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Research Article

Anthropometric Study of Facial and Nasal Indices in Young Adults of Gujarat

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ABSTRACT

Background: In forensic sciences, anthropometric parameters of the face are valuable in the identification of unknown human remains. Facial Index (FI) and Nasal Index (NI) are important cephalometric markers for classifying face and nose types across populations and show regional and ethnic variability.
Aim: To determine the average values of Facial Index (FI) and Nasal Index (NI) among young Gujarati adults, compare gender-based differences, and classify facial and nasal morphology.
Materials and Methods: A cross-sectional descriptive study was conducted on 200 medical students (100 males, 100 females) aged 18–26 years, native to Gujarat. Subjects with normal dental occlusion, competent lips, and no craniofacial abnormalities were included. Facial height, bizygomatic width, nasal height, and nasal breadth were measured with digital vernier caliper and measuring tape. FI and NI were calculated using standard formulae. Data were analyzed with SPSS v25. Student's t-test compared genders, with significance at $p<0.05$.
Results: The mean FI was 88.4 ± 3.7 for males and 86.3 ± 3.8 for females ($p=0.021$). The commonest facial type was leptoprosopic in males (46%) and mesoprosopic in females (43%). The mean NI was 77.7 ± 5.4 in males and 71.3 ± 4.8 in females ($p=0.014$). The predominant nasal type was mesorrhine in males (54%) and leptorrhine in females (58%).
Conclusion: Gujarati males typically present with long faces and medium noses, while females exhibit round faces and narrow noses. This study provides baseline anthropometric standards for the Gujarati population, valuable in forensic anthropology and reconstructive surgery

Keywords: *Facial Index, Nasal Index, Anthropometry, Forensic Anthropology, Gujarat.*

INTRODUCTION

Human facial morphology carries significant anthropological, forensic, and clinical importance. Among the "Big Four" determinants in forensic anthropology—age, sex, stature and race—facial morphology is critical in personal identification when more routine methods are limited [1-3].

Anthropometric measurements of the face differ across ethnic and racial groups, and cephalometric markers such as the Facial Index (FI) and Nasal Index (NI) are recognized worldwide for classifying human populations. The FI describes proportional relationships of facial height and width, while the NI is based on nasal breadth and height, classifying nasal types [4,5].

Despite many studies across India, literature on facial morphology of the Gujarati population remains sparse. Given the ethnic distinctness of Gujarat, establishing normative values is essential for forensic identification, plastic surgery, orthodontics, and other specialties.

The present study aimed to determine the average FI and NI in Gujarati medical students, evaluate sexual dimorphism, and classify facial and nasal morphology types.

MATERIALS AND METHODS

Study Design & Setting:

Descriptive cross-sectional study conducted among Gujarati medical students.

Sample Size:

200 participants (100 males, 100 females), aged 18–26 years, selected by simple random sampling from a local medical college.

Inclusion Criteria:

- Normal Class I occlusion with competent lips
- No prior surgical/orthodontic treatment
- Normal overjet and overbite
- Originally belonging to Gujarat (both parents Gujarati)
- Pleasing profile, free of craniofacial anomalies

Exclusion Criteria:

Facial scars, craniofacial abnormalities, facial edema, baldness obfuscating landmarks, physical disorders such as dwarfism or gigantism.

Measurements:

- Tools: Digital vernier caliper, measuring tape, skin marker

Parameters:

- Facial Index (FI) = (Total facial height ÷ Bizygomatic width) × 100
- Nasal Index (NI) = (Nasal breadth ÷ Nasal height) × 100

Classification (Martin–Saller for FI):

- Hyperleptoprosopic >93, Leptoprosopic 88–92.9, Mesoprosopic 84–87.9, Euriprosopic 79–83.9, Hypereuriprosopic <79

Classification (Nasal Index):

- Hyperleptorrhine <55, Leptorrhine 55–69.9, Mesorrhine 70–84.9, Platyrrhine 85–99.9, Hyperplatyrrhine ≥100

Statistical Analysis:

Data tabulated in Microsoft Excel, analyzed with SPSS v25. Mean ± SD calculated. Gender differences assessed with Student's unpaired t-test; $p < 0.05$ considered significant.

RESULTS

Table 1. Mean Facial and Nasal Index

Index	Males (n=100)	Females (n=100)	p-value
Facial Index	88.4 ± 3.7	86.3 ± 3.8	0.021
Nasal Index	77.7 ± 5.4	71.3 ± 4.8	0.014

Table 2. Distribution of Facial Types

Face Type	Males (%)	Females (%)
Hyperleptoprosopic	11	9
Leptoprosopic	46	29

Face Type	Males (%)	Females (%)
Mesoprosopic	31	43
Euriprosopic	9	16
Hypereuriprosopic	3	3

Table 3. Distribution of Nasal Types

Nasal Type	**Males (%)**	**Females (%)**
Hyperleptorrhine	2	6
Leptorrhine	16	58
Mesorrhine	54	32
Platyrrhine	26	4
Hyperplatyrrhine	2	–

Males showed predominantly leptoprosopic faces (46%) and mesorrhine noses (54%), whereas females showed mesoprosopic faces (43%) and leptorrhine noses (58%).

