

Original Article

Photo-Anthropometric Study of Breadth of Eye and Inter-canthal Distance Among Tribal Garo and Non-tribal Adult Bangladeshi Females of Mymensingh Zone

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Abstract:

Background: Anthropometry provides quantitative data in identifying people having different physical characteristics in diagnosing people having craniofacial abnormality and to compare between patient and normal population. The eye is a person's most defining feature because the shape of the eye differs from race to race, tribe to tribe and from one environment to another. **Objective:** To see craniofacial anthropometric differences between tribal (Garo) and non-tribal Bangladeshi females. **Materials & Methods:** This cross sectional, analytical type of study was conducted in the Department of Anatomy, Sir Salimullah Medical College, Dhaka, from January to December of 2015. The study subjects consist of two hundred adult Bangladeshi females of Mymensingh Zone – 100 were tribal (Garo) females and 100 were non-tribal females. **Results:** The mean breadth of eye from 'distance between outer and inner canthus of right and left eye' was higher in non-tribal female than tribal (Garo) female and was statistically significant ($P < 0.001$) and intercanthal breadth from 'distance between inner canthus of right and left eye' was higher in tribal female than non-tribal female and was statistically significant ($P < 0.05$). **Conclusion:** The breadth of the eye was greater in non-tribal female and intercanthal breadth was greater in tribal females.

Keywords: Photo-anthropometry, breadth of eye, intercanthal breadth, Garo tribal female, non-tribal female, Bangladesh.

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Introduction:

Variation is one of the most important phenomena occurring in human population on the globe. Anthropometry is the hallmark technique that deals with the study of body proportion and absolute dimensions and vary with age and sex within and between racial groups. The dimensions of human body are affected by ecological, biological, geographical, racial, body habitus, age factors and gender.¹ Regional and environmental climatic conditions are useful in determining the shape of the eye which may vary across different races and environments. The measurements of eye

are one of the methods that anthropologists have used to differentiate living race and subspecies of humans. Photo-anthropometry is the process of obtaining measurements by means of photographs. Digital photographic technique potentially offers a highly practical, convenient and cost-effective method. 2D digitalization method is accurate and can be applied for both clinical practice and research. In digital photography, there is no need to locate landmarks prior to image taking. Another advantage of digital photography is the opportunity to preserve the material, which allows to repeat the measurements anytime and

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to add new parameters in later measurements.² Anthropometric studies of the eye are conducted in anthropology in medicine and provide useful information for medical diagnosis and treatment. Many methods are used in anthropometric studies, including actual measurements, photographic measurements and radiographic measurements. However, photographic measurements are most often performed for the eye because of the simplicity and high repeatability of the method.³ Growth and development of craniofacial structures are important as many clinical disciplines depend on it for understanding their developmental processes for diagnosis, timing and planning of treatment.⁴ The knowledge of measurement of ocular structures are important in several clinical specialties including ophthalmology, optometry, medical and clinical genetics, oculoplastic surgery, and traumatology.⁵ It is also important tool in forensic science. The normal values of orbital region are necessary to diagnosis and identify various craniofacial dysmorphic syndromes.⁶ Periocular dysmorphism is a cardinal feature for many genetic and teratogenic syndromes.⁵

Populations vary genetically and geographically in their craniofacial features. Therefore, single standard of anthropometric variable is not appropriate for being applied to diverse racial and ethnic groups. Though Bangladesh is a relatively small country, people of different religions and ethnic groups live here and those different groups have differences in their physical characteristics.⁷ There are as many as 30 tribal communities living in different parts of Bangladesh. The Garos are one of them. The Garos are an ethnic group of 'Tibbets Borman', belonging to the Mongolian human race. The face of the tribal (Garos) are round with deep eyebrows, small black eyes, short and flat nose and high jaws.⁸ In Bangladesh, studies on craniofacial measurements are limited to mostly on tribal population. There are very few comparative studies between tribal and non-tribal Bangladeshi female. Hence, we proposed this study to document craniofacial anthropometric differences as visible between tribal (Garos) and non-tribal Bangladeshi females. This type of study will be useful for researchers, ophthalmologists, forensic odontologist, plastic surgeons and the forensic experts, which means it may be useful for cosmetic correction purpose and also for identification.

Materials and Methods:

This cross-sectional, analytical study was performed on one hundred were adult tribal Garo female and one hundred non-tribal Bangladeshi females, age ranging from 25 to 45 years of Mymensingh Zone. Before going to measurement procedure subject was greeted politely. Then her national identity card was checked to confirm her age. After a short briefing on the objective of the present study, the subject was asked to give a voluntary consent on the consent form. Each subject got seated comfortably on a chair. The digital camera was fixed on its stand at the same level of the study subject's head having a distance of 120 centimeters between the two. The face of each study subject was well-illuminated and photograph was taken keeping the study subject looking straight to the camera, both eyes opened and mouth closed. Then the photograph of the subject was uploaded in the computer having program named Adobe Photoshop Version-8 and Adobe Illustrator Version-11. Breadth of the eye was taken as the 'horizontal distance between outer canthus of right and left eye' and intercanthal width was taken as the 'horizontal distance between inner canthus of right eye and left eye' (as seen in Fig. 1 & 2), following Kolar & Salter (1997).⁹



Fig. 1: Photographic measurement of the breadth of eye (ex-en), ex- (red dot) indicates exocanthion, en- (blue dot) indicates endocanthion.



