Original Article

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Anthropometric Study of Nasal Index among the Population of Western Uttar Pradesh Region

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Abstract

Introduction: Anthropometry provides a scientific method and technique for taking various measurements in different geographic regions and races. Nasal index itself is a complex anatomic unit, so anthropometric study was devised on the same, might play an important role during the reconstruction of rhinoplasty and facial surgeries.

Objectives: To determine measurements for obtaining nasal indices of both genders and trying to correlate with morphological classification of the nose and its preponderance within that region by statistical analysis.

Materials and Methods: In this study, total 300 students' nasal indices (150 male and 150 female) within age group of 18-30 years of Teerthanker Mahaveer Medical College and Research Center, Teerthanker Mahaveer University, Moradabad, Uttar Pradesh, India were measured strictly on Frankfort's plane with the help of sliding caliper.

Results: Mean nasal index was 73.98 ± 1.9. *Z*-test value of nasal index was 4.366. Male had a higher nasal index than the female. The difference observed was statistically significant with $P < 0.05$.

Conclusion: This study concludes with gender difference in nasal index and concludes that population belong to western Uttar Pradesh region having mesorrhine type of nose.

Key words: Anthropometry, Nasal index, Rhinoplasty

INTRODUCTION

Nasal anthropometry is the study concerned with the measurements of the proportion, size, and shape of the human race of nose. The shape of the external nose varies from one to another considerably. It is a pyramidal structure located in the midline of the mid face and attached to the facial skeleton.[1] Facial characters are mostly influenced by factors such as race, ethnicity, age, sex, and culture, and their variation has been the subject of an investigation from ancient times.[2,3] Morphometric difference in facial characters are always present among various races in world geographic clusters.[4] Difference in nose types is significant in categorization between races.[5] Nasal index is the most common nasal parameter which may relate to regional and climatic differences. Longer narrower noses are favored in cold and dry climates while broader noses seen in warmer and moisten climate may consequence of natural selection in human evolution.[6] The morphological classification of face and nose has been successfully adopted by international security agencies. However, the use of morphological facial features in personal identification still remained inconclusive.[7] Facial identification with nasal morphometry is becoming more significant with the increase in crime rates, terrorist attacks.[8]

Nasal index is also useful in anthropology in distinguishing racial and ethnic differences.[5,9,10] Nasal index is the ratio of nasal width to the nasal height multiplied by 100. It exhibits sexual differences[11] and has become a useful tool in forensic sciences.[12] Dimensions obtained have a great potential to guide clinical decision, public health policy, relevant in

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esthetic and reconstructive surgery, forensic investigation as well as studying variation in humans. The proportion of the nose and facial skeleton, both from in front and the side, are of utmost importance in rhinoplastic surgeon.[1] Currently, very little data are available for Western Uttar Pradesh population.

The aim of this study is to analyze nose type and find out its dominance in this population, a process of generation of such nasal evaluation atlas of Western Uttar Pradesh community as well in reconstruction surgery, medical practice, forensic, and anthropology study.

MATERIALS AND METHODS

The study was conducted in Department of Anatomy, Teerthanker Mahaveer Medical College and Research Center, Teerthanker Mahaveer University, Moradabad, Uttar Pradesh, India. Total 300 subjects of which equal number of male and female students were randomly selected for the study. Subjects and their forefathers were belonging to Western Uttar Pradesh. All subjects were between 18 and 30 years of age. Measurements were taken in Frankfort's plane with subjects in comfortably sitting position. Based on nasal index, types of nose were classified into three types, i.e., leptorrhine - <70; mesorrhine - 70-84.9 and platyrrhine ->85.[4]

1. Height of nose, i.e., distance between nasion (n) and subnasale (sn) shown in Figure 1 and 2
2. The width of nose, i.e., the distance between right and left alae, were measured in centimeters (cm) with the help of sliding caliper shown in Figure 1 and 3

Above measurements were used to calculate Nasal index based on the following formula:

$$\text{Nasal index} = \left| \frac{\text{Width of nose (cm)}}{\text{Length of nose (cm)}} \right| \times 100$$

The data were taken on Microsoft Excel file and were summarized statistically by mean, standard deviation, and followed by *Z*-test. The result was correlated with types of noses with this study community.

