect the facial parameters in subject above 18 years of age. The selected subject were from ethnic communities, Madhya Pradeshis (130 subjects) and Uttar Pradeshis (130 subjects) whose ancestors were the residents of their respective region for atleast two generations.

2.2. *Exclusion criteria*

Subjects who had trauma of the nose, prior plastic or reconstructive surgery of the face or cleft lips and other congenital facial malformations were excluded in the study.

Five relevant nasal surface landmarks selected were:

1 **Nasion**, the point on the root of the nose where the mid-sagittal place cuts the nasofrontal 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.
4 **Alare**, the point at the most prominent side wall of the nose.

2.3. *Measurement procedure*

The following projective measurements (shortest distance between 2 point) of the nose were taken with a **Digital Vernier Caliper** with accuracy of 0.01 mm. To reduce technical error of the measurements, each measurement was taken thrice and average taken.

The subject was seated on a chair in a well-illuminated room. All the measurements were taken with the subject sitting on a chair in a relaxed condition with the head in the anatomical position. The facial muscles were relaxed in order not to alter the size of the nose. The measurement was done by one observer to prevent inter-observer error.

- Measurement of **Nasal Height (NH)** – measured from nasion to subnasale (Fig. 1)
- Measurement of **Nasal Breadth (NB)** – maximum breadth at right angle to the nasal height from ala to ala (Fig. 2)
- Measurement of **Nasal Depth (ND)** – from pronasale to subnasale (Fig. 3)

The following nasal indices were calculated for each group:

a) **Nasal index (NI) was calculated as = NB/NH × 100**
b) **Nasal elevation index (NEI) was calculated as = ND/NB × 100**

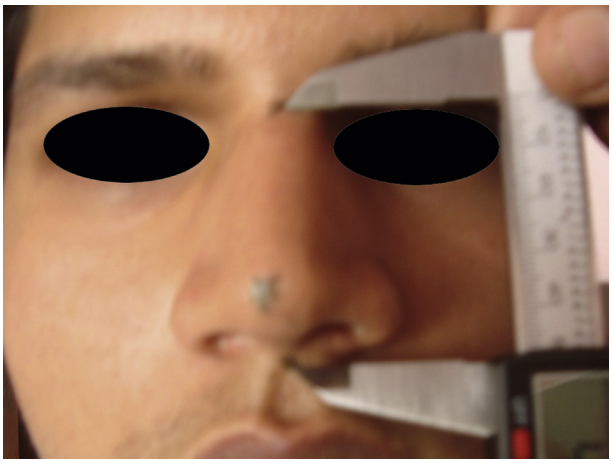

Fig. 1 – Showing measurement of Nasal height (upper point = nasion; lower point = subnasale).

The data was computed, tabulated and statistically analyzed using Graph Pad Prism and Microsoft Excel Windows 2007 software. The data obtained were compared with the measurements of other population in literature.

3. Results

The results of the study were presented in tabular forms (Tables 1–3).

The dimensions of the nasal parameters obtained in the study are shown in Table 1. The mean nasal breadth, height and depth in MP males was significantly higher than those in UP males ($p < 0.0001$).

Descriptive statistics (Table 2) showed minimum and maximum nasal index to be 51.85–86.54 in MP males and 59.26–90 in UP males. Mean nasal index (±SD) of **MP males** was 68.73 ± 8.25 which falls under the **Leptorrhine type of nose** and 76.91 ± 6.25 for **UP males** which falls under the **Mesorrhine type of nose**.

Mean nasal elevation index were 51.08 ± 7.33 and 44.13 ± 6.54 for MP and UP males respectively and the difference is statistically significant ($p < 0.0001$) which indicates that **MP males have a significance protruded longer and more elevated nose than UP males**.

Fig. 2 – Showing measurement of Nasal breadth (from right ala to left ala).

Fig. 3 – Showing measurement of Nasal depth (upper point = pronasale; lower point = subnasale).

The distribution of the nose types showed Leptorrhine to be 30.38% in MP males and Mesorrhine to be 38.46% in UP males and was the dominant type of nose among the two groups respectively; The least were platyrrhine type 5.77%. Overall the most dominant type of nose was Mesorrhine – 55.77% (Table 3).

4. Discussion

Various studies have indicated racial and ethnic differences in nasal index amongst different populations. It is necessary to have local data of these parameters since these standards reflect the potentially different pattern of craniofacial growth resulting from racial, ethic, sexual and dietary differences (Oladipo et al, 2009).[4] The statistical analysis indicates a sexual dimorphism, with significantly higher values of all the parameters in males compared to the females.

Risely[13] (1915) reported that the nasal index of Africans is basically platyrrhine. Similarly, Afro-American (Ofodile, 1995)[17] and Indo-African (Sparks and Jantz, 2002)[18] and Ibo and Yoruba (Eliakim-Ikechukwu, 2012)[2] ethnic groups have platyrrhine nose type.

Oladipo et al[19] (2007) also conducted a study on the morphometric analysis of the nasal parameters of Igbo, Ijaw and Yoruba ethnic groups in southern Nigeria. Their findings showed a mean nasal index >85.0 in the three Nigerian ethnic groups studied and reported it to be platyrrhine nose type. The Ijaws had the highest nasal index (96.4) followed by Igbos (94.1) while the lowest value was observed in Yorubas (89.2). Males had a higher nasal index than the females in all the ethnic groups. The differences observed were statistically significant ($p < 0.05$). This does not agree with our study which showed that the MP males have leptorrhine and UP males have a Mesorrhine type of nose.

