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Prevalence and Components of the Metabolic Syndrome in Lubumbashi

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Abstract

Introduction

Metabolic syndrome (MS) is a complex syndrome with a cluster of interrelated risk factors for cardiovascular disease and type II diabetes mellitus. Its increasing worldwide prevalence has been largely linked to the rise in obesity. In Lubumbashi, few studies have been conducted on this subject. Therefore, it is important to determine the prevalence of SM and its components in this setting.

Methods

This is a multicenter cross-sectional descriptive study conducted at the University Teaching Hospital of Lubumbashi (UTH-L), the Centre Medical Diamant (CMD), the Centre medical Du Centre-ville (CMDC) and the Polyclinique AFIA Don Bosco (PADB).

The data from 285 participants including anthropometric indices, blood pressure, blood glucose and lipidogram (triglycerides, total cholesterol, LDL cholesterol, HDL cholesterol). The data was compiled and edited to maintain consistency before being entered into the software PPE Info V 7.2.5. The data will be presented as frequency and percentage (%) for categorical variables and as means and standard deviation (SD) for variables.

Results

The overall prevalence of MS was 28.8% with a significant female predominance: 43.3% of women against 16.7% for men ($p<0.001$). The most predominant components among the study population were central obesity, high blood pressure and hyperglycemia respectively 54.1%; 56.1% and 56.1%. Note that among the components only 31.8% in men had a TT greater than 94 cm against 82.2% of women had a TT greater than 80cm; but related to triglycerides 37.3% of men had a triglyceride level above 150mg/dl Conclusion: The prevalence of SM is very high with a strong female predominance and the components, namely abdominal obesity, blood pressure high blood pressure and hyperglycemia are the most common. It is therefore necessary to put in place strategies to fight against these components, which are very influential factors in the appearance of non-communicable diseases.

Keywords: Metabolic syndrome; Prevalence; Component; Lubumbashi

Introduction

The metabolic syndrome (MS) associates morphological, physiological and biochemical anomalies which can coexist with genetic and acquired factors, it strongly exposes to cardiovascular diseases and type II diabetes [1]. MS is increasingly considered as a major public health problem [2], it is intimately associated with obesity, particularly abdominal obesity and lifestyle changes related to industrialization which have strongly contributed to increase its prevalence in recent decades [3,4]. MS is characterized by the presence of different combinations of several risk factors among the following: obesity, high fasting triglyceride level, arterial hypertension, insulin resistance or hyperglycemia, high low density lipoprotein cholesterol (LDLc) level, low HDLc, low Total Cholesterol [6].

MS has been the subject of various definitions over the past 10 years. It is a clinical-biological entity recognized by the World Health Organization (WHO) in 1998, the National Cholesterol Education Programm Adult Treatment Panel III (NCEP-ATPIII) in 2001, International Diabetes Federation (IDF) in 2005 [7], then the IDF harmonization consensus in 2009 [8].

The MS has been considered as a cardiovascular risk factor, it corresponds to the coexistence of several metabolic disorders including three factors among the five in the same individual. These five major criteria are central or abdominal obesity, hypertriglyceridemia, low high density lipoprotein cholesterol (HDLc), arterial hypertension and hyperglycemia [5]. There is currently evidence to support energetic measures to diagnose and treat not only hyperglycemia, but also MS-associated cardiovascular risk factors such as hypertension, dyslipidemia, and abdominal obesity, in the hope of reducing mortality due to cardiovascular complications. MS has been the subject of various definitions over the past 10 years. It is a clinical-biological entity recognized by the World Health Organization (WHO) in 1998, the National Cholesterol Education Programm Adult Treatment Panel III (NCEP-ATPIII) in 2001, International Diabetes Federation (IDF) in 2005 [7], then the IDF harmonization consensus in 2009 [8].

The prevalence of MS depends on age, ethnic origin, study population and especially the diagnostic criteria used [9]. The prevalence of MS is also increasing in countries affected by problems of malnutrition and access to quality medical information that are highly dependent on the age of the population studied, and it is also likely to increase with the lengthening of life expectancy [5,9].

