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Comparison of the Different Definition Criteria for the Diagnosis of the Metabolic Syndrome in Elderly Women

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Abstract

Background: The criteria for best defining the metabolic syndrome (MS), especially in the elderly population, are still little known, and the understanding is increasingly necessary.

Objective: Compare the four MS definition proposals, two official ones (National Cholesterol Education Program's Adult Treatment Panel III/NCEP-ATPIII and International Diabetes Federation/IDF) and two proposed definitions (Metabolic Syndrome-National Cholesterol Education Program's Adult Treatment Panel III - modified/MS-ATPM and Metabolic Syndrome - International Diabetes Federation - modified/MS-IDFM), derived from the changes in the official criteria.

Methods: A total of 113 women (60-83 years old) participated in this study; they were submitted to anthropometric, blood pressure, lipid profile, fasting glycemia tests and answered questions related to life style habits and health conditions. Statistical analyses were performed using the chi-square test and Kappa coefficient determination.

Results: The frequency of the high pressure levels was similar in the two official definitions (54.8%), with a reduction in the two proposed definitions (33.6%). The homeostasis change of the glucose was higher as per the IDF and MS-IDFM (30.1%). The hypertriglyceridemia and the low levels of HDL-c were similar in all the definitions (35.4%). In relation to the abdominal obesity, the higher occurrence was registered by the IDF criteria (88.5%). The presence of the metabolic syndrome presented higher and lower frequencies as per the IDF proposal (45.1%) and MS-IDFM (22.1%), respectively. Higher agreement was found between the modified definition MS-ATPM with NCEP-ATPIII and MS-IDFM (Kappa: 0.79 and 0.77; p < 0.00001).

Conclusion: The MS-ATPM proposal was found more adequate for the MS detection in the evaluated elderly women. (Arq Bras Cardiol 2010; 95(3): 346-353)

Key words: Metabolic syndrome; aged; risk factors; obesity, abdominal.

Introduction

The Metabolic Syndrome/(MS), considered a worldwide epidemic, is a complex disorder associated to high cardiovascular morbimortality and high socioeconomic cost. It is characterized by a group of cardiovascular risk factors, which includes abdominal obesity, high blood pressure levels, glycemic homeostasis changes and dyslipidemia[1-5]. Wang et al[4] were coherent to the above mentioned and presented evidences, by means of a longitudinal study, that the MS defined by different criteria has predicted the mortality due to cardiovascular disease in Finnish elderly people. And, in general, it is emphasized that the latter is the major mortality cause in the human senescence[6,7].

The metabolic syndrome study, however, has not been adequately explored in the 60-year old, or older, people, so the understanding of the extension of such disorder in this population segment is necessary for the national distribution of resources for medical care and research, as well as for the adequate management. It is also emphasized that the prevalence of MS in elderly people has not been defined, partly because these individuals have been traditionally under represented in large epidemiologic studies[5,8].

It has been documented that the occurrence of this clinical disorder has been incremented with the aging and varies depending on the definition, region and population[9,10]. Ford et al[11] indicate that the prevalence of MS increased 6.7% between the 20 to 29-year old adults to approximately 40% between those who are 60 years old or more in the United States, as per the Third National Health and Nutrition Examination Survey (NHANES III).

In Korea, Kim et al[12], when evaluated the prevalence of MS and its association with cardiovascular disease found that this relation was higher in older women, showing a steeper increase with the aging of this gender. This finding can be due

to the accumulation of visceral fat and due to the increase in several other cardiovascular risk factors, after the menopause[13].

Different studies performed with elderly women in Italy[5], in Germany[14], in Sweden[15], in the United States[2], in China[3] and in Taiwan[10] registered expressive and variable MS occurrence (59.8%; 24% to 46%; 33% to 58%; 39%; 39.2% to 54.1%; and 54.4%), using the criteria of National Cholesterol Education Program's Adult Treatment Panel III/NECP- ATP III; NECP - ATP III and International Diabetes Federation (IDF); NECP-ATP III and IDF; NECP-ATP III; NECP-ATP III and IDF; America Heart Association/National Heart Lung Blood Institute Definition/AHA\NHLBI, respectively.

