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ORIGINAL ARTICLE

METABOLIC SYNDROME IN NURSING PROFESSIONALS WORKING IN ONCOLOGY CARE: PREVALENCE AND ASSOCIATED FACTORS[1]

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ABSTRACT

Objective: to evaluate the prevalence of metabolic syndrome and associated factors in nursing professionals working in oncology. **Method:** cross-sectional study with 231 nursing professionals from a high complexity oncology center in the State of Rio de Janeiro, Brazil, between June 2013 and June 2015. An interview was carried out to collect sociodemographic, professional, personal history, habits and lifestyles, and health conditions data. Waist circumference, weight, height, casual blood pressure, and Ambulatory Blood Pressure Monitoring were performed, in addition to fasting plasma glucose, triglycerides, and high-density lipoprotein. Metabolic syndrome was evaluated according to the I Brazilian Guideline for the Diagnosis and Treatment of Metabolic Syndrome. Poisson regression with robust variance was performed, the outcome being the presence or not of metabolic syndrome. **Results:** there was a 25.1% prevalence of metabolic syndrome and this condition was associated with longer professional training (4.0%; 95%CI: 1.05-1.07), with higher diastolic pressure in Ambulatory Blood Pressure Monitoring during sleep (3.0%; 95%CI:1.01-1.05), overweight (2.84%; 95%CI:1.93-6.70), and obesity (4.94%; IC95%: 2.08-11.77). **Conclusions:** there was a high prevalence of metabolic syndrome among the evaluated professionals, and an association between excess weight and changes in pressure during sleep. The results point to the need for interventions to control risk factors for chronic non-communicable diseases in the studied population.

Keywords: Síndrome metabólica. Enfermagem oncológica. Fatores de risco. Saúde do trabalhador. Enfermagem do trabalho.

INTRODUCTION

Metabolic Syndrome (MS) is an independent cardiovascular risk marker, influenced by characteristics related to work, health conditions, and people's habits and lifestyle[1].

Nursing is characterized by high work demands, low control over the activities performed, as well as frequent contact with pain, suffering, and death, making it one of the most stressful professions[2]. Furthermore, nursing professionals are exposed to excessive workload, insufficient rest time, the possibility of working in shifts, fatigue, deprivation of physical and leisure activities, alteration of the sleep-wake cycle[2], among other conditions that contribute to the occurrence of metabolic syndrome (MS)[3].

MS is characterized as a pathological, multifactorial condition, resulting from the aggregation of cardiovascular risk markers, which may be associated with asymptomatic inflammation[4]. However, despite its magnitude and transcendence, there is still no consensus on the criteria that define this occurrence[4]. The criteria adopted by the *National Cholesterol Education Program Adult Treatment Panel III* (NCEP-ATP-III) are one of the most used and consists of changing at least three markers between waist circumference, fasting blood glucose, blood pressure, triglycerides, and high density[4].

In the Brazilian population, the estimated

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prevalence of MS varied between 38.4% and 66.0%, depending on the stratification used, and the variables associated with this outcome were female sex, advanced age, and low education[5]. Among professional groups, the prevalence is between 6.1% and 58.0% and, being of the male gender, older age, physical inactivity, smoking, stress, elevated liver enzymes, higher education, longer professional experience, alcohol abuse, shift work, and inadequate nutrition were the main variables associated with this outcome[6]. Among nursing professionals, the prevalence of MS was 38.1% and was associated with anxiety and stress[3].

In professionals who work in the care of cancer patients, psycho-emotional aspects such as anxiety, depression, *Burnout* Syndrome, and common mental disorders, in addition to the constant challenge of dealing with pain, suffering, and death can accentuate the occurrence of MS[7]. Further, among active nursing professionals in this context, cardiovascular diseases represent one of the main causes of absenteeism[8], which can be potentiated by the occurrence of MS, which can also be a consequence of physiological responses resulting from the chronic stress to which these professionals are exposed[9].

It appears that exploring this outcome in this group of professionals can help in the development of prevention interventions aimed at people at greater risk, in addition to improving public policies related to workers' health. Considering that any harm to the health of nursing workers has a negative impact on the quality of care provided, the scarcity of studies on the subject in oncology care professionals, as well as the increase in estimates of new cases and the continuity of cancer patients, the guiding question of this study was: what is the prevalence of MS in nursing professionals who work in oncology care? When considering the proposed guiding question, the objective of the present study was to know the prevalence and factors associated with metabolic syndrome in nursing professionals who work in oncology care.

METHODOLOGY

A descriptive-exploratory cross-sectional study carried out in three hospitals of a high complexity oncology center, which is characterized as the largest specialized hospital complex in the treatment of cancer patients in the state of Rio de Janeiro, Brazil, within the scope of the Sistema Único de Saúde [Brazilian Unified Health System]. Data collection took place between December 1, 2013, and June 30, 2015. From a population of 574 nursing professionals, a sample of 231 individuals was included, selected by simple random sampling, with replacement. The sample size calculation was performed based on different prevalence of arterial hypertension. Considering the higher estimated pervasiveness of arterial hypertension (40.0%), the sample size calculated was 220 professionals.

