THE RISK OF OBESITY AND OBESITY RELATED DISEASES AMONG THE IGBO AND IJAW ADULTS IN NIGERIA USING WAIST-TO-HIP RATIO AS A MARKER.

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ABSTRACT
This study was carried out to provide a baseline data for use by anthropologists and medical practitioners. The waist-to-hip ratio (WHR) of 1,588 adults were measured and used for the analysis of this study. Subjects were drawn from adults whose age ranged from 18-45 years from Igbo and Ijaw ethnic groups. Subjects were either Ijaws or Igbos by both parents and grandparents. The total number of Ijaw males and females were 373 and 412 and total number of Igbo males and females were 397 and 406 respectively. The result showed that the waist-to-hip ratio (WHR) of Igbo and Ijaw males and females at age range of 18-21 years were comparatively the same, but with advancing age, however difference occurred in their WHR value in both sexes of the two ethnic groups. It also showed that male had a higher WHR than their female counterparts in both ethnic groups as they progress to advancing age by 0.06. 15.8% of Ijaw males and 8.6% of Igbo males had WHR of 0.95 and above while 43.6% of Ijaw females and 39.4% of Igbo females had WHR of 0.85 and above. In general, hip and waist circumferences were higher in females than in males. Hip circumferences were greater than the waist circumferences in both sexes and the Ijaw adults had higher waist-to-hip ratio than the Igbo counterparts. This study has established the presence of sexual dimorphism in the waist-to-hip ratio of adult Ijaw and Igbo ethnic groups of Nigeria and also ethnic variations. It has also established that a large percentage of these populations are at risk of obesity and related diseases and hence need urgent intervention from medical experts. The results of this study could be very useful to nutritionists, clinicians, anthropologists and forensic scientists and could serve as reference paper for future studies on other Nigerian ethnic group.

KEYWORDS: waist circumference, hip circumference, waist to hip ratio, Nigeria.

INTRODUCTION
Waist-to-hip ratio (WHR) is widely used as indicator of abdominal obesity in population studies. It is increasingly clear that waist-to-hip ratio is a better reflection of the accumulation of intra-abdominal or visceral fat depot, because of the postulated role of visceral fat depot in health risk disease.

Many researchers have carried out studies on the determination of waist-to-hip ratio, and its correlation with stature and several cardiovascular diseases as well as obesity. Oladipo *et al.,* (2010) reported that body mass index and waist-to-hip ratio are useful markers for determination of risk factors of cardiovascular diseases in Nigeria.

Waist circumference, body mass index, waist-to-hip ratio and waist-to-height ratio have also been used to predict cardiovascular risk factors in an urban adult population of Tehranian men (Esmaillzadeh *et al.,* 2004).

Behavioural factors associated with a high waist-to-hip ratio (e.g. high alcohol consumption, physical inactivity and smoking) were attributed to both relatively large waist and relatively narrow hips (Jacob *et al.*, 2001).

Waist-to-hip ratio shows a graded and highly significant association with myocardial infarction risk world-wide. Redefinition of obesity based on waist-to-hip ratio instead of Body Mass Index (BMI) increases the estimate of myocardial infarction attribution to obesity in most ethnic groups (Charles and Laurie, 2005). People with higher waist-to-hip ratio tend to be at higher risk of cardiovascular diseases than people who carry more weight around their hips (Krisha, 2005).

Jacob *et al*. (2001) reported that waist-and-hip circumference have independent and opposite effects on cardiovascular disease risk factors and concluded that a large waist circumference in men and women was associated significantly with high density-lipoprotein-cholesterol (HDLC) concentration and blood pressure. Waist and hip girths showed different relation to body fat, fat-free mass and visceral fat accumulation. It has also been found that high waist circumference in females is associated with hyperlipidemia and cigarette smoking (Gnasso *et al*.,1994).

Jee *et al*. (2002) also worked on the segregation analysis of waist circumference, hip circumference and waist-to-hip ratio in the Korean nationwide family study. A co-relation between maternal waist-to-hip ratio and New-born size has been studied (Judith *et al*., 1996).

A large number of reports exist on the waist-to-hip ratio of different populations. However, no study of the waist to hip ratio of the ethnic groups under investigation has been carried out.

Thus, this study was aimed at documenting the waist to hip ratio of these Nigerian ethnic groups which could be of importance in anthropological studies and clinical practice.