This fact reinforces the problem related to the criteria used for the MS definition, as well as their cutoff points, which shows repercussions in the clinical practice, in addition to limit the comparability between different studies[1].

In view of all the presented aspects, the purpose of this study was to compare four proposals of MS definition, being two official (ATPIII and IDF) and two suggested ones in this study (Metabolic Syndrome - National Cholesterol Education Program's Adult Treatment Panel III modified/MS - ATPM and Metabolic Syndrome - International Diabetes Federation modified/MS-IDFM), derived from the modification of the official criteria, for identification of MS in a sample of elderly women.

Methods

Study design and case analysis

It is an observational, transversal study, performed in the Municipality of Viçosa (MG), with 113 women (age > 60) registered in Family Health Program (FHP). For the calculation of the sample size, it was used the program Epi Info, version 6.04[16], taking into consideration 2,058 as the total number of elderly women registered in all FHP of the municipality; the expected frequency for diabetes mellitus (DM) in elderly people of 12.06%[17] was adopted. The acceptable variance interval of 5% in the expected frequency estimate was adopted, as well as 95% as desired confidence level, totaling a minimum sample of 79 elderly women. To this value, 40% was added as safety margin, aiming at preventing a damage due to losses and participation denial due to, especially, the strict inclusion criteria.

For the sample selection, the inclusion criteria adopted were no previous coronary event (acute myocardial infarctation, angina pectoris, cerebral vascular accident (CVA)); no use of hypoglycemic, anti-hypertensive and/or hypolipemiant drugs, or other drugs known to interfere in the glucose homeostasis and/or blood pressure levels and/or lipids/lipid proteins.

The family records were reviewed in the health basic units and the elderly women who met the pre-established inclusion criteria were selected. Visits to their homes were performed and a nutritional visit was scheduled for those elderly women interested in participating in the study. They were oriented about a 12-hour fast for biochemical tests and not to take alcohol 72 hours (three days) before the test and to perform no physical activity in the previous 24 hours.

The data collection was performed in the Health Division's Nutrition Sector of the Federal University of Viçosa (UFV).

Lab methods

The biochemical analysis was performed in the Clinical Analysis Lab of the Health Division of UFV, in Viçosa (MG), and was consisted of fasting glycemia dosage using the glucose oxidase method, total cholesterol, HDL-c/high density lipoprotein, triglycerides (all these determined by the enzymatic colorimetric method) and LDL-c/low density lipoprotein (measured by means of the formula proposed by Friedewald et al[18]). The blood samples were collected by venous puncture, after a 12-hour fast, with disposable material, and centrifugation for 10 minutes at 3,600 rpm and dosed in the automatic analyser, with COBAS Mira Plus[â] biochemical parameters.

Sociosanitary inquiry

The volunteers underwent a structured interview to complete a questionnaire consisted of questions related to the health conditions and life style

Blood pressure

The blood pressure was measured using a mercury column sfigmomanometer, by a sole nursing technician, being the whole procedure carried out as per the officially preconized proposals[19].

Anthropometry

This evaluation included weight, height, waist perimeter (WP) data and body mass index (BMI) derived from the ratio between the weight (kg) and squared stature (m²). Lipschitz's[20] proposal was used as classification criteria.

Following procedures preconized by WHO[21], the measurements were performed by the same trained evaluator, and the elderly women were weighed by means of digital electronic scales, with 200 kg-capacity and 100g sensitivity, wearing light clothes (previously oriented), without coats and shoes. The height was obtained using a vertical stadiometer in millimeters, with 2,2 m extension and 0.1 cm scale. The waist perimeter (WP) was measured, at the umbilical level, with a flexible and non-elastic measuring tape, with 0.1 cm-precision, without compressing the tissues. During the measurement, the participant was in the orthostatic position, with the body weight equally distributed between the two feet, and the reading was performed at the end of the normal expiration.

Metabolic syndrome definitions

The official definition criteria (NCEP-ATPIII and IDF) selection adopted in this study was oriented by the fact that these are the most used ones in epidemiologic studies, due to the higher operating easiness of the obtained clinical and lab data.

