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ORIGINAL ARTICLE

Prevalence of obesity, overweight and proteinuria in an urban community in South West Nigeria

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ABSTRACT

Background: Obesity is a global health problem and is associated with cardiovascular and renal diseases. The objective of this study was to determine the prevalence of obesity and to examine its relationship with proteinuria in an urban community in a developing country. **Materials and methods:** Survey of 1368 respondents was conducted from March 2006 to 2010 as part of the World Kidney Day activities. Height, weight were measured according to standard techniques. Body mass index (BMI) was calculated as weight (Kg) divided by height in metres squared (m^2). Obesity was defined as BMI = 30Kg/m^2 while overweight was defined as BMI 25 -29.9 kg/m^2. Dipstick urinalysis for proteinuria was done with combur 3 strips. **Results:** The prevalence of obesity and overweight was 22.2% and 32.7% respectively. Women were more likely to be obese compared with men; mean BMI 27.4 ± 6.0 versus 25.4 ± 4.4 kg/m^2 p= 0.000. Proteinuria was detected in 4.9% of obese and 4.3% of overweight subjects respectively. Logistic regression analysis showed that excess weight was significantly associated with proteinuria OR 1.93 (95% CI: 1.02 – 3.65 p= 0.04). **Conclusion:** Prevalence of overweight and obesity is high among Nigerians. Subjects with excess weight were more likely to have proteinuria. Efforts should be made to control this trend through health education.

Keywords: Excess weight, obesity, proteinuria

Disclosure/Conflict of interest: None

INTRODUCTION

Obesity is becoming a major public health problem with rising prevalence all over the world. Currently, there are about 1.7 billion people that are overweight or obese all over the world[1]. Obesity has been associated with chronic non-communicable diseases like hypertension, type 2 diabetes, coronary heart disease, dyslipidaemia and chronic kidney disease (CKD) [1,2]. The incidence and prevalence of obesity is rising in the developing countries due to rapid unplanned urbanisation and adoption of western life styles [3]. The key causes of obesity are increased consumption of foods high in saturated fats, sugars and reduced physical activity[3]. Obesity often co-exists with under-nutrition in developing countries and affects virtually all age groups [1,3]. The aim of this study was to establish the prevalence of overweight and obesity among urban dwellers in Lagos and to determine the association with proteinuria.

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MATERIALS AND METHODS

We conducted community-based screening for CKD risk factors during the World Kidney Day activities over 5 years (2006 to 2010) in Lagos metropolis, located in South West Nigeria with an estimated population of 10 million inhabitants. All volunteer participants were recruited, excluded were pregnant women and those who were ill. Weights were taken with light clothing on to the nearest 0.5kg. Heights were measured using a stadiometer without shoes or headgear. Body Mass Index (BMI) was calculated based on the formula: weight in Kg/ height in metres squared[4]. BMI was classified using the WHO classification for adults as follows[4]: normal for values in the range of 18.5 – 25kg/m^2, overweight BMI between 25 and 29.9 kg/m^2, Class 1 obesity BMI 30.0 to 34.9 kg/m^2, class II 35.0 to 39.9 kg/m^2, Class III or extreme obesity BMI = 40 kg/m^2. Urinalysis was done with Combi-Screen 3 urine dipstick

(Biotechnologies AG Germany). All measurements were carried out by trained nurses.

Statistical analysis

Data were entered in Microsoft ® Excel and analyzed using Epi info ® 2007. Values are expressed as means ± standard deviation and percentages. Mean values of continuous variables were compared using the unpaired t-test. Percentages were compared using χ^2 test (with Yates correction). Simple logistic regression was used to determine the association between obesity and proteinuria. Statistical significance was assumed at a P value <0.05.

