Research article

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Obesity and Metabolic Syndrome in a Burkina Faso Urban Area: Prevalence, Associated Factors and Comorbidities

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Abstract

Background: The prevalence of obesity and metabolic syndrome is not just a problem of the developed countries but is also with a growing trend in developing countries, especially in urban areas. We aimed to estimate the prevalence of obesity and metabolic syndrome in the urban population living in Ouagadougou, Burkina Faso, and to investigate the factors and comorbidities associated with them.

Methods: Data were collected in two rounds (in March and December 2011) from two different neighbourhoods (peripheral and central) of Ouagadougou. We included all over 20 year old volunteers' subjects (excluding pregnant women). All characteristics were collected during face-to-face interviews. We used international standards to define obesity, hypertension and metabolic syndrome. The statistical analysis used chi-square (chi 2) tests and odds ratio with 95% confidence interval.

Results: 632 subjects with a mean age of 41.3 ± 6.8 years [20-75 years] and sex ratio (men/women) of 0.9were included in this survey. Overall crude prevalence of overweight, obesity and metabolic syndrome were respectively 30.5%, 22% and 7%. Compared with normal weight participants, obese individuals had more hypertension, diabetes or impaired fasting glucose (p=0.000), and they were more likely to be older, women, employed and living in the central neighbourhood. Obesity was found in 81.8% of subjects with metabolic syndrome. On bivariate analysis, those with the metabolic syndrome were female, older, and obese

Conclusion: The prevalence of obesity and metabolic syndrome in urban Burkina Faso is high. There is a need to pay closer attention to combating these health disorders. An important place must be reserved for the prevention and the fight against obesity by appropriate lifestyle.

Keywords: Obesity; Metabolic syndrome; Urban areas; Burkina faso; Sub-saharan africa

Introduction

The global epidemic of overweight and obesity is rapidly becoming a major public health problem in many parts of the world. Overweight and obesity lead to adverse metabolic effects on blood pressure, cholesterol, triglycerides and insulin resistance [1]. They are associated with many diet-related chronic diseases including diabetes mellitus, cardiovascular disease, stroke, hypertension and certain cancers [2].

In 2008, 35% (over 1 billion) of adults aged 20 and over were overweight worldwide, and 11% were obese [3]. The World Health Organization (WHO) indicate that the prevalence of obesity is not just a problem of the developed countries but is also with a growing trend in developing countries, with over 115 million people suffering from obesity-related problems [1]. This significant acceleration in the incidence of obesity also indicates that low-income countries are now confronted with a double burden where both communicable and chronic non-communicable diseases co-exist.

Almost half the disease burden in low-and-middle-income countries is now from non-communicable diseases [4,5]. Previous studies shown that the prevalence of obesity in West Africa was estimated at 10.0% [5], Obesity is thus becoming a pressing public-health problem for sub-Saharan Africa (SSA).

Burkina Faso is a West Africa tropical country. According to the last census of the National Institute of Statistics and Demographics of Burkina Faso (Institut National de la Statistique et de la Démographie du Burkina Faso) in 2009, a total of 1 029 584 individuals with at least 20 years old were living in the urban municipality of Ouagadougou [6]. One previous study performed in Ouagadougou in 2004, focused only on obesity, shown that this prevalence was about 14% [7]. According to forecasts, the urban municipality of Ouagadougou has an annual growth rate of 7.6%, and the population doubled at each decade [6]. As others low-and-middle-income countries, under-nutrition and communicable infectious diseases remain a core focus of researchers and policy makers. Quantifying the prevalence obesity and metabolic syndrome to highlight trends and evaluating theirs associated factors is important to draw health policy makers attention to address this problem. The aim of this study was to describe the prevalence of overweight, obesity and metabolic syndrome (MetS) in Ouagadougou and to investigate the associated factors or comorbidities.

Methods

Population sample

A cross-sectional survey was implemented in two rounds (in March and December 2011) in two different neighbourhoods of Ouagadougou: one central with high building density and one peripheral with middle and low building density.

A sample size of 340 individuals for each neighbourhood was adequate on the basis of an estimated prevalence of 33% of overweight/obesity [8]. The precision was 5%, with 95% confidence interval (CI) and 5% marginal of error. The size of each sample was increased by 5% up to 357, to provide for incomplete data sets. A Z-value of 1.96 used at 95% CI.

n = [Z2 x p x q] / i2 (n= sample size, p= prevalence, q = 1-p, i= margin of error).