Two other definitions (Metabolic Syndrome - National Cholesterol Education Program's Adult Treatment Panel III - ATP modified/MS-ATPM and Metabolic Syndrome - International Diabetes Federation - IDF modified/MS-IDFM), derived from

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the modification of the official criteria (NCEP-ATPIII and IDF), were proposed in this study, due to the distinct classifications in the criteria suggested by the scientific community. In the two modified definitions, it was considered the cutoff point of 92 cm for the waist perimeter, to classify the abdominal obesity, based on the results found in the preliminary study performed with the same elderly women sample (n=113), following the same protocol of this study, when such cutoff point was identified as the best value observed in terms of sensitivity (80.0%) and specificity (58.2%) for predicting the abnormalities characteristic of the metabolic syndrome, with under the ROC (Receiver Operating Characteristic) curve area ± standard error: 0.694 ± 0.079; confidence interval of 95%: 0.600-0.777 and p=0.015.

The elderly women considered as hypertensive were those who presented blood pressure levels [3]140/90 mmHg, as suggested by the World Health Organization (WHO)[22]. For the diagnosis of the metabolic syndrome, the definitions adopted are described in chart 1.

Total cholesterol and LDL-c were included in the analysis as they represent a global cardiovascular risk.

Data analysis

For the data analysis, the software Sigma Statisticâ for Windows[23] and Epi Info version 6.04[16] were used. The statistical significance level was of 5%. The normality of variable distribution was determined from the Kolmogorov-Smirnov test. Subsequently, central trend measures and variability were applied for the data descriptive analysis, and the categorical variables were presented in proportions.

When comparing the categorical variables, the Person's chi-square test (x^2) was used. The agreement between the different criteria used for the metabolic syndrome definition was analyzed by means of Kappa coefficient determination[24].

Ethic aspects

This study was analyzed and approved by the Ethics Committee in Research with Human Beings of Federal University of Viçosa, in Viçosa (MG). Before starting the study, all participants signed the informed consent.

Results

From the 113 elderly women, the median age was of 65 years old, and the nutritional status presented a predominant profile of eutrophy (47.8%), followed by overweight (35.4%). The general characteristics of the sample are presented in table 1. Among the cardiovascular risk worsening factors, it was remarkable the predominance of absence of regular physical exercise (70.8% n=80) and the presence of family history of blood hypertension (38.1% n=43), diabetes mellitus (23.0% n=26), dyslipidemia (15.0% n=17), angina (10.6% n=12) and circulation problems (CVA and/or infarctation and/or thrombosis) (30.9% n=35). Low education level, categorization represented by illiterate or with incomplete basic study elderly women, presented an expressive percentage (85.8% n=94). Regarding the *per capita* family income, 13.5% (n=14) presented less than ½ minimum wage, limit below which a family is defined as poor.

The inadequate blood pressure levels (table 2) were similar (54.8%) in the two official definitions (NCEP-ATPIII and IDF) and inferior (33.6%) in the two proposed definitions (MS-ATPM and MS-IDFM). The glucose homeostasis change was higher by the IDF and MS-IDFM definition, while the hypertriglyceridemia and the low HDL-c levels presented similar frequency for all definitions. Regarding the abdominal obesity, the higher occurrence was recorded by the IDF criteria (88.5%), which cutoff point is the "strictest" one among the others. The MS presence had higher and lower frequency, as per the IDF proposal (45.1%) and MS-IDFM (22.1%), respectively (tab. 2).

Higher agreement between the modified MS-ATPM definition with NCEP-ATPIII and MS–IDFM, as seen through the Kappa agreement coefficient (0.79 and 0.77 - p < 0.00001), in this order (tab. 3).

On table 4, the metabolic risk factor number is presented, as per NCEP-ATPIII and MS-ATPM definitions by age group, being found that in the modified proposal the total of unfavorable risk factors was lower, numerically, in relation to the official proposal. It was not observed any association between the age group and the number of cardiometabolic risk factors (p>0.05).

