(RESEARCH ARTICLE)

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Metabolic syndrome and cardiovascular risk assessed by Framingham's score: A study with soldiers of the military police of the State of Bahia, Brazil

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Abstract

Being a man is considered a risk factor for illness and death from cardiovascular causes; men in general have a lower life expectancy than women and higher mortality from all causes not related to sex in all age groups. The military policemen profession is recognized as full of stress and has high levels of professional victimization. Military Police Corporations are mostly formed by men, and the study of the health of the military policemen can be considered equivalent activity to the study of the health of men. This present study is part of the first author's doctoral thesis work whose theme was focused on the health of men; it was studied a convenience sample of 452 soldiers, selected by personnel administration by working time criterion, to submit to Corporals Training Course. It was sought to characterize the cardiovascular risk factors and prevalence of metabolic syndrome; cardiovascular risk was also assessed by applying the Framingham's score; it was found a high prevalence of cardiovascular risk factors in the studied group, with emphasis on hypertension (52.55%) and hypertriglyceridemia (46.34%), the metabolic syndrome was diagnosed in 35.03%. Cardiovascular risk by Framingham's score showed strata of medium and high risk more frequent in individuals with metabolic syndrome than in those without the syndrome. The risk of a cardiovascular event in 10 years in the group with middle and high level of risk was also more frequent among individuals in the older (= or> 45 years) than in the younger group (<45 years). It is concluded that there's a high prevalence of cardiovascular risks in the studied group, and that there's a need for continued attention directed to integral health care of men in the military police corps.

Keywords: Metabolic syndrome; Cardiovascular risk; Framingham's score; Military police

1. Introduction

Men live less than women and have higher mortality rates in all age groups and for all causes not related to sex, when compared to women; for these reasons, being a man is considered the most important demographic factor that contributes to premature death. One difficulty presented to identify the health needs of men is the very absence of them in the primary care services. A study of users of health services revealed that men still understand the health care as a feminine subject matter, claim difficulties related to time work, do not realize the structuring of services is designed specifically to meet men's specificities, and finally the social imaginary that places man as invulnerable has placed man in a position of risk of disease and death [1,2].

The Ministry of Health established the National Policy for Integral Attention to Men's Health - PNAISH - through Ordinance No. 1.944/GM on August 27, 2009. This policy would have as main objective to provide adequate assistance to men's health, reducing morbidity and mortality, by addressing the risk factors, and facilitating access to services and actions of integral health care. A study conducted with managers and health professionals working in primary care

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services through six stories and 21 semi-structured interviews revealed a kind of perception of PNAISH as a policy to reduce urological problems; others perceived politics as something vague, without attraction strategies of men to health services, or actions of appropriate care, and still others understood politics as an isolated action, not able to incorporate attention to men's health continuously [3]. Unlike other political attention to specific population segments such as women and blacks, it is understood that the PNAISH did not emerge as a result of social movements, but as a result of a government decision; therefore it is necessary to adopt guidelines made targeted by genre as a possible transformation of the conditions that still reproduce inequities in health care [4]. It is recognized that the primary care sector reproduces the trend toward medicalization of health that affect users and professionals of various services; it also continues to focus its attention on the care of women, thus reproducing gender inequities in the operation of health services and work performance; this is the way that women receive health care more organized, while men have an insufficient care and attention to their specific health needs [5].

The World Health Organization does a forecast of an increase of 250% in the event of illness and death from cardiovascular causes in Brazil, making it the world champion in this regard. Health organizations have expressed concern in adopting preventive measures directed toward cardiovascular risk factors [6]. In this context, organizations and scholars extends up interest in the metabolic syndrome (MS) which is a constellation of cardiovascular risk factors such as dyslipidemia (including increased triglycerides and reduced HDL cholesterol), abnormal glucose metabolism (elevated fasting glucose), hypertension, central obesity (characterized primarily by increased waist circumference); all these clinical conditions would still have as an underlying condition insulin resistance (usually manifested by hyperinsulinemia and altered glucose metabolism with its metabolic consequences) [7–11].

Considering MS as a complex condition that signifies multiple cardiovascular risk factors, it's discussed the clinical applicability of risk stratification, as it's done with the Framingham's Score (FS). Up to the present moment, the studies are not very consistent, but there is increasing interest in understanding the intersection of the prognostic value of meeting the criteria of MS and FS risk stratification [12,13].

