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Prevalence of Metabolic Syndrome In Obese Patients Treated in an Internal Medicine Practice in Settat, Morocco.

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Abstract:

Context:

Metabolic syndrome associates, in the same individual, several clinical and biological anomalies predisposing to cardiovascular risk and type 2 diabetes. Obesity exacerbates many of these characteristics.

Aims:

This study aimed to determine the prevalence of metabolic syndrome and its determinants in obese patients

Subjects and methods

This prospective study included 1459 obese patients treated from June 2009 to December 2023, at the Internal Medicine practice in Settat. metabolic syndrome was diagnosed according to the criteria NCEP ATP III (2002) and Consensus IDF and AHA / NHLBI (2009). criteria of the

Statistical analysis used:

The statistical analysis was carried out using SPSS software. Please mention the specific statistical tests used.

In the methodology I have detailed the statistical analysis. The summary should not be too long.

Results: please summarize the key findings more concisely.

The 1459 patients were aged 54.1 ± 11.2 years (30 to 90 years). The prevalence of metabolic syndrome was 60.3% according to NCEP III (2002) and 60.8% according to the Consensus (2009).Key criteria included high waist circumference (92.9% and 95.3%), blood pressure ≥ 130/85 mm Hg (70.8%), low HDL cholesterol (46.4%), a high triglyceride level (34.3%) and a blood sugar level ≥ 1.1 g / l or ≥ 1.0 g / l (32.1% and 35.6%).

The agreement between the two definitions was almost perfect. The prevalence was significantly higher in the elderly, diabetics and hypertensive patients. It was higher in grade 2 obesity (p = 0.001).

Conclusions:

The high prevalence of metabolic syndrome in this study suggests an increasing risk of cardiovascular morbidity and mortality. Systematic screaning and early intervention focusing on nutritional and physical activity modifications are essential

Key-words: Diabetes mellitus, metabolic syndrome, obesity, Settat, Morocco

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Introduction:

Obesity is a public health problem. Its global prevalence was 2.8% in 2000, it would reach 4.4% in 2030.[1] In Morocco, a country in the midst of an epidemiological transition, this real epidemic in 2000 affected 6.6% of the population.[2] The Steps survey carried out by the Ministry of Health in collaboration with the World Health Organization (WHO) between 2017 and 2018 on the common risk factors for non-communicable diseases observed alarming figures. Obesity was detected in 20% (18.9-21.1) of respondents, three times more frequently in women 29% (27.4-30.6) compared to men 11% (9.5- 12.6).[3]

In a meta-analysis, it was shown that overweight and obesity were associated with an incidence of several comorbidities including type 2 diabetes, some cancers and cardiovascular disease.[4]

The metabolic syndrome (Met-Syn) constitutes an entity which groups together, in the same patient, several clinical and biological anomalies: abdominal obesity, hypertriglyceridemia, drop in HDL-cholesterol (HDL-c), hyperglycemia and hypertension. It predisposes to cardiovascular risk and type 2 diabetes. It multiplies by three to four the cardiovascular risk[5] and by ten the risk of type 2 diabetes.[6,7]

Definitions of Met-Syn differ from one health organization to another. The first definition is that of the WHO in 1999.[8] Then other definitions were suggested, in particular those (i) of the National Cholesterol Education Program Adult Treatment Panel III (2001),[9] (ii) of the American Association of Clinical Endocrinology (2003),[10] (iii) from the American Heart Association / National Heart, Lung, and Blood Institute (AHA / NHLBI) (2004),[11] (iv) from the International Diabetes Federation (IDF) (2005)[12] and finally (v) of the Consensus definition in corporating IDF and AHA / NHLBI definitions (2009).[13]

Its prevalence varies according to definitions, countries and ethnic groups.[9,13] It is growing worldwide, mainly due to the spread of obesity and the sedentary lifestyle.

Explicitly mention any gaps in the existing literature that your study aims to address. This will further justify the need for your research.

Aims:

The aim of this study was to determine the prevalence of Met-Syn ~~Mt~~ and its determinants in obese patients of liberal internal medicine in the city of Settat.

Subjects and Methods:

Ensure that the terminology used is consistent throughout the section. For example, "Met-Syn" should be consistently used if it is the chosen abbreviation for metabolic syndrome.

