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Anthropometric Study on the Effect of Social Scale on Adiposity and Blood Pressure of Married Igbo Women in Nigeria

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ABSTRACT

This study examined the effect of social scale on the adiposity and blood pressure (BP) of married Igbo women (n=92) aged 18 to 78 years. Educational level of husband or self level of education was used as a sole criterion for classifying the subjects into upwardly mobile women and downwardly mobile women. Upwardly mobile women had tertiary education or married to husbands with tertiary education. Downwardly mobile women possessed primary and secondary education or married to husbands with low level of education. Adiposity indices and BP measurements were taken following standard protocols. The body mass index (BMI, kg/m^2), triceps, subscapular, calf skinfold and sum 3 skinfolds were used as indicators of fatness. The waist, hip, mid-thigh, mid-arm, mid-forearm, waist-hip ratio and waist thigh ratio were used as indicators of fat distribution. Upwardly mobile women by husbands level of education were significantly overweight (P=0.03, F=4.80), taller, younger and possessed higher weight (P<0.001) respectively; forearm circumference and subscapular skinfold were significantly higher too (P=0.03, F=4.93; P = 0.05, F=4.06). The downwardly mobile women had significantly elevated systolic BP (P<0.001, F=30.95) and slightly high values for WHR and WTR. Upwardly mobile women by self level of education had significant values for weight and BMI while the downwardly mobile women indicated significant values for age (P<0.001), systolic BP (P<0.001) and diastolic BP (P=0.04, F=4.59). Our findings contradict the result from the western world whereby the upwardly mobile women have normal BMI. Moving down the social scale is predictive of elevated BP while moving up is predict of excess adiposity and reduced BP.

Keywords: Anthropometry, Social scale, Blood pressure, Married Igbo women

Anthropometry (measurement of height, weight, body circumferences, and skin fold thickness etc) is widely used in surveys as an indicator of nutritional and health status (Khalid et al 1997, AL-Sendi et al 2003). Anthropometry allows evaluation of physical and maturational growth as well as health risks during critical period of development and if repeated on successive generations in a population it unfolds positive or negative secular trend (Khalid et al 1997).

Studies have also revealed relationship between socioeconomic status and level of fatness among men and women using simple anthropometric measurements. Higher body mass index (BMI) is more prevalent among women of lower socioeconomic status (SES) than those of upper SES. For men and children this relationship is not consistent and assumes a non-linear pattern among Western people (Lipowic 2003, Lipowic et al 2002).

According to Noppa and Bengtsson, (1980), educational level of husbands acts as a marker of social status of wives and the entire family and has a greater impact on the health status and life style factors of wives than the social class of wives. Sobal and Stunkard, (1989) also documented that Social mobility is another variable which influences the inverse relationship between SES and obesity among women from Westernized countries; for example upwardly mobile women are thinner than women who remain or decline in their social class of origin.

The Blood Pressure (BP) levels of a population have been reported to be influenced by several biological, behavioural and socioeconomic factors (Kusuma et al 2002, Howson et al 1998). For instance, married individuals have been reported to have elevated blood pressure than the never married (Ekezie et al 2009, lipowicz et al 2002). Also concordance in BP has also been established among couples (Ekezie et al 2008, James et al 1985). Age has being reported to contribute significantly to the variance in blood BP (Rohrscheib et al 2008, Joshi et al 1993). This study therefore was conducted to evaluate the effect of social scale on the measures of adiposity and blood pressure of married Igbo

women by husband's level of education. It will also examine the effect of wives' level of education (moving up or down the social scale) on the measures of adiposity and blood pressure. Recommendations on health implications of our findings would be made.

MATERIALS AND METHODS

This study was based on a random sampling of 92 healthy married women of the Ibo ethnic group of Nigeria who gave informed consent with age between 18 to 78 years.

Educational level was used as the sole criterion for classifying social mobility into upwardly mobile women and downwardly mobile women.

Thus, women were grouped by educational level of husband as follows:
Moving up the social scale i.e. upwardly mobile women (spouse with tertiary education) and

Moving down the social scale i.e. downwardly mobile women (spouse with primary education, secondary education or no education level).

Also on the effect of wives level of education on fatness, two groups were assessed: The downwardly mobile and the upwardly mobile women. The following characteristics were used as indicators of fatness and relative fat distribution the body mass index (BMI, Kg/m^2), triceps, and sub scapular and calf skin fold thickness, waist hip ratio (WHR), waist thigh ratio (WTR), and waist, hip, thigh, mid-arm and mid-forearm circumferences.