The prevalence of metabolic syndrome increases significantly with age. This effect is significant, with a doubling of the number of patients between their forties and sixties. Indeed, MS globally affects 30% of the adult population with an incidence of 7% for 20-29 year olds and peaks at 44% for 60-69 year olds [9]. An American survey [10] had shown that the prevalence of SM was 21.8% in the adult population of the United States. This prevalence increased with age: 6.7% in subjects aged 20 years against 43.5% for subjects aged between 60 and 69 years. The prevalence of MS is estimated at 15.7% in men and 14.2% in women [4]. MS represents a set of factors that increase the risk of developing

cardiovascular disease or type II diabetes, the presence of this syndrome would multiply by 2 or 3 the risk of developing cardiovascular disease, and the risk of developing type II diabetes. would be multiplied by 5. Certain characteristics increase the risk of developing SM, in particular age, ethnic origin (higher in African Americans and in people of South Asian descent), consumption of alcohol and tobacco, history of diabetes and hypertension [8]. Similarly, physical activity, which plays an essential role in the management of energy metabolism, is associated with MS [3,4]. In Africa, the available data However, in some countries, some studies focus on MS screening, for example the work carried out on diabetic subjects at the Center Hospitalo-Universitaire de Bobo Dioulasso in Burkina Faso. n/a [11]. Based on the IDF criteria, Marcelline et al. [11] observed that abdominal obesity was present in 61.9% of these subjects and that hypertension was present in 56.4% of cases; and the prevalence of MS was 48.9%. In Ouagadougou [12], a study including 168 diabetic patients found a prevalence of 68.5%; patients were often overweight (78.6%) and sedentary (62.5%).

A study conducted in Kinshasa [13] on MS in type 2 diabetics showed a relationship between cardio metabolic risk and atherosclerotic complications and MS. In these patients, the authors had noted a very high rate of uncontrolled diabetes, abdominal obesity, insulin resistance, as well as low and very high levels of HDLc. The objectives of this study were to estimate the prevalence of SM and determine its individual components in Lubumbashi using the harmonized IDF definition of 2009 [8].

Methods

This was a descriptive cross-sectional study, whose data collection was prospective, conducted in several hospitals in the city of Lubumbashi, in particular the University Teaching Hospital of Lubumbashi (UTHL), the Polyclinqiue Afia Don Bosco (PADB), the Centre Medical Du Centre-Ville (CMDC) and the Centre Medical Diamant (CMD).

The study population was made up of adult patients who presented MS, aged over 18 years. This study concerned 285 received in consultation, having consented to participate in the study and in whom the sociodemographic, anthropometric parameters (weight, height and waist circumference, clinical (average of the last two of three blood pressure (BP) measurements) obtained using an Omron M7 IT brand blood pressure monitor) and biological (total cholesterol, HDL cholesterol, LDL cholesterol, triglyceride and glycemia taken after 12 hours of fasting using enzymatic and colorimetric tests: respectively cholesterol oxidase and peroxidase glucose-oxidase and peroxidase for the lipogram and glucose-oxidase and peroxidase for the glycaemia).The conduct of the study had obtained the approval of the ethics committee (UNILU/CEM/101/).The data were analyzed SPSS V.26.0 software Simple descriptive statistics were used to describe the socio-demographic characteristics of study participants data were presented as f frequency and percentage for categorical variables and as mean and standard deviation (SD) for those that were continuous normally distributed and for which a graphical test of normality Q-Q Plot had been performed. The median and interquartile range (Iq) were used to present continuous data not normally distributed. The overall prevalence of SM will be described for the entire hospital population studied with 95% confidence intervals (CI).

A p-value of less than 0.05 was considered significant.

Results

The overall prevalence of MS was 28.8% (82 cases out of 285). The prevalence was higher in women (56 cases out of 129 or 43.4%) than in men (16.7% or 26 cases out of 156), the difference was statistically highly significant ($p<0.001$) 3.

Characteristics of the study population The sociodemographic characteristics of the 285 participants, including 156 male subjects, are presented in Table I.

Table 1: Sociodemographic characteristics of the 285 participants by sex

	Male n (%)	Female n (%)	Total n (%)	P value
Age group (years)				
< 25	7 (4,5)	1 (0,8)	8 (2,8)	0,147
25 – 34	14 (9)	17 (13,2)	31 (10,9)	
35 – 44	30 (19,2)	26 (20,2)	56 (19,6)	
45 – 54	41 (26,3)	29 (22,5)	70 (24,6)	
55 – 64	41 (26,3)	26 (20,2)	67 (23,5)	
65 – 74	16 (10,3)	20 (15,5)	36 (12,6)	
> 75	7 (4,5)	10 (7,8)	17 (6)	
Level of study				
Primary	12 (7,7)	27 (20,9)	39 (13,7)	0
Secondary	37 (23,7)	42 (32,6)	79 (27,7)	
Graduation	28 (17,9)	34 (26,4)	62 (21,8)	
Licence	79 (50,6)	26 (20,2)	105 (36,8)	
Civil status				
Single	18 (11,5)	14 (10,9)	32 (11,2)	0
Divorced	2 (1,3)	2 (1,6)	4 (1,4)	
Maried	133 (85,3)	93 (72,1)	226 (79,3)	
Widower (Widow)	3 (1,9)	20 (15,5)	23 (8,1)	