The military police corps are composed mostly of men, in such a way that studying the health of military policemen can be considered in a large extent, equivalent to the study of men's health. The professional activity of the military police is considered full of occupational stress and professional victimization events; the degree of psychological distress of these professionals is high [9,10,14,15].

No specific studies rely on the prevalence of MS in the military police, but there are studies on prevalence of individuals' risk factors such as obesity or sedentary lifestyle. Like other segments of the professional services sector, the category of military police was off the agenda of economic studies. The military police had its position even more neglected, especially during the dictatorship, when public and intellectuals' opinions were mobilized against them. More recently, mostly from the 90s, from a democratic perspective, public security is configured as an object of social construction, and this segment now - albeit in a timid perspective - constitute part of the research agenda of health experts [16].

This study is part of the doctoral thesis of the first author, and it's aimed to increase knowledge and understanding about the living conditions of police officers, with emphasis on cardiovascular risk factors and quality of life. As a central purpose this study seeks to deepen the understanding of the association between MS criteria and FS categories, such as characterized by the specific instruments in research subjects.

2. Materials and methods

It is a cross-sectional study of a qualitative nature (because it attempts to broaden the understanding of how research's subjects live and move in the spectrum of the conditions of health and diseases) with quantitative components (as it presents sociodemographic and anthropometric data, blood pressure records and laboratory information, the results of processing the data in the Framingham's risk table (for men), and the results of filling or not the criteria for diagnosis of MS). The reference population is the military police soldiers of the State of Bahia; a convenience sample was composed of two groups of soldiers (the first 256 and the second 196, totalizing 452 soldiers) convened respectively in January and March 2012 for selection (medical expert evaluation and physical fitness test) for conducting Corporals Training Course; that course is a condition established as a prerequisite for promotion to a grade above that the soldiers were at that time; groups were formed by the only criterion of admission date (date of entry into the Corporation), and the vacancies filled rigorously by older soldiers, forming the variable to be analyzed later as *service time*. The soldiers presented to the Physicians carried with them the results of the exams, which included among others the determination of fasting glucose, total cholesterol and triglyceride fractions; then anthropometric and clinical data were verified and registered (weight, height, body mass index, waist circumference, blood pressure), as well as information about the presence of previous diagnosed diseases and their treatment. Information from physical examination and laboratory

data were arranged in a table to verify the normality or non-normality of their levels that would later serve for a possible diagnosis of MS, according to the criteria of the National Cholesterol Education Program - Adult Treatment Panel III (NCEP - ATP III). The NCEP - ATP III for MS diagnosis, are for men: 1. Systolic blood pressure> or = 130 mmHg and / or diastolic blood pressure> or = 85 mmHg, triglycerides> or = 150mg/dl; fasting glucose> or = 100mg/dl, HDL-cholesterol <40mg/dl; waist circumference> 102cm [8]. The SPSS software, version 17 was used for processing of socio-demographic, anthropometric, clinical and laboratory data for descriptive analysis. The Framingham's risk score was calculated using the risk chart and points specified for men as D'Agostino et al [12]

3. Results and discussion

The study included 452 subjects, finding a mean age of 45 years; this cutoff was used to divide the whole group into two subgroups, which became named as the younger group (<45 years) and older group (= or > 45 years). Such a division has as its main objective the later comparison of the prevalence of MS and its correlation with the age variable, as well as the comparison of age groups in relation with the risk of cardiovascular events calculated by the FS. The socio-demographic information showed a frequency of 68.61% married soldiers; in relation to the educational level, the majority were individuals with a high school diploma - 86.41%.

The main physical and laboratory data are shown in the following table:

Table 1 Descritive analysis of physical and laboratory data

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Age (yrs)	451	15	42	57	45.80	2.193
Height (m)	425	.43	1.55	1.98	1.7403	.06498
Weight (kg)	425	69	52	121	84.37	12.777
BMI (body mass index)	425	20.11	19.10	39.21	27.8463	3.87812
Abdominal Waist (cm)	425	64	65	129	97.12	10.151
Sistolic BP* (mmHg)	425	110	90	200	129.73	14.925
Diastolic BP (mmHg)	425	50	70	120	84.36	7.877
Fasting Glicose (mg/dl)	416	278	68	346	99.70	33.692
Total Cholesterol (mg/dl)	417	287	109	396	205.17	39.869
HDL Cholesterol (mg/dl)	417	72	22	94	45.02	10.142
LDL Cholesterol (mg/dl)	396	278	10	288	125.54	36.966
VLDL Cholesterol (mg/dl)	331	147	7	154	32.96	17.931
Tryglicerides (mg/dl)	412	1225	37	1227	187.14	152.944

