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COMBORITIES AND RISK FACTORS ASSOCIATED WITH METABOLIC SYNDROME: AN EVALUATION OF INDUSTRY EMPLOYEES ATTENDED IN A CONQUEST-BA VICTORY AMBULATORY

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ABSTRACT

Objective: To estimate the prevalence and risk factors associated with Metabolic Syndrome of industry employees treated at an outpatient clinic in Vitória da Conquista-BA. **Materials and Methods:** A descriptive cross-sectional study with a quantitative approach was carried out, followed by an epidemiological character in which the variables (factor and effect) were observed at the same historical moment. A sample of 150 collaborators was used where biochemical, sociodemographic profile and association with comorbidities were observed. Statistical analysis was performed using Epi Info 3.5.4, Windows version. **Results and Discussion:** According to research data, MS comprises a complex association of metabolic factors, which include imbalances in glycemic metabolism, systemic arterial hypertension, central obesity, elevated total cholesterol and triglyceride levels. Factors such as age, sex, physical activity, weight, biochemical profile and presence of comorbidities were analyzed. According to the presence of three of these associated factors, MS may be present. **Conclusion:** According to the study revealed, one can warn of the close relationship that exists between work in the industrial sector, circadian cycle deregulation and how it can induce changes that culminate in changes in body composition, increased fat deposition in the abdominal region, changes in macro-nutrient metabolism, such as glucose and lipids, and increased blood pressure levels.

INTRODUCTION

Metabolic Syndrome (MS) is a set of disorders that includes insulin resistance, central obesity, high triglyceride levels, low HDL levels and hypertension, and is defined by the presence of three or more of these elements in the same individual (MARTINI *et al*., 2014).

Its etiology and components are still unknown, but studies show its correlation with genetic, cultural and lifestyle factors, especially diet and physical activity (FONSECA *et al*., 2014). MS is considered a pathological manifestation of great impact and contributes to the significant increase in worldwide mortality from cardiovascular disease. In general, the prevalence of MS is due to hereditary and environmental factors. The main complications of MS are cardiovascular diseases, such as Stroke, Acute Myocardial Infarction,

Arrhythmias, Angina Pectoris, among others (AZAMBUJA *et al.*, 2015). Although small in number, more recent research attests that the work environment is also a stimulating factor for the development of MS (MARTINI *et al.*, 2015). Working hours often become a hindrance to exercise and almost always induce the ingestion of easily prepared ultra-processed foods of low nutritional value. Moreover, failure to observe basic ergonomic principles makes these spaces unhealthy and prone to the development of comorbidities in workers (BRAGA *et al.*, 2014). Diagnosed as one of the most prevalent metabolic abnormalities, MS has a high risk of cardiovascular accidents with increased morbidity and mortality rates (OLIVEIRA *et al.*, 2015). In developed countries, for example, cardiovascular disease is the leading cause of death, and in developing countries, studies suggest significant growth, especially in areas of higher industrial concentration (ROCHA *et al.*, 2015). In Brazil, approximately two million people were affected by cardiovascular events in 2004 alone. Public health costs reached 30.8 billion (AZAMBUJA *et al.*, 2015). Considering the historical and cultural factors that imposed a new lifestyle linked to the consumption of processed foods and the reduction of physical activity, as well as their influences on the increase of non-communicable chronic diseases, and the predisposition of the economically active population to acquire MS and also its correlation with cardiovascular accidents (MARTINI *et al.*, 2014). We present the theme of the present study: analysis of the factors associated with Metabolic Syndrome and comorbidities among the employees treated at a Conquista-BA outpatient clinic, based on biochemical, anthropometric, hemodynamic, sociodemographic and behavioral indicators, according to the absence or presence of the disease SM.

MATERIALS AND METHODS

A descriptive cross-sectional study with a quantitative approach was carried out, followed by an epidemiological character in which the variables (factor and effect) were observed at the same historical moment. This research was conducted at the SESI (Social Industry Service) outpatient clinic located in the city of Vitória da Conquista Bahia, northeast region, latitude: 14 ° 51 '58' 'S, longitude: 40 ° 50' 22 " W, altitude : 932m and area: 3216 Km². Bahia's SESI works in partnership with industrial companies to promote methodological and technological solutions assisting the productive sector, aiming at improving competitiveness, investing in the quality of life of its employees, through health, cultural and social responsibility actions. healthy living, leisure and safety. The invitation to participate in the study was done in the following ways: personally, ie addressing the individual. The collaborators who agreed to participate in the research signed the Informed Consent Form. The collection was performed through the application of interviews, in which the volunteers answered two questionnaires, the first addressing questions related to the practice of physical activity, the second related if the candidate was a smoker. Then, these participants were referred to the Outpatient Support Laboratory, where the COLT, GLICEM and TRIGL laboratory tests were performed, as well as the volunteers who underwent clinical consultation to verify anthropometric and hemodynamic data such as blood pressure measurement and weighing.