RESULTS

One thousand three hundred and sixty eight subjects participated in the screening exercise. There were 720 (52.6%) male and 648 female subjects (47.4%). The mean age did not differ among male and female participants mean age 42.1 ± 13.1 for females and 41.7 ± 12.7 for males p = 0.59. Mean age overall was 41.9± 12.9years. The age distribution of the respondents was skewed with majority (74.9%) in the 25-54 years age range, the elderly constituted 5.9% of the population while the adolescents 6.9% (figure 1), age range was 18 to 88years. Table 1 shows summary of the clinical characteristics of the study population.

Table 1 showing the clinical characteristics of the study population

Variable	All n = 1368 Mean ± SD	Male n = 720 Mean ± SD	Female n = 648 Mean ± SD	t stat/ X^2	p value
Age (years)	41.9± 12.9	41.7 ± 12.7	42.1 ±13.1	0.53	NS
BMI (Kg/m2)	26.4 ± 5.3	25.4 ± 4.4	27.4 ± 6.0	6.83	0.000
Overweight	447 (32.7%)	240 (33.3%)	207 (31.9%)	0.24	NS
Obese	304 (22.2%)	113 (15.7%)	191 (29.5%)	36.7	0.000
Proteinuria	49 (3.6%)	24 (3.3%)	25 (3.9%)	0.27	NS

T stat/X^2 = Comparison between male and female subjects

The prevalence of overweight and obesity in this study was 32.7% (447) and 22.2% (304) respectively. Of the obese subjects, 70.1% had class 1, 20.4% class II and 9.5% class III obesity. Two hundred and forty (33.3%) male subjects were overweight, while 207 (31.9%) female subjects were overweight; both sexes were equally affected OR 0.94 (95% CI 0.74 – 1.18 p = 0.62). However, in terms of obesity, women were 2.2 times more likely to be obese compared with men OR 2.25 (95% CI 1.71 – 2.94, p = 0.000).

Table 2 shows the age-specific prevalence of obesity and overweight classified by gender. Prevalence of overweight was highest in the 55-64 age-group for men and the 45 to 54 years age-group for women. Obesity tends to occur earlier in women with the peak prevalence in the 35 – 44 age-group compared with peak prevalence in the 55 – 64 age-group in men. The prevalence of overweight and obesity increased with age up to age 45 – 54 years, after which it began to decline.

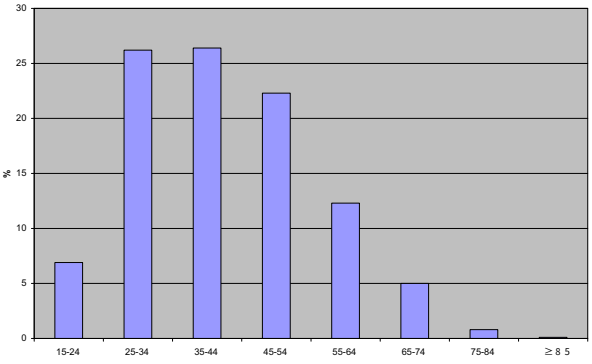
Table 2: Age-specific prevalence (%) of obesity and overweight classified by gender

	Age group in years							
Overweight	15 - 24	25 - 34	35 - 44	45 - 54	55 - 64	65 - 74	>75	Total
Male	11.9	29	35.1	38.5	45	22.9	33.3	33.3
Female	15.1	32.9	36.4	35.3	29.5	23.5	33.3	31.9
Total	13.7	30.7	35.7	37	36.9	23.2	36.4	32.7
Obesity								
Male	2.4	10.5	16.5	21.3	22.5	14.3	16.7	15.7
Female	3.8	15.2	35.8	44.9	36.4	29.4	0	29.5
Total	3 .2	12.6	25.8	31.8	29.8	21.7	9.1	22.2

Table 3: Summary of simple logistic regression analysis of proteinuria with different grades of BMI

PROTEINURIA	Odds Ratio	z	p value	95% Confidence	interval
Normal BMI (Yes/No)	0.53	- 1.90	0.06	0.28	1.02
Obesity (Yes/No)	1.58	1.39	0.16	1.83	3.00
Overweight (Yes/No)	1.33	0.93	0.35	0.73	2.44
Excess weight (Yes/No)	1.93	2.02	0.04	1.02	3.65

