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Anthropometric Study of Orbitonasal Proportion and Their Comparisons in Bangladeshi Buddhist Rakhain Ethnic Males and Females

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Abstract

Background: Anthropometric pattern of the orbitonasal proportion varies with no universal normative values. **Objective:** The purpose of the present study was to evaluate the anthropometric study of orbitonasal proportion and their comparisons in Bangladeshi Buddhist Rakhain Ethnic males and females. **Methodology**: This cross-sectional study was carried out in the Department of Anatomy, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh from January 2011 to December 2011 for a period of one (01) year. Adult healthy Bangladeshi Buddhist Rakhain males and females with the age group of 18 to 30 years were included as study population. Standard of normative facial anthropometric values related to intercanthal distance and nose width. **Results:** This study shows the inner intercanthal distance (IICD) mean value of males and females as 33.19±2.88 mm and 31.28±2.78 mm, respectively with a statistically significant relationship (P<0.05). The nose width was 41.16 (±3.03) in male and 36.11 (±2.20) in female which was statistically significant (P<0.05). **Conclusion:** This study shows that intercanthal distance and nose width differs across the adult healthy Bangladeshi Buddhist Rakhain males and females. Gender and ethnicity are two of the main parameters that affect the variation. These findings would be applicable in clinical setup as reference values during surgical planning. *[Journal of National Institute of Neurosciences Bangladesh, January 2024;10(1):21-25]*

Keywords: Anthropometric Study; Orbitonasal Proportion; Bangladeshi Buddhist; Rakhain Ethnicity

Introduction

Anthropometry comes from a Greek word Anthropos which means human and metron[1]. According to the WHO, the anthropometry is an inexpensive and noninvasive technique for assessing the size, proportions, and composition of the human body[2]. The important branch of anthropology is cephalometry through which a human being can easily distinguish between male and female face without much difficulty and also play a great role to find out the difference between different ethnic groups. Among the different parameters of cephalometry, nasal parameters are considered as one of the most important clues to racial and ethnic origin[3]. The nose is the upper most part of the respiratory tract and the organ for smell. It's shape including the the nasal bridge, slope of the tip, septum and nares differs from race to race, tribe to tribe and from one environmental region to the other[3]. It is believed that the shape of the nose is a signature indicating the ethnicity, race, age and sex[4].

Orbitonasal anthropometry has a key part in measuring dysmorphic syndromes, hypertelorism, facial trauma, especially naso-orbitoethmoid damage and also in diagnosing neural crest anomalies. It also aids in arrangement reconstructive surgical procedures of face and getting fruitful outcome. Canthus is the term used to describe the either reached the adult level most maybe in the mid to late twenties. Canthal measurements are predisposed by ethnicity[5]. It is a method used in both physical and medical anthropology comprising precise and systematic measurements of the human skull.

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Craniofacial anthropometry also includes measurement of the inner (medial) and outer (lateral) canthal distances and canthal index. Orbitonasal anthropometry significant for the study of human growth and variations in different age, sex and races[6].

Canthus is the angle at either end of the fissure between the eyelids. Lateral canthus is formed by the lateral part of superior and inferior eyelids and medial canthus is formed by the medial part of the superior and inferior eyelids. Canthal distances are measured as inner canthal distance and outer canthal distance. Inner canthal distance is the distance between the two medial canthi and outer canthal distance is the distance between the two lateral canthi[7]. Considering all facts mentioned, purpose of the present study was to establish the baseline measurements of the orbitonasal proportion and their comparisons in Bangladeshi Buddhist Rakhain ethnic males and females.

Methodology

Study Settings and Population: This cross-sectional observational study was carried out in the Department of Anatomy at Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka from January 2011 to December 2011 for a period of one (01) year. Participants of the study were adult healthy Bangladeshi Buddhist Rakhain ethnic males and females who were in the age group of 18 to 30 years. The following exclusion criteria were used to screen out the ineligible participants through history taking and physical examinations like mixed ethnic origin, congenital craniofacial anomaly, major craniofacial trauma, orthodontic treatment or craniofacial reconstructive surgery, malocclusion, common genetic, endocrine or neurological disorders and beard or mustache, cranio-facial diseases and abnormalities, growth related disorders and history of facial trauma/reconstruction surgery were excluded from the study.

