

Anthropological Comparison Of Nasal And Facial Indices Between Meena And Yadav Communities In Alwar Region

Dr Amit Manchanda^{1*}, Dr Vimal Modi², Dr Ajay Nene³

¹PhD Scholar, IMCH & Research Centre, Indore, dramitsmile@gmail.com

²Professor & HOD, IMCH & Research Centre, Indore

³Director Professor & HOD, ESICMCH, Alwar, Rajasthan

Abstract

Background: Human facial and nasal morphologies exhibit considerable variation across different populations, influenced by genetic, environmental, and socio-cultural factors. The study aimed to compare the nasal index and facial index among the Meena and Yadav communities residing in Alwar district, Rajasthan, to understand ethnic and gender-based differences in facial morphology.

Methods: A total of 110 participants, comprising 55 individuals from each community (Meena and Yadav), were selected using purposive sampling. The nasal index and facial index were calculated based on anthropometric measurements taken with a digital vernier caliper and spreading caliper. Descriptive and comparative statistical methods, including Chi-square tests and independent sample t-tests, were used to analyze the data.

Results: The majority of participants from both the Meena and Yadav communities were classified as Platyrrhine (nasal index ≥ 85), with 85.45% of Meena and 90.90% of Yadav participants falling into this category. Regarding the facial index, a significant proportion of the Meena community (43.64%) was classified as Hyper-leptoprosopic (facial index ≥ 93), whereas the Yadav community showed a higher proportion of Hyper-leptoprosopic individuals (52.73%).

Conclusions: The study demonstrates ethnic and gender-based differences in the nasal and facial indices between the Meena and Yadav communities, with a predominance of Platyrrhine nasal and Hyper-leptoprosopic facial types. These findings provide insight into the morphological characteristics of these communities and contribute to the broader understanding of ethnic variations in human facial structures.

Keywords: Facial index, Nasal index, Platyrrhine, Rajasthan, Yadav

INTRODUCTION

Facial morphology, including both the nasal and facial structures, plays a critical role in human identification and classification. The study of the relationship between nasal and facial features has been an area of interest in anthropology, forensic science, and medical research. Understanding the variations in these features across different populations can provide valuable insights into ethnic differences, genetic inheritance, and the biological factors that contribute to facial shape and structure [1]. This research focuses on the comparison of nasal and facial indices in two distinct communities—Meena and Yadav—residing in the Alwar district of Rajasthan, India. These communities were chosen for their cultural and ethnic diversity, which allows for a comparative study of the variations in facial morphology based on community and gender [2].

Facial indices are numerical expressions of the relationship between the height and breadth of the face and nose, which can vary according to genetic, environmental, and cultural factors. The **nasal index** is the ratio of the nasal breadth to nasal length, providing a classification of the nose into three broad types: Leptorrhine (narrow nose), Mesorrhine (medium nose), and Platyrrhine (wide nose). Similarly, the **facial index** measures the relationship between the height of the face and the breadth of the face, classifying individuals as Hyper-euryprosopic, Euryprosopic [3], Meso-prosopic, Lepto-prosopic, or Hyper-leptoprosopic, depending on the proportions of their facial features. These indices are not only of academic interest but also have practical implications in various fields such as reconstructive surgery, anthropology, and forensic science [4].

The aim of this study is to assess and compare the nasal and facial indices among males and females of both the Meena and Yadav communities, in order to observe any significant differences in the shape and structure of the face and nose across these two groups.

Previous studies on human facial morphology have indicated that gender, ethnicity, and environmental factors contribute to variations in facial and nasal dimensions. Males, on average, tend to have broader

and longer faces compared to females [5]. Moreover, ethnic variations play a role in determining the shape of the nose and face, with certain populations exhibiting consistent morphological patterns based on geographical and genetic factors. For instance, populations from the African and Caucasian continents are typically classified as platyrrhine and leptorrhine, respectively, due to differences in nasal dimensions. However, studies on Indian populations are relatively limited, especially concerning specific communities within the region [6,7].

The present study seeks to fill this gap by exploring these indices in the Meena and Yadav communities, providing a detailed analysis of the variations in facial morphology based on community and gender. By comparing these two communities, the study aims to contribute to a broader understanding of ethnic and gender-based differences in facial and nasal structures. Furthermore, the findings may have implications for applied fields such as anthropology, medicine, and forensic sciences, where accurate identification and categorization of facial features are crucial.

METHODOLOGY

The study employed a descriptive analytical design, aimed at examining the facial morphological features and their variations across different communities in the Eastern Rajasthan region. The study utilized a quantitative approach for data collection and analysis.