Fig. 2: Photographic measurement of intercanthal width (en-en), en-rt (red dot) indicates right endocanthion, en-lft (blue dot) indicates left endocanthion.

After documentation in preformed data sheet, all data were double-checked. Then statistical analysis was done using SPSS for Windows (version 8.0). Statistical tests such as unpaired Student 't' test was done. Statistical significance was accepted at P value equal to or less than 0.05.

Results:

In Mymensingh zone, the mean breadth of right and left eye of the tribal (Garo) women were 2.65 ± 0.44 cm and 2.65 ± 0.46 cm respectively, while in non-tribal women 2.91 ± 0.29 cm and 2.90 ± 0.28 cm respectively. The differences were statistically significant in both eyes ($P < 0.001$) (Table 1). The mean intercanthal width were found 3.50 ± 0.51 cm in tribal (Garo) women and in non-tribal women 3.36 ± 0.49 cm. The differences were statistically significant ($P < 0.05$) (Table 2).

Table 1: Breadth of right and left eye of the study subjects (n=200)

Group	Breadth of right eye in cm Mean $\pm$ SD	Breadth of left eye in cm Mean $\pm$ SD
Tribal (Garo) female (n=100)	2.65 ± 0.44 (2.06-3.35)	2.65 ± 0.46 (2.04-3.35)
Non-tribal female (n=100)	2.91 ± 0.29 (2.20-3.48)	2.90 ± 0.28 (2.21-3.46)
P value	0.0001***	0.0001***

Figures in parentheses indicate range. Comparison between groups done by unpaired Student's 't' test, *** = significant.

Table 2: Intercanthal width of the study subjects (n=200)

Group	Intercanthal width in cm Mean $\pm$ SD
Tribal (Garo) female (n=100)	3.50 ± 0.51 (2.70-4.36)
Non-tribal female (n=100)	3.36 ± 0.49 (2.45-4.25)
P value	0.043*

Figures in parentheses indicate range. Comparison between groups done by unpaired Student's 't' test, * = significant.

Discussion:

It has widely been recognized that craniofacial photo-anthropometry is affected by geographical, racial, ethnic, gender and age factors.¹ Farkas et al.¹⁰ carried out a study on Indian, Chinese of Singaporean, Vietnamese, Thai and Japanese. On comparison with the findings of the present study, on tribal and non-tribal female the mean value of breadth of eye (right and left) were similar ($p < 0.05$) to that of the present study of tribal female, but significant ($p < 0.001$) differences were found in Indian female when compared with the findings of the present study on non-tribal female. Jayaratne, Deutsch & Zwahlen⁵ conducted a study on adult Chinese young female of Hong Kong. On comparison with the findings of present study, mean value of breadth of eye (right and left) were similar ($p < 0.05$) to that of the present study of tribal female but significant ($p < 0.001$) difference were found in non-tribal female. However, Farkas et al.¹⁰ showed in Indian, Chinese of Singaporean, Vietnamese, Thai and Japanese women that the mean value of intercanthal width in had no significant differences ($p < 0.05$), as differences were observed in the present study. Mostafa et al.¹¹ conducted a study on adult Bangladeshi Buddhist Chakma females and found the mean value of intercanthal width lower ($p < 0.01$) than the present study of non-tribal female. Similarly, Jayaratne, Deutsch & Zwahlen⁵ conducted a study on adult Chinese young female of Hong Kong. On comparison with the findings of present study, the mean value of intercanthal width were similar ($p < 0.05$) to that of the present study of tribal female and non-tribal female.

Conclusion:

Our data revealed that there is a significant positive difference between tribal females (Garo) and non-tribal females in their facial anthropometric configuration. The breadth of the eye was greater in non-tribal females, while intercanthal breadth was greater in tribal females. The anthropometric data presented in this study would be useful for clinical interpretation of ocular pathology and serve as reference values for surgical intervention.

Conflict of interest: None declared.

Ethical approval issue: The study was approved by the Institutional Ethics Committee of Sir Salimullah Medical College, Dhaka, Bangladesh.

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Authors' contribution: Conception and design of the study: IJT; Data collection and compilation: IJT, MA; Data analysis: IJT, HN; Manuscript writing, revision and finalizing: IJT, SA, HN, UKP, MA.

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