Position Of The Ear In Relation To Facial Midline Landmarks In Nigerians.

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Citation

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Abstract

Objective: This study tested the hypothesis that there is no significant difference in the placement of the ears between male and female Nigerians in relation to the facial midline landmarks.Materials and Methods: This study was carried out using 1000 subjects comprising of five hundred males and five hundred females. The age of subjects ranged from 17-23 years. The position of the ear in relation to the facial midline landmarks were measured using the sliding caliper.Results: Out of the six measured anthropological parameters namely; Upper naso-aural distance (n-obs), Lower naso-aural distance (n-obi), Upper subnasale-aural distance (sn-obs), Lower subnasale-aural distance (sn-obi), Upper gnathion-aural distance (gn-obs), and Lower gnathion-aural distance (gn-obi), only the Upper gnathion-aural distance showed no statistically significant difference (at = 0.05) between Nigerian males and females.Conclusion: This study concluded that that there is a significant difference in the placement of the ears between male and female Nigerians in relation to the facial midline landmarks. The data of this study is recommended for considerations in anthropological studies, forensic medicine, human genetics and surgical reconstructions of craniofacial anomalies and/or injuries.

INTRODUCTION

Cephalometry is the measurements taken on the head of the living person directly or by radiographs and craniometry is the measurement of the skull of a deceased person. Cephalometry and craniometry have been used more and more frequently in an effort to study the growth of the skull under normal and abnormal conditions. (E. Lloyd, 1980). The head or skull has to be oriented in a fixed position in space if comparable measurements or pictures are to be taken. (E. Lloyd, 1980; Leslie, 1994; and Moore and Dalley, 1999). To achieve this, the head/skull is brought into the Frankfurt horizontal plane, which passes through the two orbital points and poria. (Leslie, 1994; and Moore and Dalley, 1999). In a living subject, the individual stands upright while looking into the far distance. (Leslie, 1994)

Earlier studies postulated that when anthropometric methods were introduced into clinical practice to quantify changes in the craniofacial framework, features distinguishing various races/ethnic groups were discovered. To treat congenital or post-traumatic facial disfigurements in members of these groups successfully, surgeons require access to craniofacial databases based on accurate anthropometric measurements. (Leslie et. al., 2005)

Normative data of facial measurements are indispensable to the precise determination of the degree of deviations from the normal. Such data are urgently needed by medical professionals but have been lacking up till now in Western and Northern Europe, Asia, and Africa. (Leslie et. al., 2005)

Generally, few anthropological studies (somatometric and cephalometric indices such as age, height, and weight; nasal, orbital and facial indices) have investigated the facial anthropological parameters in Nigerians and Africans as a whole. . (Umar et. al., 2005a; Umar et al., 2005b; Umar et al., 2005c) and (Ewunonu et. al., 2006a, Ewunonu et al., 2006b; Igbigbi et al., 2006; Oladipo et. al., 2006a; and Oladipo et al., 2006b). Nigeria is the most populous black nation in the world; and one out of every five blacks is a Nigerian. Studies carried out using Nigerian subjects can, therefore, be used appreciably as representative samples for all blacks throughout the world. This study is the probably the first to attempt to provide the required normative data on the position of the ear in relation to facial midline landmarks in Nigerians using the sliding caliper as the measuring tool.

MATERIALS AND METHODS

The survey method of research (Oyebola and Adeboye,

2000) was used in this study. This interalia involved conducting a pilot study by the administration of the instrument to a representative sample comprising of 20 individuals of Sango Area in Ilorin, who did not form part of the final respondents. The data collected on four different occasions were analyzed item by item (and correlated by means of Pearson product moment correlation) to eliminate ambiguity. Having obtained satisfactory results, the instrument (sliding caliper) was certified as useful for the study.

Thereafter, 1000 higher institution students (volunteers) randomly selected from the University of Ilorin, Kwara State Polytechnic, Ilorin and Kwara State College of Education, Ilorin, Kwara State, Nigeria (comprising of 500 males and 500 females); who were purely of the Yoruba tribe of South West, Nigeria by both parent and grandparents were used in the study were selected as subjects amongst Yorubas of Nigeria. The age of the students ranged from 18 to 23 years. Informed consent of each individual used in the study was sought and received before initiating the process of taking measurements.