Study Procedure: During landmark marking, each of the participants was asked to sit relaxed on a chair and the head was kept in the normal head position. This position was recommended and suitable for correct identification of facial features[8]. All the measurements were taken twice to avoid measurement error. With the help of a sliding calipers, the measurements were taken in millimeters. The landmarks used for taking different physical measurements have been described by Kolar and Salter[9]. The landmarks in the study were defined as follows: 'alare(al)' to 'alare(al)' endocanthion(en)' to 'endocanthion(en)'[9]:

Statistical Analysis: The data was statistically analyzed by Statistical Package for Social Science (SPSS version 17.0) to determine the range, the mean and standard deviation and any significant correlation between orbitonasal proportion.

Results

A total number of 100 male and 100 female respondents were recruited for this study. The mean with SD of Intercanthal distance was 33.19 (±2.88) and 31.28 (±2.48) in male and female respectively. The mean with SD of Nose width was 41.16 (±3.03) and 36.11 (±2.20) in male and female respectively (Table 1).

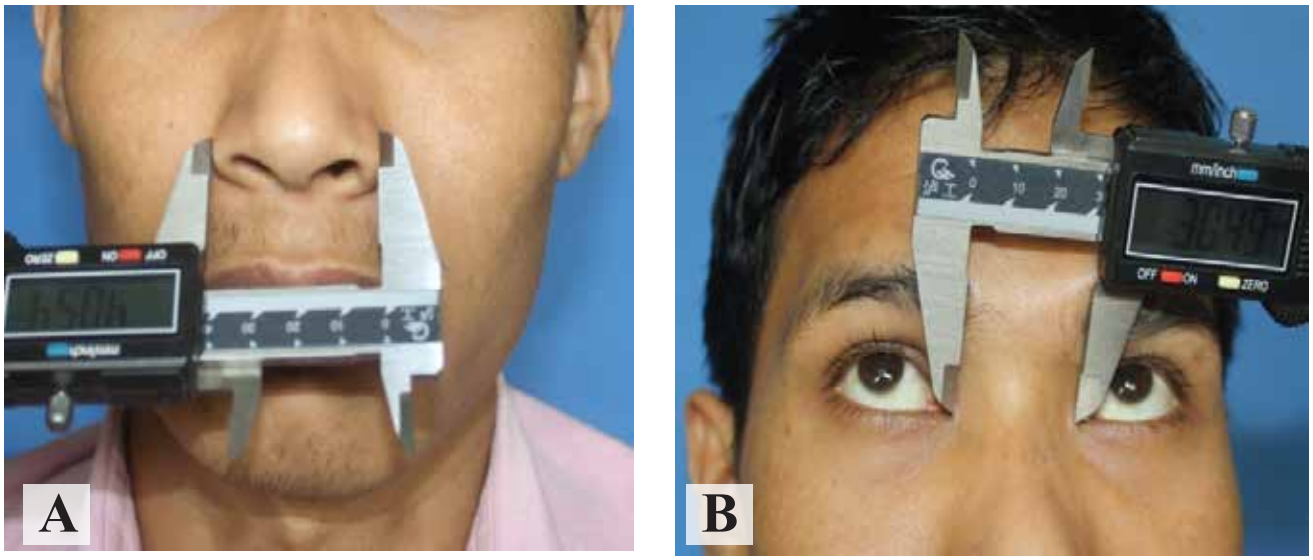

Figure-1: A: Procedure of measuring the nose width ('alare' to 'alare') in a participant using a sliding calipers. B: Procedure of measuring the intercanthal distance ('endocanthion' to 'endocanthion') in a participant using a sliding caliper

Discussion

A significant difference was found between gender in the orbitonasal in the adult healthy Bangladeshi Buddhist Rakhain males and females. The results of males and females are 33.19± 2.88 mm and 31.28±2.78 mm, respectively and the results show a significant difference (P-value = 0.001). These findings are in well agreement with the other studies[11-17].

