Anthropometric Study of Nasal Index in Medical Students of Nepal

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ABSTRACT

Introduction: Nasal anthropometry, focusing on the nasal index, highlights ethnicity and gender specific variations influenced by genetics, environment, and evolution. This study aims to analyze the nasal index of medical students to provide insights into the anthropometric variations across gender and ethnic groups. Understanding these variations can contribute to the growing body of knowledge on human morphology and may have implications for clinical and surgical practices involving nasal anatomy.

Methods: A descriptive cross sectional study was conducted among 135 medical students from 15th August 2024 to 30th November 2024. Data were collected on baseline history. Anthropometric measurements of the nose were taken using a vernier caliper. Data was entered in Microsoft Excel sheet, nasal index was calculated and analyzed using SPSS version 23. Descriptive statistics were used to summarize findings.

Results: Mesorrhine was the most common nasal type overall 71 (52.6%), observed in 37 (52.9%) males and 34 (47.9%) females. Ethnically, mesorrhine was predominant among Brahmin/Chhetri 17(51.5%), Dalits 4(66.7%), and Madhesi 38(54.3%) students. Leptorrhine was frequent in Janajati (6, 42.9%), while hyperleptorrhine and hyperplatyrrhine were least common across all groups.

Conclusion: The study reveals that mesorrhine nasal morphology was the most common type among both males and females, with subtle differences in distribution. Ethnically, mesorrhine predominates among Brahmin/Chhetri, Dalits, and Madhesi students, while leptorrhine is more common in Janajati individuals. Rare types, such as hyper leptorrhine and hyper platyrrhine, show minimal representation across genders and ethnicities, reflecting distinct anthropometric patterns.

Keywords: Anthropometric; Cross Sectional Study; Ethnicity, Genders; Medical Students

INTRODUCTION

Nasal anthropometry involves measuring various parameters of the human nose and is recognized as an ethnicity- and gender-specific feature.The nose, being centrally positioned in facial architecture, highlights the importance of nasal parameters like shape and size.[1] The nasal index is a crucial anthropometric parameter used to classify nasal morphology into distinct categories such as hyper leptorrhine, leptorrhine, mesorrhine, platyrrhine, and hyper platyrrhine.[2] This index varies significantly across populations, reflecting genetic, environmental, and evolutionary influences. Anthropologists have long utilized the nasal index to differentiate among human races and subspecies.[3,4,5] Anthropometric studies of the nasal index play an essential role in understanding human diversity, aiding in the fields of medical and forensic research. It also serves as a crucial measurement in rhinoplasty and the evaluation of craniofacial deformities.Its significance has been repeatedly emphasized by scientists in plastic surgery involving the head and neck, orthodontics, and forensic applications, particularly in identifying missing persons or deceased individuals.[6,7,8] Nasal morphology is not only a marker of ethnic and racial identity but also has functional implications, as the nasal structure adapts to climatic conditions, such as temperature and humidity, over generations.[9]

Despite its importance, there is a paucity of data on the nasal index among young adults in medical settings, particularly in diverse populations like Nepal. This study aims to analyze the nasal index of medical students, focusing on its distribution across gender and ethnic groups, and to provide insights into the anthropometric variations within this demographic. Understanding these variations can contribute to the growing body of knowledge on human morphology and enrich the previous studies.

METHODS

This was a descriptive cross sectional study conducted in the Department of Anatomy of Birat Medical College Teaching Hospital(BMCTH) from August 15 2024 to November 30 2024. Ethical approval was obtained from the institutional review committee of BMCTH (IRC-PA-411/2024). Participants' data were anonymized to maintain confidentiality.