The professionals chosen to compose the sample were contacted in person, and/or by telephone, and/or e-mail, and/or invitation letter, and received information about the research. Those who agreed to participate picked the best day (scheduling) to carry out the procedures related to data collection. Included, were the professionals who worked in the care of oncology patients for at least one year, on shifts of eight or twelve uninterrupted hours, in inpatient units, and who had returned from their last vacation for at least thirty days. Professionals who were on leave or pregnant (n=8) were excluded.

Using the self-report instrument built specifically for the research and based on a literature review and on the experience of previous studies developed by the CNPq research group “A problemática da hipertensão arterial” [The problem of arterial hypertension], the professionals were characterized as to sociodemographic variables (sex, age, race/color, marital status, highest education achieved, and monthly family income); related to work (professional category, work schedule, working in shifts, weekly working hours, number of employment relationships, time since graduation, institutional work time, working tired with decreased concentration during the shift); habits and lifestyle (smoking, leisure activities, physical activity, and alcohol consumption); and health conditions (systemic arterial hypertension, diabetes *mellitus*, dyslipidemias, angina pectoris, and has/had low

back pain). Alcoholism was assessed using the CAGE questionnaire, consisting of four questions referring to the anagram Cut-Down, Annoyed, Guilty, and Eye-opener (early morning ingestion), validated in Brazil, with a specificity of 83% and a sensitivity of 88%[10]. In the present study, alcoholism was considered when at least one positive statement was mentioned; the questionnaire was answered by the professional in the presence of the interviewer. Physical activity was evaluated by the professional's self-report; performing physical activities for at least 30 minutes, three times a week, was considered regular.

Weight (in kilograms) was obtained using a bioimpedance scale (OMRON® HBF 514); height (in meters), using a WCS® stadiometer with a scale of 20 cm to 220 cm and precision of 0.1 cm. Obtaining the variables weight and height made it possible to determine the Body Mass Index (BMI), whose cut-off points were determined according to the criteria defined by the World Health Organization (WHO)[8]. Abdominal circumference was determined at the midpoint between the costal margin and the iliac crest using a non-distensible, but flexible 1.50 m measuring tape labeled with 0.5 cm intervals. Abdominal circumference was classified according to WHO criteria[10].

Laboratory tests (total cholesterol and fractions, triglycerides, and plasma glucose) were collected and analyzed by specialized technicians who made up the hospitals laboratory teams where the study was carried out and obtained from puncturing the antecubital vein via vacuum aspiration after a 12-hour fast by the professional. The biological markers were stored by the laboratories of the hospitals that comprised the study and discarded after the analyses. Tests values that made up the lipid profile (total cholesterol and fractions and triglycerides) were categorized according to the criteria established by the V Brazilian Guideline on Dyslipidemia and Prevention of Atherosclerosis[11]. Glucose levels were categorized according to the Brazilian Diabetes Society Guidelines[12]. Metabolic syndrome was characterized by the NCEP-ATP III criteria[4].

Blood pressure was assessed by Casual Measurement (CBPM) and Ambulatory Blood Pressure Monitoring (ABPM). To obtain the casual measurement, the procedure described in the Brazilian Guidelines on Hypertension was followed[13]. It was performed with a validated and calibrated automatic device (OMROM HEM 705CP), three consecutive measurements were taken and the average of the last two measurements was used. Those with systolic blood pressure ≥140 mmHg, and/or diastolic blood pressure ≥ 90 mmHg[13], or referenced the use of antihypertensive drugs, were classified as hypertensive. ABPM was performed for 24 hours, on a usual working day in hospital care, with a validated oscillometric device (Spacelabs 90217/90207), with measurements taken every 20 minutes. Participants were provided with a diary to record the activities carried out during the ABPM and a telephone number that allowed the clarification of any doubts or complications during the performance. Monitor installation and professional guidance were carried out by trained nurses, the cuff used was adjusted to the circumference of the arm, placed on the non-dominant arm, and positioned 2 to 3 cm above the cubital fossa[10,14]. ABPM normality criteria were (systolic and diastolic, respectively): 24-hour mean, <130 mmHg and <80 mmHg; mean wakefulness, <135 mmHg and <85 mmHg; and sleep mean, <120 mmHg and <70 mmHg[10,14]. The sleep period considered was the time reported in the activity diary. Both the Casual Blood Pressure Measurement (CBPM) and the ABPM were measured or installed by the researchers themselves, who were previously trained and certified for this purpose.

Among the 231 professionals who completed the study, 223 had the minimum parameters considered for the ABPM analysis[15] and were included in the analyses that involved this variable.

Sleep quality was assessed using the *Pittsburgh Sleep Quality Index* (PSQI), a self-report instrument validated for use in Brazil[10]. The global score ranges from 0 to 21, and when > 5, it indicates that the person is presenting poor sleep pattern quality[8]. The PSQI was answered by the professional in the presence of the interviewer. Burnout Syndrome was evaluated by the *Maslach Burnout Inventory* (MBI), consisting of 22 items, allocated into three subscales. If high levels are observed, concomitantly, in the three dimensions

(emotional exhaustion ≥ 27; depersonalization ≥ 10; and Personal Accomplishment ≤ 33), it is considered an occurrence of the syndrome[10,14]. The MBI is a self-report instrument, validated for use in Brazil[10,14], answered by the participating professional in the presence of the interviewer.