It was a prospective, transverse monocentric study describing all obese patients consulting the internal medicine practice from June 2009 to December 2023. All patients had systematically undergone a history and a detailed clinical examination with measurement of anthropometric parameters (weight, height and waist circumference (WC)) and blood pressure (BP) and a laboratory investigation (blood sugar, total cholesterol, HDL-cholesterol (HDL-c), LDL-cholesterol and triglycerides). The lipid profile was not systematically carried out. We therefore report the results of 1459 overweight patients who have a complete lipid balance.

The diagnosis of Met-Syn was retained according to the definition of the National Cholesterol Education Program Adult Treatment Panel III [9] and according to the definition of the Consensus IDF and AHA / NHLBI (2009) [13] (Table 1).

Table 1 Criteria used for the diagnosis of metabolic syndrome in this study: definitions from the National Education Cholesterol Education Program-III (ATP-III)[9] and the Consensus IDF and AHA / NHLBI (2009) [13]

		NCEP ATP-III [9]	**Consensus IDF et AHA/NHLBI (2009)** [13]
		Presence of 3 or more of the following components	
Waist circumference	Females	≥ 88 cm	≥ 80 cm
	Males	≥ 102 cm	≥ 94 cm
Serum triglycerides		≥ 150 mg/dl or on treatment	
HDL-cholesterol	Females	< 50 mg/dL or on treatment	
	Males	< 40 mg/dL or on treatment	
Blood pressure		≥130/85 mmHg or anti hypertensive medication use	
Fasting blood sugar		≥110 mg/dL fasting or on treatment	≥100 mg/dL fasting or on treatment

Hypertension was defined according to the recommendations of the European Society of Arterial Hypertension (ESH) and the European Society of Cardiology (ESC) of 2013.[14]

The definition used for diabetes was that of the American Diabetes Association of 1997 (blood sugar> 1.26 g/l and / or anti-diabetic medication).[15]

The trophic state was assessed according to the WHO classification of the body mass index:[16] Leanness <18.5 kg/m²; normal between 18.5 and 25; overweight between 25 and

29 and obesity above 30. Obesity was itself classified as grade one (between 30 and 34.9 kg/m²), grade to (between 35 and 39.9 kg/m²) and grade three (≥40 kg/m²).[17]

A wide WC was defined by a WC ≥ 102 cm in men or ≥ 88 cm in women, a narrow WC by a WC ≥ 102 cm in men or ≥ 88 cm in women. The hypertriglyceridemic waist size has been defined in humans by the combination of a WC ≥ 90 cm and a triglyceride level ≥ 1.80 mg/d.[18]

Statistical analysis

To compare the frequencies of the various qualitative variables studied, namely sex, age groups, trophic state and constituents of Met-Syn, we used the Pearson χ2 test. The averages were compared with the ANOVA test. The statistical significance threshold was set at 5% (p <0.05). To assess the level of concordance or agreement between the two definitions of Met-Syn ~~Met~~, we calculated the kappa (κ) statistic. One way to interpret kappa is with this scale: κ< 0: No agreement; κ between 0.00 and 0.20: Slight agreement; κ between 0.21 and 0.40: Fair agreement; κ between 0.41 and 0.60: Moderate agreement; κbetween 0.61 and 0.80: Substantial agreement; κ between 0.81 and 1.00: Almost perfect agreement. [19] The process was performed using SPSS software, version 20.

Include a brief mention of ethical considerations, such as approval from an ethics committee and informed consent from participants.

Results:

Before going any further in presenting the results, please provide a brief summary of the key findings to give readers a quick overview

Patient characteristics

These were 1459 obese patients, 271 men (18.6%) and 1188 women (81.4%). They were 54.1 ±11.2 years old with extremes of 30 to 90 years. Ten percent (9.5%) were under the age of 40 and 10.7% were aged 70 and over. 70.4% of patients had grade one obesity and 8.2% grade three obesity. 28.6% of patients were diabetic, 28.9% were known to be hypertensive (Table 2).

