



Body Circumferential Anthropometric Features of Ijaws of Southern Nigeria

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Authors' contributions

This work was carried out in collaboration between both authors. Author PDO designed the study, performed the statistical analysis and wrote the protocol. Author HBF performed the statistical analysis and wrote the first draft of the manuscript. Both authors managed the analyses of the study. Author PDO also managed the literature searches. Both authors read and approved the final manuscript.

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ABSTRACT

Aim: The aim of the study was to investigate the circumferential anthropometric body characteristics of adult male Ijaws of southern Nigeria.

Methodology: The research design was a non-experimental, cross-sectional design. It made use of a total number of four hundred (400) subjects whose ages ranged between 21 to 40 years with BMI of 18.50 to <30.00. Individuals whose BMI fell within the category of overweight according to conventional BMI classification were included in the study because they looked apparently healthier than those with BMI classified as normal. Minimum sample size was determined using the Taro Yamane's formula. Circumferential body anthropometric measurements and BMI were taken using stadiometer, digital calipers, calibrated flexible meter tape and weighting scale. Statistical analysis was done using statistical package for the social science (SPSS version 25.0) and Microsoft Excel 2019. Continuous variables were presented as mean±SD; minimum and

maximum. Age was categorized into two groups (21 – 30 and 31 – 40) years while Body Mass Index (BMI) was also categorized into two; normal weight (18.5 – 24.9) and slightly overweight (25.0 – 30.7). Independent sample t-test was therefore carried out to determine significant difference in the measured anthropometric parameters according to age. The confidence interval was set at 95%, therefore $p < 0.05$ was considered significant.

Results: Results were presented in tables. Age and BMI were had no impact on the studied anthropometric parameters as there were no statistically significant difference seen when compared across age and BMI groups. On comparison with other racial populations, racial variation was observed.

Conclusion: Circumferential anthropometric studies are mainly used to demonstrate health status, growth rate and other population demography. This study catalogued anthropometric description of body circumference of the Ijaw ethnic group. These anthropometric values will be useful in medical studies and forensics.

Keywords: Circumferential; body; Ijaw; anthropometric; Southern Nigeria.

1. INTRODUCTION

Ijaw are a collection of people indigenous mostly to the forest regions of the Bayelsa, Delta, and Rivers States within the Niger Delta in Nigeria. Some are resident in Akwa-Ibom, Edo, and Ondo states also in Nigeria [1]. Due to their settlement along the coastal lines, their major occupation is fishing. Although human anatomy describes the structure of the body as observed in most people and has traditional value in surgery, there exists a wide range of ethnic and racial variation in the physical appearance and body proportions of different populations [2]. Those distinguishing features of different races and ethnic groups are not randomly distributed but appear in geographical clusters. Variation in human features exists across populations, and study of this physical variation relies on external measurements of the human body. Anthropometric measurements have been adopted as methods in clinical and public health works, as they are applicable to large samples and can provide national estimates and data for the analysis of secular changes [3]. It is against this backdrop that this anthropometric study is embarked upon to catalogue ethnic specific values for this negroid population using their circumferential body dimensions.

2. MATERIALS AND METHODS

2.1 Research Design

The study design was a non-experimental, cross-sectional design which catalogued values of the body circumferential anthropometric characteristics of adult male Ijaws of southern Nigeria using anthropometric standards.

2.2 Sample Size and Sampling Technique

Participants were randomly selected from amongst adult male Ijaws resident in Yenegoa, Amassoma, Ogbia, Kaima, Igbogene and Sagbama in Bayelsa State. A total number of four hundred (400) adult males were used for the study. The minimum sample size was determined using the Taro Yamane's formula which states that:

$$n = \frac{N}{1+N(e)^2}$$

where n = minimum sample size, N = population size, e = error margin = 0.05

Only adult males between the ages of 21 and 40 years with BMI of 18.50 to <30.00 were included in this study. Individuals who fell within the category of overweight according to BMI classification looked apparently healthier than those whose BMI was classified as normal and were therefore included in the study. It was ascertained that recruited subjects had both parents and four grand parents from the same ethnic group.

Ethical Considerations: Ethical clearance was sought and obtained from the Ethics Committee of the School of Graduate Studies, University of Port Harcourt. Informed consent was obtained from all subjects.

Methods: The study employed circumferential body anthropometric measurements. Measurements were carried out by fifteen trained personnel. Using appropriate landmarks, the following circumferential measurements were taken: Midarm Circumference, Chest Circumference, Abdominal (Waist) Circumference, Hip Circumference and Midthigh

Circumference. Measurements were taken with the aid of stadiometer, digital calipers, calibrated flexible meter tape, meter rule and weighing scale.

