

## THE CIRCUMFERENCE INTERORBITAL INDEX OF THE ISOKO ETHNIC GROUP IN NIGERIA

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### ABSTRACT

**Aim:** The aim of the study is to determine the circumference interorbital index amongst the Isoko ethnic group of Nigeria.

**Methods:** This study was based on data collected from 600 Isoko subjects between 12–31 years of age in Delta State of Nigeria. Data was collected using a tape rule to measure the head circumference and a non-stretchable transparent centimeter ruler to measure the inner canthal distance. Circumference interorbital index was determined by measuring the head circumference and inner canthal distance. The head circumference was measured from the occipital prominence to the supraorbital ridge, while inner canthal distance was taken as the distance between the medial angles of the two eyes. Circumference Interorbital Index was calculated as Inner Canthal Distance (ICD)/ Head Circumference (HC) x 100. Mean and standard deviation for both sexes were calculated while t-test was employed as a statistical tool to search for significant gender differences.

**Results:** The mean and standard deviation for Isoko male and female circumference interorbital indices were 6.62 and 6.58; 0.38 and 0.10 respectively.

**Conclusion:** This study has provided a baseline data on circumference interorbital index of the Isoko ethnic group of Nigeria. The Isoko males displayed a higher circumference interorbital index than the females.

**Keywords:** Anthropology, Craniofacial surgery, Forensic medicine, Isoko

### INTRODUCTION

Physical differences between people can be recorded by measurements (Oladipo et al., 2010). Circumference inter-orbital index is an important parameter in physical anthropology, because of its use for identification, for the purposes of understanding human physical variation, in paleoanthropology, and in various attempts to correlate physical with racial traits. It is determined by the measurement of the head circumference and inner canthal distance (ICD). The head circumference is measured from the occipital prominence to the supraorbital ridge, while inner canthal distance is the distance between the medial angles of the two eyes. Craniofacial dimensions may be determined by a single gene, gene groups, or environmental factors (Poswillo, 1963). It has been suggested

that the measurements of patients be compared with normal standards specific for race as well as age and sex. Measurement becomes stable once one has reached adult levels in the mid- to late twenties (Pryor, 1969; Fledelius and Stubgaard, 1986). Values for the canthal and the circumference interorbital indices of blacks differ from values available for whites (Juberg et al., 1975). Reports of an African - American study on the circumference interorbital index showed that males and females of the population have mean values of 5.89 and 5.98 respectively (Juberg et al., 1975). Another study carried out on idiopathic benign macrocephalic children to determine normal standard values on head circumference, inner canthal distance, and other parameters showed that the mean values of circumference interorbital index of boys and

girls were  $5.56 \pm 0.44$  and  $5.56 \pm 0.43$  respectively (Everklioglu et al., 2001). A Turkish study conducted to demonstrate the anthropometric variation on fronto-occipital circumference, inner and outer canthal distances, canthal index and circumference interorbital index across age and sex, showed that across all subjects aged 7 to 40 years, the mean of all measured parameters and calculated indices of men and boys were significantly different from that of girls and women ( $p < 0.001$ ) (Everklioglu et al., 2002). A Nigerian study carried out to document and compare values between two Nigerian ethnic groups (Ijaw and Igbo) reported that Ijaw females and males had circumference interorbital indices of 8.10 and 7.80 respectively. The Igbo females and males had circumference interorbital indices of 6.50 and 6.20 respectively. Significant differences were observed between the two ethnic groups (Oladipo et al., 2009). Reports of another study conducted among adult Ibibios showed that the females had a circumference interorbital index of 5.93, while the males had 6.26. The conclusion is that the Ibibio male had a significantly higher value than the female ( $p < 0.05$ ). A study carried out by human osteological database at the Israel antiquities authority on skull measurement and indices of the chalcolithic skeletal population in Northern Galilee showed that the standard deviation of orbital-index for both male and female was 5.8 (Yossi, 2011). The result of this study is relevant to the anthropologists and forensic scientists. Circumference interorbital index is also important to anatomists and craniofacial surgeons (Lakshminarayana, 1991). Also, the knowledge of circumference interorbital index in healthy subjects in a particular region can be useful to dysmorphologists in early identification of some craniofacial syndromes such as hypertelorism, hypotelorism and telecanthus. There are few studies on anthropometric measurement of circumference interorbital index among Africans, with few records on Nigerian populations and particularly

none on the Isoko ethnic group in Nigeria. This study is probably the first of its kind. This study provides a baseline data on circumference interorbital index for the Isoko ethnic group. The Isoko ethnic group is one of the smallest minority ethnic groups in the Niger Delta region of Nigeria in West Africa, occupying an area of about 1,200 square kilometres, with a residual population of over 750,000 by 2001 census.