Determinants of metabolic syndrome

The Met-Syn criteria in descending order were: abdominal obesity observed in 92.9% (wide WC) and 95.3% (narrow WC) of patients. BP ≥ 130/85 mm Hg was observed in 70.8% of patients. Low HDL-c was observed in 46.4% of patients. A triglyceride level ≥ 1.5 g/l in 34.3% of patients. Blood glucose ≥ 1.1 g/l in 32.1% and blood sugar ≥ 1.0 g/l in 35.6% of patients (Table 2).

Effect of gender

From a gender perspective, women had significantly more hypo HDL (p = 0.028) and increased waist circumference (p = 0.000). While men had significantly more BP ≥ 130/85

mm Hg (p = 0.009); more hypertriglyceridemia (p = 0.000) and more FBS ≥ 110 g/dl (p = 0.000)

Women had significantly more low HDL-c (p = 0.028) and abdominal obesity (WC ≥ 88 cm) (p = 0.000). Whereas men had significantly higher BP ≥ 130/85 mm Hg (p = 0.009) and a triglyceride level ≥ 1.5 g/l (p = 0.000) (Table 2).

Gynoid obesity was observed in 7.6% (NCEP) and 4.7% (Consensus) of patients. This was observed significantly more in men for a wide WC and a narrow WC (p = 0.000 and p = 0.072).

Effect of age

There was no significant difference in the average age of patients by gender and degree of obesity. Diabetics and hypertensives were significantly older (p = 0.000 and p = 0.000). Patients with high blood sugar or with BP ≥ 130/85 mm Hg were significantly older (p = 0.000 and p = 0.000). The other diagnostic criteria were not significantly influenced by age (Table 2).

Android obesity defined by a narrow increased WC is not significantly influenced by age (p = 0.107) whereas with a wide narrow WC it is significantly higher in young (p = 0000.

Table 2 Demographic, clinical and biological characteristics of the 1459 obese patients by sex and by age averages, Settat, Morocco

		Gender breakdown			Age	
	All subjects N° (%)	Females N° (%)	Males N° (%)	Khi² de Pearson	Mean ± SD	Anova
Age (years)	54.1 ± 11.2	54.1 ± 10.9	54.4 ± 12.3			0.689
Age groups						
30 - 39	138 (9.5%)	(105 (8.8%)	33 (23.9%)	0.197		
40 - 49	353 (24.2%)	287 (24.2%)	66 (24.4%)			
50 - 59	511 (35.0%)	430 (36.2%)	81 (29.9%)			
60 - 69	323 (22.1%)	261 (22.0%)	62 (22.9%)			
70 and older	29 (10.7%)	105 (8.8%)	134 (9.2%)			
Total	1459	1188 (81.4%)	271 (18.6%)			
Obesity grades						
Grade 1	1027 (70.4%)	796 (67.0%)	231 (85.2%)	0.009	53.9 ± 11.2	0.471
Grade 2	313 (21.5%)	283 (23.8%)	30 (11.1%)		54.2 ±10.9	
Grade 3	119 (8.2%)	109 (9.2%)	10 (3.7%)		55.3 ±11.6	
Clinical-biological criteria for metabolic syndrome						
Elevated BP	1033 (70.8%)	823 (69.3%)	210 (77.5%)	0.009	55.9 ± 10.8	0.000
Treatment HTA	422 (28.9%)	352 (29.6%)	70 (25.8%)	0.242	59.9 ± 10.4	0.000

HDL-c Low	677 (46.4%)	568 (47.8%)	109 (40.2%)	0.028	53.1 ± 11.0	0.001
Triglycerides high	501 (34.3%)	365 (30.7%)	136 (50.2%)	0.000	54.5 ± 11.7	0.388
Increased WC	1356 (92.9%)	1133 (95.4%)	223 (82.3%)	0.000	54.0 ± 11.1	0.107
WC narrow	1390 (95.3%)	1138 (95.8%)	252 (93.0%)	0.072	53.9 ± 11.1	0.000
FBS ≥ 110 g/dl	468 (32.1%)	355 (29.9%)	113 (41.7%)	0.000	56.9 ± 11.4	0.000
FBS ≥ 100 g/dl	520 (35.6%)	401 (33.8%)	119 (43.9%)	0.002	56.4 ± 11.6	0.000
Comorbidities						
Diabetes mellitus	418 (28.6%	312 (26.3%	106 (39.1%	0.000	57.6 ± 11.3	0.000
High blood pressure	422 (28.9%	352 (29.6%	70 (25.8%	0.242	60.0 ± 10.2	0.000

WC large: WC ≥ 102 cm in men and ≥ 88 cm in women

WC narrow: WC ≥ 94 cm in men and ≥ 80 cm in women

Abbreviations: BP, Blood pressure. FBS, Fasting blood sugar. HDL, high-density lipoprotein. WC, waist circumference.

