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Original Research Article

ANTHROPOMETRIC ASSESSMENT OF MORPHOLOGICAL FACIAL INDEX OF GOND MALES AND FEMALES OF UTTAR BASTAR KANKER, C.G.

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ABSTRACT

Background: Anthropometry (Greek: anthropos-"man "and metron-"measure" therefore "measurement of man") refers to the measurement of the human individual. An early tool of physical anthropology, it has been used for identification, for the purposes of understanding human physical variation, in paleoanthropology and in various attempts to correlate physical with racial and psychological traits.

Materials and Methods: The present study was carried out to demonstrate the anthropometric variation in morphological facial index in both sexes of adult Gond of Uttar Bastar, District Kanker, Chhattisgarh. With 100 males and 100 females between age group of 18- 45 yrs were selected randomly who were residing in different villages of the district. Morphological facial length and bi-zygomatic breadth of these subjects were measured by using calipers (spreading and sliding).

Statistical Analysis: The Morphological facial index were calculated according to the formula and the obtained results were analyzed statistically using the t-test.

Results: The mean values of the Morphological facial height, Bizygomatic breadth and Total facial index in males were, respectively, 11.95±0.68, 13.02±0.61 and 91.13±10 while the following values of parameters were obtained in females, respectively were 11.11±0.11,11.95±0.05 and 93.05±8.6. It has been shown that males in the studied population have significantly higher values of all measurements compared to the tested females ($p < 0.05$) and differences were significant. The dominant type of face phenotype in the studied population, according to the value of TFI were Hyperleptoprosopic both in males and females.

Conclusion: With the help of this study, the sex as well as race of the deceased can be determined accurately and this knowledge can be of immense importance to anthropologists as well as forensic science experts. These results will be very useful for genetic research, as well as in medical clinical practice.

KEY WORDS: Anthropometry, Bizygomatic breadth, Facial index, Facial phenotype, Morphological facial index.

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INTRODUCTION

Topinard defined the study of anthropometry as systemic measurements of the different parts of the human body in order to determine their respective proportion not only at different ages, but also in the different races, so as to distin-

guish them and establish their relation to each other [1]. Anthropometric evolution begins with the identification of particular location on a subject called landmark point, defined in term of visible or palpable features (skin and bone) on the subject, followed by a series of measurements between these landmarks [2]. Anthropometry, the measurement of living subjects was first developed by a German Anatomist Johnne Sigmund elsholtz for his doctoral thesis at the university of Padua in 1654 [3]. Farkas [4] and S. Roger [5] suggested that measurement of facial parameters is important to scientists and authorities, especially in case of missing persons or mistaken identities. The characteristics of the face can be used as a good identification method for the dead, missing and criminal, using both morphological features and measurements. The face can either be reconstructed (identifying the dead), superimposed or compared to facial photographs (mistaken identifies or missing persons) or for reconstruction surgeries after accidents.

Anthropometric studies have been found useful in craniofacial surgery, otolaryngology and syndromology [4], orthodontics and in reconstructions of skull in medico legal cases. Even medical illustrators recognize that facial measurements are essential when reconstruction of normal facial appearance [5]. Needless to say manufacture of more comfortable, utility objects and wear for day to day use, defense and medical equipments also benefited from anthropometric data [6].

Types of faces, as determined by craniofacial measurements, were divided into five international anatomical categories: hypereuryprosopic, euryprosopic, mesoprosopic, leptoprosopic and hyperleptoprosopic ((Martin and Saller, 1957) [7].

This study was conducted on Gond tribes ,adult males and females residing at uttar bastar, kanker district of CG during August 2010 to May 2011.Easy approachability and high density of gond population were the major criteria taken into consideration for selecting these area.

MATERIALS AND METHODS

This study was conducted on 200 persons (100 Males and 100 females) of tribe Gond, selected from different villages of north Bastar Kanker, CG, between age group 18 to 45 years that were randomly selected. All subjects were without past and existing craniofacial trauma, deformities or facial scars. The measurement process was explained to each subject and written permission was obtained from each tested person before the measurement.