The relationship between the classification variables was evaluated using the χ^2 test, *Fisher's* exact test, or likelihood ratio. For the quantitative variable (age), the difference between the means of participants with and without metabolic syndrome was evaluated using *Student's* t test. In the multiple analysis, for factors associated with metabolic syndrome, prevalence ratios and confidence intervals (95%CI) were calculated using Poisson regression with robust variance, with the occurrence or not of metabolic syndrome being the outcome. In these analyses, the sandwich library of the R 3.5.1 statistical program was used. The covariates that presented a critical level of p≤0.10 were considered candidates for permanence in the final model. The adjustment of potentially confounding variables was performed through the step-by-step statistical modeling process, with the inclusion of variables significantly associated in the bivariate analysis in the final model. After simultaneous inclusion of the main effects, plausible interactions were tested. Values of p≤0.05 were considered significant.

The study was approved by the Research Ethics Committees (CAAE No. 13329513.3.0000.5392) of the participating institutions (Opinion 320,343 and Opinion 46/13), according to the prerogatives of Resolution 466/2012 of the National Health Council.

RESULTS

Metabolic syndrome prevalence was 25.1% (95%CI: 22.47-27.95), showing that 58 professionals presented alterations in at least three risk factors that characterize this syndrome.

The professionals' anthropometric, biochemical, and blood pressure characteristics, components of the metabolic syndrome, are presented in Table 1.

Table 1. Anthropometric, biochemical, and casual blood pressure characteristics of nursing professionals working in oncology. Rio de Janeiro, Brazil, 2015.

Variables	Mean (SD)	Normal		Altered	
		n	%	n	%
Abdominal circumference (cm)	89.9 (14.9)	136	58.9	95	**41.1**
Plasma glucose (mg/dL)	93.9 (17.4)	214	92.6	17	7.4
Systolic blood pressure (mmHg)	119.8 (16.0)	172	74.5	59	25.5
Diastolic blood pressure (mmHg)	78.9 (29.3)	165	71.4	66	28.6
Triglycerides (mg/dL)	132.7 (68.4)	145	62.8	86	**37.2**
HDL cholesterol (mg/dL)	56.2 (15.1)	144	62.3	87	**37.7**

Source: Research data.

Abdominal circumference was the risk factor that most contributed to the occurrence of metabolic syndrome, being altered in 41.1% of professionals, followed by HDL cholesterol (37.7%) and triglycerides (37.2%) (Table 1).

Data in Table 2 show sociodemographic and work-related characteristics.

When comparing professionals with and without metabolic syndrome, it was observed that professionals with metabolic syndrome had (p<0.05) a higher mean age [42.0 (8.3) vs 38.9 (8.2)], longer professional training [18.9 (8.2) vs 15.4 (7.5)], institutional work [10.3 (8.2) vs 8.7 (7.2)], worked frequently/sometimes tired to a lesser extent (84.5% vs 94.8%), as well as presented decreased concentration (50.0% vs 66.5%) during shifts. Also, the phenomenon was more frequent among nurses (74.1% vs 25.9%) than to nursing assistants/technicians (**Table 2**).

Table 2. Sociodemographic and work-related characteristics of nursing professionals working in oncology care, according to the presence of metabolic syndrome – Rio de Janeiro, RJ, Brazil, 2015.

Variables	Metabolic Syndrome						
	Yes		No		Total		P value
	n	%	n	%	n	%	
Sex							
Female	47	81.0	144	83.2	191	82.7	0.701
Male	11	19.0	29	16.8	40	17.3	*
Age: Mean (SD)	42.0 (8.3)		38.9 (8.2)		39.6 (8.3)		**0.011** ‡
Race/color							
White	22	37.9	83	48.0	105	45.5	0.184
Nonwhite	36	62.1	90	52.0	126	54.5	*
Marital status							
With partner	40	69.0	123	71.1	163	70.6	0.758
Without partner	18	31.0	50	28.9	68	29.4	*
Highest education achieved							
Technical level	25	43.1	53	30.6	78	33.8	0.198 †
Undergraduate degree	6	10.3	27	15.6	33	14.3	
Residency / specialization / master's	27	46.6	93	53.8	120	51.9	
Monthly family income (BRL): mean (SD)	8,667.5 (3,926.9)		9,169.4 (4,569.7)		9,045.0 (4,416.2)		0.857 ‡
Professional category							
Nurse	43	74.1	104	60.1	147	63.6	**0.055**
Nursing assistant/technician	15	25.9	69	39.9	84	36.4	*****
Work schedule							
Day shift	26	44.8	97	56.1	123	53.2	0.128 †
Night shift	29	50.0	61	35.3	90	39.0	
Day laborer	3	5.2	15	8.7	18	7.8	
Alternate shift work	35	60.3	103	59.5	138	59.7	0.914 *
Weekly working hours: mean (SD)	52.7 (16.1)		51.7 (15.3)		52.0 (15.5)		0.744 ‡
Number of employment relationships							
1	33	56.9	97	56.1	130	56.3	0.912
≥2	25	43.1	76	43.9	101	43.7	*
Time since graduation (in years): mean (SD)	18.9 (8.2)		15.4 (7.5)		16.3 (7.8)		**0.003** ‡
Time in institutional work (in years): mean (SD)	10.3 (8.2)		8.0 (7.2)		8.6 (7.5)		**0.047** ‡
Burnout Syndrome (MBI)	24	41.4	66	38.2	90	39.0	0.663 *
Works while tired							
Frequently/sometimes	49	84.5	164	94.8	213	92.2	**0.011**
Rarely/never	9	15.5	9	5.2	18	7.8	*****
Concentration decreases during shift							
Frequently/sometimes	29	50.0	115	66.5	144	62.3	**0.025**
Rarely/never	29	50.0	58	33.5	87	37.7	*****