Number of criteria

With the 2 definitions nearly 28.2% and 29.3% of the patients had 2 criteria. So they were at risk of Met-Syn. Almost 5% had a complete picture with 5 criteria (Table 3).

Table 3 Distribution of the 1459 obese patients according to the number of diagnostic criteria NCEP-ATP III and Consensus IDF and AHA / NHLBI (2009), Settat, Morocco

N° of criteria	**NCEP ATP-III** [9]				**Consensus IDF et AHA/NHLBI (2009)** [13]			
	All subjects n (%)	Males n (%)	Females n (%)	P	All subjects n (%)	Males n (%)	Females n (%)	P
0	8 (0.5%)	3 (0.3%)	5 (1.8%)	0.019	5 (0.3%)	3 (0.3%)	2 (0.7%)	0.003
1	160 (11.0%)	132 (11.1%)	28 (10.3%)		139 (9.5%)	120 (10.1%)	19 (7.0%)	
2	411 (28.2%)	354 (29.8%)	57 (21.0%)		427 (29.3%)	364 (30.6%)	63 (23.2%)	
3	494 (33.9%)	407 (34.3%)	87 (32.1%)		455 (31.2%)	377 (31.7%)	78 (28.8%)	
4	316 (21.7%)	239 (20.1%)	77 (28.4%)		357 (24.5%)	265 (22.3%)	92 (33.9%)	
5	70 (4.8%)	53 (4.5%)	17 (6.3%)		76 (5.2%)	59 (5.0%)	17 (6.3%)	
3 or more	880 (60.3%)	699 (58.8%)	181 (66.8%)		887 (60,.8%)	700 (58.9%)	187 (69.0%)	

Prevalence

The prevalence of Met-Syn in the study population was 60.3% and 60.8%, respectively, with the NCEP and Consensus definition. They were significantly higher in men (p = 0.019 and p = 0.003), in patients aged 60 and over (p = 0.000) and in grade two obese (p = 0.000) (table 4).

The average ages of patients with Met-Syn were significantly higher with the definition of NCEP and Consensus of 55.4 ± 11.4 years (p = 0.000) and 55.3 ± 11.4 years, respectively (p = 0.000) (Table 4).

The prevalence had increased regularly and significantly with age groups. Thus for NCEP it had gone from 50% in the under 40s to 73.9% in the 70s and over (p = 0.000). The same observation for the criteria of the Consensus, the prevalence had gone from 50% in the under 40s to 73.9 % in the 70s and over (p = 0.000).

Among diabetics, the prevalence was 93.1% according to the two definitions (p = 0.000). In known hypertensives the prevalences were respectively equal to 79.1% and 79.6% (p = 0.000) (Table 4).

The highest prevalences were recorded in hypertriglyceridemics (90.6%) hyperglycemic, low HDL-c, and known hypertensives or those with high BP figures. With both definitions, patients who had grade to obesity also had the highest prevalence of Met-Syn (p = 0.001 and p = 0.001) (Table 4).

Table 4 Average age and prevalence of the metabolic syndrome and its components according to the 2 definitions used in the 1459 obese patients, Settat, Morocco

	NCEP ATP-III [9]		**Consensus IDF et AHA/NHLBI (2009)** [13]	
Age (Mean ± SD) (Anova)				
Age (years)	55.4 ± 11.4 (p = 0.000)		55.3 ± 11.4 (p = 0.000)	
	Number (%)	Khi² de Pearson	Number (%)	Khi² de Pearson
All patients: 1459	880 (60.3%)		887 (60.8%)	
Gender				
Females: 1188	699 (58.8%)	0.019	700 (58.9%)	0.003
Males: 271	181 (66.8%)		187 (69.0%)	
Age groups				
35 à 39 years: 138	73 (52.9%)	0.000	73 (52.9%)	0.000
40 à 49 years: 353	190 (53.8%)		194 (55.0%)	
50 à 59 years: 511	302 (59.1%)		305 (59.7%)	
60 à 69 years: 323	216 (66.9%)		216 (66.9%)	
70 and older: 134	99 (73.9%)		99 (73.9%)	

