Cephalofacial Characteristics Of Children Under 6 Years Of Age In East Of Nigeria

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Abstract: Objectives: The present study aimed at measuring the length and width of the head and face of children under the age of six years in Anambra state, a South Eastern state of Nigeria. Data obtained was used to calculate their respective craniofacial indices. Methods: Four hundred and fifty four children (226 males and 228 females) below the age of six were randomly sampled from pre-nursery and nursery schools. Subjects with signs of deformities or history of head and facial injuries and mental retardations were excluded from the study. Measuring tape and spreading callipers were used to measure the length and width of the head and face. Results: Results indicated that the mean head length and breadth, face length and breadth, cephalic index and facial index did not indicate significant gender differences. Mesocephalic head type was the predominant, accounting for 39.9% of the study population; brachycephalic, dolicocephalic, hyperbrachycephalic heads accounted for 35.9%, 12.1% and 7.7% respectively, while ultrabrachycephalic was the least prevalent (4.4%). The dominant type of face was found to be hypereuryprosopic accounting for about 44.5% of the study population. Euryprosopic, mesoprosopic, and leptoprosopic types of face accounted for 39.2%, 11.2%, and 4% of the sampled population respectively, while the rare type was found to be hyperleptoprosopic with 1.1%. Conclusion: This study indicates no significant gender differences in the craniofacial variables in a cross-section of Nigerian children under 6 years of age. The most prevalent type of head was the mesocephalic type while the most dominant type of face shape was hypereuryprosopic in both male and female subjects. [Ukoha U. U. et al NJIRM 2013; 4(2) : 21-25]

Key Words: Cephalic index, facial index, Eastern-Nigeria, head, face

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Introduction: Anthropometric parameters are important in identifying and differentiating the characteristics of ethnic or racial groups and in understanding the distribution of human morphologies[1,2,3]. They are also useful tools in evaluating intrauterine growth, development, detecting neonatal health problems and assessment of infant growth pattern and health status[1,4] Cephalofacial measurement is an important anthropometry, which generates data that form important indices for studying brain growth and formation of facial types [5]. Facts show that development of the face goes pari passu with the growth and development of brain and other craniofacial structures such as the development of paranasal air sinuses, growth of temporary teeth and protrusion of the mandible [6]. Cephalometry therefore plays a very important role in identification, head and face reconstruction, plastic surgery, oral and maxillofacial surgery, orthodontics and clinical treatment and planning [7].

Scanty information exists on the cephalofacial anthropometry in Nigerian infants. Previous studies on the cephalofacial anthropometry have focused mainly on foetuses, and adults [8, 9, 10, 11]. The few previous studies [4, 12] on the Nigeria infants were concentrated only on cephalic indices of neonates and children (5-15 yrs) from the Northern part of the country and none has been documented in the Eastern Nigeria. Cephalofacial growth in infants is most rapid in the first year of life and slows at later years. It is also population specific and influenced by age, sex, nutritional and environmental factors [1, 6, 13]. The recognition of the above facts necessitated the present study. In this study therefore, we aimed to establish and document the pattern of head and facial types and the cephalofacial indices of Eastern Nigerian children under the age of six years. In addition, we assessed whether gender differences exist in these craniofacial indices. Furthermore, we studied the relationships between the prevalence of the various head and face types with sex of the infants.

It is believed that such information may help clinicians, anthropologists, neurologists, and plastic surgeons in the assessment of the clinical treatment/planning, health status, nutritional status, growth pattern, brain growth, and plastic surgery in Nigerian infants.

Methods: Subjects: Four hundred and fifty four children (226 males and 228 females) below the age of six were randomly sampled from pre-nursery and nursery schools in Anambra state, Nigeria. Subjects with signs of deformities or history of head and facial injuries and mental retardations were excluded.

The spreading caliper was used to measure the height and breadth of the head and face and all the measurements were taken with the subjects sitting on the chair with heads in anatomical position. Head length was measured as the distance between the glabella (the point above the nasal root between the eyebrow and intersected by a midsagittal plane) and inion (the distal most pointed place on the external occipital protuberance in the mid sagittal plane). Head breadth was measured as the maximum diameter between two euryon (the lateral most pointed place on the side of the head). The head circumference was measured with the aid of a measuring tape.

The length of the face was measured as the distance between the nasion (the depression at the root of the nose just inferior to the level of the eyebrow) and the gnathion (the lowest point on the midline of the mandible), while face breadth was measured as the distance between the two zygomatic arches.

