Comparison of Photo Anthropometry of Facial Index of Adult Bangladeshi Khasi and Non Tribal Male

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Abstract

Context: *Facial Anthropometry is affected by geographical, racial, ethnical, gender and age factor. Facial phenotype is modified in several genomic and chromosomal alteration. Anthropometric study plays an important role in distinguishing pure race from local mingling of races. Anthropometric data is important for plastic surgery, orthodontics, archeology, hair style design and application in medical and clinical genetics. The present study aimed at establishing ethnic specific anthropometric data for the Bangladeshi Khasi population and to compare it with non-tribal population.*

Methods: *The present study was conducted on facial variables of 100 Khasi and 100 non-tribal Bangladeshi male. Photographs of face were taken by digital camera and different dimentions were measured with computer programmed MB-Ruler software. Comparisons of the measurements between Khasi and non-tribal were done by using an unpaired student's 't' test.*

Result: *The mean±SD of morphological facial height, upper facial width and mean facial index of Khasi male were10.98±0.65 cm, 11.72±0.49cm and 90.61±6.12cm respectively. The mean±SD of morphological facial height, upper facial width and mean facial index of non-tribal male were 11.63±0.53 cm, 11.52±0.56cm and 95.45±3.95 cm respectively.*

Conclusion: *Significant difference was observed in facial index between Khasi and non-tribal population.*

Key words: Photo anthropometry, Facial Index, Khasi male*.*

Introduction

Human face is a widely recognized feature which best distinguishes a person. Facial indices are among the most important cephalometric parameters useful in inter-racial and intra-racial morphological classification and categorization. Face is the anterior part of the head lying transversely between the ears and longitudinally from the chin to the hairline and includes the forehead, eyes, nose, mouth and chin.[1] Photo anthropometry is the science of measurements from precisely defined marker points in various zones of the face or in specific anatomical areas as these appear in the photographs.[2] The aim of photo anthropometry is to compare metrically the proportional relationships of one photograph to another rather than assess absolute visual differences and similarities as in morphological comparisons. Facial index is used in anthropometry to describe the facial proportion. Accurate facial analysis such as facial height, facial width and facial index is essential for genetic and acquired anomalies for the study of normal and abnormal growth and for morphometric investigations.[3] Human race is defined as a group of people with certain common inherited features that distinguish them from other group of people. There are four major human races in the world. They are Australoid, Mongoloid, Caucasoid and Negroid.[4] The Khasi people are mongoloid in origin. On the

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other hand, non-tribal Bangladeshi male were belonged to Australoid dominant mixed race. The Khasi is one of the ethnic groups who live along the north eastern part of Bangladesh. They are well known for its matrilineal culture. There are more than one million Khasi people residing in India and around 30,000 in Bangladesh, mainly in Sylhet Division.[5] The facial pattern of Khasi people has flat noses, high jaws and small slanting black eyes. They have their own set of language, social structure and economic activities and religious values.[5,6]

With the above background, the present study was conducted to establish ethnic specific anthropometric data for the Khasi population and to compare it with non-tribal population.

Materials & Methods

This cross-sectional and analytical study was carried out in the Department of Anatomy, Dhaka Medical College (DMC) from January to December, 2018. It included 200 adult Bangladeshi males, out of which 100 were Khasi and 100 were non -tribal males whose age ranged between 25 to 45 years. At the beginning of the study, each subject was greeted politely; Anthropometric dimensions and their measurement procedures were thoroughly explained. Informed written consent was taken from them. Prior to photography each subject was asked to remove his glass, ear ring and other jewelry if any. Each subject was asked to be seated comfortably on a chair while assuming the natural head position by being asked to 'look straight ahead as he is looking into a mirror'. The subject's head was at the same level as the camera on tripod. The distance between the subject and the camera was 120 cm. The subjects were instructed to keep a neutral facial expression with the closed mouth and lips lightly touching and to breathe quietly through the nose. Frontal position was achieved by ensuring that both ears were equally visible before taking the photograph. An identification number was noted for each photograph. The photograph was uploaded in the computer, downloaded in Adobe Photoshop CS Middle Eastern version. All photographs were edited to optimize brightness, contrast and size to produce a clear image. Then different dimensions of face were measured as distance between any two landmarks. To convert the photographic value into actual size, all photographic values were multiplied by a conversion factor. The conversion factor is a ratio, calculated by dividing the physically measured value of a variable, with a photographically measured value of the same variable of a subject to convert photographically measured values to actual measurements.

Formula for calculating conversion factor:

$$CF: \frac{\text{morphological facial height by physcical method}}{\text{morphological facial height by photographic method}}$$

Comparisons of the measurements between Khasi and non-tribal were done by using an unpaired Student's 't' test. Statistical significance was accepted at p value equal to or less than 0.05 ($p<0.05$) [2 tailed]. Statistical analyses were performed using statistical software SPSS 20.