A total of 135 first and second year nepali nationality medical students participated in the study. Participants were selected using total enumeration sampling technique. Written informed consent was obtained from all participants prior to data collection.
Medical students with nepali nationality and willing to participate were included for the study and those from outside nepali origin, with congenital nasal deformities, facial trauma, or previous nasal surgery, genetic, and endocrine disorders, heart diseases, kidney diseases, bony growth, visible tumor on head/face etc. were excluded from the study. Data were collected on baseline history (age,gender,ethnicity). Anthropometric measurements of the nose were taken using a vernier caliper. Nasal width was measured as the distance between the widest points of the nasal alae. Nasal height was measured from the nasion (midpoint of the nasofrontal suture) to the base of the nose(subnasale), Figure 1. The nasal index (NI) was calculated using the formula: (Nasal Width/Nasal Height)×100

Based on the nasal index, participants were classified into five nasal types2, namely -Hyper Leptorrhine (<55): very narrow nose, leptorrhine (55–69.9): narrow nose,Mesorrhine (70–84.9): moderate nose, Platyrrhine (85–99.9): wider nose and Hyperplatyrrhine (≥100): very wider nose. Caste/ Ethnicity was classified as Dalit, Janajati, Madhesi, Muslim, Brahmin/Chhetri and others according to Health Management Information System, Caste/ethnicity.10 Data was entered in Microsoft Excel sheet and analyzed using SPSS version 23. Descriptive statistics (mean, standard deviation, and percentages) were used to summarize findings. Descriptive statistics (mean, standard deviation, and percentages) were used to summarize findings.

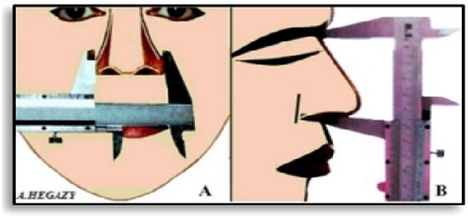

Figure 1: A) Nasal breadth/width, B) Nasal height, measured by vernier caliper.[11]

RESULTS

A total of 135 students were included during the study period. The mean±SD of age was 21.47±0.99 years in which 70 (51.85%) were males and 65 (48.15%) females. Majority 70(51.85%) were Madhesi by ethnicity followed by Brahmin/Chhetri 33 (24.4%).

Table 1: Anthropometric classification of nasal index in medical students(n=135)

Categories	n(%)
Hyperleptorrhine	5(3.7)
Leptorrhine	30(20.2)
Mesorrhine	71(52.6)
Platyrrhine	22(16.3)
Hyperplatyrrhine	7(5.2)

Table 2: Gender and ethnicity distribution of morphological classification of nose among medical students

Characyeristics	Hyperleptor-rhine	Leptor-rhine	Mesorrhine	Platyrrhine	Hyperplatyr-rhine
Gender					
Female(n=65)	**3(4.6)**	**15(23.1)**	**34(47.9)**	**10(45.5)**	**3(4.6)**
Males(n=70)	**2(2.9)**	**15(21.4)**	**37(52.9)**	**12(17.1)**	**4(5.7)**
Ethnicity					
Brahmin/Chhetri					
(n=33)	4(12.1)				
	7(21.2)	17(51.5)	4(16.7)	1(3.0)	
Dalit(n=6)	0(0)	1(16.7)	4(66.7)	1(16.7)	0(0)
Janajati(n=14)	1(7.1)	6(42.9)	7(50)	0(0)	0(0)
Madhesi(n=70)	0(0)	12(17.1)	38(54.3)	14(20.0)	6(8.6)
Muslim(n=7)	0(0)	3(42.9)	3(42.9)	1(14.3)	0(0)
Others(n=5)	0(0)	1(20.0)	2(40.0)	2(40.0)	0(0)

Mesorrhine (moderate nasal width) is the most common nasal type overall (71 out of 135 students, 52.6%), followed by leptorrhine (narrow nose) seen among 30(20.2%) students,Table 1.

Mesorrhine was the most common nasal type among both genders, accounting for 37 (52.9%) males and 34 (47.9%) females. Hyperleptorrhine and Hyperplatyrrhine were less common in both genders, representing 3 (4.6%) and 4 (5.7%) in females and males, respectively.
Among Brahmin/Chhetri students, mesorrhine was most frequent 17(51.5%), followed by leptorrhine 7(21.2%), hyperleptorrhine (4, 12.1%), and platyrrhine (4, 16.7%). For Dalits, mesorrhine dominated 4(66.7%) with no instances of hyper leptorrhine or hyper platyrrhine.
Among 14 Janajati students, mostly had leptorrhine (6, 42.9%) and mesorrhine (7, 50%), with minimal representation of other types. Madhesi students predominantly exhibited mesorrhine 38(54.3%), followed by platyrrhine 14(20%) and leptorrhine 12(17.1%), with a notable presence of hyper platyrrhine 6(8.6%).