Source: Research data: *Pearson's chi-squared test; †Likelihood-Ratio ‡: U Mann-Whitney test

Among those surveyed, only 7.4% had the habit of smoking, approximately one third (29.9%) had the habit of drinking, a few more (34.6%) did not practice physical activity, and almost all (90.9%) had poor sleep quality. Most professionals showed changes in body mass index (43.7% overweight and 26.0% obesity). About a quarter (25.5%) had arterial hypertension and a higher frequency (36.8%) had their blood pressure measured regularly. Regarding comorbidities, the most frequent was low back pain (81%), followed by dyslipidemias (28.1%) and diabetes mellitus (6.5%) (**Table 3**).

When comparing professionals with and

without metabolic syndrome, it was observed that those with metabolic syndrome had a higher prevalence of obesity (48.3% vs 18.5%), dyslipidemia (37.9% vs 24.9%), and low back pain (89.7 vs 78.0%); however, they checked their blood pressure (53.4% vs 31.2%) and capillary blood glucose (37.9% vs 24.3%) to a greater extent. It was also observed that professionals with metabolic syndrome had a higher prevalence of changes in 24-hour ABPM values (54.7% vs 31.8%), during the wakeful period (47.2% vs 25.9%), and the sleep period (79.2% vs 50.0%), in addition to higher means for systolic and diastolic pressures, in all periods (**Table 3**).

Table 3. Habit, lifestyle, and personal history of nursing professionals who work in oncology care, according to the presence of metabolic syndrome – Rio de Janeiro, RJ, Brazil, 2015.

Variables	Metabolic Syndrome						P value
	Yes		No		Total		
	n	%	N	%	n	%	
Smoking habit	5	8.6	12	6.9	17	7.4	0.671*
Drinking habit	14	24.1	55	31.8	69	29.9	0.270*
Physical inactivity	23	39.7	57	32.9	80	34.6	0.353*
Poor sleep quality (PSQI)	54	93.1	15 6	90.2	210	90.9	0.502*
Leisure activities	39	67.2	12 2	70.5	161	69.7	0.638*
Body mass index (BMI)							<0.0001
Eutrophic	5	8.6	65	37.6	70	30.3	†
Overweight	25	43.1	76	43.9	101	43.7	
Obesity	28	48.3	32	18.5	60	26.0	
Personal background							
Arterial hypertension	20	34.5	39	22.5	59	25.5	0.071*
Checked blood pressure regularly	31	53.4	54	31.2	85	36.8	0.002*
Diabetes mellitus	6	10.3	9	5.2	15	6.5	0.169*
Checked capillary blood glucose regularly	22	37.9	42	24.3	64	27.7	0.044*
Dyslipidemias	22	37.9	43	24.9	65	28.1	0.055*
Checked the lipid profile regularly	35	60.3	85	49.1	120	51.9	0.139*
Angina pectoris	3	5.2	15	8.7	18	7.8	0.390*
Has/had low back pain	52	89.7	13 5	78.0	187	81.0	0.051*
Ambulatory Blood Pressure Monitoring (ABPM)							
24-hour ABPM (n=223)							
Altered pressure	29	54.7	54	31.8	83	**37.2**	**0.003***
Systolic: Mean (SD)	124.7 (13.8)		117.4 (11.5)		119.2 (12.4)		**0.0001**‡
Diastolic: Mean (SD)	79.9 (10.2)		74.7 (9.0)		76.0 (9.6)		**0.001**‡
Wakefulness ABPM (n=223)							
Altered pressure	25	47.2	44	25.9	69	**30.9**	**0.003***
Systolic: Mean (SD)	125.9 (15.2)		119.5 (12.3)		121.0 (13.3)		**0.005**‡
Diastolic: Mean (SD)	80.9 (11.8)		77.1 (9.6)		78.0 (10.3)		**0.044**‡
Sleep ABPM (n=223)							**<0.0001**
Altered pressure	42	79.2	85	50.0	127	57.0	*****
Systolic: Mean (SD)	120.8 (15.1)		112.5 (13.3)		114.5 (14.2)		**0.0001**‡
Diastolic: Mean (SD)	77.4 (11.7)		69.9 (11.1)		71.7 (11.7)		**<0.0001**‡

Source: Research data: *Pearson's chi-squared test; †Likelihood-Ratio ‡: U Mann-Whitney test.

