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Anthropometric Comparison of Nasal Index Between Punjab and Kashmir Populations

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Abstract:

The present study presents a comparative analysis of nasal index values between two distinct North Indian populations: Punjab and Kashmir. A total of 200 adult individuals (100 from each region), aged between 18 and 40 years, were selected using stratified random sampling. Standard anthropometric techniques were employed to measure nasal height and width, and nasal index was calculated accordingly. The results revealed statistically significant differences in nasal index between the two populations. The Punjabi population predominantly exhibits the mesorrhine nasal type (88%), characterized by medium-width noses, while only 6% show the leptorrhine type, while the Kashmiri population shows a striking dominance of the leptorrhine type (94%), with an additional 6% exhibiting hyperleptorrhine features, indicating extremely narrow noses. The independent samples t-tests conducted on nasal measurements between the Punjab and Kashmir populations reveal statistically significant differences across all variables for both males and females, with p-values less than 0.0001 in each case. These findings underscore the influence of environmental pressures on anatomical traits, highlighting how nasal index serves as a valuable anthropometric marker for climatic and regional differentiation.

Keywords: Anthropometry, Nasal Index, Punab population, Kashmir population

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I. INTRODUCTION

Nasal morphology is known to vary significantly across ethnic groups and geographical regions, often reflecting long-term adaptation to environmental factors such as climate and altitude (Franciscus & Long, 1991). Because the nose shape is thought to be a distinctive characteristic of an individual's ethnic origin, it is an ethnically sensitive anthropometric index. The nasal index focuses on the nasal framework (Kaushal et al., 2013). The Nasal index is a valuable tool for identifying gender differences in addition to racial and cultural disparities. As a result, it is now a valuable instrument in forensic science (Staka et al., 2012). In anthropology, the nasal index is particularly helpful. Additionally, according to Sharma et al. (2014), it is one of the clinical anthropometric measures accepted in nose surgery and medical care.

India's diverse climatic zones and ethnic heterogeneity make it an ideal setting for anthropometric research. The Punjab region, with its subtropical climate, and the Kashmir Valley, characterized by cold, mountainous terrain, offer contrasting ecological conditions that may influence

craniofacial features, particularly nasal dimensions. Previous studies have shown that populations in colder climates tend to have narrower and longer noses (leptorrhine), while those in warmer regions exhibit broader nasal structures (mesorrhine or platyrrhine) (Rosenberg, 2002; Noback et al., 2011). Beyond its anthropological significance, nasal index holds considerable forensic importance. It aids in personal identification, ethnic classification, and reconstruction of biological profiles in forensic investigations, especially when skeletal remains are incomplete or fragmented (Krogman & İşcan, 1986). Understanding regional and gender-based variations in nasal morphology enhances the accuracy of forensic facial reconstruction and supports medico-legal casework involving unidentified individuals. The present study aims to compare the nasal index between individuals from Punjab and Kashmir, analyzing gender-based differences and regional variation. By employing standardized anthropometric techniques and statistical analysis, the research contributes to both anthropological knowledge and forensic applications in human identification.The present study not only contributes to the growing body of literature on human craniofacial diversity but also has implications for forensic anthropology, plastic surgery, and population genetics. Understanding regional nasal morphology can aid in ethnic classification and enhance the accuracy of facial reconstruction techniques.

II. MATERIAL AND METHOD

This study was conducted on a total of 100 individuals (both male and female) from two distinct regions of India—Punjab and Kashmir. Participants were aged between 17 and above 40 years. Individuals with congenital nasal deformities, a history of nasal trauma, or prior nasal surgeries were excluded to ensure the accuracy and consistency of measurements. All anthropometric data were collected with the participant seated comfortably in a relaxed posture, maintaining a natural head position. Facial muscles were kept relaxed to avoid any distortion in nasal dimensions. Measurements were taken using a Vernier caliper, ensuring precision. To minimize inter-observer variability, all measurements were recorded by a single trained observer. Prior to participation, written informed consent was obtained from each individual, in accordance with ethical research standards. The following calculations have been done on the basis of measurements above mentioned:

