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ANTHROPOMETRIC VARIATIONS OF THE INNER AND OUTER CANTHAL DISTANCES BETWEEN ADULT MALE AND FEMALE IN IKA NORTH AND SOUTH LOCAL GOVERNMENT OF DELTA STATE

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ABSTRACT

Craniofacial anthropometry has become important tool to both clinical geneticists and reconstructive surgeons. In this study, variations and similarities were detected in some parameters between individuals of this population subgroup and other population.

INTRODUCTION

Anthropometry is described as the measurement of living humans for the purpose of understanding variation in human structures. Orbital parameters like inner and outer canthal distance are important for several purposes in ophthalmology i.e. manufacture of spectacle frames and lenses management of orbito-facial deformities (Farkas *et al.*, 2005).

Inter canthal distance is the distance measured from inner cornea of the right eye and outer cornea of the left eye. It can also be referred to as the distance between the inner and outer cornea of each eye i.e. the width of the eye. However, inter canthal distance comprises of inner canthal distance and outer canthal distance. Inner canthal distance refers to the distance measured between the two inner canthal of the eyes whereas the outer canthal distance is the distance measured between the two lateral canthal of the eye (Osunwoke, 2010).

Inter canthal distance appears to be one the facial parameters which serve as a useful tool in medical genetics as many of the syndromes present at birth usually involves the head and face. Thus, this can assist clinicians to make accurate description of their diagnosis.

Through, a good knowledge of this facial parameter, the value of canthal index (CI) in a given population may be obtained. Inner canthal distance, outer canthal distance and other facial parameters like fronto-occipital distance (FOD), inter pupillary distance (IPD) are important measurements in the evaluation of several systemic syndrome, cranio-facial abnormalities and also surgical treatment of posttraumatic telecanthus (Laestadius *et al.*, 1979). Canthal index and circumference orbital index which are derived from measured parameter are also important to anatomist and cranio-facial surgeons (Everklogu *et al.*, 2002). This study is concerned with the generation of database for inner and outer canthal distances of adult male and female in Delta State.

MATERIALS AND METHODS

Materials

Veniercaliper, chair.

Inclusion Criteria

Individuals within the age range of 21-35 years.

Exclusion Criteria

Individuals with abnormal craniofacial configuration, neurologic disease oculo-facial trauma and congenital cranio-facial anomaly.

Sampling Method

Simple random sampling.

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Source of Data

Indigenes of Alihame, Akumazi, Agbor-obi, Azu-owa in Ika north and south local government of Delta State within the age range of 21-35 years.

Methodology

In this study, a total number of 1000 (569 male and 431 female) individuals volunteered as subjects. These subjects were within the age range of 21-35 years, with normal cranio-facial configuration and no known history of oculo-facial trauma, neurologic disease, congenital cranio-facial anomaly and clinically manifested telecan. Thus, this population was recruited indigenes of Alihame, Agbor-Obi, Azu-Owa, akumazi. In this cross sectional extensive study, the subjects were chosen by virtue of them having normal cranio-facial configuration and after informed consent has been obtained from the subjects, measurements of inner and outer intercanthal distances were performed from which the canthal index was determined. The mean value of each parameter were measured in relation to the gender of the subjects and analyzed to statistically assess the anthropometric variation patterns of these parameters in adult male and female of this population sub-group. In this research study work, a venier caliper was used for the measurement of the inter canthal distances (inner and outer canthal distance). During this process, each subject was seated comfortably in a chair with the head at the same level and about 40cm in front of the examiner's head. The measurement of each of these parameters (inner and outer inter canthal distance) was done twice for precision and accuracy. The inner inter canthal distance (measurement between the two medial canthi of the eyes) was measured by having the subject look straight at the examiner while a venier caliper was placed at the bridge of the subject's nose. The outer canthal distance (measurement between the lateral canthi of the eyes) was measured by instructing the subject to look upwards as this is to minimize the contrast between the sclera and the skin. From these parameters, the canthal index was determined i.e. Mathematically; inner inter canthal distance/outer inter canthal distance $\times$ 100 (Everekloglu et al., 2001).