DISCUSSION

The present study demonstrates a clear manifestation of sexual dimorphism in the facial and nasal indices of Gujarati medical students.

Facial Index: Males exhibited higher FI (88.4) compared to females (86.3), indicating a tendency towards longer faces (leptoprosopic) in males, while mesoprosopic (round face) predominated among females. Similar patterns were observed in North Indian and Himachali populations, where males showed higher values of FI.

Nasal Index: Males in the study population predominantly exhibited mesorrhine noses (medium width), consistent with prior studies on the Gujarati population. In contrast, females showed a strong prevalence of leptorrhine (narrow) noses, echoing reports in other Indo-European ethnic groups.

African populations typically demonstrate higher NI and higher platyrrhine prevalence, while Gujarati and North Indian populations gravitate towards mesorrhine and leptorrhine morphology. This establishes clear population-specific differences useful in forensic anthropology [4].

The study by Praveen et al. (2013) found that among South Indian males aged 18–23 years, the mean cephalic index was 76.48, predominantly showing the mesocephalic head type, and the mean facial index was 90.95 with a significant correlation between cephalic and facial indices ($p < 0.0001$). These results highlight notable craniofacial variation within this population.

In a study conducted by Sushila Shekhawat and Manish Dev Sharma (2018), it was observed that the dominant facial type among males was mesoprosopic (50 subjects), followed by euriprosopic (24 subjects), leptoprosopic (12 subjects), hypereuriprosopic (11 subjects), and hyperleptoprosopic (3 subjects). Among females, the mesoprosopic type was also most prevalent (35 subjects), followed by hypereuriprosopic (25 subjects), euriprosopic (19 subjects), leptoprosopic (19 subjects), and hyperleptoprosopic (3 subjects).

The study by Pandey et al. (2017) assessed facial index among 140 medical students aged 18–24 years at Kathmandu Medical College, Nepal, finding the mean facial index to be 86.09 in males and 84.84 in females, with mesoproscopic

being the most common facial phenotype in both genders. Males exhibited higher mean morphological facial height (110.7 mm) and bizygomatic width (130.8 mm) compared to females (102.1 mm and 123.5 mm, respectively). The results suggest significant gender differences in facial measurements, and the dominant face type was mesoproscopic, followed by euriprosopic and leptoprosopic faces.

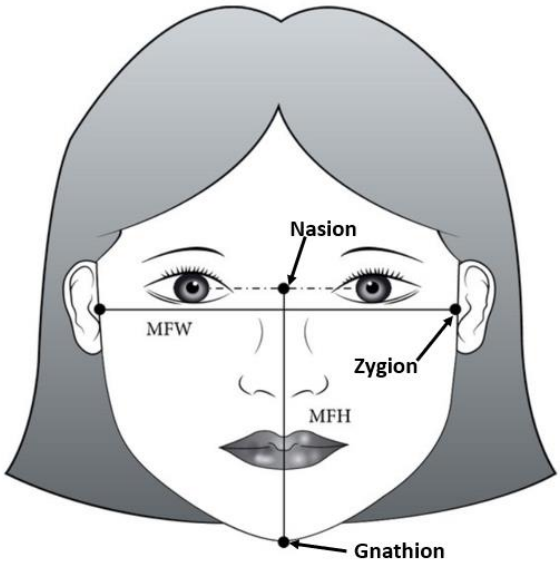
The study by Sarkodie et al. (2022) on the Bono and Ewe populations in Ghana found that males had significantly greater morphological facial height and facial breadth than females, with the hyperleptoprosopic (very long face) type being the predominant facial type in both tribes. Significant differences between the two tribes in facial dimensions highlight the need for tribe-specific facial standards for forensic and biometric applications.

The study by Palagiri Lakshmi Prasanna et al. (2020) on dental students found significant sexual dimorphism in facial indices, with males showing a higher mean facial index (83.4) than females (80.0), and mesoproscopic face type being most prevalent in males while hypereuryproscopic was dominant in females.
Facial anthropometric data assist forensic science in identifying unknown individuals in mass disasters and medico-legal cases. They also guide plastic and reconstructive surgery for facial norms and support orthodontics and prosthodontics in prosthetic rehabilitation and occlusal harmony assessment.

CONCLUSION

Gujarati males predominantly exhibit leptoprosopic face types with mesorrhine noses, while females show mesoprosopic faces and leptorrhine noses. Significant sexual dimorphism is present in both facial and nasal indices. These findings provide important anthropometric standards for forensic and clinical applications in the Gujarati population.

Figure 1: Measurement of morphological facial height (MFH) and morphological facial width (MFW).



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