Table 1: Comparisons of the values of the variables related to the orbitonasal proportion in the adult healthy Bangladeshi Buddhist Rakhain males and females (n=100 males and 100 females)

Variable related to the Orbitonasal proportion	Gender	Value (mm)		P value
		Range	Mean (±SD)	
Intercanthal distance (en – en)	Male	27.00 – 40.71	33.19 (±2.88)	0.000
	Female	25.17 – 39.15	31.28 (±2.48)	
Nose width (al – al)	Male	34.07 – 51.50	41.16 (±3.03)	0.000
	Female	31.08 – 42.30	36.11 (±2.20)	
	Total	120.00 - 160.00	140.28(±8.00)	

Adhikari et al[7] reported there is a significant difference (p value 0.05) in the value of inner canthal distance between male and female of Indian and Nepalese population with males having higher inner canthal distance. A Sudanese study was done by Salah et al18 among females and it revealed that the Intercanthal distance (IICD) minimum value is 24.15 mm and the maximum value is 37.46 mm. The other Sudanese study, done by Nasr et al[19] revealed that the mean width of the IICD is 32.80 mm. Furthermore, the gender shows significant influence on the anthropometric pattern of the IICD with higher values in males. A Turkish study done by Everekliogluet al[20] for the investigation of the IICD in males and females revealed significantly lower values when compared to the Sudanese.

It is evident from the table 2 in results section that the Rakhain males showed the mean values of all variables similar to the African American males. The mean Rakhain intercanthal distance and mean left eye fissure length was also similar (S) to those of the majority of the populations mentioned. The other variables showed varied findings, though different trends were somewhat visible. The Mongoloid (Thai and Japanese) values were mostly similar (S) lower (L) as were the Negroid Zulu means.

Porter, along with Farkas, evaluated the differences between continental Asian, Asian American, and North American Caucasian faces. The most significant differences between these two groups were that the Asian group had significantly smaller mouth width, greater Intercanthal distance, shorter eye fissures

Table 2: Comparisons of the Rakhain male mean values of variables related to Orbitonasal proportion with the means of other male population groups

	Male Population Group, (age in yrs, sample size)		References	Variables related to Orbitonasal proportion	
				Mean inter-canthal distance	Mean nose width
				en - en	al – al
1	Thai	(18-30 yrs, 30)	Farkas et al[21]	L	**S**
2	Japanese	(do)	Farkas et al[21]	L	**S**
3	Indian	(do)	Farkas et al[21]	L	**S**
4	Turkish	(18-25 yrs, 228)	Bozrik et al 2003, p 216	S	**H**
5	Azerbaijan	(18-30 yrs, 30)	Farkas et al[21]	S	**H**
6	Bulgarian	(do)	Farkas et al[21]	S	**L**
7	Czech	(do)	Farkas et al[21]	S	**H**
8	Croatian	(18-30 yrs, 30)	Farkas et al[21]	S	**H**
9	German	(do)	Farkas et al[21]	S	**L**
10	Greek	(do)	Farkas et al[21]	S	**H**
11	Slovak	(do)	Farkas et al[21]	S	**H**
12	African American	(18-30 yrs, 109)	Porter 2004, p 80	S	**S**
13	Angolan	(18-30 yrs, 30)	Farkas et al[21]	S	**L**
14	Zulu	(do)	Farkas et al[21]	L	**S**

length, and much wider noses. Farkas et al[21] have presented and discussed the findings of 14 anthropometric measurements in peoples of Europe all Caucasoid, Middle East, Asia and of African origin some of which have been discussed above and tested their differences statistically with North American White people.

In the current study, nose width was 41.16±3.03 in male and 36.11±2.20 in female which was statistically significant ($P<0.05$). Farkas[21] study showed that the mean values of nose width in Indian it was 37.9mm, in Singaporean Chinese it was 39.2 mm, in Thai it was 40.8 mm, which showed differences with the values of Bengali it was d 33.81 mm and Chakma it was 34.70 mm. When compared with Caucasian Azerbaijan, the mean values of nose width was 35.7 mm and Negroid Angolan, it was 46.3mm, ethnic differences also established[22].

Conclusion

This study shows that intercanthal distance and nose width are higher in male than female in the adult healthy Bangladeshi Buddhist Rakhain. Therefore, it needs further studies to establish the scientific reasons for variation in measurements among this ethnic study population of Bangladesh.

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Conflict of interest: We do not have any conflict of interest (financial or others).

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Data Availability
Any inquiries regarding supporting data availability of this study should be directed to the corresponding author and are available from the corresponding author on reasonable request.

Ethics Approval and Consent to Participate
Ethical approval for the study was obtained from the Institutional Review Board. As this was a prospective study the written informed consent was obtained from all study participants. All methods were performed in accordance with the relevant guidelines and regulations.

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