ANKLE-BRAQUIAL INDEX AND CARDIOVASCULAR RISK FACTORS IN NURSING PROFESSIONALS

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ABSTRACT
This is a cross-sectional study in which 94 nursing workers from the public health network were evaluated. The objective was to identify the prevalence of altered ankle-brachial index and cardiovascular risk factors in nursing workers. Ethical aspects have been met. The data were obtained through an interview with a structured script. The prevalence of altered ABI was 30 (31.9%; CI; 22.3-42.6). It was found that 83% were technical, 91.5% female, aged between 18 and 45 years-old, white skin color, belonging to the economic class A/B and with more than five years of training. Among the cardiovascular risk factors, there was a prevalence of a family history of cardiovascular disease (73.4%), having more than four cardiovascular risk factors (73.4%), BMI ≥ 25 kg / m² (68.1%), and presented waist circumference with moderate to high risk (63.8%). The non-performance of physical activity (RP: 2.36, 95% CI: 1.29-4.32) was independently associated with the change in ABI measure. The coexistence of cardiovascular risk factors associated with changes in the ABI measure in nursing workers reports the need for interventions in the health of these people.

Keywords: Peripheral Artery Disease, Cardiovascular Diseases, Occupational Nursing, Risk Factors, Ankle-Brachial Index.

INTRODUÇÃO

Measurement of the ankle-brachial index (ABI) is an effective, simple, non-invasive, low cost and easy to perform feature capable of detecting chronic obstructive arterial disease (DAOP), with or without symptomatology, and the atherosclerotic process[1-3]. The ABI represents the ratio between the highest value of the ankle systolic arterial pressure of the pedia and posterior tibial arteries and the measurement of the brachial arteries. This measure is also capable of signaling a cardiovascular alteration both in its asymptomatic phase and in its symptomatic phase [4-6].

ABI measurements, between 0.9 and 1.3, can be considered as a parameter of normality; however, there is still controversy regarding the cutoff point[7-8]. It is worth noting that ABI values above 1.30 or below 0.9 are strong predictors of diffuse atherosclerotic disease and may demonstrate the presence of arterial stiffness due to calcification of the middle layer and, consequently, vascular wall stiffness. These changes compromise blood flow both for the onset of PAD and for carotid artery disease and, thus, an increase in cardiovascular disease. However, an ABI value of> 0.9 may be related to diffuse atherosclerotic disease, with arterial hardening due to middle layer calcification and vascular wall stiffness[1,3].

Changes in ABI values, whose index is less than 0.9, are indicative of DAOP, with or without claudication, ischemia or lesion in the lower limb, as well as increased cardiovascular risk[4-6,8-9]. In Brazil, in the general population, a prevalence of DAOPis estimated at around 10.5%[1]. In Colombia, prevalence ranges from 4.0 to 4.7[10].

In Brazil, the ABI measurement is still little used in clinical practice by nurses, although it is a useful tool and easy to apply. The use of this resource in the evaluation and collection of data in the person under the care of the nurse should be stimulated[11]. The nurse practitioner usually appropriates the arterial circulation

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measurement in the venues for persons undergoing treatment for venous ulcer and undergoing compressive therapy, with values of ABI> 0.8[12] as the parameter.

In a systematic review and meta-analysis, people with ABI <0.9 were associated with increased cardiovascular mortality from heart disease, stroke, and acute myocardial infarction[5]. However, changes with ABI index> 1.31 were also associated with cardiovascular disease mortality[4].

In Brazil, cardiovascular diseases (CVD) are responsible for high hospitalization rates and high socioeconomic costs. In people exposed to risk factors, inappropriate behavioral habits can be identified as a consequence of increasing urbanization, worsening the prognosis of exposed persons. Such diseases become a major public health problem because they cover different age groups and economic classes, and represent a multifactorial etiology due to risk factors that predispose to its onset[6].

In addition to the general population, health professionals and the nursing team are also exposed to different cardiovascular risk factors. Nursing workers carry out their activities with a high workload, which generates the risk associated with the development of cardiovascular disease due to the lack of time for physical activities, good food and leisure, actions that can generate better habits of life, avoiding the appearance of diseases and providing a better quality of life[13].