Chart 1 - Definitions and diagnostic criteria used for metabolic syndrome

	Obesity	Triglycerides (mg/dl)	HDL-c (mg/dl)	Blood pressure (mmHg)	Fasting glycemia (mg/dl)
NCEP-ATPIII[1] 3 or more criteria	PC ♀ > 88 cm	≥ 150	♀ < 50	≥ 130/85 Or use of anti-hypertensive	≥ 110
MS-ATPM (proposal) 3 or more criteria	PC ♀ ≥ 92 cm	≥ 150	♀ < 50	≥ 140/90 mmHg	≥ 110
IDF[22] WP + 2 criteria	PC* ♀ ≥ 80 cm	≥ 150	♀ < 50	≥ 130/85 Or use of anti-hypertensive	≥ 100 or previous diagnosis of diabetes type 2
MS-IDFM (proposal) WP + 2 criteria	PC ♀ ≥ 92 cm	≥ 150	♀ < 50	≥ 140/90 mmHg	≥ 100

*NCEP-ATP III - National Cholesterol Education Program - Adult Treatment Panel III; Metabolic Syndrome - National Cholesterol Education Program's Adult Treatment Panel III - ATP modified/ MS-ATPM; IDF - International Diabetes Association; Metabolic Symbol - International Diabetes Federation - IDF modified/ MS-IDFM; WP - waist perimeter. *Mandatory ethnic-specific criterium for Central America and South America, being adopted the same recommendation for the Southern Asia.*

Table 1 - General characteristics of the sample (n = 113). Viçosa (MG), 2008

Variables	n	%
Age		
60 ├ 65 years old	56	49.6
≥ 65 years old	57	50.4
BMI		
≤ 27 kg/m²	73	64.6
> 27 kg/m²	40	35.4
Tobacco		
Yes	16	14.6
No	97	85.8
Regular physical exercise		
Yes	33	29.2
No	80	70.8
Education level		
Low	97	85.8
Medium to high	16	14.2
Per capita family revenue (in minimum wage in force)		
< ½	14	13.5
≥ ½	90	86.5
Family disease history		
Blood hypertension	43	38.1
Diabetes mellitus	26	23.0
Dyslipidemias	17	15.0
Angina	12	10.6
CVA and/or infarct and/or thrombosis	35	30.9

BMI - body mass index; Minimum wage in force - R$ 415,00 n=104 (nine volunteers did not know the income of all the family members, making it impossible to calculate the per capita); CVA - cerebral vascular accident.

The number of risk factors for the metabolic syndrome differed statistically between the high WP group and the normal WP group as per the IDF definition. No statistical difference was observed in this aspect with MS-IDFM and

Table 2 - Metabolic disorders occurrence and metabolic syndrome, according to different definitions in elderly women (n = 113). Viçosa (MG), 2008

	NCEP - ATPIII[1]	IDF[2]	MS-ATPM[3]	MS-IDFM[4]
	% (n)	% (n)	% (n)	% (n)
Blood pressure	54.8 (62)	54.9 (62)	33.6 (38)	33.6 (38)
Fasting glycemia	10.6 (12)	30.1 (34)	10.6 (12)	30.1 (34)
Triglycerides	30.1 (34)	30.1 (34)	30.1 (34)	30.1 (34)
HDL-c levels	35.4 (40)	35.4 (40)	35.4 (40)	35.4 (40)
Abdominal obesity	64.6 (73)	88.5 (100)	46.9 (53)	46.9 (53)
Metabolic syndrome	30.9 (35)	45.1 (51)	23.0 (26)	22.1 (25)

[1]*: Presence of .three of five risk factors: WP > 88 cm; TG ≥ 150 mg/dl; HDL-c < 50 mg/dl; Blood pressure ≥ 130/85 mmHg; Fasting glycemia ≥ 110 mg/dl;* [2]*: WP ≥ 80 cm (mandatory criterium) + 2 additional risk factors: TG ≥ 150 mg/dl; HDL-c < 50 mg/dl; Blood pressure ≥ 130/85 mmHg; Fasting glycemia ≥ 100 mg/dl;* [3]*: Presence of three of five risk factors: WP ≥ 92 cm; TG ≥ 150 mg/dl; HDL-c < 50 mg/dl; Blood pressure ≥ 140/90 mmHg; Fasting glycemia ≥ 110 mg/dl;*[4] *WP ≥ 92 cm (mandatory criterium) + 2 additional risk factor: TG ≥ 150 mg/dl; HDL-c < 50 mg/dl; Blood pressure ≥ 140/90 mmHg; Fasting glycemia ≥ 100 mg/dl.*

between the age group and the two definition criteria for MS under analysis (tab 5).