Obesity grades				
Grade 1: 1027	595 (57.9%)	0.001	601 (58.5%)	0.001
Grade 2: 313	218 (69.6%)		218 (69.6%)	
Grade 3: 119	67 (56.3%)		68 (57.1%)	
Clinical-biological criteria for metabolic syndrome				
Elevated BP: 1033	753 (72.9%)	0.000	760 (73.6%)	0.000
Anti hypertensive medication: 422	334 (79.1%)	0.000	336 (79.6%)	0.000
HDL-c low: 677	568 (83.9%)	0.000	570 (84.2%)	0.000
Triglycerides high: 501	454 (90.6%)	0.000	456 (91.0%)	0.000
FBS ≥ 110 g/dl: 468	436 (93.2%)	0.000	439 (93.8%)	0.000
FBS ≥ 100 g/dl: 520	477 (91.7%)	0.000	480 (92.3%)	0.000
Increased WC:1356	853 (62.9%)	0.000	853 (62.9%)	0.000
WC narrow: 1390	863 (62.1%)	0.000	870 (62.6%)	0.000
Pathologies				
Diabetes mellitus: 418	389 (93.1%)	0.000	392 (93.8%)	0.000
High blood pressure: 422	334 (79.1%)	0.000	336 (79.6%)	0.000

Abbreviations: BP, Blood pressure. FBS, Fasting blood sugar. HDL, high-density lipoprotein. WC, waist circumference.

According to the NCEP criteria 7.6% of the patients had gynoid obesity and 92.4% an android obesity, with the Consensus criteria the figures were respectively 4.7% and 95.3% (Table 2). According to the 2 definitions, the prevalences were significantly higher in patients who had android obesity (p = 0.000)

The overall agreement between the 2 definitions is almost perfect for all the variables analyzed. The same is true when the analysis is carried out in diabetic and non-diabetic subpopulations (κ between 0.81 and 1.00: almost perfect agreement) (Table 5)

Table 5 Kappa values between different criteria of the tow definitions of metabolic syndrome

	NCEP ATP-III [9] versus Consensus IDF et AHA/NHLBI (2009) [13]		
	All patients	Diabetics	No-diabetics
All	0.956	1.000	0.941
Men	0.951	1.000	0.932
Women	0.957	1.000	0.943
Age groups			
35 - 39 years	1.000	1.000	1.000
40 - 49 years	0.923	1.000	0.906
50 - 59 years	0.965	1.000	0.952
60 - 69 years	0.971	1.000	0.958
70 and older	0.916	*	0.888

Obesity grades			
Grade 1	0.961	1.000	0.947
Grade 2	0.929	1.000	0.912
Grade 3	0.966	1.000	0.957
Pathologies			
Diabetes mellitus	1.000	--	--
High blood pressure	0.961	1.000	0.951

Note:

*. No statistics are calculated because NCEP ATP-III and Consensus IDF and AHA / NHLBI (2009) are constants

Discussion:

At the beginning of the discussion, provide a brief summary of the key findings to give readers a quick overview.

The difference between the definitions of Met-Syn (Table 1) focuses on abdominal obesity and hyperglycemia. With a wide WC (≥ 88 cm in women and 102 cm for men) for the NCEP / ATPIII-2001, [9] the AACE-2003 [10] and the AHA / NHLBI-2004 [11] versus a WC narrow (≥ 80 cm in women 94 for men) for the criteria of IDF-2005 [12] and Consensus IDF and AHA / NHLBI-2009. [13] With a blood sugar level ≥ 1.1 g/l for NCEP / ATPIII-2001, [9] AACE-2003[10] and AHA / NHLBI-2004 [11] versus a blood sugar level ≥ 1.0 g/l for the criteria of IDF-2005 [12] and of the Consensus IDF and AHA / NHLBI-2009. [13] So prevalence will be higher when using a narrow WC and / or lower blood sugar. It should also be noted that in the definition of IDF-2005 [12] abdominal obesity was a major criterion and that the WHO definition [8] took obesity into account (BMI ≥ 30 kg/m2) and / or a WC on hip measurement> 0.9 in men and> 0.85 in women.