RESULTS

The mean of the nasal height for male and female of Western Uttar Pradesh was found to be 3.625 ± 0.155 cm while mean in males and females it were 3.78 and 3.47, respectively. The mean nose width for male of Western Uttar Pradesh was recorded as 2.68 ± 19 cm while that of male and females mean were 2.87 and 2.49, respectively. When the values for males compared with the values for females, there was sexual dimorphism observed with male values being higher. Ranges also showed the same and tabulated in Table 1. The mean and

Figure 1: Nasal index

Figure 2: Height of nose

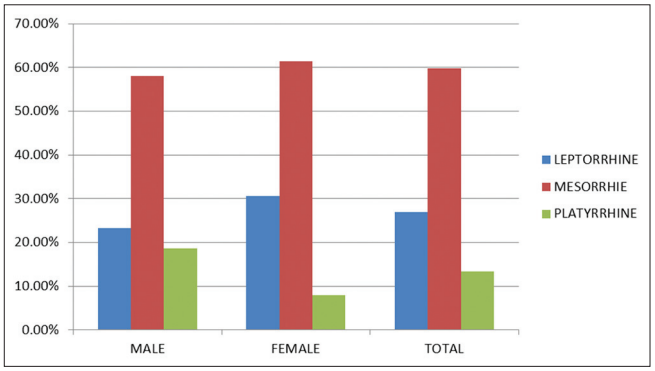
Figure 3: Width of nose

standard deviation of nasal indices in males and females were determined, and it was observed that the overall male values were 75.866 ± 7.60 while that of females was 73.978 ± 7.399. *Z*-test value of nasal index was 4.366. Mean and standard deviation is given in Table 1. Frequency (percentage) of nose types in population of Western Uttar Pradesh region is shown in Table 2 and Graph 1 also presented for the same. The difference observed was statistically significant with $P < 0.05$. The result also shows that the population belongs to western Uttar Pradesh region shares Mesorrhine type of nose in majority, i.e., 59.72% compared to leptorrhine (26.99%) and platyrrhine (13.33%).

DISCUSSION

The nose is exquisite facial triad[13] and the best hint to racial origin.[14] The nasal index is one of the clinical anthropometric parameters recognized in rhinoplasty and medical management.[15] Various studies have indicated racial and ethnic differences in nasal index among different populations.[16-18]

The present study at TMU, Moradabad of Western Uttar Pradesh region indicated that the predominant nose fall under Mesorrhine type. Male and female nasal indices



Graph 1: Frequency (percentage) of nose types in population of Western Uttar Pradesh region

Table 1: Descriptive statistics of nasal height, nasal width, nasal index and *Z*-test

Gender	*N*	Nasal height (cm)		Nasal width (cm)		Nasal index			*Z*-test
		Mean	Range	Mean	Range	Mean	SD	Range	
Male	150	3.78	3.2-4.2	2.87	2.2-3.5	75.866	7.600	60.0-89.74	2.474
Female	150	3.47	3.1-4.1	2.49	2.0-3.5	72.089	7.399	48.78-89.74	2.522
Total	300	3.63	3.1-4.2	2.68	2.0-3.5	73.978	7.723	48.78-89.74	4.366

SD: Standard deviation

Table 2: Frequency (percentage) of nose types in population of western Uttar Pradesh region

Types of nose	Percentage distribution of nose types					
	Male		Female		Total	
	n=150	Percentage	*n*=150	Percentage	*n*=300	Percentage
Leptorrhine	35	23.33	46	30.66	81	26.99
Mesorrhie	87	58	92	61.44	179	59.72
Platyrrhine	28	18.66	12	8	40	13.33
Total	150	50	150	50	300	100

Table 3: Comparative and chronological studies of nasal indices with predominant type of noses among various populations of the world

Ethnicity	Nasal index	Predominant type of nose	Studied by	Year
Indo-Aryans*	73.25	Mesorrhine	Risely[20]	1915
Indian–Sudriods*	84.10	Mesorrhine	Risely[20]	1915
Africans	90-100	Platyrrhine	Risely[20]	1915
Chinese				
Male	81	Mesorrhine	Aung *et al.*[10]	2000
Female	79	Mesorrhine		
Lebanon	63.30	Leptorrhine	Daniel[21]	2002
Alawite	62.74	Leptorrhine	Daniel[21]	2002
Damascus	63.26	Leptorrhine	Daniel[21]	2002
Homs-Hama-Aleppo	58.66	Leptorrhine	Daniel[21]	2002
Armenians	63.80	Leptorrhine	Daniel[21]	2002
Greeks	68.49	Leptorrhine	Daniel[21]	2002
Arabic	74.48	Mesorrhine	Daniel[21]	2002

Contd...