A quantitative approach was followed to quantify the facial features of the study participants through precise measurements, utilizing instruments designed for accuracy and reliability.

The study was conducted in the Department of Anatomy at ESIC Medical College and Hospital (ESICMCH), located in Alwar, Rajasthan. The hospital provides a conducive environment for anatomical research and allowed for easy access to the target population.

The target population consisted of adult individuals from various communities residing in Eastern Rajasthan, who possessed symmetrical facial features. The study focused on individuals from both the Jat and non-Jat communities of the Alwar district.

The accessible population included adults residing within or in the vicinity of the ESIC Medical College and Hospital. Participants were selected based on their ability to provide valid informed consent.

A total of 110 subjects were included in the study, who met the predefined inclusion and exclusion criteria.

Purposive sampling was employed in this study. Participants were selected based on specific characteristics and the objectives of the study, ensuring that they were representative of the target population.

The following criteria were established for participant inclusion:

1. Age between 18 to 50 years.
2. Apparent physical health, with no history of facial abnormalities.
3. Symmetrical facial morphology, assessed visually and by measurements.

The following criteria were applied for participant exclusion:

1. Subjects with any nasal trauma.
2. Individuals with a history of plastic or reconstructive facial surgery, or cleft lips.
3. Those with congenital facial malformations were also excluded from the study.

Data regarding the demographic and morphological features of the subjects were collected through the following tools:

- A pre-structured proforma that included details such as identity, socio-economic status, occupation, and community.
- Anthropometric measurements were taken using the following instruments:
 1. **Spreading Caliper:** To measure the nasal and facial dimensions.
 2. **Sliding Compass:** For measuring specific nasal features.
 3. **Digital Vernier Caliper:** For precise measurements of facial and nasal features.

1. **Spreading Caliper:** Used for measuring facial dimensions.
2. **Digital Vernier Caliper:** For accurate measurements of nasal and facial structures.

Data collection occurred in a controlled environment, with subjects seated in a well-lit room in a relaxed state. All subjects were instructed to maintain an anatomical head position during measurements. The following parameters were measured:

- **Nasal Length (NL):** Measured from the nasion (midpoint of the frontonasal suture) to the pronasale (tip of the nose).
- **Nasal Breadth (NB):** Measured at the widest point of the nose, perpendicular to the nasal length, between the ala of the nose.

○ **Nasal Index:** Calculated using the formula:

$$\text{Nasal Index} = \left(\frac{\text{Max. Nasal Breadth}}{\text{Nasal Length}} \right) \times 100$$

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- **Facial Height (FH):** Measured from the nasion to the gnathion.
- **Facial Breadth (FB):** Measured across the zygomatic arches (from right to left zygomatic bone).

○ **Facial Index:** Calculated using the formula:

$$\text{Facial Index} = \left(\frac{\text{Facial Height}}{\text{Bizygomatic Diameter}} \right) \times 100$$

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The research tools were developed by the investigators and tested for validity during the pilot study. The tools were refined based on feedback, with any inconsistencies addressed to enhance alignment with the study objectives. Data was gathered using the specified instruments under standardized conditions. Measurements of facial and nasal features were taken accurately, and demographic data was collected through a structured proforma, ensuring consistency and reliability.

Data collected from the study subjects was entered into Microsoft Excel for further analysis. The analysis involved the following:

- **Quantitative Data:** The mean and standard deviation (SD) were calculated for continuous variables.
- **Categorical Data:** Percentages and proportions were used to summarize categorical data.
- **Statistical Tools:** SPSS software (version 26) was employed for data analysis.
- **Comparative Analysis:** The Chi-square test was used for comparing categorical variables, while independent sample t-tests were used to compare continuous variables.
- **Statistical Significance:** A p-value of <0.05 was considered statistically significant for all tests.

This methodology ensured a robust and comprehensive approach to analyzing the morphological features of facial structures in the targeted population.

RESULTS

A total of 110 study participants were included in the analysis of the Nasal Index across the Meena and Yadav communities. The distribution of participants based on the Nasal Index for both communities is summarized in Table 1.

