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Prevalence of Obesity in Black Subjects with Type 2 Diabetes in Benin

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Abstract

Background: Abdominal obesity is often associated with type 2 diabetes, especially in the context of metabolic syndrome. The objective of this study was to determine the prevalence of corpuscular and abdominal obesity in type 2 diabetes in the two major cities in southern Benin. Methods: It was a multicentric, prospective, descriptive and analytical study that had as framework the center for screening and monitoring of diabetes "Banque d'insuline" of Cotonou, the Polyclinic Atinkanmey of Cotonou and the Internal Medicine Department of the Departmental University Hospital of Ouémé-Plateau in Porto-Novo. The study was a six-month period (March-August 2014). Results: We included a total of 400 type 2 diabetics. Women represented 66% of the study population with a sex ratio of 0.52. The mean age of patients was 55.6 ± 10.3 years with extremes of 28 and 87 years. The prevalence of corpuscular obesity (BMI ≥ 30 Kg/m²) was 38.5% in our study population. For the gender, it was 48.5% in women and 19.1% in men with a statistically significant difference (p = 0.0001). The overall prevalence of abdominal obesity in our study population was 87.8%. Almost all of our diabetic women (99.2%) had abdominal obesity versus 65.4% in men (p = 0.0001). All the patients with type 2 diabetes having corpuscular obesity had also abdominal obesity. This abdominal obesity was observed in 80.1% of non-obese diabetic (p = 0.0001). On the contrary, the majority of patients with abdominal obesity (56.12%) had a BMI below 30 kg/m². Conclusion: This study shows a high prevalence of abdominal obesity (87.8%) in our study population compared with the corpuscular obesity (38.5%). Hence, the importance of measuring waist circumference is more than BMI in diabetic patients.

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Keywords

Obesity, Diabetes, Prevalence, Benin

1. Introduction

Abdominal obesity is often associated with type 2 diabetes, especially in the context of metabolic syndrome. Although many diabetics are obese, all obese people are not diabetic, and there are also non-obese diabetic. Hence it is important for us to study the prevalence of obesity in diabetics in Benin, where the prevalence of diabetes is steadily increasing [1]-[3] like in other countries around the world [4]. Moreover, being a cardiovascular risk factor, obesity constitutes a co-morbidity in the diabetics and thus accelerates the development of diabetes complications particularly the macrovascular complications.

The mean BMI in a population of diabetics in Kinshasa was 23.992 ± 5.413 kg/m^2 in 2009 [5]. In a study of sleep apnea syndrome in type 2 diabetes subjects in Benin, Amoussou-Guénou *et al*. have noted a corpuscular obesity prevalence of 44.3% in 2014 [6]. Seventy nine (79) patients were included in this study.

The objective of this study was to determine the prevalence of corpuscular obesity and abdominal obesity in type 2 diabetics in the two major cities of southern Benin.

2. Methods

This was a multicentric, prospective, descriptive and analytical study which had a framework the center for screening and monitoring of diabetes "Banque d'Insuline" of Cotonou, the Polyclinic Atinkanmey of Cotonou and the Internal Medicine Department of the Departmental University Hospital of Ouémé Plateau (CHUD-OP) in Porto Novo. The study is a six-month period (March-August 2014), and included all type 2 diabetics consulted during the period and who consented. We have therefore included a total of 400 type 2 diabetics.

The waist circumference was measured between the iliac crest and the last rib at a standing position. Abdominal obesity (IDF 2005) was defined by a waist circumference ≥ to 94 cm in men and 80 cm in women.

For the BMI (WHO): Normal: 18 to 24.99 kg/m²; Overweight: 25 to 29.99 kg/m²; Obesity grade 1:30 to 34.99 kg/m²; Obesity grade 2: 35 - 39.99 kg/m²; Obesity grade 3: ≥40 kg/m². Diabetes is said to be balanced if the glycated hemoglobin (HbA1c) is less than 7% and unbalanced if it is ≥ to 7%.

Data entry and statistical analysis were made by Excel and Epi Info version 3.5.1 software. Chi-squared test was used to compare qualitative variables with a degree of significance of $p < 0.05$.

3. Results

3.1. Population Characteristics

Women represent 66% of the study population. The sex ratio is 0.52. The mean age of patients was 55.6 ± 10.3 years with extremes of 28 and 87 years. 380 patients (95%) lived in urban areas. Trade was the most represented profession with a proportion of 52.5%. 390 patients (79.8%) lived in couple. Diabetes was balanced (HbA1c < 7%) in 31.28% of 243 patients who have achieved HbA1c, then unbalanced at 68.72%. Hypertension was present in 70% of this study population. The development of diabetes in patients ranges from 1 to 33 years with a mean of 8.27 ± 6.78 years. Dyslipidemia was present in 111 of 400 patients was 27.75%.