Operational definitions:

Nasion (n): Point in the midline of the nasal root and the nasofrontal suture.

Gnathion (gn): The most inferior midline point on the mandible.

Zygoma (zy): The most lateral point of the zygomatic bone (cheek bone)

Morphological facial height: Nasion (n) to Gnathion (gn)

Upper facial width: Zygoma (zy) to zygoma (zy).

Facial index is the ratio of morphological facial length to upper facial width multiplied by 100.

$$\text{Facial index} = \frac{\text{morphological facial height } (n-gn)}{\text{upper facial width } (zy-zy)} \times 100$$
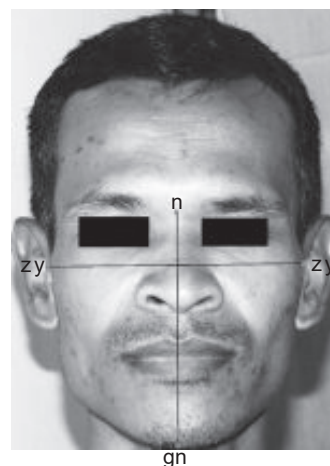

Fig-1: *Photograph showing morphological facial height and upper facial width of face. n= nasion, gn= gnathion, zy= zygoma*

Ethical clearance: Ethical clearance was obtained from the Institutional Ethical Committee of DMC.

Result

The mean (±SD) of morphological facial height was 10.98±0.65 cm and 11.63±0.53 cm in Khasi and non-tribal Bangladeshi male respectively. Significant difference was observed between two groups where non-tribal male had higher values (p<0.001) than Khasi male (Table I).

The mean (±SD) of upper facial width was found 11.72±0.49 cm and 11.52±0.56 cm in Khasi and non-tribal Bangladeshi male respectively. Significant difference was observed between two groups where Khasi male had higher values (p<0.01) than non-tribal male (Table I).

The mean (±SD) of facial index was 90.61±6.12cm and 95.45±3.95 cm in Khasi and non tribal Bangladeshi male respectively. Significant difference was observed between two groups of male where non-tribal male had higher values (p<0.001) than Khasi male (Table I).

Table I

Morphological facial height, upper facial width and facial index in Khasi and non-tribal male

Variable	Khasi n=100 Mean ± SD (Range)	Non-tribal n= 100 Mean ± SD (Range)	p value
Morphological facial height (MFH)	10.98±0.65 (9.46 - 12.28)	11.63±0.53 (10.62- 13.17)	0.000***
Upper facial width (UFW)	11.72±0.49 (10.16-12.76)	11.52±0.56 (10.42-12.88)	0.007**
Facial index (FI)	90.61±6.12 (80.87-105.61)	95.45±3.95 (82.45-102.36)	0.000***

Figures in parentheses indicate range.

SD = Standard deviation, n = Number of subjects, ***= Significant at P < 0.001 (2 tailed)

Discussion

In the present study, the mean value of morphological facial height was higher in non- tribal male than in Khasi male and when compared statistically significant (p=0.000) difference was observed. The mean value of morphological facial height of Khasi male of the present study was almost similar (p>0.05) with the findings noted by Shrestha et al[7] who worked on Rai and Limbu tribes in Nepal. Rai, Limbu and Khasi people all belonged to Mongoloid race.

The mean value of morphological facial height of present study was significantly (p<0.0001) higher than that of Akinlolu[8], who investigated upon Yoruba tribe who belonged to mixed race from Nigeria. The dissimilarity reported might be due to variation in race and ethnicity.

In the present study, the mean value of upper facial width was higher in Khasi male than in non-tribal male and when compared statistically significant (p=0.007) difference was observed.

The mean value of upper facial width of Khasi male was almost similar (p>0.05) to the findings of Chandra et al[9] who studied on Indian male. it was found significantly higher (p<0.01) than that of Turkish male[10] and significantly lower (p<0.01) than that of Malaysian male.[3] Dissimilarity observed with Turkish and Malaysian male might be due to different race and ethnicity.

The mean value of facial index was higher in non-tribal male than in Khasi male and when compared

statistically significant (p=0.000) difference was observed. A similar study was carried out by Wai et al[3] on Chinese and Indian male showed that Indian male had greater facial index than Chinese male. The difference is due to their racial difference where Chinese are mongoloid and Indians belong to mixed race.

The mean facial index of Khasi male of present study was almost similar with Meitei male[11], Malay male[12] and Chinese male[13]. Similar race and geographical orientation may be the cause of this similarity.

Conclusion

The present study gives an idea of the morphological facial height, facial width and facial index of the Khasi population. Significant difference in facial index was observed between Bangladeshi Khasi and non-tribal population.

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