Multiple analysis showed that the prevalence of metabolic syndrome increased by 4.0% (PR=1.04; 95%CI:1.05-1.07) for each year of professional training and 3.0% (PR=1.03; 95%CI:1.01-1.05) for each 1 mmHg increase in sleep-period ABPM diastolic pressure. A progressive increase in the prevalence of metabolic syndrome was also observed when eutrophic professionals were compared with those with overweight and obesity **(Table 4)**.

Table 4. Unadjusted and adjusted prevalence ratio of factors associated with metabolic syndrome in nursing professionals working in oncology care. Rio de Janeiro, RJ, Brazil, 2015.

Related Variables	Metabolic Syndrome			
	*Gross PR	†95%CI	*Adjusted PR	†95%CI
Time since graduation	1.04	1.01-1.07	1.04	1.05-1.07
Body mass index (BMI)				
Eutrophic			1	
Overweight	3.46	1.39-8.61	2.84	1.93-6.70
Obesity	6.53	2.70-15.86	4.94	2.08-11.77
Sleep period diastolic ABPM	1.04	1.02-1.06	1.03	1.01-1.05

Source: Research data *PR: Prevalence ration; †CI: Confidence Interval

DISCUSSION

In this study, a high prevalence of MS was observed, which was associated with longer professional training, higher BMI (overweight and/or obesity), and changes in ABPM during sleep.

The prevalence observed in professionals working in oncology (25.1%) was lower than that estimated in the Brazilian population (38.4%)[5], based on data from the National Health Survey, but similar to that observed in a study with health services professionals in Iran (22.4%)[16], and higher than that found in a study with military police officers in a northeastern city (7.3%)[17]. The differences observed are possibly related to the different socioeconomic profiles of the studied professionals, characterized by a higher level of income and average education than the Brazilian population[5], as well as the greater presence of physical activities in the daily lives of military police[17], when compared with the sample of the present study.

Regarding sex, despite the predominance of MS in women (82.7%), there was no statistically significant difference in relation to men, unlike what was found in the National Health Survey in 2013, which covered all Brazilian regions. In that survey, although the prevalence observed in women was lower than in the present study (41.8%), the female sex was associated with the occurrence of MS (PR = 1.16; 95%CI 1.08-1.24)[5].

Both the higher prevalence among women and the non-association of sex with the outcome in the present study could be related to the fact that nursing professionals are mostly female.

Although the variables age and time in institutional work did not remain in the regression model, each year of time since graduation increased the prevalence of the outcome by 4% and it is known that this variable has a positive relationship with age and institutional work time. In this sense, this result was expected, given that aging is an important factor of metabolic deterioration[5,16], characterized by an increase in the incidence of chronic diseases related to a lower frequency of physical activity, an increase in the percentage of fat, with greater importance for central obesity and decreased lean mass[18], as well as longer exposure to risk factors.

Another cardiovascular and metabolic risk factor that intensifies with increasing age is excess weight (overweight/obesity), which, reflecting what has been observed in the world population, had a high prevalence (69.7%) in the studied sample. The presence of overweight or obesity is characterized as a predictor of unfavorable outcomes such as insulin resistance, deterioration of the lipid profile, and elevation of blood pressure[19], which also contributed to the increase in the prevalence of metabolic syndrome. This finding was not surprising because, in this study, although BMI is not a criterion for defining the presence of MS, this marker has a potential correlation with other parameters studied, such as waist circumference, triglycerides, and HDL cholesterol values, considered criteria for the presence of metabolic syndrome according to the World Health Organization[4]. Such findings may be related to changes in habits and lifestyle, which occurred with the process of urbanization and industrialization in the country, such as sedentarism, which covered more than a third of those surveyed.

Professionals with MS showed a higher proportion of concentration changes during the shift, possibly due to chronic exposure to work-related stressors and the "alarm reaction" triggered by stimuli in this environment, making it difficult to concentrate on a specific activity. It is emphasized that the higher proportion of MS in

this group may be the result of the manifestation of allostatic overload in these professionals, characterized by the prolonged and repetitive release of primary stress mediators, acting on different target organs, which can trigger changes in blood pressure, heart rhythm, in thrombotic and immune response processes, in lipid and glucose metabolism, and in the functioning of the central nervous system[9], increasing the risk for illness.

Professionals with MS regularly measured their blood pressure and capillary glycemia more frequently, possibly because the presence of MS makes these professionals more attentive to associated comorbidities, such as arterial hypertension and diabetes *mellitus*, or that having knowledge that these variables contribute to the manifestation of the syndrome, monitor them more frequently as a way of evaluating the control of this pathology.

Most participants (81.0%) had low back pain, more frequent in those with MS. This finding may be due to the characteristics inherent to the work activities performed and to the working conditions of nursing professionals[20], reflecting the high pervasiveness of this morbidity in the general population[21]; the high prevalence of sedentary lifestyle, which is linked to structural changes in the spine, which contribute to disability[22]; high prevalence of excess weight, which causes muscle overload, wearing out bone structures and vertebral discs, through inflammatory processes, which favors the onset of low back pain[23]; and even greater possibility of access for the diagnosis of work-related morbidities[23].