## MATERIALS AND METHODS

This study is based on data collected from subjects in the two Isoko local government areas (Isoko South and Isoko North) of Delta State, Nigeria. The descriptive type of the quantitative design using anthropometric measurements was adopted for this study. This cross sectional study was carried out using a total of 600 Isoko subjects between 12–31 years of age; 300 were males and 300 were females. The multistage sampling technique was used for the study. The subjects were made to sit in a relaxed and upright position with head in anatomical position while taking measurements. The parameters were taken using a tape rule to measure the head circumference from the occipital prominence to the supraorbital ridge. Also a non-stretchable transparent centimeter ruler was used to measure the inner canthal distance. The inner canthal distance was taken as the distance between the medial angles of the two eyes. Circumference Interorbital Index was calculated as Inner Canthal Distance (ICD)/ Head Circumference (H.C) x 100. The research subjects had no history or clinical features of craniofacial disorders. No research subject had history of plastic surgery or trauma of the face. Approval for this study was obtained from the Anatomy Department Research and Ethics Committee. Mean and standard deviation of both sexes were calculated while t-test was employed as a statistical tool to search for significant gender difference with the aid of the Statistical Package for Social Sciences (SPSS), version 16. P value less than 0.05 ( $P < 0.05$ ) was considered significant.

## RESULTS

Table 1: ICD, HC and CII for Isoko males

AGE GROUP	NO	ICD	HC	CII±STD
12-16	100	3.57	54.35	6.48±1.06
17-21	95	3.65	55.10	6.62±0.44
22-26	75	3.74	56.74	6.66±0.80
27-31	30	3.87	58.32	6.71±0.53

An increase in the ICD, HC and CII from one age group to another

Table 2: ICD, HC and CII for Isoko females

AGE GROUP	NO	ICD	HC	CII±STD
12-16	100	3.46	53.56	6.46±0.45
17-21	95	3.53	54.38	6.58±0.36
22-26	75	3.66	55.16	6.63±1.76
27-31	30	3.80	57.23	6.65±0.35

An increase in the ICD, HC and CII from one age group to another

Table 3: Mean Circumference Interorbital Index of the Isokos

VARIABLES	MALES	FEMALES
MEAN CII	6.62	6.58
STD	0.38	0.10
SAMPLE SIZE	300	300

The mean canthal index of Isoko males is higher than that of the females

## KEY

CII: Circumference Interorbital Index  
 HC: Head Circumference  
 ICD: Inner Canthal Index  
 STD: Standard Deviation  
 NO: Number

## DISCUSSION

The mean and standard deviation for Isoko male and female circumference interorbital indices were 6.62 and 6.58; 0.38 and 0.10 respectively. It is obvious that in the Isoko ethnic group, the circumference interorbital index of the male is higher than that of the female. The observed gender differences were significant ( $p \leq 0.05$ ). The presence of sexual dimorphism in the studied sample agreed with other studies that compared anthropometric characteristics of male and female. The circumference interorbital index of Adult Ibibios in Southern Nigeria exhibited sexual dimorphism (Oladipo et al., 2010). This study also agreed with another study (Everklioglu et al., 2001) on normative values of craniofacial measurement in idiopathic benign macrocephalic children, in which all the craniofacial parameters studied had mean values higher in males than in the females and the gender differences were significant ( $p < 0.001$ ). However, this study differed from findings of

other researches (Juberg et al., 1975) on the circumference interorbital index of the African - Americans where the mean value of the female was 5.98 and was higher than that of the male which was 5.89. It did not concur with mean circumference interorbital indices of 5.60cm and 5.65cm respectively for the male and female Turkish (Everklioglu et al., 2002). This research also differed from that done on the Ijaws and Igbos who had mean circumference interorbital indices of 7.80 cm and 6.20 cm for the males and 8.10 cm and 6.50 cm for the females respectively (Oladipo et al., 2009). The Ijaw population presented the highest value in circumference interorbital index (7.80 cm for male and 8.10cm for female) (Oladipo et al., 2009) while the Turkish population presented the lowest value of 5.60cm for males and 5.65cm for females (Everklioglu et al., 2002). The mean circumference interorbital index displayed in this study seemed to be closest to

that of the adult Igbos due to the fact that both are Nigerians. The differences between different populations in the circumference interorbital index may be due to genetic and environmental factors.

### CONCLUSION

The mean circumference interorbital index of the Isoko male and female subjects are 6.62 and 6.58 respectively. The males displayed a higher circumference interorbital index than the females ( $p < 0.05$ ).

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