RESULTS AND DISCUSSION

Results

Table 1: Age

Age Range	Frequency	Percentage
(0-25) Years	255	25.9
(26-30) Years	402	40.9
(31-35) Years	327	33.2
Total	984	100.0

Table 2: Statistical Analysis Showing Descriptive Statistics of the Canthal Distance of Adult Male and Female in Delta State

Canthal Distance	Frequency	Minimum	Maximum	Mean	Std. Deviation
MALE ICD	560	21.41	44.53	34.0587	4.09328
MALE OCD	560	89.42	140.93	110.2861	8.65867
MALE C.I	560	19.36	41.38	30.9266	3.30472
MALE AGE	560	0.00	0.00	2.0393	.77660
FEMALE AGE	424	0.00	0.00	2.1179	0.75026
FEMALE ICD	424	23.22	45.64	33.5888	4.05238
FEMALE OCD	424	89.22	133.98	110.6442	8.72727
FEMALE C.I	424	22.20	41.75	30.3680	2.86721

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Table 3: Statistical Analysis Showing Comparison of Canthal distance of Adult Males and Females in Delta State

Canthal Distance	Gender	Freq.	Mean $\pm$ (mm)	StdDistance Difference	P-Value	T-Value
Intercanthal Distance	Males	560	34.06 $\pm$ 4.09	0.47	0.073	1.793
	Females	424	33.59 $\pm$ 4.05			
OuterCanthal Distance	Males	560	110.29 $\pm$ 8.66	0.35	0.523	-0.640
	Females	424	110.64 $\pm$ 8.73			
Canthal Index	Males	560	30.93 $\pm$ 3.30	0.56	0.005	2.832
	Females	424	30.37 $\pm$ 2.87			

P-value is significant if ($p < 0.05$) and not significant if ($p > 0.05$)

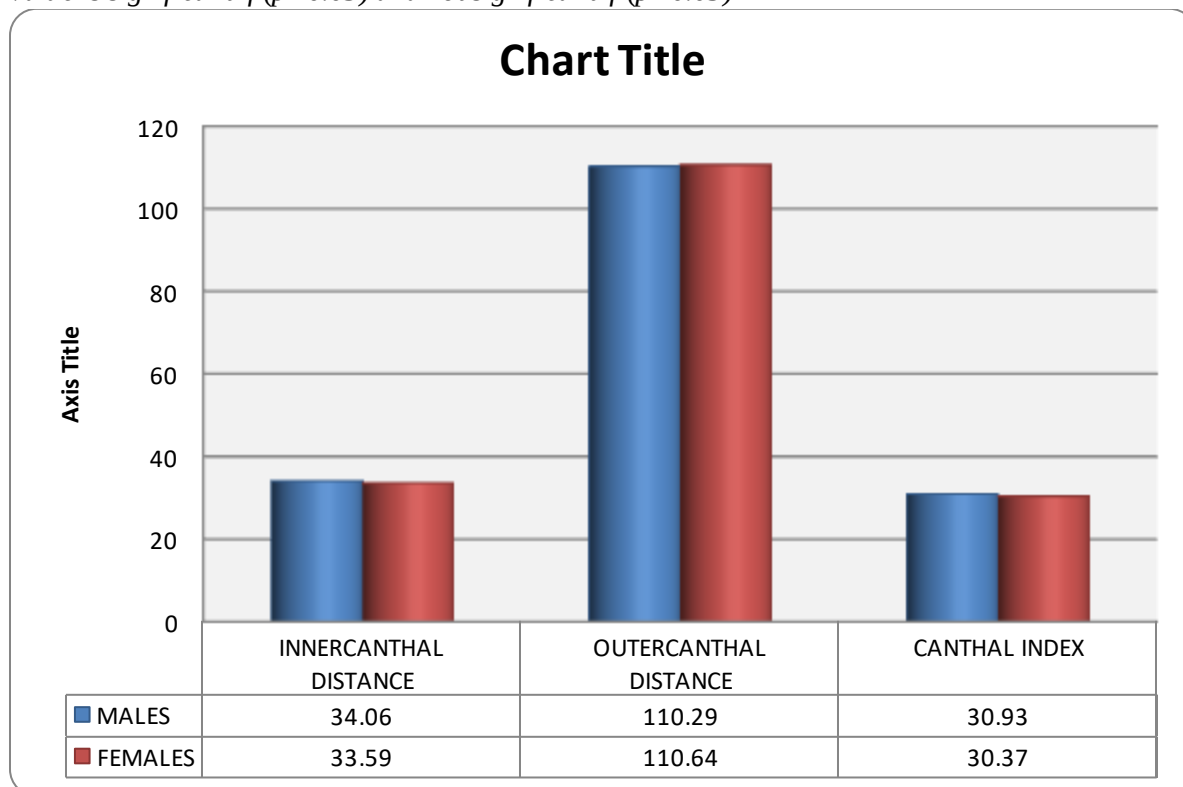


Figure 1: Showing Comparism of Canthal Distance amongst Delta Male and Female Population

