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Incidence of brachycephalization among Nigerians

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Abstract

Background- The study of head dimension is of considerable anthropological interest especially in the study of the growth in shape of the head. The incidence of brachycephalization in Nigeria was established by carrying out an analysis of the craniometric study of the three major tribes in Nigeria. Similar reports have been made elsewhere within and outside Africa. **Materials and Method-** A cross sectional measurement of the head length and head breadth was carried out on regional basis on 500 subjects each from Hausa, Ibo and Yoruba tribes of Nigeria. The Cephalic Index was calculated accordingly and classified. **Result-** The Mean Cephalic Index of the Hausa subjects was 80.20 ± 2.66 while the mean values for Ibo and Yoruba subjects were 82.40 ± 2.91 and 82.20 ± 3.09 respectively. **Conclusion-** The present report shows that Cephalic Index of Nigerians appreciated from the mesocephalic values reported by earlier researchers to brachycephalization.

Keywords: Head length, Head breadth, Cephalic Index, Brachycephalic, Ethnic groups.

INTRODUCTION

The use of measurements to establish head dimensions has been practiced by early anthropologists. Such studies depend on a number of standard metrical techniques of craniometry[1]. The knowledge from such anthropometrical studies is relevant in comparing the body dimensions of our present and past generations[2][3]. The result from such studies has been used to classify the skull into different categories of Cephalic Index which has made it possible to establish the relationship that existed in different racial groups[4].

The Cephalic Index expressed as the percentage of the ratio of maximum head breadth per maximum head length measures the shape of the head rather than the size[5]. It varies among races and is classified into three categories thus: Dolichocephalic or long head, up to 74.9; Mesocephalic or medium skull, between 75.0 to 79.9 and Brachycephalic or short skull, up to 80.0 and above.

Skulls with the same Cephalic Index may vary considerably in their overall size irrespective of the race. Presently, statistically follow-up investigations have been conducted on adults over a period of time to show how size and shape of the head change during the entire life span[6]. The result has shown that generally, the capacity of the skull is affected by growth of the brain but the shape of the vault is not directly related to the growth of the brain. It is rather controlled by some independent genetic factors[6].

Some earlier reports had tried to explain the reasons for these changes through anthropometric analysis. It has been reported that an increase in head breadth was accompanied by a decrease of the head length[7]. Other studies reported an increase in head length at various age groups[8][9] but no increase in the head breadth[9]. A follow up study on the Japanese reported that both the head length and head breadth increased considerably as age progresses but implicated increase in head breadth as the chief factor responsible for the secular changes in head shape[10].

Generally, progressive brachycephalization seems to be worldwide. Some authors have reported progressive brachycephalization among the Japanese[10-13] and Indian people[14]. Head breadth had been implicated as playing the principal role in brachycephalization[10][12][15]. Similar studies considered the influence of heredity, environment and nutrition as factors contributing to such growth variation[10][16][17].

In Africa, Cephalic Indices of 75 to even 80 have been reported[1] while in Nigeria, earlier studies on different ethnic groups had at different times reported that most subjects were mesocephalic[18-23].

Such studies had reported Ibo males[18] and Efik School Children[20] as mesocephalic. Ibo males were reported to have Cephalic Index of 77.2[18]. On the other hand, while the Ogbia children of Bayelsa State in the Niger Delta region of Nigeria were reported to be dolichocephalic[24] , a recent report recorded that 78.68% of the older children and adolescents in the Ogbia tribe were mesocephalic[23]. However, a different study revealed an incidence of dolicocephalization tending towards mesocephalization amongst the Yorubas [22]

However, an earlier study had observed a tendency towards brachycephalization in a group of African-American Children[5]. In Nigeria, some reports have indicated that the male and female subjects of Ibo ethnic group were brachycephalic with mean Cephalic Index values of 80.94 and 82.82 respectively[25]. A recent study reported that the Igbo male and female people of Abakaliki area of Ebonyi State, Nigeria were brachycephalic and mesocephalic respectively with mean Cephalic Index values of 80.00 and 79.83[26] while another study reported that brachycephalic type was dorminant in the young adults of Ndi Igbo of Abia State, Nigeria[27]. Also, it was reported that the Ogoni people[28] and young adults of Urhobo and Itsekiri origin[29] from rural and urban areas of Delta State of Nigeria were in the brachycephalic population.