Nasal Index: Nasal Width/Nasal Height x 100

III. RESULT AND DISCUSSION

NASAL INDEX OF PUNJAB POPULATION

Table 1 presents the mean and standard deviation of nasal measurements for 50 male and 50 female individuals from the Punjab population. The data show that males have a higher average nasal height (40.18 ± 2.73 mm) and nasal width (30.66 ± 2.56 mm) compared to females, who exhibit a nasal height of 38.46 ± 5.32 mm and nasal width of 28.85 ± 3.06 mm. Interestingly, despite these dimensional differences, the nasal index—which reflects the proportion of nasal width to height—is nearly identical between genders: 75.22 ± 5.29 for males and 75.52 ± 5.98 for females. The values of T-test showed that nasal height statistically significant difference ($p = 0.04$), with males having slightly greater nasal height and nasal width also significant difference ($p = 0.01$), indicating broader noses in males. but there is nasal index no significant difference ($p = 0.78$) of nasal index, suggesting similar nasal proportions between genders. This suggests that while males generally have larger nasal dimensions, the overall nasal shape remains proportionally consistent across genders within the Punjab population.

Table. 1 Mean and+ SD nasal index of Male and Female (n=50) population of Punjab

Gender	Nasal Height	Nasal width	Nasal Index
Male	40.18±2.73	30.66±2.56	75.22±5.29
Female	38.46±5.32	28.85±3.06	75.52± 5.98
p-value	**0.04**	**0.01**	**0.78**

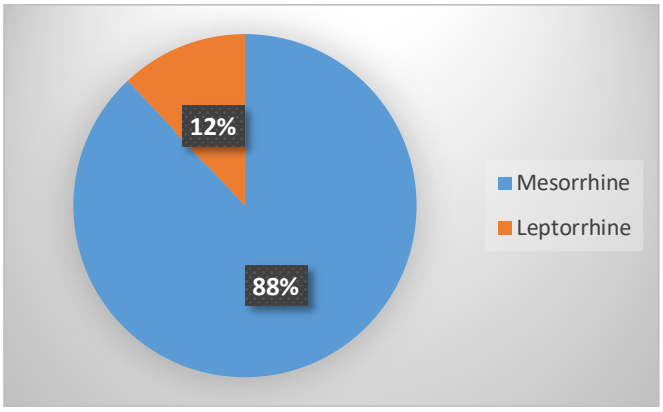

Fig.1 Pie graph showing the percentage of type of nose among Male and female population of Punjab

The Punjabi population predominantly exhibits the mesorrhine nasal type (88%), indicating that medium-width noses are most common. In contrast, only 6% show the leptorrhine type, suggesting that narrow noses are relatively rare. This pattern implies a tendency toward broader nasal structures, which are often considered adaptive traits for warmer, more humid climates. According to Asharani et al. (2014), the Indian population largely displays the mesorrhine type, followed by platyrrhine and leptorrhine forms. Patil et al. (2014) found mesorrhine noses to be most prevalent among males and leptorrhine among females in South India—a finding that contrasts with the current study.

Choudhary et al. (2012) compared the mean nasal height of Jats and Sindhis, reporting values of 56.42±3.70 mm and 55.84±4.61 mm, respectively. They concluded that the predominant nasal type among Jats was leptorrhine, whereas Sindhis mostly exhibited the mesorrhine type. Reviewing previous studies reveals that nasal morphometric characteristics vary significantly by gender, age, ethnicity, and race. A meta-analysis would be valuable to better understand these variations. For instance, Chettri et al. (2017) reported leptorrhine noses as the most frequent type among female students at Sikkim University. Hegazy et al. (2014) found statistically significant differences in nasal index between males and females. Their study on healthy Egyptians aged 1 month to 65 years showed that at one year, the mean nasal index exceeded 85—classified as platyrrhine. This value declined to around 70 between ages one and five, indicating a shift to mesorrhine type. After age 20, a significant gender difference emerged, with mean nasal indices of 71.46 in males and 64.56 in females.