Heads of subjects were brought into the Frankfurt horizontal plane with the help of a commercial angle meter. This plane passes through the two orbital points and poria. (Leslie, 1994; and Moore and Dalley, 1999). Subjects stood upright while looking into the far distance and their heads were ensured to be at resting positions (in a relaxed comfortable condition and in anatomical position) while measurements on the head were taken. The investigator stood comfortably in front of the subject; with the measuring edges of the sliding caliper placed on the two points of the parameter to be measured. The measurement was then taken, read and recorded for computation. A total of six (6) parameters (n – obs, n – obi, sn – obs, sn – obi, gn – obs and gn – obi) were measured in each individual.

Areas of Measurements (in centimeters)

The following parameters were taken from the various landmarks of the head and face:

The upper naso-aural distance (n – obs) was measured between the nasion and each otobasion superius (Figures 1 and 2). (Leslie, 1994)

The lower naso-aural distance (n – obi) was measured between the nasion and each otobasion inferius (Figures 1 and 2). (Leslie, 1994)

The upper subnasale distance (sn – obs) was measured between the subnasale and each otobasion superius (Figures 1 and 2). (Leslie, 1994)

The lower subnasale distance (sn – obi) was measured between the subnasale and each otobasion inferius (Figures 1 and 2). (Leslie, 1994)

The upper gnathion-aural distance (gn – obs) was measured between the gnathion and each otobasion superius (Figures 1 and 2). (Leslie, 1994)

The lower gnathion-aural distance (gn – obi) was measured between the gnathion and each otobasion inferius (Figures 1 and 2). (Leslie, 1994)

The Nasion (n) is the point in the midline of both the nasal root and the nasofrontal suture. The slight ridge on which it is situated was felt by the observer's fingernail. This point is above the line that connects the two inner canthi. (Hrdlicka, 1920 and Leslie, 1994) The bony and soft nasion are identical. (Ashley-Montagu, 1935 and Leslie, 1994)

Otobasion superius (obs): Is the point of attachment of the helix in the temporal region. It determines the upper border of the ear insertion. (Leslie, 1994)

Otobasion inferius (obi): Is the point of attachment of the ear lobe to the cheek. It determines the lower border of the ear insertion. (Leslie, 1994)

Subnasale (sn): Is the midpoint of the angle at the columella base where the lower border of the nasal septum and the surface of the upper lip meet. (Howells, 1937 and Leslie, 1994). This point is not identical to the bony subnasion or nasospinale (ns), which is the midpoint of the anterior margin of the aperture piriformis at the base of the spina nasalis anterior. (Godysci, 1956 and Leslie, 1994). The landmark was identified in base view of the nose, or from the side.

Menton (or Gnathion) – gn: - Is the lowest median landmark on the lower border of the mandible. (Godysci, 1956 and Leslie, 1994). It is the lowest point used in measuring facial height. (Leslie, 1994). It was identified by palpation and is identical to the bony gnathion.

THE HYPOTHESIS TESTING METHOD

This study tested the hypothesis that there is a difference in the placement of the ears between male and female Nigerians in relation to the facial midline landmarks (the null hypothesis, H_o. While the alternative hypothesis (H_1)

stated that there is a difference in the placement of the ears between male and female Nigerians in relation to the facial midline landmarks. The hypothesis test used in this study was Chi-square test. This method was used to compare an actual (observed) distribution against the hypothesized (expected) distribution. It is also called goodness of fit test. To carry out the hypothesis test, the value of Chi-square computed was compared with the table value for a given significance level and the number of degrees of freedom which was determined by the number of independent outcomes. (Oyebola and Adeboye, 2000)

If the table value was greater than the calculated value, the null hypothesis (H) was accepted and no significant difference was observed between the measured parameter in Nigerian males and females. If the calculated value was greater than the table value, the null hypothesis (H_o) was rejected (while H_1 was accepted); and a significant difference was observed between the measured parameter in Nigerian males and females.

