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Research Paper

Comparative Study of Facial Morphology Among Males and Females Using Facial Index

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Abstract

The present study investigates the morphological characteristics of the human face, focusing on the facial index as a key anthropometric parameter. A total of 100 individuals (50 males and 50 females), aged 18–50 years were analyzed using standardized facial index classifications. Results showed that the predominant facial type among males was hyperleptoprosopic (40%) indicating a tendency toward elongated facial structures, followed by leptoprosopic (24%). In contrast, females most commonly exhibited the mesoprosopic type (36%), suggesting moderately round faces, with a significant number also displaying euryprosopic features (30%). Further the mean value of the morphological facial index in males was 94.54±11.37while in female value of parameters was, 86.30±11.43. The findings revealed clear differences in facial morphology between sexes, highlighting distinct patterns of facial structure and sexual dimorphism in this regional group.

Keywords: Forensic Anthropology, Somatomerty, Facial index, Face type

1. Introduction

Forensic facial comparison involves the detailed analysis of facial features to assess similarities between unknown individuals and potential matches, whether through photographs, videos, or skeletal remains. This method is essential in forensic anthropology, particularly for facial reconstruction and identification. By examining the skull and applying data on soft tissue depth and facial indices, experts can estimate facial appearance, aiding in determining ancestry, sex, and identity. In forensic science, facial comparison is widely used in criminal investigations, missing person cases, and disaster victim identification, especially when fingerprints or DNA are unavailable. Common techniques include morphological analysis, facial superimposition, photo-anthropometry and craniofacial morphometric analysis (Byers, 2016). These methods rely on both qualitative and quantitative assessments of facial shape and proportions (Ubelaker, 2018). By comparing known and unknown faces, forensic analysts help confirm or exclude identities, supporting legal proceedings and contributing significantly to forensic casework. Facial evaluation thus remains a vital tool in modern identification practice (Wilkinson, 2024). The present study investigates the morphological characteristics of the human face,

focusing on the facial index as a key anthropometric parameter. Moreover, this study is establishing essential baseline data on facial indices within this regional population, as anthropometric standards can vary considerably across ethnic and geographical groups, directly influencing the accuracy of forensic identification."

2. Methodology

Study Design: A cross-sectional study was conducted on 100 persons (50 females, and 50 male) aged 18-50. All the participants belong to Punjab. The participants are the students of Bachelor of Forensic Science and masters of Clinical Embryology of Dolphin PG college, Chunni Kalan. Before the measurement the written consent is taken, and methodology of the research is explained to the participants. The participants were instructed to face forward while seated in a chair. The vernier's two sliding ends, from nasion to gnathion. Callipers were set up. After removing the vernier calliper from the face, the height of the face—the straight distance between the nasion and the gnathion—was measured to the closest millimetre.

Maximum head length (g-op): It measures the maximum distance from Glabella (g) to opisthocranion when the head is oriented in eye-ear plane.

Morphological facial index morphological= facial height (n-gn)/ Facial breadth× 100

Morphological facial height (n-gn): It measures the straight distance between nasion (n) to gnathion (gn) when the head is oriented in eye-ear plane. All the measurements were taken thrice, and mean was calculated to correct accuracy of the measurement taken. Mean and standard deviation for each parameter were calculated. T- test is applied and statistical significance is checked by p value.

Figure 1: Image represents the facial measurement by using vernier calliper.

3. Result

Main focus of present study is on the morphological human face. Human face has distinct traits; one of them is facial index which is very useful in determining racial differences and sex of an individual. Facial index is determined by calculating the ratio between maximum width and maximum length of the face. In the present study facial index is measured of 100 people (50 female and 50 male). All the participants are in age 18-50 years and belongs to Punjab.

Table: 1 Classification of male face based on facial index

		Male(n=50)	
S.No	**Range**	**No.**	**%**
1.	< 79.9	8	16
2.	80.0-84.9	6	12
3.	85.0-89.9	4	8
4.	90.0-94.9	12	24
5.	95.0> 95	20	40

Table 2: Classification of male face according to Morphological Facial Index

S.No.	Type Of Face Class	Shape of Face	No. of Male
1.	Hypereuryprosopic	Very Board Face	8
2.	Euryproscopic	Broad Face	6
3.	Mesoprosopic	Round Face	4
4.	Leptoprosopic	Long Face	12
5.	Hyperleptoprosopic	Very Long Face	20

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Table 3: Classification of female face based on facial index

