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Radiological Assessment of the Interorbital Distance In Nigerian Children

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ABSTRACT

Inter orbital distance is an important tool in craniofacial anthropometry. It is useful in making a diagnosis of hyper or hypotelorism. A total of 70 plain radiographs of Nigerian children were used for this study. The interorbital distance was measured using standard measurement procedure. The results revealed mean value of 19.59mm±5.59 for age group 1day to 5years, 23.74mm±4.15 for age group 6years to 10years and 28.22 for age group 11 to 15years. The distance interval range was 17.63-21.55mm, 21.96-25.52mm and 26.29-30.15mm as against 12.20-18.60mm, 17.00-23.00mm and 22.50-28.00 of the Caucasian values for age groups 1day to 5yrs, 6yrs to 10yrs and 11-15yrs respectively. The difference was statistically significant for all age groups (P>0.05). This value will be useful in the medical practice most especially in craniofacial surgery.

Key words: interorbital distance, measurement, Nigerian.

Interorbital distance refers to the distance between medial canthi of the two eyes. It is also referred to as the intercanthal distance. The distance between the orbits vary significantly with differences in age, sex and race. The orbit is strongly built to protect the eye and the position and shape of the orbit in humans have given them an understanding peculiarity distinguishing them from other primates. The size and shape of the orbital cavity depend on the growth of the globe and other contents (Kirks 1991).

At birth, the globe is said to be 75% of adult size and its growth completed at about age 12 attaining full adult dimensions (Gerald and Siverman 1965, Kirks 1991). Measurements of interorbital distance may show normal distance, abnormally increased or abnormally reduced dimensions. The abnormal widely spaced orbits is a feature of nearly 400 syndromes (Korf and Pritchard 2003). Orbital measurements vary considerably but are usually quite symmetrical and disparities between the two sides of as little as 2mm are considered significant because, this disparity separates patients with mongolism, hypertelorism from normal children (Gerald and Silverman 1965, Korf and Pritchard 2003).

According to Du Boulay (1980), narrowing of the interorbital distance is as a result of early fusion of the metopic suture. And generally, abnormal conditions associated with the interorbital distance have been found to be congenital rather than acquired (Kirks 1991).

This study therefore, was put forward to asses the interorbital distance of Nigerian children and also to provide a baseline data which will be helpful for paediatricians and those involved in cranio-orbital surgeries.

MATERIALS AND METHODS

A total of 70 skull radiographs of Nigerian children aged 1day-15years were selected and used. Information on Subject's age and state of origin were gathered from the X-ray request form. Subjects with history suggestive of congenital malformation and accident were excluded from the study. Radiographs were obtained from the Radiology department of the University of Port-Harcourt Teaching Hospital, Braithwaite Memorial Hospital, Images diagnostic centre and Pix Medical centre all in Port-Harcourt. Radiographs used were that of posteroanterior (Cadwell's view) and straight posteroanterior projections.

Measurements

A Sliding (Venier's) Caliper was used to measure the interorbital distance as the distance from measured from the medial canthus of the right eye to the medial canthus of the left eye. This was the method previously applied by Laestadius, (1969).The tips of the caliper were mandatorily cleaned with methylated spirit soaked in cotton wool between each subject to prevent cross-transmission of any infection and great care was taken during measurements to avoid injury.

Data analysis

Data was analysed statistically using student t-test with a level of significance set at $P<0.05$.

RESULTS

The results of this study are presented in table 1. The mean interorbital distance was 19.59mm for ages 1day to 5yrear, 23.74mm for age group 6 to 10years and 28.22mm for age group 11-15years. The distance interval range which is recorded in the table 1 below, was compared statistically with known standard values in table 2. In all age groups there was a statistical significant difference ($p<0.05$).

Table 1: Interorbital Distance in Nigerian Children

Age Range	sample Size	Mean Distance (Mm)	standard deviation	Distance interval range
1day-5years	31	19.59	5.59	17.63-21.55
6yrs-10yrs	21	23.74	4.15	21.96-25.52
11yrs-15yrs	18	28.22	4.18	26.26-30.15

Table 2. Comparative Data of Interorbital Distance interval

Age Range	standard value (mm) Gerald et al (1965)	Kirks(1991)	Present study (Nigerian value)
1day-5yrs	12.20-18.60*	12.70-18.50*	17.63-1.55
6yrs-10yrs	17.00-23.00*	17.40-23.10*	21.96-25.52
11yrs-15yrs	22.50-28.00*	22.50-28.10*	26.29-30.15

* $p<0.05$ in comparison to the present study

DISCUSSION

The result obtained in this study indicates that majority of the children population under study have interorbital distances between the range of 15-20mm and 25-30mm.

Comparing the values obtained from this study with that of previous studies carried out by Gerald and Silverman (1965) and Kirk (1991), it was observed that the interorbital distances of Nigerian children under study is statistically larger than their Caucasian counterpart ($p<0.05$). This significant difference in interorbital distance might be due to the fact that skull size and shape affect the interorbital distance. Earlier studies had revealed that Causcasians have smaller skull sizes than Africans as a result of racial variation (Williams et al., 1995). Another possible reason is the fact that Caucasians have smaller nasal index than Nigerians as the interorbital distance crosses the root of the nose and blacks have a wider nasal bridge. Black African populations are known to exhibit illusory hypertelorism in individual with flat nasal bridge (Oyibo *et al* 2008)

Since the sample size of this study is from different ethnicity within the Nigerian nationality, it will therefore not be surprising to have values different from the present study on work done for Nigerians with different ethnicity forming the bulk of the data.

Anatomical features are considered dysmorphic if their values lie outside the normal range. Abnormally increased interorbital distance referred to as hypertelorism is a feature of nearly 400 syndromes (Korf and Pritchard 2003). Some of the differential diagnosis or common causes of orbital hypertelorism include familial hypertelorism, median cleft face syndrome, trisomy 13-15, infantile hypercalcemia, cleidocranial dysplasia, crouzon disease, encephalocele and cooley anaemia (Kirks 1991). In contrast to orbital hypertelorism, orbital hypotelorism is uncommon (Judisch et al 1983). It is known that since the interorbital space is mainly occupied by the ethmoid bone, most probably, this bone is narrower than normal when the orbits are closely set. It is however, not known if abnormally narrowed intercanthal distance is the result of a primary hypoplasia or if it is secondary to other unappreciated basic causes.

Since orbital hypotelorism is often more obvious radiographically than on clinical assessment, features with high index of suspicion relating to this condition requires more careful examination for additional ocular or dimorphic features particularly those relating to forebrain, midbrain and face development.

Since osteometric standards tend to be population specific thus, the findings in this research should be used as a baseline for further research work in Nigeria. This finding will also offer important information to clinicians in the management of disease conditions associated with the interorbital area in Nigerian children.

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