MATERIALS AND METHODS

In the present study, one thousand five hundred and eighty eight (1,588) subjects selected at random from the University of Port Harcourt, Port Harcourt, Abia State University, Uturu and Niger Delta University, Amassoma were used. The figure comprises of seven hundred and eighty five (785) Ijaws out of which three hundred and seventy three (373) were males and four hundred and twelve (412) were females. A total of eight hundred and three (803) Igbos were used out of which three hundred and ninety seven (397) were males and four hundred and six (406) were females. Subjects were either Ijaws or Igbos by both parents and genealogies. The age of the subjects ranged from 18-45 years.

The waist and hip circumferences were measured with a measuring tape. Waist circumference was measured midway between the lower rib margin and the iliac crest, and hip circumference at the widest point over the greater trochanters (World Health Organisation, 1988).

All measurements were taken with the subjects standing and in a relaxed mood. The waist to hip ratio was calculated as waist circumference/hip circumference. Classification into various risk levels was done with the method described by Charles and Laurie (2005). Results were tabulated and then compared statistically using z-test and chi-square at significance level of 0.05.

RESULTS

The values of the mean and standard deviation (SD) were calculated for waist circumference, hip circumference, waist-to-hip ratio and the summary of the results for the parameters were presented in tables 1-7. Result showed that the waist to hip ratio of Igbo and Ijaw males and females at age range of 18-21 years were comparatively the same, but with advancing age, however difference occurred in both sexes of the two ethnic groups (Table 1). Result also showed that male had a higher waist-to-hip ratio than their female counterparts in both ethnic groups as they progress to advancing age by 0.06 (Table1).

The mean waist, hip circumference and waist to hip ratio in male Igbos were found to be 83.3cm, 92.0cm and 0.89 respectively, while those of their females were found to be 82.3cm, 97.2cm and 0.89 respectively (Table 2).

The mean waist, hip circumference and waist to hip ratio in male Ijaws were found to be 83.0cm, 92.0cm and 0.90 respectively, while those of their female were found to be 84.2cm, 99.7 and 0.84 respectively (Table 3). Observations showed that females generally had higher hip circumference but lower waist to hip circumference ratio in the two ethnic groups. The Ijaws also demonstrated higher waist-to-hip ratio than the Igbos in both sexes. The differences were statistically significant (p<0.05). Thus sexual dimorphism and ethnic difference occurred (Table 4-5). From table 6-7 it was observed that 15.8% of Ijaw males and 8.6% of Igbo males had WHR of 0.95 and above while 43.6% of Ijaw females and 39.4% of Igbo females had WHR of 0.85 and above. In addition, more than 50% of the Igbo and Ijaw populations were outside the healthy class and are at risk of obesity and related diseases.

Table 1: The mean WHR amongst different age groups in Igbos and Ijaws.

Age Range (Years)	Igbos				Ijaws			
	Male WHR	n	Female WHR	N	Male WHR	n	Female WHR	n
18-21	0.88	89	0.82	90	0.89	60	0.83	87
22-25	0.88	86	0.81	88	0.89	60	0.82	90
26-29	0.89	60	0.83	60	0.90	84	0.84	46
30-33	0.89	58	0.84	60	0.90	54	0.84	81
34-37	0.90	54	0.84	53	0.91	56	0.85	58
38-41	0.91	28	0.85	30	0.93	30	0.86	29
42-45	0.91	22	0.86	25	0.90	29	0.87	21
TOTAL	0.89	397	0.83	406	0.90	373	0.84	412

Table 2: Summary of mean of waist circumference (WC), hip circumference (HC) and waist to hip ratio (WHR) among male and female Igbos.

Sex	Sample size	Mean W.C (cm)	Mean HC (cm)	Mean W.H.R±SD
Males	397	83.3cm	92.0cm	0.89±0.03
Female	406	82.3cm	97.2cm	0.83±0.05

P<0.05

Table 3: Summary of mean waist circumference (WC), mean hip circumference (HC) and mean waist-to- hip ratio (WHR) (with standard deviation) among male and female Ijaws.

Sex	Sample size	Mean W.C (cm)	Mean HC (cm)	Mean W.H.R±SD
Males	373	83.0cm	92.0cm	0.90±0.05
Female	412	84.2cm	99.7cm	0.84±0.04

P <0.05

Table 4: Comparison of the parameters used between male Igbos and Ijaws

Ethnic Group	Sample size	Mean W.C (cm)	Mean H.C (cm)	Mean W.H.R
Ijaw	373	83.0cm	92.0cm	0.90±0.05
Igbo	397	83.3cm	92.0cm	0.89±0.03

p<0.05; HC(p>0.05)

Table 5: Comparison of the parameters used between female Igbos and Ijaws.

