

Original Research Article

Study of Variation in Total Facial Index of North Indian Population

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ABSTRACT

Background: Human face is a distinct criterion in personal identification and is a reflection of uniqueness of every individual. This makes it desirable to have some means of giving quantitative expression of variation that such traits exhibit. Although there are several methods are the metric (anthropometry) and morphological (anthroposcopy) assessment of characteristics of living and skeletal remains. Anthropometric measurements especially facial measurements are important for determining various face shape. Climatic adaptations and nutritional factors are found to be detrimental to body shape and size.

Objective: The main objective of this study was to examine Facial Index of North Indian population and to find out the distribution of their face type. This information will be highly important for Anatomists, Forensic Scientists, Criminologists, Plastic surgeons & Physical Anthropologists.

Methodology: A total number of 400 students (200 males & 200 females) of 18-25 year of age. Facial index is the facial height measured from Nasion to Menton with the help of sliding caliper and the facial width measured between the Zygon of each side with the help of spreading caliper.

Result: Mesoprosopic is the most common facial type in both males and females and the difference is statistically highly significant. Euriprosopic and Hypereuriprosopic facial types are more commonly seen in females whereas Mesoprosopic, Leptoprosopic and Hyperleptoprosopic facial types are common in males.

Key words: Anthropometry, Facial index, Mesoprosopic, Significant, North Indian Population

INTRODUCTION

'It is the common wonder of all men, how among so many million faces, there should be none alike' - Sir Thomas Browne.

All human beings occupying this globe belongs to the same species i.e. Homo Sapiens. No two individuals are exactly

alike in their measurable traits, even the genetically identical twins (monozygotic) differ in some respects. These traits tends to undergo changes in varying degree from birth to death, in health and in diseases under the influence of ecological, geographical, biological, racial, gender and age factors. Anthropometric characteristics

have direct relationship with gender, shape and form of a personal and these factors are closely linked with each other and are manifestation of the internal structure and tissue components which successively, are influenced by environmental and genetic factors. [1]

Measurement of total facial index is important for study of Human growth, Population variation, Aesthetic surgery, forensic science, Plastic surgery and Dentistry. The importance of seeing the face "*in proportion*" has been emphasized by many surgeons. All medical specialties interested in improving facial appearance need to measure the face to quantify the desired facial changes.

The climatic adaptations and nutritional factors are found to be detrimental to body shape and size. [2] Comparison of changes in facial index between parents, offspring and siblings can give a clue to genetic transmission of inherited characters. [3] Craniofacial anthropometrics have become an important tool for genetic counselors to identify any dysmorphic syndromes. [4] For assessment of variations in craniofacial morphology, the standards of anthropometric measurements should be established for a particular population. [5] A person with euryprosopic facial type favours the nasal breathing mode. [6] The human facial contour has always been an interesting subject for anatomists, anthropologists, plastic surgeons and artists. [7]

For the evolution of craniofacial morphology during development which differs among races and ethnic groups, Facial (Prosopic) index becomes an important anthropological parameter to categorize human population. The present study aimed to determining the morphometric facial type and their predominance in the North Indian population.

MATERIALS & METHODS

After obtaining an institutional ethical clearance and informed consent from all the subject, a total 400 students (200 males & 200 females) of age group 18-25 years were randomly selected and examined for this study. The participant who volunteered in the study were healthy and without any obvious craniofacial abnormalities like congenital, developmental or acquired through any form of trauma and had no history of plastic or reconstructive surgery.

In the present study **Hooten's method** were used for assessing the total facial index. The subject were asked to sit in a chair in a relaxed position keeping the mouth closed and teeth in central occluded position and head in anatomical position. [8] All the measurements were carried out after careful palpation of the head for anatomical landmarks and measurements were taken to the nearest 1mm.

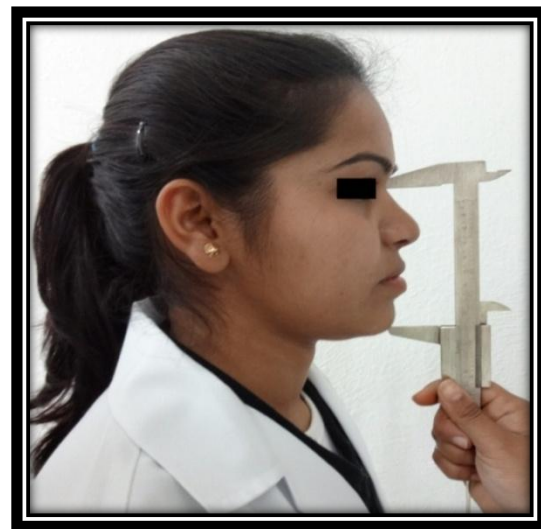


Fig 1: Showing measurement of Facial height (distance from Nasion to Menton) with the help of Sliding caliper.

Facial height (Fig. 1) were measured from **Nasion** (point on the root of the nose where the mid-sagittal plane cuts the Nasofrontal sutures) to **Menton** (lowest point on the mandible where the lower

margin of the lower jaw is intersected by the mid-sagittal plane) with the help of **Sliding caliper** and Facial width (Fig. 2) were measured between the **Zygion** (most laterally placed point on the zygomatic arch) of each side with the help of **Spreading caliper**.