The present study therefore investigates the head growth changes that have taken place towards brachycephalization amongst the three major tribes in Nigeria. The study was carried out within the same period of time and is considered to be of great anthropological interest, especially in the field of forensic and legal medicine. The study is therefore documented as data for future references.

MATERIALS AND METHODS

A cross sectional anthropometric study was undertaken on the Cephalic Index of 1500 young adult Nigerians whose age range falls within 10 to 30 years. The selection comprises 500 subjects from each of the three major ethnic groups; Hausa, Ibo and Yoruba. They were healthy with no obvious head deformity. Their ages were determined by using ±6 months to their actual age[30]. All the subjects were born and bred at their respective regional locality in line with reports on the influence of environmental factors of growth on general body dimensions[31][32][33].

The anthropometric parameters were measured with Martin's Spreading Calipers and Steel Tape. Maximum Head Length was measured from the Glabella to the Opisthocranium while the Maximum Head Breadth was measured as the distance between the most laterally projecting points on the sides of the head (i.e. euryons).

Cephalic Index was calculated as follows;

$$\text{Cephalic Index} = \frac{\text{Maximum Head Breadth}}{\text{Maximum Head Breadth}} \times \frac{100}{1}$$

RESULTS

The Mean value of the parameters increased gradually with advancing of age.

The head indices gradually decreased with advancement in age. The Cephalic Index for each of the ethnic groups studied is brachycephalic.

Table 1: Mean and Standard Deviation of Cephalic Index of the Ethnic Groups by Age

	HAUSA	**IBO**	**YORUBA**
Age	Mean SD	Mean SD	Mean SD
10-11	82.2 3.71	83.5 3.66	83.3 3.68
12-13	80.3 3.27	82.5 3.66	82.7 3.68
14-15	80.6 3.33	82.7 3.42	82.8 3.58
16-17	79.8 2.95	82.5 3.05	82.3 3.50
18-19	80.2 2.85	82.0 3.19	81.5 2.95
20-21	80.5 2.57	82.3 2.87	81.9 3.35
22-23	80.0 2.25	82.0 2.58	82.1 2.88
24-25	79.3 2.09	82.0 2.68	82.5 2.75
26-27	79.4 2.00	81.9 2.13	82.1 2.40
28-30	79.4 1.98	81.9 2.08	81.5 2.21
TOTAL	**80.20 ± 2.66**	**82.40 ± 2.91**	**82.20 ± 3.09**

The Cephalic Index gradually decreased with Age. However, the mean Cephalic Index for each tribe is brachycephalic.

DISCUSSION

Most Nigerians in the present study are brachycephalic with the mean Cephalic Index of 80.20 for Hausas, 82.40 for Ibos and 82.20 for Yorubas. Earlier studies had represented Nigerians as mesocephalic[18][19][20][21][22][23]. The present report therefore shows an indication for secular change in the cephalic index of Nigerians with a tendency towards brachycephalization. This study corresponds to the earlier report on the cephalic index of the Ibo males and females[25][26][27]. Similar reports have been documented in other ethnic groups of Nigeria[28][29] while several authors had earlier reported incidence of progressive brachycephalization in other places of the world[10][11][12][13].

Increase in head breadth has been implicated as reason for brachycephalization[12]. Lasker (1953) On the other hand reports have indicated that there was little tendency for head length to change with advancing age but head breadth had a tendency to change[15]. However, hereditary and environmental factors have been adduced as explanation for such changes[10]. Other authors had earlier reported an increase in both head length and head breadth with age[8][34] while another study reported a gradual increase in head length but no increase in head breadth[9].

The present study observed a gradual increase in both the head length and head breadth with advancing of age in the three ethnic groups studied. This result is in line with the report on the Japanese people [10]. Again, hereditary and environmental factors may be ascribed as reason

for the growth changes in the head dimensions observed in the present study. This report is relevant in anthropological and archeological studies and forensic medicine.

CONCLUSION

The study successfully established that most Nigerians studied were brachycephalic. Also, secular changes towards brachycephalization was attributed to the gradual increase in both head length and head breadth as age progresses.

Competing Interests : There are no competing interests in this research study.

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