The research was evaluated in 2019 in June and July, using a sample of 150 patients who were in the outpatient care, aged between 18 and 63 years, individuals of both sexes. Exclusion criteria were given to people with special needs, under 18 years old who are part of the Young Apprentice Program, nursing mothers and pregnant women. The data provided were taken from the project "comorbidities and risk factors associated with metabolic syndrome: an assessment of industry employees treated at a victory clinic of conquista-BA". The project was approved by the Ethics Committee of the Independent Faculty of the Northeast- FAINOR. Approved by Opinion No. 060898/2019, CAAE: 14390919.0.0000.5578.

In this research, it was considered as dependent variable the performance of laboratory tests and clinical consultation, which compared the results individuals with reference values, blood pressure assessment, physical activity practice, weight and smoking. Statistical analysis was performed using Epi Info 3.5.4, Windows version and then presented in graphs and tables. Also consisting of descriptive analyzes of risk factors, comorbidity and MS by categorization. In the association between all variables, the chi-square test was used, considering a significance level of 5% with a confidence interval of 95%.

RESULTS AND DISCUSSION

In the graph No. 1 is the sociodemographic characteristics, it was observed that industry officials who participated in the survey presenting an age range 18-63 years, of both sex, performed corresponding average to (100%) of the surveyed employees, (61%) of the employees showed moderate physical activity. Since (39%) do not practice any kind of physical activities. The questionnaire for smokers was applied, but only (0.3%) surveyed (0.3%) were smokers, a small number to be represented in the graph.
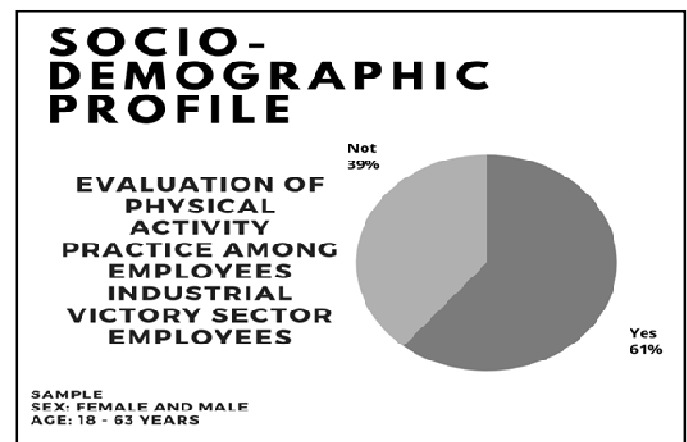

Source: Data obtained from SM research project.

Graph 1. Analysis of the population studied to evaluate physical activity, age and gender

The present study proves a higher percentage of physical activity (PA) practice in the studied population, considering the context of MS shows that the overweight index in the individual is one of the predisposed factors for its evolution, however the practice of physical activity brings improved quality of life and better work performance. Corroborating with GU *et al.* (2016), where reports that physical activity reduced the risk of injuries, slips and falls in the workplace in physically demanding occupations, in addition, regular exercise brings many health benefits (GU *et al.*, 2016). Physical inactivity and sedentary behavior (SB) involve health risks, as poor performance of moderate to vigorous physical practice is directly associated with metabolic syndrome (COMMISSARIS *et al.*, 2016). Other authors also point out