Ethnic Group	Sample size	Mean W.C (cm)	Mean H.C (cm)	Mean W.H.R
Ijaw	412	84.2cm	99.7cm	0.84±0.04
Igbo	406	82.3cm	97.2cm	0.83±0.05

P <0.05

Table 6: Percentages of risk categories of waist-to-hip ratio for male Ijaws and Igbos

Category		W.H.R Values	Ijaw Males	Igbo Males
High Risk	Worst	>1.00	0.0%	0.0%
	Worse	0.95 to 1.00	15.8%	8.6%
Moderate Risk		0.90 to 0.94	39.0%	47.1%
Healthy	Better	0.85 to 0.89	32.9 %	35.0%
Condition	Good	<0.85	12.3%	9.3%.

P <0.05

Table 7: Percentages of risk categories of waist-to-hip ratio for female Ijaws and Igbos.

Category		W.H.R Values	Ijaw Females	Igbo Females
High Risk	Worst	>0.90	6.3%	5.9%
	Worse	0.85 to 0.90	37.3%	33.5%
Moderate Risk		0.80 to 0.84	36.4%	42.1%
Healthy	Better	0.75 to 0.79	16.8%	16.7%
Condition	Good	<0.75	3.2%	1.8%

P <0.05

KEY: WHR= waist-to-hip ratio, HC= hip circumference, WC= waist circumference, SD= standard deviation

DISCUSSION
Waist-to-hip ratio is widely used as indicator of abdominal obesity in population studies. It is increasingly clear that waist-to-hip ratio is a better reflection of the accumulation of intra-abdominal or visceral fat depot, because of the postulated role of visceral fat depot in health risk disease. Therefore, waist-to-hip ratio is now the preferred measure in the context of population studies. Waist-to-hip ratio shows a graded and highly significant association with myocardial infarction risk world-wide. Redefinition of obesity based on waist-to-hip ratio instead of Body Mass Index (BMI) increases the estimate of myocardial infarction attribution to obesity in most ethnic groups. Men with waist-to hip ratio (WHR) greater than 0.95 are considered to be at high risk of cardiovascular disease while women with waist-to-hip ratio greater than 0.85

are also considered to be associated with heart risk problems(Charles and Laurie, 2005).

The present study showed that 15.8% of Ijaw males and 8.6% of Igbo male had waist-hip-ratio greater than 0.95 and above, while 43.6% of Ijaw females and 39.4% of Igbo female had waist-hip-ratio of 0.85 and above. Thus, the Ijaws had higher risk of cardiovascular disease than the Igbo counterpart in both sexes. Waist-to-hip ratio is also found to increase with advancing age. The difference in waist circumference and waist-to-hip ratio of male and female is very significant except the hip circumference which shows no significant difference. But in female during their puberty stage, their Hip circumference increase more than the male counterparts, this accounts for low waist-to hip ratio in females. Comparison between the two ethnic groups under investigation showed that Ijaws had higher waist to hip ratio than the Igbos.

In line with these findings, some other investigators have also reported WHR to be a better predictor of cardiovascular risk factors than BMI. Lakka *et al.*, 2002, in a prospective study on Finnish men, aged 42–60 years, suggested WHR as a better index to predict coronary heart disease than waist and BMI. Dobbelsteyn *et al.*, 2001, in a study on Canadian adult men and women showed that WHR can predict cardiovascular disease risk factors more accurately than BMI and is as capable as waist circumference in identifying subjects at risk for cardiovascular disease risk factors.

Others also have reported WHR to be a better indicator of cardiovascular disease risk, (Hartz *et al.*, 1990; Kissebah and Krakower, 1994; Kortelainen and Sarkioja, 1994; Kotchen et al., 1993) a finding that has been confirmed in Japan (Ito *et al.,* 2003) and Australia (Welborn *et al.*, 2003). This could be as a result of environmental factor, nutritional factors, alcoholism and socio-economical factors as reported by earlier researchers (Yusuf and Ounpun, 2005).

With the knowledge of waist to hip ratio, individual can be advised to maintain or adjust the degree of body fatness, abdominal fats and over weight to the limits associated with optimal health and minimal heart risk, otherwise increase in waist-to-hip ratio could lead to obesity, over weight and subject individuals to high risk of cardiovascular related disease, if not properly managed.

In conclusion, the study has established the presence of sexual dimorphism in the waist-to-hip ratio of adult Ijaw and Igbo ethnic groups of Nigeria and also racial and regional variations. It has also established that a large percentage of these populations are at risk of obesity and related diseases and hence need urgent intervention from medical experts. The results of this study are expected to be of importance to nutritionists, clinicians, anthropologists and forensic scientists and could serve as reference for future studies on other Nigerian ethnic groups.

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