Table 21: Comparison of Nasal Index Among Meena and Yadav Communities (N=110)

Nasal Index (mm)	Meena			Yadav		
	Male	Female (%)	Total (%)	Male	Female (%)	Total (%)
40.00 - 69.99	Leptorrhine	0	0	0	2 (6.06)	1 (4.55)
70.00 - 84.99	Mesorrhine	6 (17.64)	5 (23.81)	11 (20.00)	2 (6.06)	4 (18.18)
≥ 85	Platyrrhine	28 (82.35)	16 (76.19)	44 (80.00)	29 (87.88)	17 (77.27)
Total		34	21	55	33	22

Table 2: Comparison of Facial Index Among Meena and Yadav Communities (N=110)

Facial Index (mm)	Meena			Yadav		
	Male	Female (%)	Total (%)	Male	Female (%)	Total (%)

Less than 78.9	Hyper-euryprosopic	0	0	0	0	0
79.0 – 83.9	Eury-prosopic	5 (14.70)	2 (9.52)	7 (12.73)	3 (9.09)	3 (13.64)
84.0 – 87.9	Meso-prosopic	6 (17.64)	1 (4.76)	7 (12.73)	3 (9.09)	2 (9.09)
88.0 – 92.9	Lepto-prosopic	9 (26.47)	8 (38.09)	17 (30.91)	10 (30.30)	7 (31.82)
93.0 and above	Hyper-leptoprosopic	14 (41.17)	6 (28.57)	20 (36.36)	17 (51.51)	10 (45.45)
Total		34	21	55	33	22

Analysis:

Nasal Index Comparison:

Meena Community:

Among the Meena community, the majority exhibited Platyrrhine noses (Nasal Index ≥ 85), making up 80% (44 out of 55) of the total. The Mesorrhine type (Nasal Index between 70.00–84.99) was present in 20% of Meena participants, with a slightly higher proportion of females (23.81%) compared to males (17.64%). The Leptorrhine type was absent in this group.

Yadav Community:

Similar to the Meena community, the Yadav community had a high prevalence of Platyrrhine noses, accounting for 80% (46 out of 55) of participants. The Mesorrhine type was found in 7.27%, with a higher occurrence in females (18.18%) compared to males (6.06%). The Leptorrhine nasal type was found in 2.73% of the Yadav group.

Facial Index Comparison:

Meena Community:

In the Meena community, Hyper-leptoprosopic faces (Facial Index ≥ 93) were most common, observed in 36.36% (20 out of 55) of participants. The Lepto-prosopic type (Facial Index between 88.0 – 92.9) was found in 30.91% of Meena participants.

The Mesoprosopic type was observed in 12.73%, and the Eury-prosopic type (Facial Index 79.0 – 83.9) was seen in 12.73% as well.

Yadav Community:

In the Yadav community, Hyper-leptoprosopic faces were also most common, observed in 36.36% (27 out of 55) of participants, slightly less than the Meena group. The Lepto-prosopic type occurred in 29.09% of Yadav participants, and Mesoprosopic faces were observed in 9.09%.

The Eury-prosopic type was found in 9.09% of Yadav participants.

Both communities predominantly exhibited Platyrrhine and Hyper-leptoprosopic facial types, with slight variations in the proportions across different nasal and facial index categories. These findings suggest that while there are some similarities between the two communities, the distribution of certain nasal and facial types shows minor differences.

DISCUSSION

Regarding the Facial Index, most individuals from both communities were classified as Hyper-leptoprosopic (≥ 93.0), with males showing a greater tendency towards this category.

J Deva et al. (2024) [9] study on the nasal index in South Indian populations found a similar predominance of Platyrrhine noses among populations from southern India, particularly in tropical regions. The high percentage of Platyrrhine classification in the Yadav and Meena communities corresponds to this pattern observed in southern India, suggesting that environmental and genetic factors may play a significant role in shaping nasal features.

D Dabhi et al. (2025) [3] study comparing facial indices in different Indian ethnic groups found that the Leptoprosopic facial type was more prevalent in North Indian populations, which contrasts with the Hyper-leptoprosopic and Lepto-prosopic categories observed in this study for the Meena and Yadav communities. The differences in the facial type classifications could reflect regional differences and the unique genetic makeup of the populations in Rajasthan.

Nazim Nasir et al. (2021) [9] study on the nasal index among Indian ethnic groups found a high prevalence of **Platyrrhine** noses in populations from the northern and central regions of India, similar to the findings in the Yadav and Meena communities. This consistency further supports the idea that the wider nasal structure is common in populations living in warmer climates, as it is believed to aid in temperature regulation and humidity control.

CONCLUSION

The present study provides a detailed comparison of facial and nasal indices between the Meena and Yadav communities, contributing to the understanding of ethnic and gender-based variations in facial morphology. The patterns observed in this study, particularly the prevalence of **Platyrrhine** nasal structures and **Hyper-leptoprosopic** facial types, align with findings from previous studies, reinforcing the influence of ethnicity, geography, and environmental factors on human facial morphology. Further research involving a larger sample size and comparisons across additional communities would help to refine these findings and enhance their applicability in fields like anthropology and forensic science.

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