that the promotion of PA programs designed to increase workers' health or fitness brings benefits to work, besides professional and leisure time PA is a fundamental means of health promotion (FANG; HUANG; HSU, 2018). These physical activity programs offered at workplaces are important as they can benefit the industry as employees interact regularly with each other, creating an integrated social network and social support; AF-promoting policies can be easily implemented due to the means of communication (DAS; SARTORE-BALDWIN; MAHAR, 2016). However, Pereira *et al.* (2015) reports that vigorous PA practice even within the workplace such as frequent walking, climbing stairs, and arduous and heavy occupational tasks to carry increases the likelihood of sick leave; With this, employers have an economic interest in maintaining better health among workers, since employee health will be related to productivity and financial issues (PEREIRA *et al.*, 2015). Graph 2 shows the definition of the biochemical profile. We used the parameter to determine abnormality: total cholesterol> 200 mg / dl; triglycerides ≥ 150 mg / dL or use of medications for dyslipidemia; and fasting blood glucose test ≥ 100 mg / dL or use of diabetes medications. It was possible to identify that among the total of patients in the study, the highest rate of biochemical abnormality was in the cholesterol level, with 40.66% alteration, followed by triglycerides and glycemia alterations, with 30% and 22% respectively.
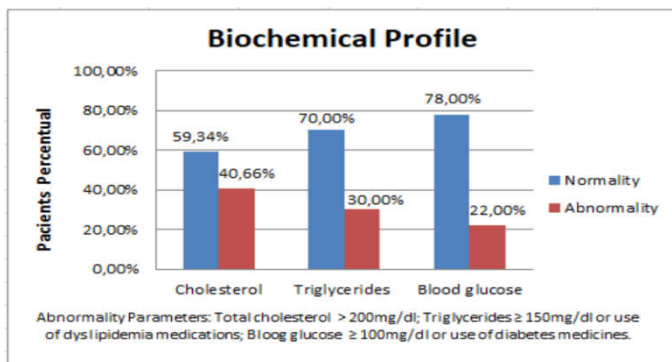
Graph 2. Analyzes of the population studied to assess the biochemical profile

When comparing the percentage found in the study of total cholesterol levels, with data mentioned by Him et. al. (2004) for the study of hypercholesterolemia in China, in individuals between 35 and 74 years old, we noticed that since the beginning of the 21st century, most of the urban dwellers had elevated cholesterol levels, which is one of the main factors for increased morbidity and mortality during this same period due to cardiovascular diseases. According to Rosinger et. al. (2017), when comparing samplings of US adults 20 years and older, between 1999-2000 and 2013-2014 there was a decrease in total cholesterol rates averaging 204 mg / dl to 189 mg / dl respectively, in a longitudinal study with more than 30,000,000 patients sampled. Both studies are consistent with the data found, as 40.66% of patients had changes in cholesterol and 59.34% had normality of this factor, in a single sample in the urban area of Vitória da Conquista. Regarding triglyceride rates, we obtained a normality of 70% of the patients sampled, which is the second factor analyzed with the greatest alteration. It is also possible to determine that when cholesterol changes are associated with triglyceride elevation, according to data sampled in American patients by Luz et. al. (2008) and Budoff (2016) the chance of developing cardiovascular disease is quite high. As the third factor of

analysis, to determine the biochemical profile, we had glycemia, which appeared with altered rate in only 22% of patients, which is the lowest risk biochemical factor detected in the study. Blood glucose is considered one of the factors associated with various cardiovascular diseases, as well as metabolic syndrome, since its value is related to insulin resistance and development of type II diabetes, as mentioned by Oguoma et. al. (2017), which establishes significance for the exposed approach. There is also a possibility that insulin resistance may be related to the elevation of triglyceride and total cholesterol levels, factors that presented higher alteration rate in the present study (Taniguchi, 2000). In table 1 the analysis of the results obtained through the sample of 150 patients showed a prevalence of three of the five comorbidities closely related to the occurrence of Metabolic Syndrome, namely: hypertriglyceridemia, hypercholesterolemia and elevation of glycemic values and alteration of fasting blood glucose. In addition to the above, it was possible to establish relationships between the comorbidities evaluated, such as the increase in total cholesterol with the other comorbidities, given their representativeness in the sample (41.3%) compared to others.

Table 1. Analysis of the population studied to evaluate comorbidities

Comorbidities	Normal	Men Changed (%)	Women Changed (%)	Total Changed
High fastind blood glucose (≥100 mg / dL)	81.4%	18%	0.6%	18.6%
Hypercholesterolemia (≥ 200 mg / dL)	59.3 %	33.4%	7.3%	40.7%
Hypertension (≥140 / 90 mmHg)	90%	6.7%	3.3%	10%
Hypertriglyceridemia (≥150 mg / dL)	71.4%	26%	2.6 %	28.6%
Obesity (≥30 kg / m²)	90%	8.7%	1.3%	10%