Discussion

It is not known yet a sole criterium for the best MS classification[25], and the use of different diagnostic criteria, in turn, limits the comparison of its frequency among the populations. The multicauses, as genetic differences, age group, sex and environmental factors (as food and physical activity level), is also an element that contributes to the variability in the prevalence of this disorder[22]. Thus, the increased risk of cardiovascular disease associated with the MS can depend on the used definition[3].

The International Diabetes Federation (IDF) formulated a worldwide definition for the metabolic syndrome presented in 2005[26], having as differentials the abdominal obesity as a pre-

Table 3 - Agreement among the different definition criteria for metabolic syndrome in elderly women (n = 113). Viçosa (MG), 2008

	Kappa (p) Agreement Coefficient			
	NCEP - ATPIII[1]	IDF[2]	MS-ATPM[3]	MS-IDFM[4]
NCEP - ATPIII[1]	1	0.70(0.529-0.882)*	0.79 (0.619-0.980)*	0.64 (0.461-0.820)*
IDF[2]		1	0.53 (0.369-0.696)*	0.51 (0.352-0.674)*
MS-ATPM[3]			1	0.77 (0.588-0.956)*
MS-IDFM[4]				1

: statistically significant (p<0.00001); [1]: Presence of three of the five risk factors: WP > 88 cm; TG ≥ 150 mg/dl; HDL-c < 50mg/dl; Blood pressure ≥ 130/85 mmHg; Fasting glycemia ≥ 110 mg/dl;* [2]*: WP ≥ 80 cm (mandatory criterium) + 2 two additional risk factors: TG ≥ 150 mg/dl; HDL-c < 50 mg/dl; Blood pressure ≥ 130/85 mmHg; Fasting glycemia ≥ 100 mg/dl;* [3]*: Presence of three of five risk factors: WP ≥ 92 cm; TG ≥ 150 mg/dl; HDL-c < 50 mg/dl; Blood pressure ≥ 140/90 mmHg; Fasting glycemia ≥ 110 mg/dl;* [4]*: WP ≥ 92 cm (mandatory criteria) + 2 additional risk factors: TG ≥ 150 mg/dl; HDL-c < 50 mg/dl; Blood pressure ≥ 140/90 mmHg; Fasting glycemia ≥ 100 mg/dl.*

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Table 4 - Metabolic risk factors as per the NCEP-ATPIII[1] and MS-ATPM[2] definitions, by age stratification in elderly women (n = 113). Viçosa (MG), 2008

Definition + number of risk factors	NCEP - ATPIII*		MS-ATPM**	
	Risk factors n(%)		Risk factors n(%)	
	0-2	3-5	0-2	3-5
Age group				
60 ⊢ 65 years old	40 (35.4)	16 (14.2)	45 (39.8)	11 (9.7)
≥ 65 years old	38 (33.6)	19 (16.8)	42 (37.2)	15 (13.3)
Total	78 (69.0)	35 (30.9)	87 (76.9)	26 (23.0)

[1]: The risk factors include: WP > 88 cm; TG ≥ 150 mg/dl; HDL-c < 50 mg/dl; Blood pressure ≥ 130/85 mmHg; Fasting glycemia ≥ 110 mg/dl; [2]:The risk factors include: WP ≥ 92 cm; TG ≥ 150 mg/dl; HDL-c < 50 mg/dl; Blood pressure ≥ 140/90 mmHg; Fasting glycemia ≥ 110 mg/dl. *,**χ^2 (p non significant).

Table 5 - Metabolic risk factors as per the IDF and MS-IDFM definitions, by stratification of the mandatory criterium and age group in elderly women (n = 113). Viçosa (MG), 2008

Waist perimeter (WP)	IDF[1]*		MS-IDFM[2]	
	Number of risk factor		Number of risk factor	
	0-1	2-4	0-1	2-4
	n(%)		n(%)	
High WP[a]	49 (43.4)	51 (45.1)	28 (24.8)	25 (22.1)
Normal WP	11 (9.7)	2 (1.8)	42 (37.2)	18 (15.9)
Total	60 (53.1)	53 (46.9)	70 (61.9)	43 (38.1)