Figure 1: Age distribution of the study population Age-group (years)



Forty-nine (3.6%) subjects had overt proteinuria of which 2.6% (36) had 1+, 0.7% had 2+, while 0.3% had 3+ proteinuria. Prevalence of proteinuria was 4.9% among obese subjects,

4.3% in overweight and 2.4% in subjects with normal BMI $X^2 = 4.31$ df 2 p= 0.12. There was no gender difference in the prevalence of proteinuria 3.3% (24) in men and 3.9% (25) in women (Table 1). Logistic regression analysis showed that excess weight (obesity and overweight combined) was significantly associated with occurrence of proteinuria Table 3.

DISCUSSION

The prevalence of overweight and obesity is rising at an alarming rate both in developed and developing countries of the world. In this study about half the population was either overweight or obese. This is comparable with results from the developed countries[5-7] but lower than reports from other parts of Nigeria[8-11]. The rate of excess weight in this study is close to prevalence rates in the developed world. In the Australian diabetes, obesity and lifestyle study (AusDiab), 60% of the population was obese or overweight, while in the US prevalence of excess weight was as high as 68% [5, 6]. The reasons for the much higher prevalence in our study compared with the other studies from Nigeria could be attributed to the urban nature of Lagos and the changing behavioural patterns of the people, with the adoption of western lifestyle and diets. In addition there is a shift towards less physically demanding jobs and an increasing adoption of sedentary jobs.

In this study women were more obese than men and this is in agreement with other studies [6, 8-11] but differs from reports from the AusDiab study in which men had higher BMI compared with women [5]. Obesity also increased with age finding that is consistent with other reports[5,8-11]

Obesity has been shown to be a risk factor for CKD [2]. Obesity related glomerulopathy has been described in the literature in obese patients without overt diabetes and pre-existing renal disease [3,12]. It is a form of secondary focal segmental glomerulosclerosis (FSGS) manifested as proteinuria and progressive renal dysfunction. Several studies have shown that obesity is associated with CKD and end-stage renal disease [ESRD] [13 – 16]. In the Physician Health study, 11, 000 healthy men were followed up for 14years, those in the highest BMI quintile (26.6kg/m^2) at baseline, were more likely to develop CKD (OR, 1.27; 95% CI, 1.06 to 1.53). CKD in this study was defined as estimated GFR < 60ml/min/1.73m^2 [13]. In another cross-sectional population based study of 1,978 Japanese residents aimed at identifying risk factors associated with CKD, multivariate analysis showed that increased BMI was significantly associated with CKD independent of blood pressure, serum lipids and glucose [14].

Obesity has been shown to be associated with proteinuria in population based studies [17 - 20]. In the Prevention of Renal and Vascular End-stage Disease (PREVEND) study, analysis of data showed that BMI was independently associated with urinary albumin excretion [18]. In another large cross sectional study of young Japanese men and women below 40 years, obesity was found to be an independent risk factor for proteinuria [19]. In our study, the subjects with excess weight were more likely to develop proteinuria compared with those with normal weight. Proteinuria is an indicator of renal damage as well as a risk factor for progression of renal disease [2, 17 – 20]. The mechanism responsible for obesity related glomerulopathy includes glomerular hyperfiltration, hyperlipidaemia induced proliferation of mesangial cells and possible role for leptin and other adipocyte derived hormones [2]. Several studies have shown that weight reduction through diet and regular physical exercise has been associated with reduction and slowing down progression of renal dysfunction [2, 12]. The limitations of this study include absence of quantitative measurement of proteinuria and the population studied was not selected. Further studies looking at the association between obesity and CKD in the community are desirable.

In conclusion, prevalence of overweight and obesity is high among urban residents in Nigeria. Subjects with excess weight were more likely to have overt proteinuria and this could partly explain the rising prevalence of CKD in the country. Concerted efforts should be made to control this unwholesome trend through public enlightenment programmes.

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