It appears from this table I that the majority of our patients were between 35 and 75 years old, most of whom are licensed and married with a statistically significant association

Table 2: clinical and anthropometric characteristics of participants by gender

	Male		Female		p
	n	Average standard deviation	n	Average standard deviation	
Weight (kg)	155	84 (±16)	125	85 (±17)	0,468
Size(m)	150	1,72 (±0,07)	121	1,63 (±0,07)	0
Body mass index (kg/m²)	154	29,8 (±5)	117	29,9 (±6,6)	0,875
Waist size (cm)	148	89 (±13)	118	91 (±12)	0,23
SBP (mm Hg)	146	140 (±22)	123	148 (±27)	0,012
DBP (mm Hg)	146	86 (±15)	123	89 (±16)	0,215
Blood glucose (mg/dl)	151	122 (±61)	127	141 (±81)	0,036
Total Cholestérol (mg/dl)	154	176 (±47)	126	192 (±48)	0,007
LDLc (mg/dl)	154	114 (±74)	126	118 (±37)	0,608
HDLc (mg/dl)	154	57 (±44)	126	59 (±21)	0,594

Triglycerides (mg/dl)	153	145 (±85)	125	121 (±72)	0,016

SBP, systolic blood pressure. DBP, diastolic blood pressure. LDLc, low density lipoprotein cholesterol. HDLc, high density lipoprotein cholesterol. The average BMI was 29.8, abdominal obesity found in women and whose blood pressure and glycemia were elevated in our study participants 3.2 Characteristics of subjects with metabolic syndrome Subjects with MS were among the number of 82.

Table 3: Sociodemographic characteristics of 82 subjects with SM according to sex

	YesN= 82 (%)	**NoN= 203 (%)**	**TotalN= 285 (%)**	**p-value**	**RP (IC 95%)**
Sex					
Male	26 (31,7)	130 (64)	156 54,7)	0	0,38 (0,26-0,57)
Female	56 (68,3)	73 (36)	129 (45,3)		
Age average, years (standard deviation)	54 ± 14	50 ± 14		0,055	
Age group (years)					
<25	2 (2,4)	6 (3)	8 (2,8)	0,328	
25-34	6 (7,3)	25 (12,3)	31 (10,9)		
35-44	12 (14,6)	44 (21,7)	56 (19,6)		
45-54	24 (29,3)	46 (22,7)	70 (24,6)		
55-64	18 (22)	49 (24,1)	67 (23,5)		
65-74	15 (18,3)	21 (10,3)	36 (12,6)		
≥75	5 (6,1)	12 (5,9)	17 (6)		
Study Level (%)					
Primary	16 (19,5)	23 (11,3)	39 (13,7)	0,293	
Secondary	23 (28)	56 (27,6)	79 (27,7)		
Graduation	15 (18,3)	47 (23,2)	62 (21,8)		
Licensee	28 (34,1)	77 (37,9)	105 (36,8)		
Civil -Status, n(%)					
Single	5 (6,1)	27 (13,3)	32 (11,2)	0,172	
Divorced	2 (2,4)	2 (1)	4 (1,4)		
Maried	66 (80,5)	160 (78,8)	226 (79,3)		
Widower(Widow)	9 (11)	14 (6,9)	23 (8,1)		
Profession, n(%)					
Unemployed	8 (9,8)	31 (15,3)	39 (13,7)	0,035	
Student or pupil	2 (2,4)	5 (2,5)	7 (2,5)		
Liberal	16 (19,5)	57 (28,1)	73 (25,6)		
Household	23 (28)	26 (12,8)	49 (17,2)		

Worker	33 (40,2)	84 (41,4)	117 (41,1)		

The average age was 54 ± 14 years, the men were younger (50.45 ± 14 years) than the women (52.02 ± 14 years). The prevalence of MS increases with age up to 50 years and then decreases. There was a statistically significant difference between the two groups (male and female) in terms of occupation (p=0.035)

Table 4: Characteristics of SM components

	YesN= 82 (%)	NoN= 203 (%)	TotalN= 285 (%)	p-value	RP (IC 95%)
Blood glucose ≥ 100mg/dl					
Yes	61 (75,3)	95 (48,2)	156 (56,1)	0,000	2,39 (1,53 - 3,73)
No	20 (24,7)	102 (51,8)	122 (43,9)		
Triglycerides ≥ 150mg/dl					
Yes	35 (44,3)	51 (25,6)	86 (30,9)	0,004	1,78 (1,23 - 2,56)
No	44 (55,7)	148 (74,4)	192 (69,1)		
HDL < 40 mg/dl (Male) or < 50 mg/dl (Female)					
Yes	34 (42)	39 (19,6)	73 (26,1)	0,000	2,05 (1,44 - 2,92)
No	47 (58)	160 (80,4)	207 (73,9)		
Waist Size ≥ 94 cm (Male) or ≥ 80cm (Female)					
Yes	82 (100)	62 (33,7)	144 (54,1)	0,000	
No	0 (0)	122 (66,3)	122 (45,9)		
High Blood pressure					
Yes	66 (82,5)	85 (45)	151 (56,1)	0,000	3,68 (2,18 - 6,22)
No	14 (17,5)	104 (55)	118 (43,9)		