DISCUSSION

This study provides valuable baseline data on nasal morphology among medical students in a medical college of Eastern Nepal. By including both male and female participants from diverse ethnic backgrounds, the study offers insights into gender- and ethnicity-based variations in nasal index classification. In the present study, mesorrhine emerged as the most common nasal type in both genders, with a slightly higher prevalence among males 37(52.9%) compared to females 34(47.9). These findings differ from study by Sudhakar Kumar Ray et al in India emphasizing more common in females than male.1 Mesorrhine was also the most commonest among all ethnic groups in this study, which is similar to a study done in Nepal by Hari Prasad Upadhyay[12] and in India by Maitreyee Kulkarni et al in their study.[13] The observed differences in nasal types can be attributed to genetic inheritance, environmental adaptations, and evolutionary processes. For instance, the narrower nasal types, such as hyper leptorrhine(very narrow nose) and leptorrhine (narrow nose), predominated among Brahmin/Chhetri and Janajati populations, while leptorrhine was most dominant among muslim ethnicity in this study. Conversely, broader nasal types, such as platyrrhine [14](20%) and hyperplatyrrhine 6(8,6%) were most prevalent among Madhesi populations in the study. Madhesi individuals primarily inhabit lowland plains characterized by hot and humid climates. Some studies suggested that variation in nasal morphology are thought to be due to human human adaptation to diverse climatic environments in order to provide efficiency in respiratory physiology.[14] However other studies contradict the rational suggesting inconsistent evidence in supporting the influence of nasal shape and size with respiratory physiology.[15] The gender difference was minimal in our study, suggesting that while nasal morphology may show slight gender-specific variations, it is predominantly influenced by ethnicity and environmental factors. The evolutionary significance of nasal morphology cannot be overlooked. Human populations have undergone millennia of adaptation to diverse environments, leading to distinct nasal structures optimized for respiratory efficiency. For example, populations in Arctic regions exhibit narrow and elongated noses to warm the air effectively, while those in tropical climates display broader noses to enhance ventilation and thermoregulation.[16] Socioeconomic and nutritional factors also contribute to variations in nasal morphology.[17] Cultural influences further justify the variations in nasal types. Societal perceptions of beauty and aesthetic preferences can impact the selection of certain nasal traits over time. For instance, in some cultures, narrow and straight noses are considered more appealing, influencing subtle shifts in nasal morphology through intergenerational preferences.[18]

The functional and physiological significance of nasal morphology underscores its evolutionary and adaptive importance. The nose serves as a critical structure for breathing, filtering, and conditioning air. Variations in nasal shape and size are not merely aesthetic but serve specific physiological purposes, ensuring optimal respiratory function in diverse climates.[19]

In conclusion, the variation in nasal types observed in this study reflects the dynamic interplay of genetics, environment, evolution, and culture. The findings provide valuable insights into the anthropometric diversity of nasal morphology, with implications for plastic surgery, forensics, and anthropology. A key strength of this study is the use of standardized anthropometric measurements, ensuring reliability and consistency in data collection. The classification of nasal morphology into hyper leptorrhine, leptorrhine, mesorrhine, platyrrhine, and hyper platyrrhine categories enables a structured analysis of variations, which can be useful for comparative studies across different populations. Furthermore, the study highlights the influence of genetic and environmental factors on nasal morphology, supporting its relevance in medical, surgical, and forensic applications.

The findings can be particularly useful for plastic surgeons orthodontists, and anthropologists studying craniofacial diversity. Additionally, by addressing nasal morphology variations in a multiethnic population, the study contributes to a growing body of knowledge on human adaptation and evolution. Overall, this research lays the groundwork for future studies exploring nasal anthropometry in broader populations, with potential applications in clinical diagnostics, forensic investigations, and reconstructive surgery.

CONCLUSION

The study reveals that mesorrhine nasal morphology is the most common type among both males and females, with subtle differences in distribution. Ethnically, mesorrhine predominates among Brahmin/Chhetri, Dalits, and Madhesi students, while leptorrhine is more common in Janajati individuals. Rare types, such as hyperleptorrhine and hyperplatyrrhine, show minimal representation across genders and ethnicities, reflecting distinct anthropometric patterns.

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