Original Article:

Interpupillary Distance of Bangladeshi Medical Students – A Photo-Anthropometric Study

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Abstract :

Background: *Interpupillary distance (IPD) is the distance between the center of the pupils. It helps to identify race, age & gender of an individual. It is an essential guide to reconstructive surgery like ocular prosthetics, blepharoplasty, ptosis correction. It is also useful for evaluation of various dysmorphic syndromes and also useful factor in selecting artificial teeth.* ***Objectives:*** *Many studies were carried out in various populations to determine normal values of interpupillary distance. However, there is no published article on this topic in Bangladesh. So, this study was aimed to measure the interpupillary distance among the medical students of Bangladesh and to find out the variations in interpupillary distance between male and female medical students.* ***Methods:*** *This cross-sectional analytical study was carried out in the department of anatomy, Sir Salimullah Medical College, Dhaka from July 2017 to June 2018. Digital photographs of face in frontal view both in opened and closed eyes of the study subjects were taken from 200 consented medical students (100 male and 100 female) aged between 20 to 25 years. The actual "nose height" of the study subjects was measured from nasion to subscale by slide caliper. Then the "nose height" of individual photograph was transformed into physically measured value by using transform option of Adobe Photoshop version: CC 2014 and ultimately photograph of eye was converted into actual size. Then the interpupillary distance was measured from photograph by MB ruler software and the data were analyzed with the help of SPSS software package.* ***Results:*** *The mean ± SD of interpupillary distance was 60.81±5.79 mm (range 33.44 - 79.52 mm) in male and 57.07±5.34 mm (range 45.75 - 71.96 mm) in female. Interpupillary distance is significantly higher in male than female (P < 0.01).* ***Conclusion:*** *Interpupillary distance shows sexual dimorphism.*

Keywords: Interpupillary distance, Medical students, Photo-anthropometry.

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Introduction

The human eye is an important key determinant of face in the perception of facial attractiveness, youthfulness and health[1]. Anthropometry is concerned with measurement of physical sizes and shapes of human body[2]. Interpupillary distance is an important tool used by genetic counselor and in reconstructive surgery. The diagnosis of many dysmorphic syndromes is based on advanced cytogenetic and molecular techniques[3].

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Physical growth is a fundamental vital process and the common property of life. The normal distance between the pupils varies during embryogenesis and after birth in accordance with the general craniofacial development. Hypertelorism is an excessive distance between eyes and it is an integral part of various syndromes e.g. Cat eye syndrome. Dysmorphic characters are usually reported by clinicians in descriptive terms such as 'wide set eyes', 'broad nose' or 'largemouth'[3]. Interpupillary distance is the best method to quantify it[4]. Using both morphological features and measurements, the face can either be reconstructed (identifying the dead), superimposed or compared to a facial photograph (mistaken identities or missing personal or for the reconstruction surgeries after accidents). Congenital posttraumatic deformities can be better treated with the knowledge of normal values for this region to produce the best esthetic and functional result.3 It

is also used for the estimation of combined width of the maxillary six anterior teeth and serve as a useful factor in selecting artificial teeth[5].

Materials And Methods

This cross-sectional analytical study was carried out in the Department of Anatomy, Sir Salimullah Medical College, Dhaka from July 2017 to June 2018. The study was carried out on 200 medical students (100 male and 100 female) with age ranged from 20 to 25 years (The ossification of all bones of the face is completed by the age of twenty years. So, fully ossified face achieves its adult form and fixed measurements after this age. So, study subjects included in the study were between 20-25 years of age)[6].

At first the nature of the work was explained to the study subject (student). A written informed consent was taken from each study subject. Information was collected from each study subject with the help of a questionnaire. Age of the study subject was recorded from birth certificate or from national identity card. Subject who had no history of congenital and acquired orbital anomaly like squint, oculoplastic surgery or orbital trauma, medical conditions like ptosis, facial palsy, hyperthyroidism were included in the study[7].

Digital photographs of face – frontal view both in opened and closed eyes of the study subjects were taken in the Anatomy departments of Sir Salimullah Medical College, Dhaka, Mugda Medical College, Dhaka and Green Life Medical College, Dhaka.