2.3 Identification of Landmarks

Mid-arm circumference (also mid upper arm circumference): This is the point between the acromion process of scapula and olecranon process of ulna.

Chest circumference: This is the region corresponding to the nipples - the xiphoid process.

Waist circumference: This is the region, corresponding to the superior iliac crest and then crosses the line to indicate the mid-axillary line of the body.

Hip circumference: This is the area corresponding to the inguinal region, the area relating to the groin (the area between the abdomen and thigh).

Thigh circumference: This is the mid-point between the greater tubercle of femur and the lateral epicondyle of the femur.

2.4 Data Collection Method

The following procedures describe methods for the anthropometric measurements for each of the parameters:

2.5 Upper Arm Circumference

The subject stands with the elbow relaxed so that the right arm hangs freely to the side.

The measuring tape is placed around the mid-upper arm at the point perpendicular to the long axis of the upper arm (at the medial part of the mid-arm).

The tape is held so the zero end is held below the measuring value.

The tape rests on the skin surface but not pulled tight enough to compress the skin.

The upper arm circumference is recorded to the nearest 0.1 cm.

2.6 Chest Circumference

The subject stays in a standing position with both hands spread side by side.

The measuring tape is placed horizontally at the medial part of the chest (the region corresponding to the nipples - the xiphoid process).

The measuring tape is then placed at the right side and passed round through the back and back to the starting point.

The chest circumference is then carried out with minimal respiration to the nearest 0.1cm and recorded.

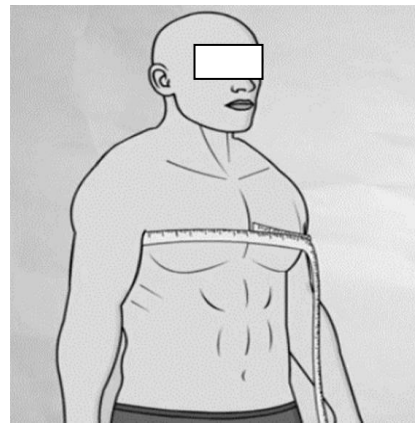


Fig. 1. Measurement chest circumference

2.7 Waist Circumference

The subject stays in a standing position.

The measuring tape is placed horizontally at the waist region, corresponding to the superior iliac crest and then crosses the line to indicate the mid axillary line of the body.

The measuring tape is placed at the right side around the trunk in a horizontal plane at this level marked on the right side of the trunk.

The measuring tape is then carried around the subject to make sure the tape is parallel and ensure the tape is snug but not compressing the skin.

The measurement is then carried out at minimal respiration to the nearest 0.1cm and recorded.

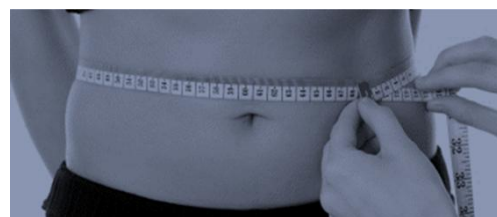


Fig. 2. Waist circumference measurement

2.8 Hip Circumference

The Subject stands erect with feet together and weight evenly distributed on both feet.

The measuring tape is placed at the inguinal region, the area relating to the groin (the area between the abdomen and thigh).

The sides of the tape are then adjusted and the front side is checked to ensure that the plane of the tape is horizontal.

The zero end of the tape is then held under the measurement value.

The tape is held snug but not tight.

Measurement is then taken from the right side and recorded.

2.9 Mid-thigh Circumference

The subject stands with the right leg just in front of the left leg and the weight shifted back to the left leg.

A table may be used to maintain the subject's balance.

The measuring tape is placed around the medial part of the mid-thigh, the tape is positioned perpendicular to the long axis of the thigh with the zero end of the tape held below the measuring value.

The tape rests firmly on the skin without compressing the skin and ensured the tape is placed correctly.

The thigh circumference is then carried out to the nearest 0.1 cm and recorded.

2.10 Statistical Analysis

Statistical analysis was done using statistical package for the social science (SPSS version 25.0) and Microsoft Excel 2019. Continuous variables were presented as mean \pm SD; minimum and maximum. Age was categorized into two groups (21 – 30 and 31 – 40) years while Body Mass Index (BMI) was also categorized into two; normal weight (18.5 – 24.9) and slightly overweight (25.0 – 30.0). Independent sample t-test was therefore carried out to determine significant difference in the measured

anthropometric parameters according to age and BMI. The confidence interval was set at 95%, therefore $p < 0.05$ was considered significant.

3. RESULTS AND DISCUSSION

Independent sample t-test shows there was no statistically significant difference ($p > 0.05$) in the parameters across the age groups (Table 2). Independent sample t-test shows there was no statistically significant difference ($p > 0.05$) in the parameters (Table 3).