The most predominant components in our participants were abdominal obesity, elevated blood pressure and hyperglycemia, while the least prevalent were low HDL cholesterol and elevated triglycerides. The most common component of MS in male participants was hyperglycemia (57.6%), and in females increased TT (82.2%). There was a statistically significant difference in all components of MS, participants with MS had the same age 54(±14); the prevalence increasing with age up to 50 years and then decrease. There is a statistically significant difference in the mean values of high BP, blood glucose, triglycerides, low HDL and TT between those with and without SM all a p<0.001 except for triglyceride p=0.004, There was a significant difference between the two groups in terms of waist circumference (T-T) with higher values in women Ce during triglycerides and low Hdl cholesterol levels were decreased in men. The results suggest that elevated BP is the best predictor of MS in participants in our study.

Discussion

In this study, we assessed the prevalence of MS and its components, using the IDF Global Definition of MS (14). According to status, participants with MS and those without MS had the same age 54 years ± 14; compared to the study by Kebba et al (Gambia) 50.89 ± 12.54 with metabolic syndrome versus 41.87 ± 15.81 without metabolic syndrome the prevalence increasing with age up to 50 years, then decreasing, this result is similar to those of several studies [15,16]. Age-dependence of MS has been observed in most populations, indicating its role as a risk factor [17].

The overall prevalence of SM in our study was 28.8%, with a significant female predominance (women: 43.4%; men: 16.7%), this prevalence is almost similar to that

reported by Wiliane JT et al. [16] 32.45% (women: 46.11%; men: 14.01%), our prevalence is lower than that found by Kebba et al (Gambia) 54.4% but also by Nkum et al. [18] 42 % ,The very high prevalence in our patients and the large increase in prevalence compared to that of the study conducted 21 years ago, although published in 2015(18) could be attributed to the exponential increase over the years . The female predominance (women: 43.4%; men: 16.7%) in the prevalence of SM found in our study is similar to the conclusions of Nkum et al. [18] and several other studies [15,16,19]. The high prevalence in women could also be attributed to the high level of abdominal obesity, 82.2% of our participants had abdominal obesity compared to 31.8% for men. Ogbera [15] reported a prevalence of MS 86% using the harmonized definition among diabetic patients in Lagos, Nigeria. This high prevalence in a diabetic population is expected given the known association between MS and an increased risk of developing type 2 diabetes [20].

The components of SM vary in their rates of occurrence, the most frequent components in our study were central obesity, high blood pressure and hyperglycemia with respectively (54.1%; 56.1% and 56.1 %), this is almost similar to the most prevalent component reported by Nkum et al [18] which was elevated BP found in 72.4% of their participants, followed by abdominal obesity. omuse et al [21] also found abdominal obesity to be the most prevalent component in their study participants, with abdominal obesity being the most prevalent component not surprisingly given that it has been suggested that it is the cardinal characteristic and that it plays a central role in the development of MS and seems to precede the appearance of the other components [22,23]. Kebba et al [24]; Wiliane et al [16] also found abdominal obesity as the most prevalent component. Excessive accumulation of adipose tissue, particularly visceral fat, contributes to the development of insulin resistance, central to the pathogenesis of MS, resulting in symptoms characteristic of MS, including: diabetes mellitus type 2, dyslipidemia and hypertension [25.26]. The most common component of MS in our male participants was elevated blood glucose (57.6%), and in females increased TT (abdominal obesity) (82.2%). Nkum et al [18] also found that central obesity was the most common component among their participants at 89.9%, implying the importance of this component in Lubumbashi especially among women. MS increases the risk of morbidity from cardiovascular disease and diabetes mellitus type 2(2,8). It could be said that this is the first study mainly designed to investigate SM in Lubumbashi, our study providing more recent data on MS compared to study conducted in Kinshasa by Longo mbenza et al [13] on MS. MS in type diabetics, this study may help contributed to awareness and prevention of MS.

Conclusion

Our study reveals a very high prevalence of MS among the participants, and a significant female predominance. Central obesity and increased BP and fasting blood glucose were the most common among our participants. The results also suggest that hypertriglyceridemia is the strongest predictor of MS in our study participants. Our findings highlight the need for prevention strategies of SM and its components in Lubumbashi. It is therefore important to establish preventive measures to have a healthy lifestyle, especially for women.

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