Each round was preceded by 02 days of information campaigns using advertisements by the national television channel, the national broadcasting, and 03 private broadcasting of Ouagadougou. Information was given in French language and then translated into the 02 most spoken national languages (Moré and Dioula). He was asked volunteers to come fasting (at least 8 hours, excluding water) in the screening center at morning between 7AM and 12 AM.

Pregnant women and people younger than 20 years were excluded from the study.

Each survey team was composed by nurses and physicians. Data were collected using an oral applied questionnaire form, containing age, gender (male/female), employment status, medical history status (diabetes, hypertension), clinical, and glucose data sections was used for data collection for each patient. To standardize survey measurements and procedures, each survey team was trained. All field workers were trained and certified to administer the questionnaire, measure waist circumference, take blood pressure measurements and draw blood.

Variables studied

Socioeconomic variables:

The questionnaire was orally translated into Mooré (mossi ethnic group language) or Dioula for persons who did not understand French. Then we made some categories for age (20–29/30–39/40–49/50-59/≥ 60 years) and profession (employed/unemployed).

Body Mass Index:

Waist circumference:

Blood pressure:

Glycemic control:

Operational definitions:

The BMI values were classified into 4 groups according to the WHO criteria (BMI < 18,5 : underweight ; 18,5 ≤ BMI ≤ 24,9 : normal weight; 25 ≤ BMI ≤ 29,9 : overweight; BMI ≥ 30 : obesity. For purposes of analysis we classified all subjects with a BMI ≥ 25 kg/m^2 as overweight or obese.

Hypertension was defined as a systolic BP greater than or equal to 140 mmHg and/or a diastolic BP greater than or equal to 90 mmHg or reported treatment for hypertension.

The metabolic syndrome was defined using the International Diabetes Federation criteria for the waist circumference, the blood pressure and the raised blood [10,11]. Given the limited resources and poor infrastructure during the screenings, it was not possible to make the blood lipid assays.

Statistical analysis

Data were recorded and analyzed using Predictive Analytics Software (PASW Statistics) version 18. Data are expressed as mean ± standard deviation (SD). The Student's unpaired, two-sided t-test was used to compare means between two groups. The Chi-square (χ^2) test was used in the comparison of proportions. The strength of association between the dependent variables was assessed using odds ratio (OR). To identify factors associated with the MetS among various groups, we first performed a bivariate comparison of the prevalence of MetS using the χ^2 test. Variables associated with the MetS with a P<0.10 on bivariate analysis were then considered for multivariate regression.

Ethical considerations

The study was approved by the Ethics Committee for Health Research of Burkina Faso. The study objectives were clearly explained to participants, selected household heads and local authorities. All subjects were voluntarily disclosed. We have obtained from each subject oral informed consent prior to enrolment. They were given back their results on blood pressure and glycaemia, and those with abnormal values were referred for diagnosis and treatment.

Results

Characteristics of all subjects

A total of 632 subjects (central area: 321, peripheral area: 311, response rate: 88.5%) with the mean age of 41.3 ± 6.8 years [20-75 years] completed the study. The main characteristics are described in Table 1.

| Variables | Number of subjects (%) | Gender | | Odds Ratio [95% CIa] | P value |
		Women (%)	Men (%)		
Medical history	47 (7.4)	33 (10.1)	14 (4.6)	2.32 [1.23-4.54]	0.009
Diabetes	104 (16.5)	62 (18.9)	42 (13.8)	1.45 [0.95-2.24]	0.084
Hypertension					
Employment statusb	227 (36)	158 (48.3)	61 (20.1)	3.70 [2.60-5.29]	0.000
Unemployed	404 (64)	169 (51.8)	243 (79.9)	0.27 [0.19-0.38]	0.000
Employed					
Age range (years)	164 (25.9)	90 (27.4)	74 (24.3)	1.18 [0.82-1.68]	0.374
20-29	154 (24.4)	75 (22.6)	79 (26)	0.84 [0.59-1.22]	0.319
30-39	172 (27.2)	94 (28.7)	78 (25.7)	1.16 [0.81-1.66]	0.397
40-49	104 (16.5)	53 (16.2)	51 (16.8)	0.96 [0.63-1.46]	0.839
50-59	38 (6)	16 (4.9)	32 (10.2)	0.44 [0.23-0.81]	0.011
≥ 60					
Mean age (years)	41.3	40.2	42.4	-	0.048
BMIc(Kg/m2)	32 (5.1)	11 (3.4)	21 (6.9)	0.47 [0.21-0.98]	0.045
< 18,5	268 (42.4)	111 (33.8)	157 (51.6)	0.48 [0.35-0.66]	0.000
18,5 – 24,9	193 (30.5)	96 (29.3)	97 (31.9)	0.88 [0.63-1.24]	0.478
25 – 29,9	139 (22)	110 (33.5)	29 (9.5)	4.78 [3.08-7.55]	0.000
≥ 30					
Mean BMI (Kg/m2)	26.2	28.1	24.3	-	0.000
Metabolic syndrome	44 (7)	31 (9.5)	13 (4.3)	2.34 [1.21-4.69]	0.010
Hypertension	178 (28.2)	97 (29.6)	81 (26.7)	1.16 [0.82-1.64]	0.418
aCI: Confidence Interval; bwe exclude one retired; cBMI: Body Mass Index					