3.1 Discussion

Anthropologists employ the use of anthropometric measurements of the different body parameters to study variations in body compositions between races. Racial variations could be attributed to the impact of factors such as biological, environmental, nutritional, geographical, social factors among others [4].

Human anatomy though provides description for the structure of the body as seen in most individuals, and has traditional value in surgery, there exists a wide range of ethnic and racial variation in the physical appearance and body proportions of different populations [2]. Variations in body proportions depend on variations in skeletal dimensions, distribution of muscles and body fat. These factors in turn depend on the influence of climate, nutrition and environment [4].

This study provides a catalogue of the circumferential body anthropometry of the Ijaw of southern Nigeria. Circumferential body measurements together with body mass index (BMI) have been implicated in various studies ranging from evaluation of nutritional status [5,6], risk of cardiovascular disease [7] and birth weight [8]. Mid arm circumference has been reported in Iran. The mid-arm circumference of the Ijaw (27.24 \pm 2.26 cm) was lower than those reported in Iran; 280 \pm 31 mm (28.0 cm), 282 \pm 33 mm (28.2cm), 285 \pm 29 mm (28.5 cm), 283 \pm 26 mm (28.3 cm), 282 \pm 30 mm (28.2 cm) and 284 \pm 27 mm (28.4 cm) for age groups 25 – 29, 30 – 34, 35 – 39, 40 – 44, 45 – 49 and 50 – 55 respectively [9]. This could be attributed to skin thickness (cutaneous fat distribution), an adaptation for the caucasoid to cold weather in the temperate region. No statistically significant difference ($p > 0.05$) was observed in the parameters across the age and BMI groups.

Table 1. Descriptive statistics of the measured circumferential body measurements of the Ijaw

Circumferential body measurements	[N = 400]		
	Mean± SD	Min	Max
MAC	27.24±2.26	2.52	36.50
CC	94.79±8.78	9.34	117.50
WC	95.73±8.22	68.32	95.12
HC	95.12±3.07	86.50	100.70
MTC	54.24±3.13	48.30	61.60

SD = Standard deviation, Min = Minimum, Max = Maximum

Table 2. Descriptive statistics of the measured circumferential body measurements according to age in Ijaw subjects

Circumferential body measurements	Age group	N	Mean	SD	t-test			Inference
					Df	t-value	p-value	
MAC	21 – 30	308	27.21	2.47	398.00	-0.45	0.65	Not Significant
	31 – 40	92	27.33	1.29				
CC	21 – 30	308	94.66	8.89	398.00	-0.55	0.58	Not Significant
	31 – 40	92	95.24	8.41				
WC	21 – 30	308	81.62	8.21	398.00	-0.49	0.63	Not Significant
	31 – 40	92	82.09	8.32				
HC	21 – 30	308	95.03	3.02	398.00	0.39	0.70	Not Significant
	31 – 40	92	94.89	3.24				
MTC	21 – 30	308	54.28	3.16	398.00	0.48	0.63	Not Significant
	31 – 40	92	54.10	3.02				

MAC = Mid arm circumference, CC = Chest circumference, WC = Waist circumference, HC = Hip circumference, MTC = Midhigh circumference, SD = Standard deviation

Table 3. Descriptive statistics of the measured circumferential body measurements according to BMI in Ijaw subjects

Circumferential body measurements	BMI	N	Mean	SD	t-test			Inference
					Df	t-value	p-value	
MAC	Normal weight	342	27.22	2.38	398.00	-0.50	0.62	Not Significant
	Slightly overweight	58	27.38	1.36				
CC	Normal weight	342	94.90	7.53	398.00	0.58	0.56	Not Significant
	Slightly overweight	58	94.17	14.12				
WC	Normal weight	342	81.62	8.23	398.00	-0.63	0.53	Not Significant
	Slightly overweight	58	82.35	8.26				
HC	Normal weight	342	94.95	3.08	398.00	-0.81	0.42	Not Significant
	Slightly overweight	58	95.30	3.05				
MTC	Normal weight	342	54.11	3.14	398.00	-1.98	0.05	Not Significant
	Slightly overweight	58	54.99	2.95				

MAC = Mid arm circumference, CC = Chest circumference, WC = Waist circumference, HC = Hip circumference, MTC = Midhigh circumference, SD = Standard deviation

4. CONCLUSION

This study provides a catalogue on the circumferential body features of the Ijaw ethnic group. Racial variation was observed in the mid-arm circumference. To the best of our knowledge, other than nutritional status [10], health risk assessment [11,12], growth trend [10],

there is dearth of information on most circumferential body anthropometric variables in terms of normal description. This makes it difficult for wider racial comparison.

CONSENT

It is not applicable.

ETHICAL APPROVAL

As per international standard or university standard, written approval of Ethics committee has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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