Anthropometry

The following anthropometric measurements were taken following standardized protocols (Lohman et al 1988): The body mass (BMI, Kg/m^2), triceps, sub scapular and calf skinfold thickness and sum of 3 skinfolds as indicators of fatness; waist, hip, mid thigh, mid forearm and mid arm circumferences, waist-hip ratio and waist thigh ratio, as indicators of fat distribution.

Height was measured to the nearest 0.1cm using an anthropometer with subjects standing without shoes and with heels together, toes part, and the head held in the Frankfort plane.

Weight was measured with a balance scale to the nearest 0.1kg with subjects wearing light cloths.

An inelastic tape was used to measure hip, waist, thigh, arm and forearm circumferences. For hip circumference, the tape was placed around the buttocks in a horizontal plane at the level of maximum protrusion of the buttocks.

Waist circumference was measured at the level of the natural waist, which is the narrowest part of the torso below the ribcage and above the hips.

Thigh, arm and forearm circumferences were taken at the midpoint of the thigh, arm and forearm respectively. Then the following ratios were calculated:

i. WHR = Waist (cm)/Hip (cm) and
ii. WTR = Waist (cm)/Thigh (cm)

Skin fold thickness was measured on the subject's body at 3 sites (triceps, sub scapula and calf regions) by using skin fold calipers.

The triceps skin fold was measured in midline of the posterior aspect of the arm over the triceps muscle midway between the lateral process of the scapula and the inferior margin of the ulnar olecranon process. The subscapular skin fold (SSF) was taken beneath the inferior angle of the scapula. Calf skin fold thickness was measured in the midline over the skin covering the calf muscle. In these cases a double thickness of skin and underlying tissue were raised and measured.

Blood Pressure (BP) Measurement

Blood pressure measurements were carried out using aneroid sphygmomanometer and Littman stethoscope to nearest 0.1mmHg. Seated BP was measured with the cuff on the right arm of the subject. The stethoscope was used to establish systole as the initiation of Korotkov sounds (phase I) and diastole as the cessation of Korotkov sound (phase 5). Blood pressure was measured three times with the cuff completely evacuated and recovery allowed between readings. The average of the three was used as the dependent variables, systolic and diastolic blood pressure (Al-Kandari et al, 2002). Hypertensive and pregnant women were excluded in the exercise.

Statistical Analysis

Data were expressed as mean ± standard deviation. Student's t- tests was used to determine significant values in means of the upwardly and downward mobile women by husbands level of education and self level of education respectively.

Alpha level was set at P<0.05. Sigma Stat 3.5 (Systat software, inc. Point Richmond,CA) was used for the statistical analysis.

RESULTS

The anthropometric characteristics of women moving up and down the social scale by their husbands' level of education and by their own levels of education are presented in Tables 1 and 2 respectively. In most cases the frequencies of these characteristics differ markedly between the 2 groups. Upwardly mobile women are younger (ages 37.73 ± 8.93 and 36.27 ± 8.28) as compares to ages 48.42 ± 16.30 and 55.44 ± 14.55 of the downward mobile women in Tables 1 and 2 ($p < 0.001$). Women who move up the social scale on their own have high BMI (28.02 ± 5.73 and 27.49 ± 5.66) as compared to 25.41± 4.65 and 27.49 ± 4.32) of the downward mobile women ($F=5.81$, $p = 0.02$; $F = 4.80$, $p=0.03$) as in Tables 1 and 2 respectively.

The same trend was also seen in their weights; conversely downward mobile women reported significantly higher level of systolic BP and diastolic BP ($F=18.10$, $p=0.001$; $F=4.54$, $p=0.04$) Table 1, and ($F = 30.95$, $p < 0.001$) Table 2 respectively.

Table 1: The anthropometrics characteristics of married women by husband's levels education

Parameter	Downward mobile (n=52)	Upward mobile (n=40)	F	P
Age (years)	48.42±16.30	37.73±8.93	13.98	<0.001
Height (cm)	157.81±6.47	159.85±6.92	2.10	0.150
Weight (kg)	63.41±13.35	71.83±16.21	7.45	0.008
BMI (kg/m^2)	25.41±4.65	28.02±5.73	5.81	0.02
Systolic BP (mmHg)	134.16±29	111.83±18.01	18.10	<0.001
Diastolic BP (mmHg)	82.97 ±15.13	76.50±13.51	4.54	0.04
Waist Circumference (cm)	92.48 ± 12.56	93.50±12.18	0.15	0.70
Hip Circumference (cm)	100.96 ± 10.04	101.96±11.18	0.20	0.65
Arm Circumference (cm)	29.66±3.73	30.09±4.37	0.26	0.61
Forearm Circumference (cm)	50.52±7.91	51.91±6.10	0.84	0.36
Thigh Circumference (cm)	21.85±10.36	19.95±10.25	0.76	0.38
Subscapular Skinfold (mm)	17.25±8.16	19.44±9.29	1.44	0.23
Triceps Skinfold (mm)	21.78±8.74	22.14±8.17	0.04	0.84
Calf Skinfold (mm)	60.87±24.09	61.53±23.90	0.02	0.90
Waist hip ratio (cm)	0.92±0.07	0.92±0.07	0.04	0.84
Waist thigh ratio (cm)	1.87±0.42	1.81±0.18	0.70	0.41