RESULTS

The calculated mean ± standard deviation (in centimeters) of each measured parameter in Nigerian males is as follows; n – obs (12.27 ± 0.3916), n – obi (12.67 ± 0.3692), sn – obs (12.86 ± 0.2372), sn – obi (11.64 ± 0.6399), gn – obs (14.46 ± 0.3458) and gn – obi (12.47 ± 0.3982). (Tables 1 – 6 respectively)

The calculated mean ± standard deviation (in centimeters) of each measured parameter in Nigerian females (including the range of measurement) is as follows; n – obs (11.39 ± 0.504), n – obi (11.76 ± 0.536), sn – obs (12.41 ± 0.414), sn – obi (11.84 ± 0.450), gn – obs (14.26 ± 0.440) and gn – obi (12.11 ± 0.402). (Tables 1 – 6 respectively)

Figure 1

TABLE 1: Statistical analyses of the measured parameter n - obs in Nigerian males and females

Range of Measurement	10.4 - 11.6	11.61 - 13.1	Total	Mean ± SD	Variance	X^2 value	Table value	df	sf
No of Male	15	485	500	12.27 ± 0.3916	0.1533	447.9	3.841	1	YES
No of Female	334	166	500	11.39 ± 0.504	0.2540				
Total	349	615	1000						

Range of Measurement (in centimeters)

No of Male=Number of Male

No of Female=Number of Female

Mean ± SD =Calculated Mean (in centimeters) ± Standard deviation

X^2 value=Chi square value

Table value=Table value of 0.05

df=degree of freedom

sf=significant difference

Figure 2

TABLE 2: Statistical analyses of the measured parameter n - obi in Nigerian males and females

Range of Measurement	10.3 - 11.7	11.8 - 13.1	Total	Mean ± SD	Variance	X^2 value	Table value	df	sf
No of Male	80	420	500	12.67 ± 0.3692	0.1363	41.02	3.841	1	YES
No of Female	412	88	500	11.76 ± 0.536	0.2869				
Total	492	508	1000						

Range of Measurement (in centimeters)

No of Male=Number of Male

No of Female=Number of Female

Mean ± SD =Calculated Mean (in centimeters) ± Standard deviation

X^2 value=Chi square value

Table value=Table value of 0.05

df=degree of freedom

sf=significant difference

Figure 3

TABLE 3: Statistical analyses of the measured parameter sn - obs in Nigerian males and females

Range of Measurement	11.4 – 12.4	12.5 – 13.6	Total	Mean ± SD	Variance	X^2 value	Table value	df	sf
No of Male	15	485	500	12.86 ± 0.2372	0.563	398.76	3.841	1	YES
No of Female	311	189	500	12.41 ± 0.414	0.1714				
Total	326	674	1000						

Range of Measurement (in centimeters)

No of Male=Number of Male

No of Female=Number of Female

Mean ± SD =Calculated Mean (in centimeters) ± Standard deviation

X^2 value=Chi square value

Table value=Table value of 0.05

df=degree of freedom

sf=significant difference

Figure 4

TABLE 4: Statistical analyses of the measured parameter sn - obi in Nigerian males and females

Range of Measurement	10.8 - 11.8	11.9 – 12.9	Total	Mean ± SD	Variance	X^2 value	Table value	df	sf
No of Male	357	143	500	11.64 ± 0.6399	0.4095	97.49	3.841	1	YES
No of Female	202	298	500	11.84 ± 0.450	0.2028				
Total	559	441	1000						

Range of Measurement (in centimeters)

No of Male=Number of Male

No of Female=Number of Female

Mean ± SD =Calculated Mean (in centimeters) ± Standard deviation

X^2 value=Chi square value

Table value=Table value of 0.05

df=degree of freedom

sf=significant difference

Figure 5

TABLE 5: Statistical analyses of the measured parameter gn - obs in Nigerian males and females

Range of Measurement	13.4 – 14.1	14.2 – 15.0	Total	Mean ± SD	Variance	X^2 value	Table value	df	sf
No of Male	102	398	500	14.46 ± 0.3458	0.1195	2.768	3.841	1	NO
No of Female	124	376	500	14.26 ± 0.440	0.1936				
Total	226	774	1000						

Range of Measurement (in centimeters)

No of Male=Number of Male

No of Female=Number of Female

Mean ± SD =Calculated Mean (in centimeters) ± Standard deviation

X^2 value=Chi square value

Table value=Table value of 0.05

df=degree of freedom

sf=significant difference

Figure 6

TABLE 6: Statistical analyses of the measured parameter gn - obi in Nigerian males and females

Range of Measurement	11.9 – 12.3	12.4 – 12.9	Total	Mean ± SD	Variance	X^2 value	Table value	df	sf
No of Male	142	358	500	12.47 ± 0.3982	0.1586	118.55	3.841	1	YES
No of Female	336	164	500	12.11 ± 0.402	0.1615				
Total	478	522	1000						

Range of Measurement (in centimeters)