Group age	IDF[1]		MS-IDFM[2]	
	Number of risk factor		Number of risk factor	
	0-1	2-4	0-1	2-4
	n(%)		n(%)	
60 ⊢ 65 ys old	28 (28)	21 (21)	15 (28.3)	10 (18.8)
≥ 65 years old	21 (21)	30 (30)	13 (24.5)	15 (28.3)
Total	49 (49)	51 (51)	28 (52.8)	25 (47.2)

[1]: The risk factors include: TG ≥ 150 mg/dl; HDL-c < 50 mg/dl; Blood pressure ≥ 130/85 mmHg; Fasting glycemia ≥ 100 mg/dl; [a]: WP ≥ 80 cm (mandatory criteria); [2]: The risk factors include: TG ≥ 150 mg/dl; HDL-c < 50 mg/dl; Blood pressure ≥ 140/90 mmHg; Fasting glycemia ≥ 100 mg/dl; [a]: WP ≥ 92 cm (mandatory criteria). * $\chi^2 = 4.52$ p=0.03 odds ratio=5.72 (CI 95%: 1.11-39.54).

requirement, being respected the ethnic group differences, in addition to an inferior cutoff point to consider as glycemic abnormality. According to Brown et al[25], analyses in healthy population suggest that the IDF definition identifies more men with MS than the NCEP-ATPIII criteria, with small differences among women.

Thus, since the IDF definition for MS was published, great speculation arisen on which one (NCEP-ATPIII or IDF) would be the best predictor of cardiovascular events[25], Up to now, what has been demonstrated is that the NCEP-ATPKIII definition has been associated to high prevalence of cardiovascular disease and as the best predictor of the incidence of said event, in comparison to the proposal by the IDF. In Austrian patients, the MS according to NCEP-ATPIII detected significant vascular events (adjusted risk ratio of 1.74; 95% CI 1.255–2.427; p=0.001), however the MS defined by the IDF criteria did not demonstrate this prediction (1.18; 0.859 - 1.646) and p=0.297)[27].

Athyros et at[9] evidenced that the cardiovascular disease prevalence of the cardiovascular disease increased in the presence of the MS, independent of the used definition. However, as emphasized by these authors, this increase was more pronounced when the NCEP-ATPIII criteria is used, in comparison to the IDF definition. In addition, the latter included broad proportion of people who did not present increase in the prevalence of cardiovascular disease.

He et al[3] found, however, that in the Chinese elderly people who presented MS as per the IDF criteria, but not as per the NCEP-ATPIII, had high ratio of coronary arterial disease chance (1.66; 95% CI: 1.31-2.10) and cerebral vascular accident (1.53; 95%CI: 1.13-2.06), indicating,thus, that in this studied population, the IDF criteria demonstrated it is more pertinent than the NCEP-ATPIII for screening and risk estimate.

Considering the occurrence of each MS component, as per the NCEP-ATPIII definition, the values found in this study for the high blood pressure levels (54.8%) and for the

change in the glycemic homeostasis (10.6%) were inferior to the one reported for Italian[5] and North American[2,28] elderly people (90.1%, 23.9%; 80.5%, 19.9%; and 70.5%, 14.4%, respectively). For hypertriglyceridemia, the value found (30.1%) was also inferior to the one observed in other samples of elderly women[2,5] (36.8%) and (32.5%). The low HDL-c levels (35.4%) and abdominal obesity (64.6%), in turn, were inferior to the ones found by Maggi[5] (56.4% and 75.2%, respectively) and superior to the ones by McNeill et al[28] (24.0% and 53.7%, in this order).

The agreement among the four definitions for the metabolic syndrome tested in this study was good between the MS-ATPM and NCEP-ATP III proposals (0.79), MS-ATPM and MS-IDFM (0.77) and NCEP-ATPIII and IDF (0.70). However, it was shown as moderate between MS-ATPM (0.53) and IDF and this with MS-IDFM (0.51).

In the United States[25], the prevalence of MS was compared according to the NCEP-ATPIII (70%) and IDF (74%) definitions, presenting agreement of 92.2%, in post-menopausal women, with average age of 65.3 ± 8.4 years old.