3.2. Prevalence of Corpuscular Obesity (BMI)

The mean BMI was 26.83 ± 4.62 kg/m^2 with a range of 16.30 and 46.79 kg/m^2 in men and 30.29 ± 5.74 kg/m^2 with a range of 19.15 and 56.01 kg/m^2 in women. The difference is statistically significant with $p = 0.0001$.

According to the distribution depending on the class of BMI, this predominance is also noted for overweight women ($p = 0.0001$) than in men (**Figure 1**).

The prevalence of corpuscular obesity (BMI ≥ 30) was 38.5% in the overall population. For the gender, it was 48.5% among women and 19.1% among men with a statistically significant difference ($p = 0.0001$) (**Table 1**).

3.3. Prevalence of Abdominal Obesity

The mean waist circumference was 97.93 ± 14.12 cm with a range of 62.50 and 181.00 cm for men and 98.89 ± 12.15 cm with extremes of 66.00 and 150.00 in women.

Table 1 shows that virtually all women with diabetes (99.2%) had abdominal obesity versus 65 4% in men (p = 0.0001). The overall prevalence of abdominal obesity in our study population was 87.8%.

Table 2 shows that all type 2 diabetics with corpuscular obesity (BMI ≥ 30 Kg/m^2) had abdominal obesity. This abdominal obesity was observed in only 80.1% of non-obese diabetic (p = 0.000). As against the majority of patients with abdominal obesity (56.12%) had a BMI below 30 kg/m^2.

4. Discussion

Our study found a prevalence of corpuscular obesity (BMI ≥ 30) of 38.5% in this population of type 2 diabetics. As for the gender, it was 48.5% in women and 19.1% in men with a statistically significant difference (p = 0.0001). It

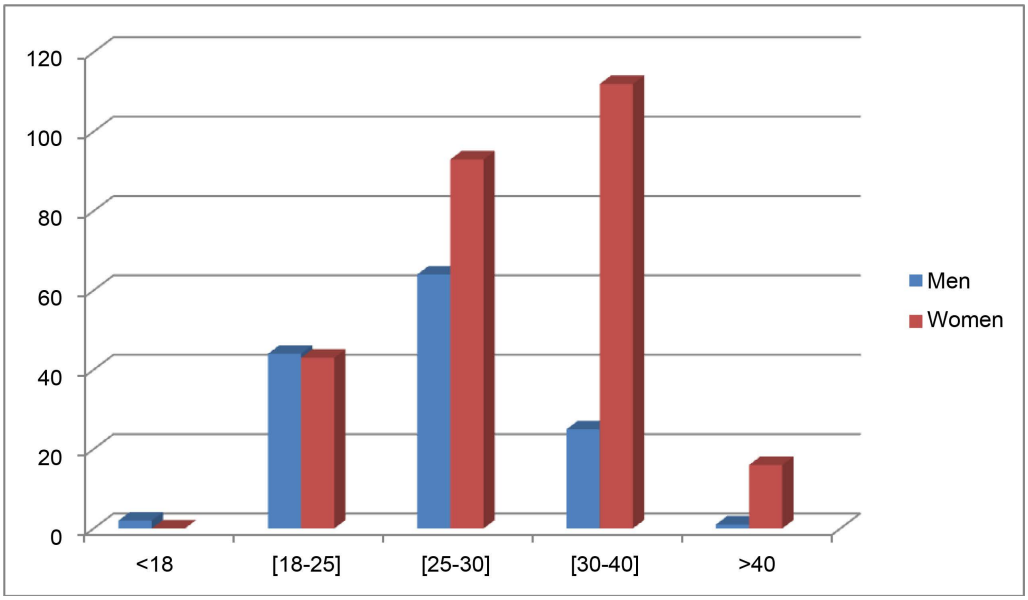

Figure 1. Distribution of patients according to BMI.

Table 1. Distribution of patients according to sex and obesity.

		Sex (%)		OR	CI 95%	p
		M	F			
Corpuscular obesity (BMI ≥ 30)	**Yes**	26 (19.1)	128 (48.5)	3.982	2.437 - 6.505	0.0001
	No	110 (80.9)	136 (51.5)			
Abdominal obesity	**Yes**	89 (65.4)	262 (99.2)	0.014	0.003 - 0.061	0.0001
	No	47 (34.6)	02 (0.8)			

Table 2. Crossing between corpuscular obesity and abdominal obesity.