Discussion

Craniofacial anthropometry has become important tool to both clinical geneticists and reconstructive surgeons. In this study, variations and similarities were detected in some parameters between individuals of this population subgroup and other population. In this study, the male had higher inner canthal distance (ICD) than the female subjects (males: 34.06mm; female: 33.59) and as such showed statistically insignificant sexual difference. Bruce and Timothy (1992) reported 34 ± 4 mm; Murphy and Lasin (1990) reported 33.9 ± 3.0 mm; Ngeow and Akan (2005) reported 33.0 ± 2.6 mm; for Malaysians in kuala Lumpur which are similar to the value of the same parameter in the present study. Gupta (2003) reported a range of 20-36mm for an Indian population which falls within the range of value obtained in the present study. However, these differences that are significant could be attributed to racial and ethnic differences caused by environmental and genetic factors control pre-pubertal and post-pubertal development of the upper third of the face.

According to Caucasian norms, inner canthal distance range from 30-35mm. Farkas *et al.*, (2005) reported a mean value of 34.1mm in Indian males and Kurjur *et al.*, (2006) reported 33.3mm in white females

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which are similar to the value of the parameter obtained in the present study. Farkas *et al.*, (2005) also reported a lower mean value of 27.3mm for male and 24.6mm for female subject aged 18-30 in a study on an Iranian population. Oladipo *et al.*, (2008) reported higher values (male 38.9; females 37.3mm) in an anthropometric study of ocular dimension on adult Ijaws of Nigeria when compared to the values obtained in the present study. Freihofner reported a mean value of 28mm-53mm which is within the range of value obtained with respect to this parameter in the present study.

In this study, the mean value of outer canthal distance for male is slightly lower than that of female subjects (males: 110.29mm; females: 110.64mm). Bozkir *et al.*, (2003) in a study in Turkish adults reported mean values (males: 95.55mm; females: 92.44mm). Vasanthakumar *et al.*, (2009) also reported similar values (males: 95.55mm; females: 92.44mm) which are lower than the value obtained in the present study with respect to the parameter. Gupta (2003) reported a mean range of 71-105mm which is lower than the value obtained in relation to the parameter in the present study. Oladipo *et al.*, (2008) in a study on Ijaws of Nigeria reported a mean value of 107.6mm for males and 104.5mm for females which are lower than the values reported in the present study.

The mean value of canthal index for male in the present study, is higher when compared to that of the female subjects (males: 30.93mm; females: 30.37mm) and as such indicates statistical significance in both sexes. Egwu (2008) in a study on student population in southeast Nigeria, reported the canthal index to be 37.1 ± 2.93 mm for males and 36.41 ± 2.69 mm which are higher than the values reported in the present study for both gender.

This study has tried to consider the intra-specific attributes of anthropometrical variables. The novelty of this study draws from the fact that all internet search engines employed did not reveal that such study has been carried out in this population subgroup.

However, further studies involving age-related changes of inner inter-canthal distance (IICD) and outer inter-canthal distance (OICD) and deduction of predictive relationships between the canthal parameters and other maxillofacial parameters like anterior maxillary teeth (Al Wazzan, 2001) and maxillary central incisor width (Abdullah, 2002) should be carried out as this will add to the knowledge of maxillofacial relationships which is important for efficient correction of maxillofacial and craniofacial disorders.

Conclusion

From the result of the present study, the value of the inner canthal distance (ICD), is similar to the value obtained in previous studies such as Gupta *et al.*, (2003). The value of the outer canthal distance (OCD) when compared to the value obtained in previous studies such as Oladipo *et al.*, (2010), Gupta *et al.*, (2003) is closely related. Knowledge gained from this study will help in the understanding of orbito-cranial growth patterns of males and females in this subgroup, early diagnosis of craniofacial syndrome and surgical management of craniofacial deformities. However, craniofacial dimension should be performed with normal standards specific for age, sex, race and ethnic group. Thus, the data obtained in this study is important to maxillofacial surgeons, clinicians and forensic scientist.

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