NASAL INDEX OF KASHMIR POPULATION

Table 2 describe the both males and females exhibit nearly identical nasal height values, with males averaging 46.12 ± 2.95 mm and females 46.11 ± 3.46 mm. The p-value of 0.98 indicates no statistically significant difference in nasal height between genders, suggesting uniformity in this dimension. However, nasal width shows a marked variation, with males having a significantly broader nose (27.16 ± 1.37 mm) compared to females (23.42 ± 2.23 mm), supported by a highly significant p-value of less than 0.001. This difference in nasal width contributes to a higher nasal index in males (59.08 ± 4.16) than in females (57.67 ± 3.18), with a p-value of 0.04, indicating statistical significance. These findings suggest that while nasal height remains consistent across genders in the Kashmiri population, nasal width and nasal index exhibit sexual dimorphism, reflecting broader nasal proportions in males.

Table.2 Mean and + SD of nasal index of Male (n=24) population of Kashmir

Gender	Nasal Height	Nasal Width	Nasal Index
Male	46.12± 2.95	27.16±1.37	59.08± 4.16
Female	46.11± 3.46	23.42±2.23	57.67±3.18
P-value	**0.98**	**< 0.001**	**0.04**

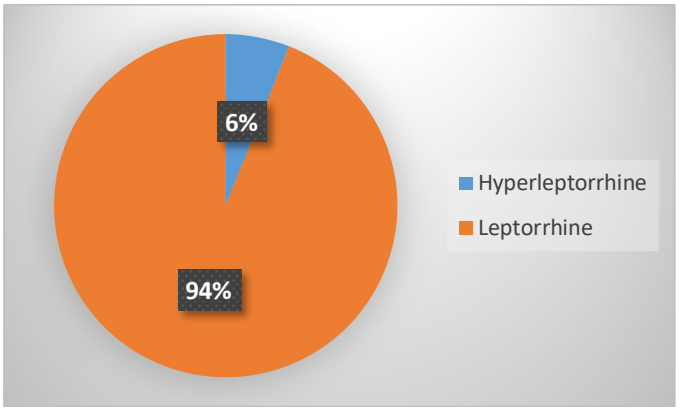

Fig. 2 Pie graph showing the percentage of type of nose among female population of Kashmir

Also Kashmir Population Predominantly show Leptorrhine (94%) Narrow noses and a small Presence of Hyperleptorrhine (6%) noses (Fig2). This nasal morphology is consistent with populations adapted to colder, drier climates, where narrower nasal passages help warm and humidify air before it reaches the lungs. Some previous studies showed that in hot, humid conditions a low, broad nose serves to dissipate heat which affects the shape of nose. It has been seen that if a child of African descent is born in very chilly climate and on the other hand if a child of Caucasian descent is born in a very hot and humid environment. In both cases, they retain their size and shape of the nose irrespective of the environmental influence. It means that an environmental factor plays a smaller role in determining the nasal index of an individual (Ordu et al., 2016).

Table:3 Classification of nose shape according to finding of the present study of nasal index

Type of nose	**Punjab Population**	**Kashmir Population**
Hyperleptorrine	-	6
Leptorrhine	12	94
Mesorrhine	88	-
Chi-square(χ^2)	**164.15**	

The comparative analysis of nasal morphology between Punjabi and Kashmiri populations reveals distinct adaptations shaped by their respective climates. The Punjabi population predominantly exhibits the mesorrhine nasal type (88%), characterized by medium-width noses, while only 6% show the leptorrhine type. This suggests a tendency toward broader nasal structures, which are typically associated with adaptation to warmer, more humid environments—facilitating efficient heat dissipation and moisture regulation. In contrast, the Kashmiri population shows a striking dominance of the leptorrhine type (94%), with an additional 6% exhibiting hyperleptorrhine features, indicating extremely narrow noses. The Chi-square value of 164.15 indicates a highly significant difference in the distribution of nose types between the Punjab and Kashmir populations. This supports the conclusion that nasal morphology is strongly influenced by regional and environmental factors.

IV CONCULSION

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