Fig 2: Showing measurement of facial width (Bizygomatic distance) with the help of Spreading caliper.

Facial index was calculated using the following formula.

$$\text{Facial index} = \frac{\text{Facial height}}{\text{Facial width}} \times 100$$

The above index was determined on the basis of international anatomical descriptions. Based on this index, the facial shape and type were categorized (Table 1) according to Banister's classification. [9]

Table 1: Classification of facial index determined on the basis of International descriptions

Facial Shape	Range of Facial Index (in cm.)	Type of Face
Hypereuriprosopic	≤ 79.9	Very broad face
Euriprosopic	80-84.9	Broad face
Mesoprosopic	85-89.9	Round face
Leptoprosopic	90-94.9	Long face
Hyperleptoprosopic	≥ 95	Very long face

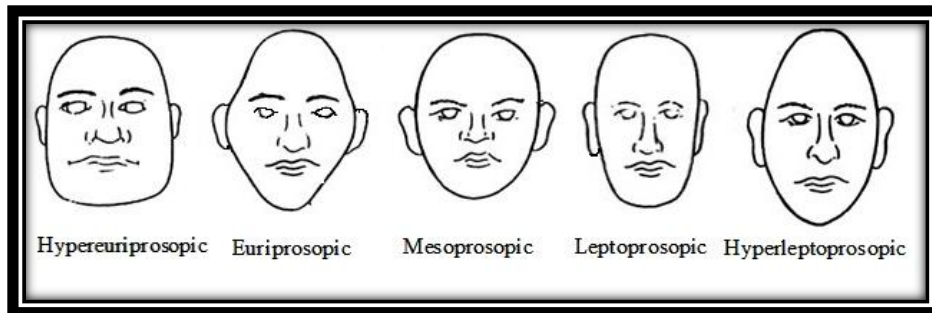


Fig 3: Illustration showing the different types of face shapes.

Statistical analysis:

The data were recorded, tabulated and statistically analyzed using Microsoft Office Excel 2007 and Statistical Package for Social Sciences (SPSS) version 16. A proper analysis was done by applying 2 tail Z-test at 5% level of significance. It is known that the critical value of $Z = \pm 1.96$ at 5% level of significance for 2 tail test.

OBSERVATIONS

On the basis of measurement, the different constants for various facial measurements like Mean, SD and Z-value of both males and females were calculated and presented in Table 2.

From the observation of the table it is revealed that the mean facial height in male and female is 11.35 and 10.37 where as the mean facial width in male and female is 13.149 and 12.237 respectively. The difference of facial parameters (Facial height and Facial width) in both the gender

was highly significant ($p < 0.001$). The mean facial index in male and female is

86.449 and 85.024 respectively and the difference of facial index is also significant.

Table 2: Gender wise distribution of facial parameters and total facial index

Parameters (in cm) and Index	Mean		Standard Deviation		Z value	P value
	Male (200)	Female (200)	Male (200)	Female (200)		
Facial Height	11.35	10.376	0.966	0.673	11.87	0.0001
Facial Width	13.149	12.237	1.053	0.789	9.83	0.0001
Facial Index	86.449	85.024	5.463	6.282	2.42	0.0155

On the basis of total facial index, the study group is further divided into different facial phenotypes according to the Banister's classification (Table 3). On the basis of this table the most common type of facial shape both in males and females are Mesoprosopic (47% and 44.5% respectively) which is followed by Euriprosopic, Hypereuriprosopic and Leptoprosopic,

whereas Hyperleptoprosopic is the least common.

The Euriprosopic (31.5%) and Hypereuriprosopic (15%) facial types are more common in females whereas Mesoprosopic (47%), Leptoprosopic (9%) and Hyperleptoprosopic (5.5%) are more common in males.

Table 3: Distribution of Facial Index in males and females

Gender	Hypereuriprosopic	Euri Prosopic	Meso Prosopic	Lepto prosopic	Hyperlepto prosopic	Total
Male	22 (11%)	55 (27.5%)	94 (47%)	18 (9%)	11 (5.5%)	200
Female	30 (15%)	63 (31.5%)	89 (44.5%)	13 (6.5%)	5 (2.5%)	200
Total	52	118	183	31	16	400

Table 4: Comparison of Facial index (Mean) with previous Indian studies of other population

Research Worker	Country region	Facial Index	
		Male	Female
Sapana shah <i>et.al.</i>	Gujarat	89.86	87.06
Mahesh Kumar	Haryana	86.09	84.84
Ashok K. Pandey	Andaman and Nicobar	77.98	75.29
Present Study	North India	86.449	85.024

DISCUSSION

The present study shows that the dominant type of face shape in North Indian males and females are Mesoprosopic which is followed by Euriprosopic, Hypereuriprosopic, Leptoprosopic and Hyperleptoprosopic.