The alteration of all ABPM parameters in professionals with metabolic syndrome was a particularly important finding of the present study, especially during the sleep period, when a drop in blood pressure is expected, known as a dip. The absence of descent and the intensity at which it occurs are related to autonomic dysfunction, sleep apnea, nocturnal volume overload, increased mortality, development of target organ lesions such as left ventricular hypertrophy, reduced myocardial diastolic function, increased prevalence of diabetic retinopathy, and decreased glucose tolerance[24]. Nocturnal hypertension is still a predictor of cardiovascular events, such as acute myocardial infarction or stroke[25]. Therefore, although the average blood pressure levels among professionals are within normal limits in the different ABPM periods, the hypertension observed during sleep, especially among professionals with metabolic syndrome, suggests that they are exposed to greater cardiovascular risk[25], a finding corroborated by the fact that for each additional one mmHg in diastolic blood pressure, assessed by ABPM during sleep, increases the prevalence of metabolic syndrome by 3%. The importance of these results is more pronounced when considering that ABPM reduces the white coat effect and minimizes the influence of the observer and the environment on blood pressure measurement.

The results evidenced by the study show that in order to reduce the occurrence of MS, professionals should be encouraged to adopt healthier lifestyles and corroborate the importance of carrying out periodic examinations, which can detect changes in the pre-clinical phase, when they are reversible[26].

The design of the present study does not allow the establishment of a cause-and-effect relationship, the data obtained through self-report are subject to memory bias, and the prevalence of comorbidities can be influenced by access to health services. However, as the sample was educated and had a higher income than the majority of the Brazilian population, it was considered that those who had or did not have the outcome of interest would have had the same conditions of access to health services. Furthermore, it is important to consider the well-known problem of survival bias and reverse causality inherent in cross-sectional studies.

CONCLUSION

MS in oncology nursing professionals was associated with longer professional training, BMI, and changes in ABPM during sleep. Nurses can establish strategies, such as educational programs and behavioral and cognitive actions, in order to identify the variables that may be favoring the occurrence of MS, and, if these are related to the work environment, it is urgent to seek to readjust it.

SÍNDROME METABÓLICA EM PROFISSIONAIS DE ENFERMAGEM QUE ATUAM NA ASSISTÊNCIA ONCOLÓGICA: PREVALÊNCIA E FATORES ASSOCIADOS

RESUMO

Objetivo: avaliar a prevalência da síndrome metabólica e os fatores associados em profissionais de enfermagem que atuam em oncologia. **Método:** estudo transversal com 231 profissionais de enfermagem, de um centro de alta complexidade em oncologia do Estado do Rio de Janeiro, Brasil, entre junho de 2013 e junho de 2015. Realizou-se entrevista para coleta de dados sociodemográficos, profissionais, antecedentes pessoais, hábitos e estilos de vida e condições de saúde. Foram realizadas medida da circunferência da cintura, peso, altura, pressão arterial casual e Monitorização Ambulatorial da Pressão Arterial, além da glicemia plasmática de jejum, triglicerídeos e lipoproteína de alta densidade. Avaliou-se a síndrome metabólica de acordo com a I Diretriz Brasileira de Diagnóstico e Tratamento da Síndrome Metabólica. Regressão de Poisson com variância robusta foi realizada, sendo a presença da síndrome metabólica ou não o desfecho. **Resultados:** a prevalência da síndrome metabólica foi de 25,1% e esta condição se associou ao maior tempo de formação profissional (4,0%; IC95%:1,05-1,07), à maior pressão diastólica na Monitorização Ambulatorial da Pressão Arterial do período de sono (3,0%; IC95%:1,01-1,05), presença de sobrepeso (2,84%; IC95%:1,93-6,70) e obesidade (4,94%; IC95%:2,08-11,77). **Conclusões:** Observou-se alta prevalência da síndrome metabólica nos profissionais avaliados, e associação com excesso de peso e alteração da pressão no período de sono. Os resultados apontam para necessidade de intervenções para controle de fatores de risco para doenças crônicas não transmissíveis na população estudada.

Palavras-chave: Síndrome metabólica. Enfermagem oncológica. Fatores de risco. Saúde do trabalhador. Enfermagem do trabalho.