Table 2: The anthropometric characteristics of married women by their own level of education

Parameter	Downward mobile (n=36)	Upward mobile (n=56)	F	p
Age (years)	55.44±14.55	36.27±8.28	64.85	<0.001
Height (cm)	154.90±5.42	161.14±6.35	23.64	<0.001
Weight (kg)	60.13±10.77	71.54±15.96	14.21	<0.001
BMI (kg/m^2)	25.05±4.32	27.49±5.66	4.80	0.03
Systolic BP (mmHg)	141.52±29.08	113.50±19.31	30.95	<0.001
Diastolic BP (mmHg)	83.70±15.58	77.89±13.82	3.50	0.065
Waist Circumference (cm)	91.75±11.35	93.68±12.98	053	0.47
Hip Circumference (cm)	99.06±8.92	102.90±11.22	0.30	0.087
Arm Circumference (cm)	29.25±3.47	30.23±4.30	1.30	0.26
Forearm Circumference (cm)	49.10±7.33	52.43±6.82	4.93	0.029
Thigh Circumference (cm)	20.68 ± 9.09	21.24±11.09	0.07	0.80
Subscapular Skinfold (mm)	15.96±7.42	19.64±9.19	4.06	0.047
Triceps Skinfold (mm)	20.02±8.23	23.17±8.44	3.12	0.08
Calf Skinfold (mm)	56.66±20.34	64.05±25.65	2.13	0.15
Waist hip ratio (cm)	0.93±0.07	0.91±0.064	1.25	0.27
Waist thigh ratio (cm)	1.92±0.49	1.79±0.16	3.07	0.08

Upward mobile women show slight increased level of skin fold thickness and body circumferences which are not statistically significant.

Values of WHR and WTR are comparable in the 2 groups. But women of upward social scales have slightly low values of WHR and WTR.

DISCUSSION

The analysis examined the effect of husband's education on fatness of wives and the effect of wives level of education on self-fatness as well as BP.

This study suggests an association between educational level of husband and level of fatness and fat distribution of wive's. The upward mobile women by husbands' level of education have high BMI than the downward mobile women. The same trend is seen with their own level of education where upwardly mobile women (women who move up the social scale) are fatter than the downward mobile women (women who move down on social scale).

Other measures of adiposity indicated the same trend but not statistically significant, except TC and TSF of those who marry up by their own level of education. However, this result does not agree with the report from the western world whereby the upwardly mobile women with high level of education are consistently leaner and have less abdominal fat distribution than the comparable downwardly mobile women (Lopiwicz, 2002).

In Poland, similar to other industrialized countries, there is a strong inverse gradient among women. Women of lower socio-economic scale (SES) are more likely to be obese than women of upper SES. Among Polish males the incidence of obesity increases with decreasing position on an

educational scale. (Rogicka and Bielicki, 1999). Garn *et al* 1989 a, b , noted that among spousal pairs in the United States, women who marry up were leaner by 13-26% in summed skin fold measurements, but there was no significant effect of marrying down or marrying up on the fatness or body mass of men.

This study suggest significant effect on marrying down or up on the blood pressure. Women who marry down on their own or by their husbands' level of education show significantly elevated blood pressure. This may be an epidemiological paradox since those moving down the social scale (marrying down) have normal body mass index and more so excess adiposities have been implicated in cardiovascular risk. However the reason for this may be that those who move up the social scale have access to good health facilities, although they are overweight, their BP is low. Another reason may be their reduced value of WHR and WTR, although not statistically significant; while elevated BP on the side of downward mobile women, may be because of stress.

CONCLUSION

Our findings were not consistent with the results from the western world whereby the upwardly mobile women have normal BMI and were lean.

Moving down the social in our case is predictive of normal BMI and elevated BP while moving up the social scale is predictive of excess adiposity and normal BP (an epidemiological paradox).

RECOMMENDATION

This study recommends further study in this area involving large samples even in other ethnic group in Nigeria. Emphasis should also be laid on the influence of wives' level of education on measures of adiposity and BP of the husbands'. Upwardly mobile women and downwardly mobile women should engaged in exercises aimed at reducing adiposity level and BP respectively

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