As for the BP figures, all definitions use figures ≥ 130/85 mm Hg. So patients who have a BP between ≥ 130/85 mm Hg and <140/90 actually have a high normal BP according to the ESH and ESC. [14] The situation would be more homogeneous if we retain the new definition of Americans (ACC / AHA 2017), [20] with HTA stage 1 when the figures are between 130/80 and 139/89 mm Hg. Furthermore, the Americans do not recommend drug treatment, for stage 1 patients, as secondary prevention, in case of clinical cardiovascular disease and primary prevention if the cardiovascular risk at 10 years> 10%. In this context should we treat all obese patients with BP figures between ≥ 130/85 and <140/90 mm Hg?

The components of Met-Syn pose major public health problems in the world and in Morocco. [2,3] Globally, in 2015, one in four men and one in five women were hypertensive. In Morocco in 2017, the prevalence of hypertension was 29.3%. [3] The WHO estimates that around 13% of the world's population is overweight. The prevalence of obesity more than doubled worldwide between 1980 and 2014. In Morocco, severe and morbid obesity

increased by 7.3% per year between 2001 and 2011. [21] In the 2017 survey, obesity was detected in 20% (18.9-21.1) of respondents, three times more frequently in women 29% (27.4-30.6) compared to men 11% (9.5-12.6). [3] Therefore, the prevalence of Met-Syn is also expected to increase.

In Morocco, studies on the prevalence of Met-Syn are not numerous. They are all conducted in hospital environments. Some were interested in the general population, [22,23] others in diabetics; [24,25,26] patients with rheumatoid arthritis, [27] the impact of menopause [25, 28] or obesity. [29,30] Very few reported results specific to obesity.

The study that collected the most patients is a retrospective study conducted on 820 adult patients (653 women and 167 men) consultants at the diagnostic center in Rabat, (October 2010 to May 2012). On the basis of the criteria of the new harmonized definition, it observed a prevalence of Met-Syn of 35.7%. This prevalence was higher in women (40.1% compared to only 18.5% in men) and increased with age, with a peak among people aged 50-59 years. The most common component of Met-Syn was abdominal obesity.[22]

In other countries, the prevalence of Met-Syn varies widely. Differences in genetic, socio-environmental factors, lifestyles, criteria used to define Met-Syn and the age of the study population could explain this variability. Similar prevalence to the Moroccan prevalence was observed in the United States of America [31] (38.5%) and in India [32] (33.5%). Whereas in South Africa [33] and in France [34] the figures were lower respectively (22.1% and 20%).

Among the studies that have been devoted to obese or that have reported results related to obesity, the prevalence observed in our series (60.3% and 60.8%) is slightly lower than that observed in Marrakech (67.9%) [25] and higher than in Marrakech (40%) [29] and flap (39%).[28]

In our study we observed that the prevalence was higher in men but not significantly. The opposite was observed in Rabat[28] but still without statistical significance. In the general population, the effect of gender is controversial. In South Africa women are the most affected[33] while in France the opposite is observed.[34]

In our study the prevalence was significantly higher in the elderly. The same observation was made in Rabat. [28]

There are two models of obesity, central or abdominal obesity (android) and gluteo-femoral obesity or (gynoid obesity). Abdominal obesity is a cardiovascular risk factor independent of overall obesity.[35] It is associated with a high risk of diabetes, hyperglycemia, increased small and dense LDL fraction, high blood pressure and cardiovascular disease. [35] In our study, central obesity was the most important determinant with a prevalence of 95.3%), for a narrow WC and 94.0% for a wide WC. This is also the case in the Motalib study (99.17%).[29] Abdominal obesity was also predominant (1st or 2nd factor) in non-obese studies. Thus, in the general population, it was the second determinant, [22] similarly among diabetics.[22]

A high triglyceride level was more frequently observed in our series compared to Berdi[28] (34.3% against only 23.3%).