SÍNDROME METABÓLICO EN PROFESIONALES DE ENFERMERÍA QUE ACTÚAN EN LA ASISTENCIA ONCOLÓGICA: PREVALENCIA Y FACTORES ASOCIADOS

RESUMEN

Objetivo: evaluar la prevalencia del síndrome metabólico y los factores asociados en profesionales de enfermería que actúan en oncología. **Método**: estudio transversal con 231 profesionales de enfermería, de un centro de alta complejidad en oncología del Estado de Rio de Janeiro, Brasil, entre junio de 2013 y junio de 2015. Se realizó entrevista para recolección de datos sociodemográficos, profesionales, antecedentes personales, hábitos y estilos de vida y condiciones de salud. Fueron realizadas medida de la circunferencia de la cintura, peso, altura, presión arterial casual y Monitoreo Ambulatorio de Presión Arterial, además de la glucemia plasmática de ayuno, triglicéridos y lipoproteína de alta densidad. Se evaluó el síndrome metabólico de acuerdo con la I Directriz Brasileña de Diagnóstico y Tratamiento del Síndrome Metabólico. Fue realizada Regresión de Poisson con varianza robusta, siendo la presencia del síndrome metabólico, o no, el resultado. **Resultados**: la prevalencia del síndrome metabólico fue de 25,1% y esta condición se asoció al mayor tiempo de formación profesional (4,0%; IC95%:1,05-1,07), a la mayor presión diastólica en elMonitoreo Ambulatorio de Presión Arterial del período de sueño (3,0%; IC95%:1,01-1,05); presencia de sobrepeso (2,84%; IC95%:1,93-6,70) y obesidad (4,94%; IC95%:2,08-11,77). **Conclusiones**: se observó alta prevalencia del síndrome metabólico en los profesionales evaluados, y asociación con exceso de peso y alteración de la presión en el período de sueño. Los resultados señalan la necesidad de intervenciones para el control de factores de riesgo para enfermedades crónicas no transmisibles en la población estudiada.

Palabras clave: Síndrome metabólico. Enfermería oncológica. Factores de riesgo. Salud laboral. Enfermería del trabajo.

REFERENCES

1. Félix NDC, Nóbrega MML. Metabolic Syndrome: conceptual analysis in the nursing context. Rev. Latino-Am. Enfermagem. 2019; 27: e3154. DOI: https://doi.org/10.1590/1518-8345.3008.315.
2. Sabin Ayres C, Friedrich D, Nunes S. Riscos ergonômicos enfrentados pelo enfermeiro: uma revisão narrativa. Revista Sobre Excelência Em Gestão E Qualidade. 2020; 2(1): 1-16. DOI: https://doi.org/10.47591/2674-9203.2020v2n1.art1-1-16.
3. Ribeiro RP, Marziale MHP, Martins JT, Ribeiro PHV, Robazzi MLCC, Dalmas JC. Prevalence of Metabolic Syndrome among nursing personnel and its association with occupational stress, anxiety and depression. Rev. Latino-Am. Enfermagem. 2015; 23(3): 435-440. DOI: https://doi.org/10.1590/0104-1169.0383.2573
4. Monte IP, França SL, Vasconcelos RNO, Vieira JRS. Comparação entre quatro diferentes critérios de diagnóstico de síndrome metabólica em indivíduos do Arquipélago do Marajó (Pará, Brasil). R. Assoc. bras. Nutr. 2019; 10(1): 96-102. Disponível em: https://www.rasbran.com.br/rasbran/article/view/1242
5. Oliveira LVA, Santos BNS, Machado IE, Malta DC, Velasquez-Melendez G, Felisbino-Mendes MS. Prevalence of the metabolic syndrome and its components in the brazilian adult population. Ciênc. saúde coletiva. 2020; 25(11): 4269-80. DOI: https://doi.org/10.1590/1413-812320202511.31202020.
6. Roomi MA, Mohammadnezhad M. Prevalence Of Metabolic Syndrome Among Apparently Healthy Workforce. J Ayub Med Coll Abbottabad. 2019; 31(2): 252-254. Available from: https://jamc.ayubmed.edu.pk/jamc/index.php/jamc/article/view/5121/2682
7. Merces MC, Gomes AMT, Coelho JMF, Servo MLS, Marques SC, D'Oliveira Júnior A. Scientific evidence on the association between burnout and metabolic syndrome: integrative review. Acta paul. enferm. 2019; 32(4): 470-476.

DOI: https://doi.org/10.1590/1982-0194201900064.

8. Nogueira M. Afastamentos por adoecimento do trabalhador de enfermagem do ambulatório de uma instituição oncológica. 2007. [Dissertação de mestrado]. Rio de Janeiro (RJ): Programa de Pós-Graduação em Enfermagem. Universidade Federal do Estado do Rio de Janeiro - UNIRIO. 2007. Disponível em: http://bvsms.saude.gov.br/bvs/publicacoes/inca/Maria_Luiza_Nogueira.pdf.

9. Guidi J, Lucente M, Sonino N, Fava GA. Allostatic load and its impact on health: a systematic review. Psychother Psychosom. 2021; 90(1): 11-27. DOI: https://doi.org/10.1159/000510696.

10. Santos J. Cardiovascular risk and allostatic load in nurses working in oncology: bio-psycho-emotional and work-related variables. 2016. [Doctoral Thesis]. São Paulo (SP). Programa de Pós-graduação em Enfermagem na Saúde do Adulto. Universidade de São Paulo - USP. 2016. DOI: 10.11606/T.7.2017.tde-17052017-111748.

11. Xavier HT, Izar MC, Faria Neto JR, Assad MH, Rocha VZ, Sposito AC, et al . V Diretriz Brasileira de Dislipidemias e Prevenção da Aterosclerose. Arq. Bras. Cardiol. 2013; 101(4 Suppl1): 1-20. DOI: https://doi.org/10.5935/abc.2013S010.