*BP = blood pressure

Adapted from second article of Braga Filho RT Doctoral Thesis, 2013 [17]

The mean age of 45 years puts the group in the age group of adults in the mature stage; the mean height is compatible with the mean height of the Brazilian biotype, specially in the northeast region of the country. The mean BMI classifies the studied group as having overweight characteristically; it was also found abdominal circumference mean of 97.12 cm; according to the WHO (World Health Organization) criteria, both BMI classified as overweight (= or> 25kg/m2 and <or = 29.9 kg/m2) *and* waist circumference = or> than 94cm, put these individuals at increased risk for a range of cardiovascular diseases [18]. Fasting glucose mean - 99.70 mg / dl - is close to the cutoff point accepted by the International Diabetes Federation - IDF - as impaired fasting glucose (> or = 100mg/dl). The mean level of serum triglycerides - 187.14mg/dl - is above the cutoff point established by NCEP-ATP III as a diagnostic criterion for MS (= or> 150mg/dl) and therefore it also helps to stratify the group in the classification of increased cardiovascular risk. Some studies consider that a high intake of alcohol (this subject is not specifically addressed in this study) is associated not only with elevated levels of serum triglycerides, but also with cardiovascular disease, fatty liver disease of alcoholic

etiology and acute pancreatitis [19]. It is possible that the kind of foods predominant in Bahia, with a high content of animal fat, and fried typical foods, is also contributing to the elevated levels of serum triglycerides found.

The following are the findings regarding the prevalence of the individual components of MS, according to NCEP-ATP III, and the entire MS.

Table 2 MS and its individuals components frequency by main age groups, according to NCEP-ATP III

	Younger Group*		Older Group**		Total		Prevalence Ratio Older/Younger Group
	Count	Percentage	Count	Percentage	Count	Percentage	
Hypertension	121	51.71%	116	53.46%	237	52.55%	1.04
Tryglicerides	100	42.73%	109	50.23%	209	46.34%	1.17
Abdominal Waist	61	26.07%	74	34.10%	135	29.93%	1.31
HDL-Cholesterol	68	29.06%	59	27.19%	127	28.15%	0.93
Fasting Glucose	57	24.36%	70	32.26%	127	28.15%	1.32
MS	74	31.62%	84	38.71%	158	35.03%	1.22
Valid N	234		217		451		

*<45yr; **= or >45yr

The prevalence of hypertension is higher than that found in other population-based studies. In a study conducted in the United States (The National Health and Nutrition Examination Survey III), involving a 20-year period, it was found a prevalence of MS 7% for men and 5% for women between 20 and 29 years of age, and 44 % for both sexes in those between 60 and 69 years of age; the components most frequently encountered were abdominal obesity in women -46% -, and hypertension for men (38%) [20]. In a city of southern Brazil it was conducted a population-based study that showed that the presence of overweight (BMI> 24.9kg/m2), and increased waist circumference (> 102cm) increases the chance of having hypertension in respectively 1.66 and 1.48 fold more than in those considered normal [20,21]. Another population-based study conducted in a city in southeastern Brazil involving men enrolled in the Program of Family Health found a prevalence of overweight / obesity in 43.3%, irregular physical activity / inactivity in 28%, smoking in 25.3 %, hypertension in 24% [22,23]. In the present study, it was found the prevalence of overweight / obesity in 72.64%, and the presence of MS in a group aged between 42 and 57 years, with a mean age of 45 years was 35.03%, that is more than 1/3 of the sample.

Following there is a cardiovascular risk description as verified by FS [12,23].