Table 3: *Contd...*

Ethnicity	Nasal index	Predominant type of nose	Studied by	Year
African American females	79.7	Mesorrhine	Porter[9]	2003
India-Raj puts*	71.60	Mesorrhine	Mulchand[22]	2004
Western Europeans	69.9	Leptorrhine		
Bantus	85.0	Platyrrhine	Nichani[23]	2004
German	71.0	Mesorrhine		
Caucasian				
Male	65.5	Leptorrhine	Farkas *et al.*[24]	2005
Female	64.2	Leptorrhine		
Turkish males	59.4	Leptorrhine	Uzun *et al.*[25]	2006
Nigerian Igbo				
Male	95.9	Platyrrhine	Oladipo *et al.*[17]	2007
Female	90.8	Platyrrhine		
Nigerian Yoruba's				
Male	90.0	Platyrrhine	Oladipo *et al.*[17]	2007
Female	88.1	Platyrrhine		
Nigerian I-Jaws				
Male	98.6	Platyrrhine		
Female	94.2	Platyrrhine	Oladipo *et al.*[17]	2007
Nigerian Ogonis	98.50	Platyrrhine	Oladipo *et al.*[17]	2007
Nigeria–Yorubas				
Male	89.85	Platyrrhine	Oladipo *et al.*[26]	2008
Female	83.66	Mesorrhine		
Nigeria-Okrikas				
Male	86.23	Platyrrhine	Oladipo *et al.*[27]	2009
Female	86.46	Platyrrhine		
Nigeria–Adonis				
Male	79.83	Mesorrhine	Oladipo *et al.*[27]	2009
Female	83.77	Mesorrhine		
Iran-Sistan female	69.7	Leptorhine	Heidari *et al.*[28]	2009
Iran–Baluchestan female	59.2	Leptorhine	Heidari *et al.*[28]	2009
Ukwuani				
Male	97.47	Platyrrhine	Eboh and John[29]	2011
Female	98.08	Platyrrhine		
Isokos	91.0	Platyrrhine	Anibor *et al.*[30]	2011
Kosovo Albanian				
Male	67.07±6.67	Leptorrhine		
Female	63.87±5.56	Leptorrhine	Staka *et al.*[31]	2012
Gujarati population India*				
Male	80.00	Mesorrhine	Kanan *et al.*[3]	2012
Female	76.00	Mesorrhine		
India-Southern Rajasthan*				
Male	83.0	Mesorrhine	Gangrade and Babel[32]	2012
Female	79.73	Mesorrhine		
Nigeria-cross River State				
Male	99.77	Platyrrhine	Esomonu *et al.*[33]	2013
Female	91.7	Platyrrhine		
Serbia				
Male	67.56	Leptorrhine	Jovanović *et al.*[34]	2014
Female	66.01	Leptorrhine		
South Indian Population*				
Male	84.99	Mesorrhine	Patil *et al.*[19]	2014
Female	67.75	Leptorrhine		
Nepal mongoloid				
Male	74.6	Mesorrhine	Koirala *et al.*[35]	2014
Female	75.9	Mesorrhine		
Nepal Tharu				
Male	83.8	Mesorrhine	Koirala *et al.*[35]	2014
Female	82.4	Mesorrhine		
Egypt-East Delta				
Male	71.46	Mesorrhine	Hegazy[36]	2014
Female	64.56	Leptorrhine		
TMU; Western Uttar Pradesh, India*				
Male	75.86	Mesorrhine		
Female	72.08	Mesorrhine	Present study	2016

*Studies on Indian population

are of 75.86 and 72.08 with standard deviation 7.60 and 7.39, respectively. This study shows that males have a significantly higher nasal index than females ($P < 0.05$). This confirms the existence of sexual dimorphism in nasal parameters among Western Uttar Pradesh population. South Indian males have mesorrhine type of nose and females have leptorrhine type. The study showed even within the same geographical location different nasal indices were observed.[19] but is absent in our study. The similar finding also observed in Jingpo people in China who have mesorrhine nose type.[13] The present work is in agreement with the previous researchers on nasal parameters and showed in tabular format (Table 3).

CONCLUSION

The human nose has an esthetic feature in facial region which differs in anatomy and morphology among racial groups and of the most characteristic differences during the analysis of ethnic and racial differences. This study indicates difference in nasal index of both males and females, but the messorrhine type of nose is same for both genders of Western Uttar Pradesh population of India with little higher value in male population. It is useful in various branches of medicine such as reconstructive surgery, forensic medicine, and medicolegal assessment of individuality and race.

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