The study subject was allowed to seat comfortably on a chair looking straight forward. The camera was set up on a tripod. Frontal facial photograph was taken with a digital camera at a 7.2 megapixel resolution under same lighting condition using flash mode from a fixed distance of 4 feet using zoom function. The subject's head was at the same level with the camera. The frontal facial photograph was taken at a particular time between 9 AM to 2 PM to avoid diurnal variation. Before taking frontal facial photograph of each study subject the "nose height" was measured from nasion (its manifestation on the visible surface of the face is a distinctly depressed area directly between the eyes, just superior to the bridge of the nose) to subscale (the point at which the nasal septum merges in the mid sagittal plane with the upper lip) by slide caliper and marked on the skin by black ball point. Then photograph was taken with the landmark "nasion" to "subscale" and the "nose height" of individual photograph was transformed into physically measured value by using transform option of Adobe Photoshop version: CC 2014 and ultimately photograph of eye was converted into actual size[8]. Then the variables were measured from the photograph of eye using MB ruler software[9] and the data were analyzed with the help of SPSS software package. (IBM SPSS statistics for windows, version 22.0; IBM corp; Armon K, New york.)

Procedure of measuring interpupillary distance (IPD):

Interpupillary distance (IPD) is the distance between the center of the pupils[10].

To get the interpupillary distance, center of one eye to the center of another eye was identified in a frontal digital photograph of face. Then the distance between the points was measured by using 'MB Ruler' software and was recorded on data sheet.

Ethical clearance:

To avoid any medicolegal questions for collection of digital photographs of face from the study subjects, a written clearance from the Institutional Ethics committee of Sir Salimullah Medical College, Dhaka was taken.

Result

Result of the study are shown in Table I and Figure 2. In male, the mean ± SD of interpupillary distance was 60.81±5.79 mm (range 33.44 - 79.52 mm)and in female, the mean ± SD of interpupillary distance was 57.07±5.34 (range 45.75 - 71.96 mm).The mean was significantly higher (p=0.000) in the male than in the female (Table I).

Discussion

Results of photographic variable of interpupillary distance were compared with the photographic variable of other studies from different countries like India, Nigeria, Pakistan and Iran.

The study showed some similarities as well as

Table I: Descriptive statistics of the measured Interpuillary distance

Sex	Interpupillary distance (in mm) Mean ±SD)
Mele (n=100)	60.81±5.79 (33.44-79.52)
Female (n=100)	57.07±5.34 (45.75-71.96)
P value	0.000**

Figure in parenthesis indicate range

Comparison between sex was done by unpaired Student's t' test

** = Significant at P < 0.01 (2 tailed)

n= sample size

SD = Standard Deviation

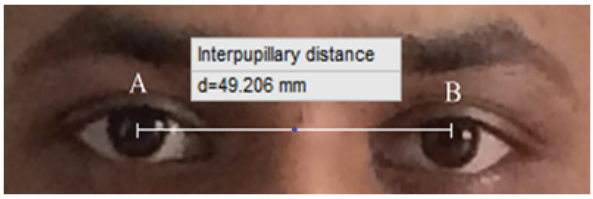

Figure 1: Digital photograph of face in frontal view showing the measurement of interpupillary distance. A- center of one eye, B- center of another eye and AB- interpupillary distance.

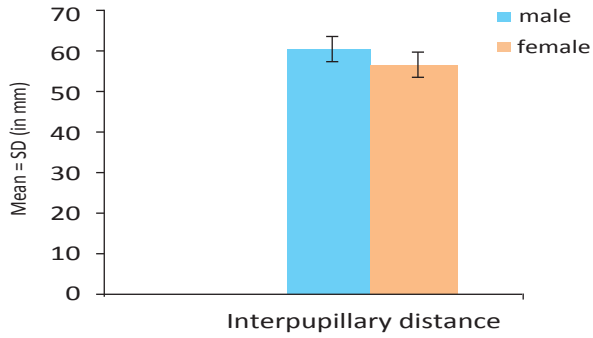

Figure 2: Bar diagram showing interpupillary distance (in mm) in male and female.

dissimilarities with otherstudies when the mean value of interpupillary distance was compared. Similarities were found with the people of India[4] and Nigeria.[11] Dissimilarities was found with the people of Pakistan[12] and Iran.[13] Similarities in findings might be due to almost similar race (mixed) present all over the Indo Bangla sub-continent. Dissimilarities in the findings with other studies might be due to mixture of different races, different climates, dietary habits and different geographical topography.[14] Use of different techniques for measurements might also be another cause of difference.