Table 1: Characteristics of all subjects

	Overall (%)	Central neighbourhood (%)	Peripheral neighbourhood (%)	Odds Ratio [95% CIa]	P value
Overweight	193 (30.5)	106 (33)	87 (28)	1.27 [0.90-1.79]	0.17
Obesity	139 (22)	92 (28.7)	47 (15.1)	2.26 [1.52-3.36]	< 0.001
MetSb	44 (7)	28 (8.7)	16 (5.2)	1.76 [0.94-3.39]	0.08
aCI: Confidence interval; bMetS: metabolic syndrome					

Table 2: Comparison of overweight, obesity and metabolic syndrome between the peripheral and the central neighbourhood

Factors	Categories	Number of subjects	MSa cases (%)	Odds Ratio [95% CIb]	P value (bi-variate analysis)	P value (multi-variateanalysis)
Gender	Women	328	31 (9.5)	2.34 [1.21 – 4.69]	0.010	0.048
	Men	304	13 (4.3)			
Age range (years)	20-39	318	05 (1.6)	1 (reference)	0.000	0.000
	40-59	276	37 (13.4)	9.69 [3.97-28.11]		
	≥ 60	38	2 (5.3)	3.48 [0.45-18.22]		

Employment statusc	Unemployed	227	15 (6.6)	1.091 [0.57-2.13]	0.77	-
	Employed	404	29 (7.2)			
Neighborhood	Central	321	28 (8.7)	1.76 [0.94-3.39]	0.08	0.685
	Peripheral	311	16 (5.2)			
BMId (Kg/m2)	< 30	493	8 (1.6)	15.98 [7.26-37.95]	0.000	0.000
	≥ 30	139	36 (25.9)			
BMI(continuous)	-	-	-		0.001	0.05
aMetS: metabolic syndrome; bCI: Confidence interval; cwe exclude one retired; dBMI: Body Mass Index						

Table 3: Comparison of selected factors according to the presence or absence of the metabolic syndrome

The subjects consisted of 328 women and 304 men with a sex ratio (M / W) of 0.9. Three hundred and seventeen subjects (50.2%) were under 40 years and 315 (47.8%) had at least 40 years. Four hundred and four subjects (64%) led gainful employment.

The mean BMI was 26.1 ± 5.2 kg/m2 (95% CI, 23.40-37.93). The mean waist circumference was 93.93 cm (95% CI, 73-131) for women and 92.03 cm (95% CI, 73-125) for men.

In terms of medical history, 47 subjects (7.4%) were previously diagnosed diabetic patients and 104 (16.5%) previously diagnosed hypertension.

The prevalence of overweight, obesity and MetS were respectively 30.5% (n=193), 22% (n=139) and 7% (n=44) (Table 2).

Associated factors

Among overweight subjects, 15.5% had hypertension, and 6.7% had diabetes mellitus (newly and previously diagnosed).

The mean age was 47.5 ± 9.7 years for obese subjects and 37.5 ± 11.2 years for non-obese subjects (p=0.000). Fifty-four percent of obese subjects had hypertension (vs 9.1% in non-obese subjects, OR: 11.67 [95% CI, 7.40-18.36], p=0.000). The prevalence of impaired fasting glucose and diabetes was respectively 22.3 % among obese subjects vs 4.5% for non-obese subjects (OR: 6.15 [95% CI, 3.41-11.12], p < 0.001) and 16.5% among obese subjects vs 3% for non-obese subjects (OR: 6.32 [95% CI, 3.19-12.70], p<0.001).

Compared with normal weight participants, obese individuals were more likely to be older, women, and employed.

Obesity was found in 81.8% of subjects with MetS. On bivariate analysis, those with the MetS were female, older, and were obese (Table 3).

Discussion

The main limitation of the present study is its realization in urban areas that is not representative of the population of Burkina Faso. Further studies in other urban and rural areas and among other socio-ethnic groups are required to obtain an overall picture of the prevalence of obesity and MetS in Burkina Faso. In addition the cross-sectional design of this study does not allow longitudinal evaluation to examine how obesity and MetS have evolved over time.