Similar type of study was carried out in the Gujarat region of India by Sapana shah *et.al.* in 2012 and concluded that males have Mesoprosopic and females have Euriprosopic facial shape. [10]

This type of research work was carried out in some other countries. Majority

of the Nigerian population has Hyperleptoprosopic facial form as concluded by J.M. Raji *et.al.* [11] Joshaph Antenor Firmin found that Australian and African population has Hypereuriprosopic type of face. [12] Jahanshahi M. found that major type of face in native Fars and Turkman ethnic groups of Iran is Mesoprosopic in males and Euriprosopic in females. [13]

In the present study, the total facial index of male and female is 86.449 and 85.024 respectively. Sapana Shah *et.al.* in Gujarat region found facial index 89.86 and 87.06 where as Mahesh Kumar found 86.09 and 84.84 in males and females respectively among Haryanvi Adults. [10,3]

A similar study was carried out by Ashok K. Pandey in Andaman and Nicobar Islands among Onges and found that the

facial index in males and females are 77.98 and 75.29 respectively. ^[14]

Table 4 shows the comparison of facial index of present study with the previous Indian studies and it reveals that the facial index of males and females in the present study is greater than the findings of Mahesh Kumar among Haryanvi adults and Ashok K. Pandey among Onges population of Andaman and Nicobar Islands but the facial index findings of Sapana shah *et.al.* in Gujarat region is greater than the present findings.

CONCLUSION

The primary aim of the study was to evaluate and report, the association of sexual dimorphism with cephalic indices in individuals of 18-25 year age group from the North Indian population. A highly significant difference is found in between both the gender with a value being higher in males than females in the present study. The total facial index shows highly significant statistical value for males as compare to females. Distribution according to face shape shows that the Mesoprosopic is most common type in both males and females and the difference is statistically highly significant. Further the Euriprosopic and Hypereuriprosopic facial types are more common in females. The Mesoprosopic, Leptoprosopic and Hyperleptoprosopic facial types are more common in males.

From the present study it may also be concluded that there is a variation in dominance of facial shape in different region of a country or in the different countries of the globe. This study has been conducted on 400 subjects which is the limitation of this study. To overcome such errors, similar type of studies should be conducted on a large number of populations, which may be at the national level so as to increase the accuracy of the prediction.

This study is important in medical applications such as cosmetology and the data of this study will be very useful to orthodontists, facio-maxillary surgeons, plastic surgeons, anatomists, physical anthropologist and forensic experts for various anthropological purposes. The present study will serve as basis of comparison for future studies on North India population.

REFERENCES

1. Kewal Krishan. Anthropometry in Forensic Medicine & Forensic Science-Forensic Anthropometry. The Internet Journal of Forensic Science. 2006; 2(1):1-10.
2. Jasuja et al. Comparison of Indian and Turkish cephalo-facial measurements: Data for facial reconstruction applications. Journal Indo-Pacific Academy of Forensic Science Odontology. 2011; 2(1):1-6.
3. Mahesh Kumar, Mohd. Muzzafar Lone. The Study of Facial Index among Haryanvi Adults. International Journal of Science and Research. September 2013; 2(9):51-53.
4. E. Nagle, U. Teibe, D. Kapoka. Craniofacial Anthropometry In A Group Of Healthy Latvian Residents. Acta Medica Lituanica. 2005; 12(1):47-53.
5. Basciftel et al. A Craniofacial Structure of Anatolin Turkish Adults With Normal Occlusion And Well Balanced Faces. AMJ Orthod and Dental Orthopedics. 2004; 125(3):366-72.
6. Crupi P, Portelli M, Matarese G, et al. Correlations Between Cephalic Posture And Facial Type In Patients Suffering From Breathing Obstructive Syndrome. Eur J Paediatr Dent. 2007; 8(2):77-82.
7. Manoharrao Save et al. A study of facial (Prosopic) index of Andhra Region students. Noval Sci Int. J Med Sci. 2012; 1(8):248-52.
8. Bertram S Kraus. The western Apache: Some Anthropometric Observations. 1961; 19(3):227-36.

9. Imami-Mibodi MA, Mastri-Farahani R. Study Of Normal Range Of Anatomical Dimensions of One-Day Old Newborn By Cephalometry. J Med Counc Islam Repub Iran. 1996; 14:1-8.
10. Sapana Shah, Parth Pandya, Jignesh Vadgama et al. The Study of Total Facial Index in Living Subjects in Gujarat Region. NJIRM. 2012; 3(4): 95-97.
11. J. M. Raji. S. H. Garba, A. I. Numan et.al. Morphological Evaluation of Head and Face Shapes in a North - Eastern Nigerian Population. Australian Journal of Basic and Applied Sciences 2010; 4(8):3338-41.
12. Joshaph Antenor Firmin. The Equality of Human Races: Positivist Anthropology. Garland Publishing Inc, New York. 2000.
13. Jahanshahi M, Gotalipour M J, Heidari K. The effect of ethnicity on facial anthropometry in Northern Iran. Singapore Med Journal. 2008; 49 (11): 941-43.
14. Ashok K. Pandey. Cephalo-facial Variation Among Onges. Anthropologist. 2006; 8(4): 245-49.

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