Calculation of cephalic index was carried out based on standard anatomical description by dividing the maximum cranial breadth with the maximum cranial length and then multiplied by 100, while that of facial index was calculated by dividing the maximum facial height (length) with the maximum facial breadth and then multiplied by 100 [14].

Data Analysis: Descriptive data was expressed as mean ± standard deviation. Comparative analysis between genders was done using independent sample t-test. The prevalence of facial types and association with sex was analysed using cross-tab Pearson's chi-square test. The statistical significance was set at $P<0.05$. All statistics were done using SPSS for windows (Version 16.0).

Results: The means and standard deviations of head length, head breadth, face length, face breadth, cephalic index and facial index of 454 children under 6 years of age are as presented in Table 1. These craniofacial variables indicated no significant gender differences.

Head shapes were classified by cephalic index. Mesocephalic head type was the most predominant, accounting for 39.9% of the sample population while the ultrabrachycephalic head type is the least prevalent of the head types – 4.4% (Fig.1). The prevalence of the other head types are as shown in Fig.1.

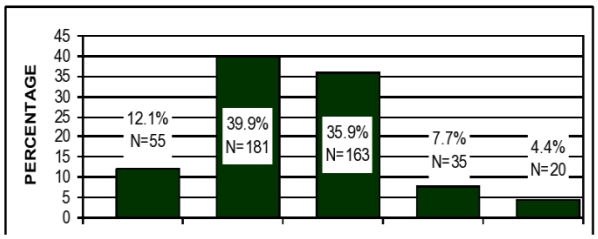

Fig.1. : prevalence of the other head types

Figure 2 indicates the frequency of anatomical shapes of face of the children. The dominant type of face was found to be hypereuryprosopic with 44.5% while the rare type was found to be hyperleptoprosopic with 1.1 %.

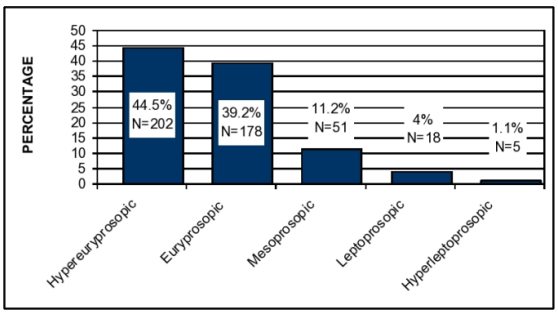

Figure 2. Frequency of anatomical types of face in children under 6 years of age

Tables 2 and 3 show the distribution of the head types and face types according to gender respectively. A Pearson's chi-square cross-tab analysis indicated no significant association between gender and the prevalence of the head types (X^2 = 4.18; df = 4; P=0.38) or the face types (X^2 = 4.59; df = 4; P=0.33).

Discussion: The present study indicated no significant gender differences in the mean head length, head breadth, face length, face breadth, cephalic and facial indices respectively. According to standard anatomical classifications [14], mesocephalic was the most predominant head type, while hypereuryprosopic was the most predominant face type in the present data of Eastern Nigerian children under 6 years of age. The prevalence of these craniofacial measurements indicated no significant association with gender.

The present data indicated mean cephalic index of 80.35% for males and 79.56% for females. These values were similar when compared with those obtained from previous studies conducted on South African neonatals (80.29), but lower than those of newborns in Iran (85.0%). In contrast, the present values were higher than those obtained from Kanuri newborns in Maiduguri, Nigeria (70.23% (males) and 73.60% (females)) and in Babura males (77.15%) and females (77.23%). The mean facial index (80.86 for males and 80.41 for females) in this study was similar when compared with a previously published data (80.5%) for normal newborns in Patiala India [15].

Table 1. Craniofacial parameters according to gender. Data are means ± standard deviations.

VARIABLES	MALES	FEMALES	P-VALUE
Head Length (cm)	16.20 ± 0.86	16.19 ± 0.83	0.92
Head Breadth (cm)	13.01 ± 0.95	12.87 ± 0.76	0.08
Cephalic Index (%)	80.35 ± 5.42	79.56 ± 4.92	0.10
Face Length (cm)	8.06 ± 6.44	7.96 ± 6.51	0.12
Face Breadth (cm)	9.97 ± 5.72	9.91 ± 6.25	0.31
Facial Index (%)	80.86 ± 5.20	80.41 ± 5.41	0.36