12. Sociedade Brasileira de Diabetes. Diretrizes da sociedade Brasileira de Diabetes 2019-2020. [Internet]. São Paulo: SBD, 2019. Disponível em: http://www.saude.ba.gov.br/wp-content/uploads/2020/02/Diretrizes-Sociedade-Brasileira-de-Diabetes-2019-2020.pdf.

13. Barroso WKS, Rodrigues CIS, Bortolotto LA, Mota-Gomes MA, Brandão AA, Feitosa ADM, et al. Diretrizes Brasileiras de Hipertensão Arterial 2020. Arq Bras Cardiol. 2021; 116(3):516-658. DOI:

14. Nascimento JOV, Santos J, Meira KC, Pierin AMG, Souza-Talarico JN. Shift work of nursing professionals and blood pressure, burnout and common mental disorders. Rev Esc Enferm USP. 2019;53: e03443. DOI: https://doi.org/10.1590/S1980-220X2018002103443.

15. Alessi A, Brandao AA, Paiva AMG, Nogueira AR, Feitosa A, Gonzaga CG, et al. I Brazilian position paper on prehypertension, white coat hypertension and masked hypertension: diagnosis and management. Arq Bras Cardiol 2014; 102:110-118. DOI: https://doi.org/10.5935/abc.20140011

16. Niazi E, Saraei M, Aminian O, Izadi N. Frequency of metabolic syndrome and its associated factors in health care workers. Diabetes Metab Syndr. 2019; 13(1): 338-342. DOI: https://doi.org/10.1016/j.dsx.2018.10.013.

17. Santos Fontes IS, Sampaio CG, Santos CG, Sá Barros AMM, Fontes DS, Santos IMC, et al. Metabolic syndrome among police officers in a police station from the city of Aracaju, Sergipe State, Brazil. Sci Med. 2016; 26(3): ID24160. DOI: https://doi.org/10.15448/1980-6108.2016.3.24160.

18. Silva PAB, Sacramento AJ, Carmo CID, Silva LB, Silqueira SMF, Soares SM. Factors associated with metabolic syndrome in older adults: a population-based study. Rev. Bras. Enferm. 2019; 72(Suppl 2): 221-228. DOI: https://doi.org/10.1590/0034-7167-2018-0620.

19. Costa MVG, Lima LR, Silva ICR, Rehem TCMSB, Funghetto SS, Stival MM. Increased cardiovascular risk and role of metabolic syndrome in hypertensive elderly. Esc. Anna Nery. 2021; 25(1): e20200055. DOI: https://doi.org/10.1590/2177-9465-EAN-2020-0055.

20. Trindade LR, Merlo ARC, Silva RM, Beck CLC, Goes NC. Factors of illnesses of health workers: integrative review. Cienc Cuid Saude. 2017; 16(4): 1-7. DOI: https://doi.org/10.4025/cienccuidsaude.v16i4.39161.

21. Instituto Brasileiro de Geografia e Estatística. Pesquisa Nacional por Amostra de Domicílios. Panorama da Saúde no Brasil: acesso e utilização dos serviços, condições de saúde e fatores de risco e proteção à saúde (PNAD 2008). Rio de Janeiro: IBGE; 2010. Disponível em: https://biblioteca.ibge.gov.br/visualizacao/monografias/GEBIS%20-%20RJ/panorama.pdf.

22. Bergmann GG, Pinheiro ES, Mello JB, Graup S. Association between different domains of physical activity and the nonspecific low back pain. Motricidade Edições Desafio Singular. 2020; 6(3): 245-54. DOI: https://doi.org/10.6063/motricidade.18141.

23. Malta DC, Oliveira MM, Andrade SSCA, Caiaffa WT, Souza MFM, Bernal RTI. Factors associated with chronic back pain in adults in Brazil. Rev Saude Publica. 2017; 51 (Supl 1): 9s. DOI: https://doi.org/10.1590/S1518-8787.2017051000052.

24. Coccina F, Pierdomenico AM, Cuccurullo C, Pizzicannella J, Madonna R, Trubiani O, et al. Prognostic value of masked uncontrolled hypertension defined by different ambulatory blood pressure criteria. Am J Hypertens. 2020; 33(8): 726-733. DOI: https://doi.org/10.1093/ajh/hpaa078.

25. Sakhuja S, Booth JN, Anstey DE, Jaeger BC, Lewis CE, Lloyd-Jones DM, et al. Using predicted atherosclerotic cardiovascular disease risk for discrimination of awake or nocturnal hypertension. Am J Hypertens. 2020; 33(11): 1011-1020. DOI: https://doi.org/10.1093/ajh/hpaa099.

26. Helou TN, Santos RD, Laurinavicius AG, Bittencourt MS, Pesaro AEP, Franco FGM, et al. Association between clinical factors and self-underestimation of cardiovascular risk in subjects submitted to a routine health evaluation. Clin Cardiol. 2018; 41(1): 28-33. DOI: https://doi.org/10.1002/clc.22841.

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