According to CATHARINA *et al.* (2018), the occurrence of MS has expanded worldwide and is higher in hypertensive patients than in the general population. In our study, it was observed that 40% of patients with MS were hypertensive, in contrast, in the study by CATHARINA *et al.* (2018) a considerable prevalence of MS was observed in hypertensive individuals (66%). According to FOX *et al.* (2017), the most prevalent component of MS was hypertension (64.3%); however, in the present study two components equally prevailed, hypercholesterolemia (86.7%) and hypertriglyceridemia (86.7%). Obesity is the main factor causing the development of metabolic syndrome. In a study conducted in Ghana by NSIAH *et al.* (2015), it was evidenced that obesity represented 48.67% as a risk factor for MS, while in the present study sample obesity reflected 73.3%. However, in both studies obesity was placed second as a risk factor. In the study by ZHANG *et al.* (2018), the data demonstrated the presence of significant linear correlations between composition indices and metabolic parameters, since BMI was correlated to most metabolic parameters, in agreement with the present study. Regarding fasting glucose alterations, according to RAPOSO *et al.* (2017), this was the least representative component in their sample (24.9%), while in this study hypertension was the least significant (40%). According to LI *et al.* (2016), MS was more common in women than in men (27.0 vs. 19.2%), a result that is not in accordance with what was shown by our sample, in which the opposite was observed. (11.4 vs 3.5%). According to the results presented in Graph 3,

it can be evidenced that MS is present in 10% of the studied population. Corroborating with a study by Felipe-de-Melo (2011), also conducted with industry workers, MS was evidenced in 15% in the referred work. According to the mentioned study, it was also found that the prevalence of MS is significantly higher among males, where 9.4% were male, in addition to the age range is in agreement, ie the most affected age was between 24-48 years.
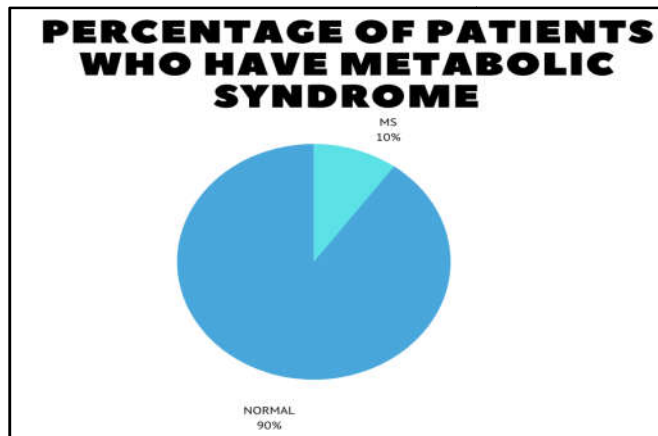
Source: Data obtained from SM research project.

Graph 3. Analyzes of the studied population to evaluate the presence of MS

After analyzing the associated factors leading to the diagnosis of MS, 1.4% of workers met the five criteria, while 3.3% of workers exhibited 4 factors, however, 5.3% of the population. studied presented 3 of the 5 criteria, it is noteworthy that, 28 individuals had hyperglycemia, 43 individuals had hypertriglyceridemia and 61 individuals had hypercholesterolemia. It can be verified the relevance that altered cholesterol levels are a determining variable in the definition of the comorbidity evidenced. Collaborating with our results, AMBROSIM (2014) also verified changes of this nature that were evidenced in the study with industry workers.

Final Considerations

According to data obtained in the research, MS comprises a complex association of metabolic factors, which include imbalances in glycemic metabolism, with emphasis on insulin resistance, systemic arterial hypertension and central obesity, high levels of total cholesterol and triglycerides. Obesity plays a central role in the development of metabolic syndrome, since it induces disorders of adipocyte function, resulting in cascade reactions that directly influence metabolic disorders, atherosclerotic process and insulin sensitivity, ending as a factor of obesity. risk to cardiovascular disease. There are several metabolic and biochemical correlations that contribute to the development of diseases, which can be diagnosed by analyzing the biochemical profile as present in the study. When we relate the parameters to each other, considering that the evaluated patients are individuals who work in the industrial sector, we can conclude that, given their routine, the values found are mainly influenced by the workload and their life habits, such as diet, stress, smoking and physical inactivity; These variables may be related in future studies in search of broader delimitations that contribute to the elaboration of prevention and control measures for cardiovascular problems, in order to improve the quality of life of this population.

As revealed, one can warn of the close relationship that exists between work in the industrial sector, circadian cycle dysregulation and how it can induce changes that culminate in changes in body composition, increased fat deposition in the abdominal region, changes in metabolism. of macro nutrients such as glucose and lipids and elevated blood pressure levels. In this context, dysfunctions that work can generate are part of MS, which leads the worker to greater risk of morbidity and mortality from cardiovascular diseases, among others. In this sense, it is important to infer that there is a need for future and complementary studies aimed at broader delimitations, which may contribute to the elaboration of prevention and control measures for cardiovascular problems, in order to improve the quality of life of this population.

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