Table 2. Distribution of head types and its association with gender

HEAD TYPES	MALES N (%)	FEMALES N (%)	TOTAL N (%)	X^2	DF	P
Dolicocephalic	21 (38.2)	34 (61.8)	55 (100.0)			
Mesocephalic	92 (50.8)	89 (49.2)	181 (100)			
Brachycephalic	84 (51.5)	79 (48.5)	163 (100)	4.18	4	0.38
Hyperbrachycephalic	20 (57.1)	15 (42.9)	35 (100)			
Ultrabrachycephalic	9 (45.0)	11 (55.0)	20 (100)			
TOTAL	226	228	454 (100)			

Table 3. Distribution of face types and its association with gender

FACIAL TYPES	MALES N (%)	FEMALES N (%)	TOTAL N (%)	X^2	DF	P
Hypereuryprosopic	102(50.50)	100 (49.50)	202 (100)			
Euryprosopic	92 (51.7)	86 (48.3)	178 (100)			
Mesoprosopic	19 (37.3)	32 (62.7)	51 (100)	4.59	4	0.33
Leptoprosopic	11 (61.1)	7 (38.9)	18 (100)			
Hyperleptoprosopic	3 (60.0)	2 (40.0)	5 (100)			
TOTAL	226	228	454 (100)			

However the overall face length (5.17cm) and breadth (6.42 cm) of the Patiala infants were lower than those obtained in this study (Table 1). Differences observed in cephalofacial measurements may be attributable to influences of genetic, cultural, nutritional, environmental and racial factors. This implies that local values derived from well-defined populations should be used as references in the evaluation of cases with dimorphic features.

Most previous studies [16, 17, 18,] which have shown gender differences in cephalofacial measurements focused mainly on adults or children of older age groups. We did not observe sex differences in all the cephalofacial measurements in the present study. However, our data on facial measurements agreed with a previous study on Chinese babies, which indicated no statistically significant gender differences in facial length and facial breadth [19]. The present data therefore indicate that sexual dimorphism in head and facial growth may not be significantly evident in infants of ages below 6 years as often reported in adults and older children. This may suggest that the craniofacial growth of Nigerian children below the age of six may not be affected by gender-discriminating factors such as social-cultural inequalities or nutritional deprivation often associated with most populations. It is also reasonable to deduce that environmental influence on early infancy exposure may not be different in boys and girls leading to equal head length and breadth and face length and breadth.

Our data also indicated that the categorization of head with regard to cephalic index shows that mesocephalic was the most predominant head type (39.9%) in Eastern Nigerian infants (Fig. 1); interestingly, this predominance was observed in both males and females (Table 2). On the other hand, ultrabrachycephalic was the least prevalent of the head types (4.4%). This finding concurred with the dominant mesocephalic head type reported in Babur/Bura male and female children of Maiduguri Nigeria [4]. In contrast, our finding disagrees with previous studies by Safikhani et al [6] and Garba et al [4], which reported brachycephalic and dolicocephalic as the dominant head types in Ahwaz Southern Iran and Kanuri Nigeria children respectively. Similarly, our study was in contrast with a previous report by Bharati [20], which indicated that in tropical zones dolichocephalic was the most dominant head type, since the present study was carried out in a tropical zone. It is also noteworthy that a significant percentage (35.9%) of Nigerian children below the age of six had brachycephalic head type. This data is consistent with the finding that head growth in children reaches about 80 % of the adult head size [12]. According to the facial index, hypereuroprosopic facial type (44.5%) was the most prevalent face shape, while hyperleptoprosopic (1.1%) was the least prevalent in both males and females. This agrees with the findings of Golalipour et al, Garba et al and Mibodi & Frahani [1, 4, 21]. The craniofacial variations observed between ethnic groups may be attributed to genetic, nutritional and environmental influences.

It is not certain if the prevalence of head and face types have been previously related to sex. The present data indicated no significant associations between the head or face types and sex. This suggests lack of gender differences in the prevalence and distribution of the head and face types. Mesocephalic head type appeared predominant, while ultrabrachycephalic was the least prevalent in both males and females. A similar trend was observed in the facial index, where hypereuryprosopic and hyperleptoprosopic were the dominant facial types in both genders.

In conclusion, the present data defined the baseline cephalofacial measurements in healthy Eastern Nigerian children under six years of age. In addition, this study demonstrated lack of significant sexual dimorphism in craniofacial variables of Nigerian infants. These data are expected to be useful for dysmorphologists in the early identification of some craniofacial syndromes and of utmost importance for correct diagnosis and treatment planning. It can also be used for further anthropometric studies to specify the role of heredity, nutrition and environment. Further

studies in other parts of the Eastern Nigeria are suggested to confirm and strengthen the present findings.

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