Table 3 FS levels of cardiovascular risk related to MS occurrence

Framingham Score	With Metabolic Syndrome		Without Metabolic Syndrome		Prevalence Ratio With/Without MS
	Count	Percentage	Count	Percentage	
Low Risk	112	70.89	203	80.56	0.88
Medium Risk	31	19.62	38	15.08	1.30
High Risk	15	9.49	11	4.36	2.18
Total	158	100.00	252	100.00	

This study shows a correlation between the empiric results and the theoretical data; individuals with MS had slightly lower frequency of low cardiovascular risk classification than those without the syndrome, according to the FS. The prevalence ratio between those with and without MS, with low cardiovascular risk was less than 1 (.88). The prevalence of those with medium cardiovascular risk becomes greater in those with the syndrome; the prevalence ratio between those with and without MS becomes greater than 1 (1.30); the more impressive result is the prevalence ratio of high cardiovascular risk among those with MS that got to be 2.18 fold the prevalence of the same risk classification in those

without MS; such data point out the importance of diagnosing MS as a prognosis facilitator, reinforcing the immediate adoption of measures directed to control cardiovascular risk in these individuals. There are controversies and increased scientific interest in the assessment of cardiovascular risk in individuals with MS and their prognostic correlation with FS [13]. A study conducted in India showed a risk of cardiovascular event in 10 years measured by FS in a rate greater of 10% of subjects with a diagnosis of MS [22]. Another study with 256 patients with MS diagnosis, was conducted in 2020 and evaluated biochemical parameters, psychological aspects as risk factors for cardiovascular diseases and Framingham's Risk Score; it was found that risk for cardiovascular disease (low, intermediate or high] was significantly higher in men than in women; it was also concluded that in both genders at high risk of cardiovascular diseases, there were older ages, higher levels of systolic blood pressure and fasting serum glucose concentrations,compared with men and women in low or intermediate risk for cardiovascular diseases [24]. The data comparison of cardiovascular risk by FS in relation to age groups showed a growing prevalence ratio of the older group compared to the younger group, respectively 0.93, 1.02, and 2.42 for low, medium and high risk ranges; data are also consistent with the medical literature, that age increases cardiovascular risk, and is a risk factor that increases the frequency of other risk factors [12,21].

Table 4 FS levels of cardiovascular risk Related to main age groups

Frammingham's Score	Younger group*		Older Group**		Prevalence Ratio Older Group / Younger Group
	Count	Percent	Count	Percent	
Low Risk	190	81.20%	165	76.04%	0.93
Medium Risk	36	15.38%	34	15.67%	1.02
High Risk	8	3.42%	18	8.29%	2.42
Total	234	100%	217	100%	

*< 45 yo; **>=45yo

4. Conclusion

Being male is a risk factor for disease and death, particularly from cardiovascular causes. The military police profession is considered risky activity, with a high level of occupational stress and professional victimization. The military police corps are mostly made up of men, so studying the health status of military policemen can be considered equivalent to the study of men's health in its most generic sense. This study is part of the doctoral thesis of the first author which sought to characterize the cardiovascular risk factors in a convenience sample of 452 soldiers of the Military Police of Bahia, which were selected by human resources department to carry out the corporals training course, in order to be promoted in their career; the only criterion to form selected group was the admission date, being convened by the administration those with greater permanence in the corporation. Studies on the socio-demographic data, found a mean age of 45 years; the analysis of the data demonstrate a high prevalence of hypertension (52.55%), followed by hypertriglyceridemia (46.34%), increased waist circumference (29.93%), reduced HDL cholesterol, and impaired fasting glucose (28.15%), showing a prevalence of 35.03% of MS. The characterization of cardiovascular risk with FS instrument, showed a prevalence ratio of medium and high risk respectively 1.30 and 2.18 fold higher in MS patients compared to those who did not meet the diagnostic criteria of the syndrome. When comparing the age groups, it was found a prevalence ratio of medium and high risk of respectively 1.02 and 2.42 times higher in the older group (age = or> 45 years) than in the younger group (age <45 years). The data are consistent with established scientific knowledge in the medical literature and reinforce the understanding that the diagnosis of MS should have prognostic value that supplements that provided by the application of FS. Considering the limitation that the sample studied was formed by convenience criteria and can not be assumed as statistically representative of the entire set of soldiers, it is concluded that soldiers of Military Police of Bahia, in this study represented by 452 soldiers, have a high density of risk factors for illness and death from cardiovascular causes. There is a great need to adopt measures to promote health, prevent diseases and provide adequate healthcare to the policemen, within the principles of integral health, and considering individuals in their wholeness.

Compliance with ethical standards

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