The atherogenic metabolic triad is a non-traditional cardiovascular risk factor for abdominal obesity. It combines an increase in triglycerides, a decrease in HDL-c and an increase in the fraction of small and dense LDL.[36] According to the Quebec Cardiovascular Study team, the atherogenic metabolic triad combines an elevation of fasting insulinemia and apolipoprotein B and an excess of the fraction of small and dense LDL. All of these abnormalities contribute to the increased cardiometabolic risk caused by excess visceral adipose tissue. The Quebec team found that these anomalies frequently encountered in men with visceral obesity were associated with a 20-fold higher risk of coronary artery disease compared to uninjured subjects. Therefore it suggested a simple and inexpensive algorithm capable of being used in clinical routine. It proposed the term hypertriglyceridemic waist which combines WC ≥ 90 cm and triglyceride levels ≥ 2.00 mmol/l (≥ 180 mg/dl). This makes it possible to screen patients threatened by the atherogenic triad. They found that 80% of men with hypertriglyceridemic WC are carriers of the atherogenic metabolic triad and therefore have a very high risk of developing coronary artery disease.[18]

In our study, of the 271 men, 68 (25%) had hypertriglyceridemic WC. And of these 68 patients 97.1% had a Met-Syn according to the NCEP and according to the consensus. In a study in Indian type 2 diabetics the percentage of hypertriglyceridemic WC was 50%.[37]

The Met-Syn predisposes to a prothrombotic and pro-inflammatory state. This leads some to discuss the use of a low dose of aspirin in primary prevention and for others the addition of inflammatory parameters in the diagnosis of Met-Syn.[38]

Moreover, it is obvious that the fact that diabetes, hypertension and obesity are parameters that are themselves part of the definition of SM, the prevalence of SM will be higher in patients with these pathologies.

The management of obese, overweight or abdominal obesity patients revolves essentially around the progressive and realistic reduction of weight by a rebalancing of food and adequate physical activity. Weight loss in the range of 5-10% over a period of 6-12 months with a balanced diet of 55% carbohydrates, 30% fat and 15% protein. Intakes of saturated fat should be reduced (not more than 10%) and trans fatty acids (less than 1%). Dietary fiber intake must be maintained (20 to 35 g/day). Physical activity begins with a relentless fight against sedentary lifestyle. It must be regular, adapted and progressive. It consists of a daily minimum of 30 minutes at moderate to high intensity, combining resistance and endurance exercises. Thus, physical activity, associated with food rebalancing, have a definite impact on the reduction of WC, the decrease in blood sugar, insulin resistance, triglycerides and BP and the increase in HDL-c levels.[39] This approach has enabled Zeber et al[40] to reduce the risk of cardiovascular events from 39 to 44%.

Please include a brief discussion of the study's limitations, such as the lack of a systematic lipid profile for all patients and any biases in the study population.

Suggest areas for future research, such as longitudinal studies to track the progression of Met-Syn and the effectiveness of different intervention strategies.

Limitations of the study:

The main limitations of this study are the failure to consider the dietary survey and the assessment of both subjective and objective physical activity, the cross-sectional design and the over-representation of women. This last element is related to the patients consulting in Internal Medicine who are in the majority of cases women.

Outlook:

Monitoring this cohort of obese patients will allow us to assess the evolution of the overall prevalence of metabolic syndrome and especially its determinants, including type 2 diabetes, dyslipidemia and hypertension. It will also allow us to assess the impact of a balanced low-calorie diet combined with appropriate physical activity.

Conclusion

The obese are patients at high cardiovascular risk and type 2 diabetes even more if they have a metabolic syndrome. The high prevalence in this study among the obese is likely to increase in the coming years.

The prevention of this syndrome is therefore a major public health issue. Metabolic syndrome is both a threat and inopportunity to identify people at risk and to implement prevention strategies by acting early on its various parameters. The measurement of WC should be systematic in all patients and particularly if they are obese. The beneficial effect of diet and diet measures on diabetes and obesity is well documented. However, their impact on cardiovascular complications is not yet formally proven. Monitoring this cohort will help address this problem.

Taking care of each of the elements of this syndrome remains the most relevant solution, emphasizing nutritional factors and healthy living. However, the management of this syndrome raises several problems at the individual and collective levels. Systematic screening for the obese should be considered.

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