All measurements were performed in the same way and under the same conditions. The subjects were in a sitting position, relaxed, with the head in the correct anatomical position (neutral position of the head). Measurements were performed during the period from 14.00-16.30 to eliminate discrepancies in relation to diurnal variation. All measurements were repeated three times and the mean value of the measurements was taken for further analysis. The measurements were made with a permissible error of 1 mm.

A standard spreading caliper with scale was used for the measurement of facial parameters. The statistical significance of sex differences in mean values of the measured parameters was examined by using an independent t-test.

Landmark points used in measuring of the parameters were: n – nasion: the midpoint of the naso-frontal suture; gn – gnation: in the midline, the lowest point on the lower border of the chin; zy - zygion: the most lateral point on the zygomatic arch.

Morphological facial height (MFH) is the distance between nasion and gnation (n-gn). It was measured by standard caliper with scale as follows: the fixed tip of the caliper was placed at the subject's gnation and the movable part was moved and placed on the nasion. Bizygomatic Breadth (BZB) or Maximum facial breadth (MFB) is the distance between the two zygomatic prominences/ zygion (zy-zy).It was measured by standard caliper with a scale in the following way: after palpation (by fingers) to locate the most lateral point of the zygomatic arch (arcus zygomaticus) on the both sides of the face, the ends of spreading caliper were placed at these points, with enough pressure to feel the bone under the caliper. The caliper was slightly shifted in the direction of up and down and back and forth, until the maximum value was shown. From these observations Morphological Facial Index

(MFI) was calculated as the ratio of MFH and BZB and can be calculated according to the formula:

MFI = (n-gn / zy-zy)×100.

The data thus collected was subjected to statistical analysis. The values of TFI were used to determine the incidence of certain facial types (according to Martin Saller's scale) (Table 2).

RESULTS

Our research provides important information concerning the MFI, face shape, and facial phenotype in the adult population of Gond (males & females), selected from different villages of north Bastar Kanker, CG. The mean values of MFH, BZB and MFI in males (in Cms) were, respectively, 11.95±0.68, 13.02±0.61 and 91.13±10, while the following values of parameters were obtained in females, respectively 11.11±0.11, 11.95±0.05 and 93.05±8.6 (Table 1). It has been shown that males in the studied population have significantly higher values of MFH, BZB, and MFI compared to the tested females (p <0.001).

The dominant type of face phenotype in the studied population, according to the value of TFI were Hyperleptoprosopic element was 43 % in females and 41 % in males followed by Leptoprosopic 25% in female & 35 % in males which was followed by Mesoprosopic 22 % in females & 15% in males followed by Euryprosopic 9% in females and 8% in males, Hypereuryprosopic was 1% only in both sexes. (Table 2, Figure 1).

The phenotype of face, hyperleptoprosopic, dominant in both sexes, has a higher incidence in females compared to males, while leptoprosopic and mesoprosopic are more common in male subjects compared to females (Table 2, Figure 1).

Fig. 1: Bar Diagram Showing Classification of Selected male and female subjects according to morphological facial index.

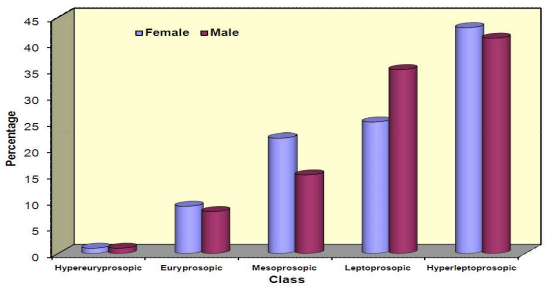

Fig. 2: Measurement of Bizygomatic breadth (BZB) using spreading caliper. BZB is the distance between the two zygomatic prominences/ zygion (zy-zy).

Table 1: Comparison of Selected Variables in Males and Females.