No of Male=Number of Male

No of Female=Number of Female

Mean ± SD =Calculated Mean (in centimeters) ± Standard

deviation

X^2 value=Chi square value

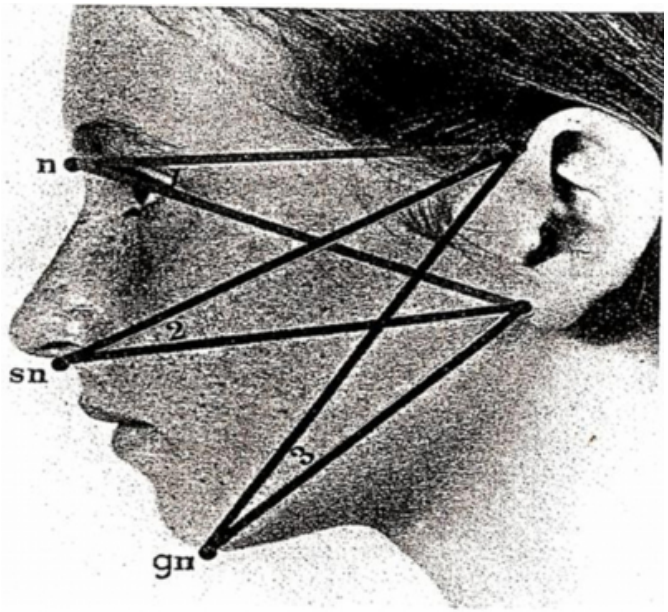
Table value=Table value of 0.05

df=degree of freedom

sf=significant difference

Figure 7

Figure 1: Position of the ear in relation to the facial midline landmarks



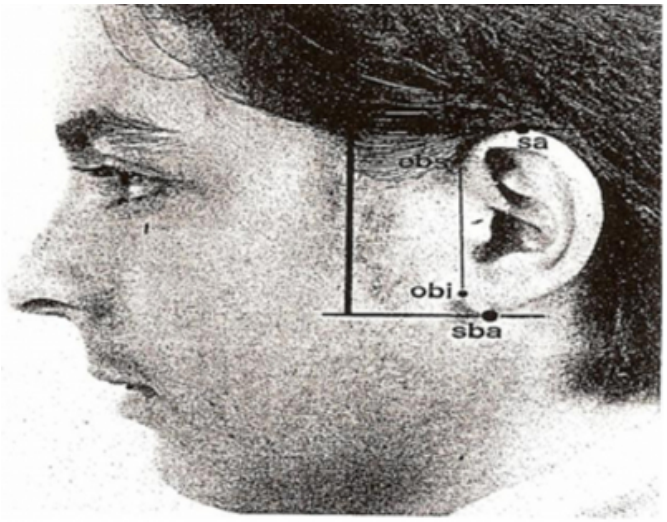
to the nasion (n-obs) and (n-obi)

to the subnasale (sn-obs) and (sn-obi)

to the gnathion (gn-obs) and (gn-obi). (Leslie, 1994).

Figure 8

Figure 2: Perpendicular measurement of the auricle: width of the ear (obs-obi). (Leslie, 1994).



DISCUSSION AND CONCLUSIONS

This study tested the hypothesis that there is no difference in the placement of the ears between male and female Nigerians in relation to the facial midline landmarks. The study was carried out using 1000 Nigerian subjects comprising of five hundred males and five hundred females. The age of subject ranged from 17 - 23 years. The position of the ear in relation to the facial midline landmarks were measured using sliding caliper. Out of the six measured anthropological parameters namely: upper naso-aural distance (n-obs), Lower naso-aural distance (n-obi), upper subnasale-aural distance (sn-obs), Lower subnasale-aural distance (sn-obi), Upper gnathion-aural distance (gn-obs), and Lower gnathion-aural distance (gn-obi), only the upper gnathion-aural (gn-obi) distance showed no statistically significant difference between Nigerian males and females. (Tables 1 – 6).

This study concluded that there is a significant difference in the placement of the ears between male and female Nigerians in relation to the facial midline landmarks. Similarly, Nigerian males and females are of different facial morphological patterns with respect to the position of the ear in relation to the facial midline landmarks.

The data of this study is recommended for considerations in anthropological studies, forensic medicine, human genetics and surgical reconstructions of craniofacial anomalies and/or injuries. This study recommends that more studies are needed to provide data on other African countries using the sliding caliper and other research techniques such as Three-

Dimensional Facial Morphometry method as applied by Virgilio et. al., 2000.

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