In these studies, sexual dimorphism was observed with males having significantly higher nasal index than females ($p < 0.05$). Their results are in agreement with the results obtained in this study.

Oladipo[4] in 2009 reported that the Andonis fall within the Mesorrhine nose type while the Okrikas fall within the

Table 1 – Basic descriptive statistics of nasal measurements of M.P. and U.P. males.

Statistics	Nasal breadth (NB)		Nasal height (NH)		Nasal depth (ND)	
	MP	UP	MP	UP	MP	UP
Minimum (cm)	2.8	2.8	4.5	3.8	1.3	1.2
Maximum (cm)	4.6	4.1	6.3	5.8	2.4	2
Mean (cm)	3.73	3.49	5.44	4.56	1.89	1.54
SEM	0.037	0.033	0.029	0.035	0.02	0.019
SD	0.42	0.38	0.33	0.4	0.23	0.23
Coefficient of variation	11.17%	10.74%	6.04%	8.83%	12.25%	14.76%
P value (two-tailed)	$p < 0.0001$		$p < 0.0001$		$p < 0.0001$	
Are means significantly different? ($p < 0.05$)	Yes		Yes		Yes	
t Value	$t = 4.695$		$t = 19.44$		$t = 12.42$	
Difference between means	0.24 ± 0.049		0.88 ± 0.046		0.35 ± 0.028	
95% confidence interval	0.135–0.33		0.796–0.975		0.297–0.408	

$n = 130$ for MP males; $n = 130$ for UP males.

Table 2 – Descriptive statistics of nasal index and nasal elevation index of MP and UP males.

Statistics	Nasal index (NI)		Nasal elevation index (NEI)	
	MP males	UP males	MP males	UP males
Minimum	51.85	59.26	36.96	31.71
Maximum	86.54	90	67.65	60
Mean	68.73	76.91	51.08	44.13
SEM	0.724	0.55	0.643	0.574
SD	8.25	6.25	7.33	6.54
Coefficient of variation	12.01%	8.12%	14.35%	14.83%
95% CI of discrepancy	67.31–70.15	75.83–77.98	49.82–52.34	43.01–45.26
P value (two-tailed)	$p < 0.0001$		$p < 0.0001$	
Are means significantly different? ($p < 0.05$)	Yes		Yes	
t Value	$t = 9.007$		$t = 8.055$	
Difference between means	-8.176 ± 0.9077		6.941 ± 0.8617	
95% confidence interval	−9.955 to −6.397		5.252–8.630	

Platyrrhine nose type. Nasal index is related to regional and climatic differences (Farkas, 1986).[7]

The nose is one of the best clues to racial origin (Madison, 2004).[20] Xu et al[21] in 2001 reported mesorrhine type of nose of Jingpo people in China.

Study by Staka et al (2012)[22] showed that the predominant nose type is leptorrhine based on the mean NI of 67.07 and 63.87 for males and females respectively. It was shown that Leptorrhine type of nose is typical for Albanian population (Pittard, 1910; Luschan, 1922; Tildesley, 1933).[23–25]

Another study was carried out by Franciscus and Long[11] (1991) in Onges reporting that the mean nasal index for males fell between the ranges of 77.3–97.7 while those of females fell between the ranges of 70.5–97.4 and mean nasal indices of 86.09 and 90.16 respectively. Carleton[26] (1989) showed that the Negroid race mainly of African descent have the Platyrrhine nose type. Akpa et al[27] (2003) did a study on the nasal parameters in Nigerian Igbos and classified them as Platyrrhine.

The NI is very useful in anthropology and it is one of the clinical anthropometric parameters recognized in nasal surgical and medical management (Hansen and Mygind, 2002; Zankl, 2002).[28,29]

The results of this study will serve as a guide to reconstruction surgeons when improving the personality and beauty of a person and also in correcting nasal defects. It could also be useful during forensic investigations in differentiating the ethnic groups in this study.

Table 3 – Frequency (percentage) of nose types of MP and UP males.

Nose type	MP males *n* (%)	UP males *n* (%)	All *n* (%)
Leptorrhine	79 (30.38)	21 (8.08)	100 (38.46)
Mesorrhine	45 (17.31)	100 (38.46)	145 (55.77)
Platyrrhine	6 (2.31)	9 (3.46)	15 (5.77)
All	130 (50.00)	130 (50.00)	260 (100.00)

5. Conclusion

The present study indicated that the predominant nose type is leptorrhine in MP males and mesorrhine in UP males based on the mean NI of 68.73 and 76.91respectively. This shows that UP males have a significantly higher NI than MP males ($p < 0.0001$) which confirms the existence of racial difference in nasal parameters between MP and UP males. The NEI of MP males is 51.08 ± 7.33 which was greater than UP males which had 44.13 ± 6.54 which indicates that MP males have a significance protruded longer and more elevated nose than UP counterpart. This revealed a clear ethnic variations possibly

due to multi factorial etiological factors i.e. environment, genetic, geography, nutrition and other related. The result of this study will be useful in forensic medicine, anthropology and rhinoplasty and will also serve as a future framework for estimating the other craniofacial variables in same population. The data obtained showed difference in nose types. Thus the data of this study is recommended in anthropological studies and reconstructive surgery amongst the ethnic groups under study. This study should be subjected to further investigation because of its relevance to forensic science and clinical anthropometry.

Conflicts of interest

All authors have none to declare.

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