Parameters	Female (n=100)	Male (n=100)	P value
	Mean (cms) ± S.D.	Mean (cms) ± S.D.	
MFH	11.11±1.15	11.95±0.68	<0.05**
BZB	11.95±0.55	13.02±0.61	<0.05**
TFI	93.05±8.6	91.13±10	<0.05**

** Statistically significant, TFI: Total Facial Index, MFH: Morphological facial Height, BZB: Bizygomatic breadth, S.D: Standard Deviation.

Table 2: Classification of Selected male and female subjects according to morphological facial index.

Class	Range in cm	Female (n=100)		Male (n=100)	
		No.	Percentage	No.	Percentage
Hypereuryprosopic	x-78.9	1	1	1	1
Euryprosopic	79-83.9	9	9	8	8
Mesoprosopic	84-87.9	22	22	15	15
Leptoprosopic	88-92.9	25	25	35	35
Hyperleptoprosopic	93-x	43	43	41	41

Table 3: Comparison of Facial index (Mean) with other population.

Research worker	Country/ people	TFI	
		Male	Female
Pandey AK [10]	Onges of Andaman & Nicobar Island	75.29	-----
Meka & Rexhepi [13]	Albanian Kosova Population	90.38	90.27
Shetti et al [11]	Indian population	87.19	86.75
	Malaysian population	85.72	87.71
Save et al [15]	Andhra region students	89.5	86.72
Hossain et al [12]	Japanese population	-----	82.66
Mahesh kumar et al [14]	Haryanvi Banias	86.09	84.84
D. Jeremić	Cental Serbia population	94.04	92.68
Present study	Gond tribe, Kanker, CG	93.05	91.13

DISCUSSION

TFI values obtained in our study were higher in both males and females than the values obtained in the following populations: the Onge

population of India (Indian Onges) [8], the population of Malaysia, the population of India [9], Japanese adult females [10], Albanian Kosova Population [11], Haryanvi Banias [12], Andhra region students [13].TFI values in our study were similar to the study done in population of central Serbia [14] (Table 3).

In our research, according to the value of the TFI, the most common facial phenotype was hyperleptoprosopic (Table 2) which is different from the research results of Pavlica et al (2007) [15] and D.Jeremiæ et al [14] conducted among Montenegrins in Vojvodina (Serbia) and central serbia respectively.

Pavlica et al. (2006) [16] , in their study of anthropometric characteristics of the head and face conducted among adult populations of northwest Baèka (Serbs, Montenegrins, Hungarians) concluded that the presence of euryprosopic, mesoprosopic and leptoprosopic facial phenotypes was equal in this population. A survey of the anthropological characteristics of adult Poles living in northern Banat (Yugoslavia, Serbia), showed that in this population the most common shape of face was the euryprosopic phenotype [17] (Boziæ-Krstiæ et al., 1997).

MFH values obtained in our study (11.95 cms ±0.68 for males and 11.11 cms ±1.15 for females) were lower than the values obtained after anthropometric research in the population of central Serbia (121.42 mm ± 5.79 for males and 110.84 mm ± 5.61 in females) [14], northeastern part of Nigeria (141.15 mm ± 7.5 in males and 141.29 mm ± 7.6 in females) [18],the population of India (130.02 mm ± 7.2 in males and 125.4 mm ± 6.0 in females) [19], and the population of Sri Lanka (140.2 mm ± 10.3 in males and 138.8 mm ± 12.9 in females) [20].

CONCLUSION

In our research, it was concluded that the dominant facial phenotype in the population of adult Gond of Uttar Bastar, District Kanker, Chhattisgarh is hyperleptoprosopic in both males and females. With the help of this study, the sex as well as race of the deceased can be determined accurately and this knowledge can be of immense importance in anthropological research, forensic science, genetic research as well as in medical clinical practice.

ABBREVIATIONS

n- nasion
gn- gnation
zy- zygion
MHF- Morphological facial height
BZB- Bizygomatic breadth
TFI- Total facial index
MFB- Maximum facial breadth

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Conflicts of Interests: None

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