S.No	Range	Female(n=50)	
		No.	%
1.	< 79.9	5	10
2.	80.0-84.9	15	30
3.	85.0-89.9	18	36
4.	90.0-94.9	7	14
5.	≥ 95	5	10

Table: 4 Classification of female face according to Morphological Facial Index

S.No	Type Of Face Class	Shape Of Face	No. Of Female
1.	Hypereuryprosopic	Very Board Face	5
2.	Euryproscopic	Broad Face	15
3.	Mesoprosopic	Round Face	18
4.	Leptoprosopic	Long Face	7
5.	Hyperleptoprosopic	Very Long Face	5

Table 5: Statistics of facial index of male and female

S.No	Variable	Mean	P value
1.	Male (*n*=50)	94.54±11.37	$p < 0.05$
2.	Female (*n*=50)	86.30±11.43	$p < 0.04$

4. Discussion

The primary focus of the present study is on the morphological characteristics of the human face, with particular emphasis on the facial index—a crucial anthropometric parameter. The human face exhibits distinct traits that can be quantitatively assessed to evaluate sexual dimorphism and racial differences among populations. In the present cross-sectional study, facial indices of 100 individuals (50 males and 50 females) aged between 18 and 50 years were measured. All participants were natives of Punjab, ensuring a uniform ethnic background. The face types were categorized based on established anthropometric ranges of the facial index.

The data indicates that the majority of male participants (40%) belong to the hyperleptoprosopic category, suggesting a predominance of very long facial types in the studied Punjabi male population. This is followed by leptoprosopic individuals (24%), indicating that a significant portion of males have long faces. Fewer individuals fall into the broad and very broad face categories, showing a clear trend toward elongated facial morphology in this demographic.

Heidari et al., 2009 conducted a study on Baluchi and Sistani women, who showed close resemblances to northern Indians. This resemblance revealed a common origin of both, which could be explained by assuming common origin of immigrant Aryans of India and Bauchs and Sistanis of Iran. Indians from West Bengal had broad to very broad faces in both genders, according to research by Ghosh and Malik, 2007 on the region's population. According to Jahanshahi's research, the faces of Iranian Fars and Turkmens were round to broad (2008). According to the current study, female displayed round faces, while males had very long faces. Male North Indians possessed hyperleptoprosopic faces, while females had hyperleptoprosopic to mesene faces, according to Bannister's classification.

In case of female, the data reveals that the most common facial type among females in the sample is mesoprosopic (36%), indicating a predominance of moderately round faces. This is followed by the euryprosopic type (30%), representing broad facial features. Fewer females exhibit extreme facial proportions—only 10% fall into each of the hypereuryprosopic and hyperleptoprosopic categories. Unlike the male participants, where elongated face types

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were dominant, females in this population display a more balanced or broader facial morphology. This highlights sexual dimorphism in facial structure among the Punjabi population. According to Ansari MS et al. (2019) 81% of Jansari tribe females and 85% of males have leptene-type faces with notable sexual variations. A study by Prasanna et al. 2008 comparing the populations of North and South India confirmed the importance of the upper facial index for sexual dimorphism; most North Indian females have round faces, while North Indian males have leptene to hyperleptene (very long) faces.

These findings also have potential forensic implications. Since facial indices are integral to reconstructing facial profiles from skeletal remains, the accuracy of such anthropometric measurements directly influences the reliability of forensic facial reconstruction. A clearer understanding of sexual dimorphism and population-specific variations enhances the precision with which forensic experts can predict facial form, thereby improving identification in medico-legal investigations."

5. Conclusion

The present study highlights the significance of facial index as a reliable anthropometric tool for analyzing morphological variations in the human face. Male participants predominantly exhibited elongated facial types, with a high prevalence of the hyperleptoprosopic category. In contrast, female participants showed a tendency toward moderately broad and round facial types, with the majority falling into the mesoprosopic and euryprosopic categories. These differences emphasize the potential of facial index measurements in anthropological, forensic, and clinical applications for sex determination and population-based facial analysis.

This study demonstrates a positive correlation between male and female facial index. However, the findings are based on a limited sample size and data collected from a small area, which may affect the generalizability of the results. Future research should explore broader geographic areas, more diverse population of Punjab to validate these outcomes.

Ethics approval and consent to participate: This study is a part of bachelor's Degree submitted to the Dolphin PG College chunni Kalan, fathehgarh sahib, Punjab, India. Before data collection, the consent was taken from the participants and the meaning, and the purpose of the study was explained to them.

Competing interests: The authors declare that they have no competing interests.

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