Many anthropologists believe that the Bengalis, the people of Bangladesh and different state of India make a vastly mixed race. The people of Iran and Pakistan belongs to Caucasoid race. The people of Nigeria came from Negroid race. Their nutritional habit was also different (more protein than carbohydrate).[15] So, the values of interpupillary distance was more than the study subjects.

Conclusion

The present study was an attempt to construct photo-anthropometric data on different measurements of eye in medical students of Dhaka city. Interpupillary distance of two hundred study subjects aged between 20-25 years were measured from digital photograph of face - frontal view both in opened and closed eyes to serve the purpose. This attempt may provide the direction to construct baseline photographic data of interpupillary distance in medical students of Dhaka city.

Result of the present study stated that interpupillary distance was found to be significantly higher in the male than in the female and also showed significant sexual dimorphism.

Data of the present study were compared with those of other countries.

This may contribute to the understanding of the relative status of the present study population in the context of the photographic variations of other study population around the world.

References

1. Kumar V, Kumar P and Rao MD. Anthropometric Analysis of Palpebral Fissure Dimensions and its Position in South Indian Ethnic Adults. Oman Med J. 2013; 28(1): 26-32.

2. Oladipo GS, Akande PA and Yorkum KL. Anthropometric Studies of Inner Canthal Distance, Outer Canthal Distance and Canthal Index of Adult Ibibios. Asian Journal of Med Sciences. 2011; 3(1): 16.

3. Agrawal J, Yogesh AS, Shukla CK, Banerjee C and Chandrakar AK. Orbitofacial anthropometric assessment of inter-canthal and outer canthal distance measurement in Chhattisgarh region. Biomed Research India.2013; 24(3): 365-369.

4. Shah K, Sambav S, Jethani J and Gupta A. An assessment of the interpupillary distance, the inner and outer intercanthal distances in the normal Indian population from early neonatal period upto over 70 years of age: a study of 3500 subjects. BJKines-NJBAS. 2014; 6: 17-24.

5. Abdullah MA, Stipho HD, Talic YF and Khan N. The Signifince Of Inner Canthal Distance In Prosthodontics. The Saudi Dental Journal. 1997; 9(1): 35-39.

6. Benzaquen J., 2015. Sinus development in children. [online] Available at: https://www.livestrong.com/article/263807-sinus-development-in-children/ [Accessed 30 November 2017].

7. Bukhari AA. The distinguising anthropometric features of the Saudi Arabian eyes. Saudi Journal of Ophthalmology. 2011;25: 419.

8. Mostafa A, Banu LA and Sultana A. Periocular anthropometric study among adult Bangladeshi Buddist Chakma females. Journal of Med & Allied Sciences. 2014; 4(1): 28-34.

9. Markus Bader- MB- Software solutions, 2017. MB- Ruler – the triangular screen ruler (5.3). [computer program] Available at: http://www.markus -bader.de /MB-Ruler/index.php [24 October 2017].

10. OsunwokeEA,Elekwa A, Bob-Manuel IF and Ojeka SO. A study on the normal values of inner canthal, outer canthal, canthal index, interpupillary distance and head circumference of 23-42 years. Global Journal of Medical Sciences. 2010; 9(1&2): 43-48.

11. Osunwoke, EA, Didla BC, Olotu EJ and Yerikema AH. A study on the normal values of inner canthal, outer canthal, interpupillary distance and head circumference of 3-21 years ijaws. American Journal of Scientific and Industrial Research. 2012; 3(6): 444.

12. Hussain MW, Qamar K and Naeem S. The role of interpupillary distance in the selection of anterior teeth. Pakistan Oral & Dental Journal. 2012; 33(2): 165-169.

13. Fesharaki H, Rezaei L, Farrahi F, Banihashem T and Jahanbakhshi A. Normal Interpupillary Distance Values in an Iranian Population. Journal of Ophthalmic and Vision Research. 2012; 7(3): 231-234.

14. Esomonu UG and Badmasi MI. Anthropometric Variation Pattern of Canthal Distances with Advancing Age Among the Igbos of South-Eastern Nigerian. Asian Journal of Med Sciences. 2012; 4(3): 121-126.

15. Banglapedia., 2015. [online] Available at: http://en.banglapedia.org/index.php?title=Bangali_Nation [Accessed 30 November 2018].