The cutoff point of 92 cm for the waist perimeter, although higher that the recommended by the international committees, of 80 cm[26] and 88 cm[29] can, probably, be more adequate to evaluate elderly women. Although the abdominal obesity is frequently found in association with the insulinic resistance, which, in turn, has been indicated as the ethiological link for the MS, the occurrence of this kind of obesity can not be used, at a first sight, as an evidence for the co-existence of the IR, as the WP is influenced by the subcutaneous and visceral fat[15].

The classification limit for the inadequate arterial pressure is also different among the different criteria suggested by the scientific community, varying from ≥ 130/85 mmHg to ≥ 140/90[22,30]. Considering the above mentioned, it is important to emphasize that the aging process determines several changes in the cardiocirculatory system, among which there is an increase of the collagen component and loss of elastic component in the large arteries, causing higher rigidity of the wall. In the arterioles, it was observed an increase of the wall thickness and reduction of their light. And, also, in the autonomous nervous system, there is a decrease in the number of adrenergic receptors and lower cardiovascular response to the sympathetic and parasympathetic stimuli[31].

The abnormal glucose metabolism characterization, by means of the fasting glycemia test, passed through a cutoff point change, previously considered as ≥ 110 mg/dl and now considered as ≥ 100 mg/dl by the "Expert Committee on the Diagnosis and Classification of Diabetes Mellitus"[32]. The NCEP-ATPIII definition considers the first value, which the IDF criteria presupposes the adoption of the second described value. According to NcNeill et al[28], there are some reviews regarding this change, which are supported by the absence of consistent results of the high risk of cardiovascular disease attributed to the glycemia levels, as the other risk factors established were taken into account, such as the substantial number of Americans who are classified with "pre-diabetes", but who have never developed diabetes mellitus

In this study, it was observed that the difference in the

cutoff points for the fasting glycemia, among the used definitions, implicated, approximately, in a three time-higher occurrence of glycemic change, comparing a definition with the other, that is, from 10.6% (NCEP-ATPIII and MS-ATPM) to 30.1% (IDF and MS-IDFM). Similar behavior was seen by McNeill et al[28] in a study with North American elderly people (65-92 years old), and it was found that the prevalence of individuals with altered fast glycemia varied from 14.4% to 40.7% due, also, to the distinction between the adopted cutoff points.

Regarding the numbers of risk factors for MS, according to the different definitions, by NCEP-ATPIII and MS-ATPM criteria, the majority of the elderly women concentrated in the group with a lower number of risk factor (0 to 2) (69.0% and 76.9%, respectively), close to the number observed in Thailand[33], in women who are ≥ 55 years old (62.1%). According to the IDF criteria, higher frequencies were observed among the risk factor groups in those women with high WP. Although it is not possible to establish the cause-effect association as it is a transversal study, the statistically significant association leads to the supposition that the high WP, as per the proposed parameters, predisposes to a higher number of risk factors for MS. However, the important limitation of the abdominal obesity criteria by IDF is that the same recommendation used for the Southern Asia is used for Central America and South America. In the case of the MS-IDFM proposal, there was a predominance of the sample in the normal WP groups. Santibhavank[33] also found that, as in this study (51%), the IDF criteria emphasized the group of two to four risk factors (66.2%) for MS.

As it can be observed, the change of the NCEP-ATPIII and IDF criteria had as effect expressive variations in the occurrence of high levels of blood pressure and abdominal obesity, as expected, due to the higher threshold in the substitute cutoff points, reflecting on the reduction of the MS prevalence by two adapted criteria, in comparison to the official proposals.

Conclusion

Taking into consideration all the aspects explored in this study, in the context of public health, where there is a great need for more effective directioning, the human and financial resources for the groups with the highest morbimortality risk in the MS-ATPM criteria were found the most pertinent ones for MS identification in the evaluated sample of 60 to 63 year old-women. It is remarkable that the MS-ATPM proposal is derived from the NCEP-ATPIII criteria, which, in turn, has been indicated as the best predictor of the cardiovascular event in elderly people. In addition, the best Kappa coefficient was observed between such definitions. However, this conclusion can not be extrapolated to the elderly population in general, due to the fact that to adopt a certain criterium as the best for the metabolic syndrome classification in this age group, it is necessary to compare the different evaluated definition proposals of MS by means of a bigger populational sample.

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