		Abdominal obesity (%)		OR	CI 95%	p
		Yes	No			
Corpuscular obesity	**Yes**	154 (100.0)	0 (0.0)	0.000	0.000 - 0.082	0.0001
	No	197 (80.1)	49 (19.9)			

OR: odds ratio; CI: confidence interval; BMI: Body Mass Index.

shows that women with diabetes type 2 are more obese than men. The prevalence of obesity in women may be explained by several factors:

- inactivity: trade is the dominant occupation in the study population and the profession is mainly carried out by women who mostly spend the daytime sitting;
- pregnancies: this was shown as a positive association between obesity and the number of pregnancies [7].

In a study of sleep apnea syndrome in type 2 diabetes subjects in Benin, Amoussou-Guénou *et al*. have noted a corpuscular obesity prevalence of 44.3% [6].

In our study, the mean BMI of 26.83 kg/m^2 in men and 30.29 kg/m^2 in women with a statistically significant difference ($p = 0.0001$).

In France, data from the 2001-2007 ENTRED study show that the median Body Mass Index (BMI) of type 2 diabetes subjects is estimated to 29.5 kg/m^2 (value for overweight). Thus, only 20% of type 2 diabetes subjects are of normal weight (BMI < 25 kg/m^2), 39% are overweight (25 ≤ BMI < 29 kg/m^2) and 41% are considered obese (BMI ≥ 30 kg/m^2) [8].

In general, in multiracial population, in 2014 Di Cesare M. *et al*. found a mean BMI of 24.2 kg/m^2 in men and 24.4 kg/m^2 in women [9].

Obesity leads to many complications responsible for an increase of morbidity and mortality, among them, insulin resistance, especially if obesity is android (metabolic syndrome).

It is complicated by glucose intolerance or diabetes and could also play a role in renal sodium retention, responsible for volume expansion, and increased peripheral vascular resistance, leading to high blood pressure, frequently identified in obese [10].

Regarding abdominal obesity, almost all of the women with diabetes type 2 (99.2%) had abdominal obesity versus 65.4% in men ($p = 0.0001$). The overall prevalence of abdominal obesity in our study population was 87.8%. The mean waist circumference was 97.93 ± 14.12 cm with a range of 62.50 and 181.00 cm for men and 98.89 ± 12.15 cm with extremes of 66.00 and 150.00 in women. We therefore find that the prevalence of abdominal obesity is very high (87.8%) against 38.5% for the corpuscular obesity. This demonstrates the primacy of measuring abdominal perimeter compared with BMI.

Most often, obesity linked to diabetes is an androgenic type corresponding to an increased volume of adipocytes located primarily in the abdominal region. Although abdominal fat is less than 20% of the total fat body mass, its importance is prominent in postprandial lipid management, and both because of its physiology (lipase activity) and anatomy (drainage through the hepatic system). The contribution to the diabetic states that fatty tissue results from the activity of its two components, namely, the abdominal fat itself but also the subcutaneous fat tissue that is present in this area of the body and plays a major role in the synthesis of non-esterified fatty acids. These fabrics are also a source of adipokines, such as PAI-1 (plasminogene activator inhibitor-1), which act on the whole metabolism. Visceral fat accumulation in adipocytes helps maintain a high level of free fatty acids involved also in the development of insulin resistance, particularly hepatic and muscular level, and damage affecting the β cells; hence, the importance of systematic measurement of waist circumference among our patients with type 2. This also allows the systematic investigation of the metabolic syndrome including abdominal obesity is the main criterion as classified by the International Diabetes Federation (IDF).

If the essential physiological role of leptin is a hypothalamic regulation of feeding behavior and energy expenditure [11]-[14], other adipocytokines affect the sensitivity to insulin, so glucose and lipid metabolism, as well as cardiovascular function and inflammatory and immune responses. Among the identified adipokines, adiponectine increases insulin sensitivity and reduces body fat by promoting fatty acid oxidation in muscle, while resistine induced state of insulin resistance, and complications metabolic that result. It has been shown that the production of adiponectine is reduced in obese subjects, whereas resistine is excessive, especially in cases of abdominal obesity associated with insulin resistance and glucose tolerance [15].

The fact that almost all (99.2%) of the women with diabetes type 2 have a higher waist circumference of 80 cm does it suggest that the women are really obese and that this threshold of 80 cm should be reviewed with African black women?

5. Conclusion

This study shows a high prevalence of abdominal obesity (87.8%) in our study population compared to the corpuscular obesity (38.5%). Hence the importance of measuring waist circumference is more than BMI in diabetic patients. Our study also shows that the diabetic women are more obese than men. In addition, they have almost

all abdominal obesity (99.2%) versus 65.4% in men with a significant difference (p = 0.0001).

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