Nevertheless, this study provides an estimate of the prevalence of the MetS and some associated comorbidities in urban Burkina Faso.

These data could provide baseline figures for the guide planning of health care policy and establishment of medical priorities in Ouagadougou, the most urbanized region of Burkina Faso [6].

The higher mean BMI of our population reported tendency to overweight and obesity. Indeed, over half of the subjects were at least overweight and 22% were obese in Ouagadougou. Women were more often overweight or obese (p=0.000). This prevalence is higher than the previous 2004 rate (14.7% for obesity and 33% for both overweight and obesity), using a population-based cross-sectional survey reported in Ouagadougou [7,8] with also female predominance. Age, gender, household equipment index (residents from structured and high building-density areas are more likely to be obese than those from unstructured and low building-density areas), usual transport with motor vehicles and micronutrient-rich food consumption are the factors associated with obesity in Ouagadougou [7].

Our results were close to those of N'Djamena and Libreville where half of the population are overweight [12]. However, according to studies in other urban areas of SSA, the prevalence of obesity varies from 8.3% in Senegal to 37% in Cameroon, through 8.9% in Gabon, 11.5% in Mali, 13.8% in Ivory Coast, 16.1% in Ghana, 19.5% in Guinea, 21.5% in Benin and 22.5% in Nigeria [12-20]. The high rates noted in our study and in these studies could be an indication of a raising of obesity in sub-Saharan Africa, although sampling strategy varied from one study to another.

Being women were strongly associated with obesity. Overall in SSA the prevalence of overweight and obesity is higher among women [5,12,17-20]. This female predominance could be explained by pregnancies [21] and socio-cultural motivations. In many sub-Saharan countries being overweight is indeed considered as a criterion of beauty and well-being in women.

Obese subjects had significantly more hypertension, impaired fasting glucose or diabetes than non-obese subjects. These findings support the fact that overweight and obesity lead to adverse metabolic changes such as insulin resistance and increasing blood pressure [1]. Consequently, they could promote the burden of cardiovascular diseases, diabetes and many types of cancer in Ouagadougou and Burkina Faso or others SSA countries urban areas [4,5,22,23].

The association between obesity and age, found also in others SSA countries [5,20], supports the conclusion that the prevalence of obesity is expected to increase with the aging of the population. This high frequency can be explained in part by the increase in life expectancy and sedentary lifestyles in developing countries.

The MetS is not uncommon in Ouagadougou. Indeed, using 03 of the IDF criteria, we found it in 7% of our subjects with no significant difference between the peripheral and the central neighbourhood. One previously study in 2010 [24], using the National Cholesterol Program Education-Adult Treatment Panel III criteria [25], found a prevalence of 10.3% of MetS in Ouagadougou. This MetS was associated with age, being female and general obesity. The influence of the number of pregnancies on the waist circumference could explain in part the predominance of women with MetS [21]. One other study in Ivory Coast, using also the National Cholesterol Program Education-Adult Treatment Panel III criteria, shown a 4.94% of MetS prevalence [16], but with no association with age and sex. In Africa, the definition criteria for MetS varies from one study to another. Then, assuming the fact that there is an ethnic difference in the relationship between abdominal adiposity and metabolic disease risk, some authors say that waist circumference cut point used for the diagnosis of MetS in SSA Women is not appropriate [26].

Nevertheless, the hypothesis that demographic transition (the increase in life expectancy leading to an increasingly elderly population) is at the root of the increase of the prevalence obesity and especially central obesity with MetS, has been confirmed by our findings.

The acceleration of urbanization in Africa, sedentary lifestyle and the present epidemiological transition in SSA so-called westernization of lifestyle - characterized by decreased amounts of physical activity and increased consumption of energy-dense or high-fat diets as a result of rapid urbanization are factors that increase the prevalence of obesity and therefore, metabolic syndrome and cardiovascular risk [5,20,23]. For these reasons, preventing obesity intervention programs designed to reduce waist circumference through lifestyle modification, including exercise and diet, may have important public health significance in reducing the incidence obese related diseases.

Conclusion

Obesity is fast becoming a public health problem in sub-Saharan Africa. This study shown that the prevalence of obesity in urban Burkina is high, which lead to a rising of hypertension and glucose disorders. It is necessary to develop effective health policies to address this problem. There is a need to pay closer attention to combating these health disorders. An important place must be reserved for the prevention and the fight against obesity by appropriate lifestyle.

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