Tracking people with changes in ABI measurement has been recommended[6]. However, in Brazil, the prevalence of changes in ABI measures in nursing professionals is unknown. In this sense, the study sought to identify the prevalence of ABI and cardiovascular risk factors in nursing workers from public health units in a city of the Southwest Health Region II (Jataí, Goiás, Brazil).

METHODOLOGY

This is a cross-sectional study carried out between August 2015 and January 2016 in nursing workers, between nurses and nursing technicians, who worked in public health services in Jataí, Goiás, Brazil (municipality of southwest of Goiás).

Data collection was performed at the Basic Health Units, and at the Municipal Hospital. The following inclusion criteria were adopted: age ≥ 18 years-old; being linked to a public health service; being a nursing professional (nurse, nursing technician); having no

history of lower or upper limb amputation, with or without history of limping.

The study complies with Resolution 466/2012 and was approved by the Ethics and Research Committee, under protocol number 1,083,474. All legal ethical aspects were considered, and the participants were informed about the procedures, objectives of the research and maintenance of secrecy; thus, they signed the term of participation agreement by signing the Term of Free and Informed Consent.

The ABI measurement was performed on each participant after resting for five minutes in the supine position. A portable vascular Doppler device (DV-2001, 10 MHz), mercury sphygmomanometer, duly calibrated, and conductive gel were used. The examination was performed in both limbs, meeting the requirements of width and length. Blood pressure (BP) was measured by the auscultatory method, after five minutes of rest, in the left upper limb, with the practitioner sitting and the limb supported[6]. The devices were calibrated prior to data collection. Results were defined as altered ABI <0.90 and> 1.30, and values between 0.90 and 1.30[1] were considered normal.

The AP was verified with automatic device, duly calibrated. Also as recommended, the cuff was selected based on the brachial circumference, measured at the midpoint between the acromion and the olecranon, and placed 2 to 3 cm above the antecubital fossa. PA checks were performed in a quiet environment, in a room reserved for this purpose on the days of data collection, with the worker sitting in the sitting position, feet flat on the floor, uncrossed legs, empty bladder, arm extended at the fourth intercostal space, and supported on a flat and solid surface. Resting care (5 to 10 minutes)[6] was also observed. It is important to note that three measurements of blood pressure were measured with a one-minute interval between each scan, discarding the first one and considering the mean arterial pressure obtained from the last two ones.

Patients with BP> 140 x 90 mmHg were considered at cardiovascular risk. The categorization for hypertensive and diabetic patients was performed by means of self-report, in the same way as the information regarding alcoholism, smoking, physical activity and history of cardiovascular disease.

Interviews were conducted with a structured script containing socioeconomic and demographic variables, reporting questions on sex, age, self-reported skin color, marital status, economic class and professional

information. The economy class was classified according to the Economic Classification Criteria of the Brazilian Association of Research Companies[14].

The cardiovascular risk factors evaluated were hypertension, diabetes, smoking, alcoholism, altered cholesterol and family history of cardiovascular changes. A physical evaluation was performed, contemplating anthropometric measures. The body weight was evaluated in kilograms, using a mechanical balance measured before the beginning of each weighing, and the height was measured with stadiometer coupled to the same balance. The body mass index (BMI) was then calculated by applying the formula: BMI = weight (kg) / height² (m). The BMI> 25 kg/m² was considered as a cardiovascular risk[15].

Measurement of waist circumference (WC) was performed with an inelastic metric tape graduated in centimeters and with an accuracy of 0.1 cm. The measurement was verified at the midpoint between the last rib and the lateral iliac crest. They were classified as adequate (men <94 cm and women <80 cm), with cardiovascular risk (men> 94 cm and women> 80 cm) and high cardiovascular risk (men> 102 cm and women> 88 cm)[15].

It was considered for the evaluation of the number of cardiovascular risk factors the coexistence in one worker of the clinical variables listed that may be associated with the outcome of cardiac alteration or possibilities of fatal event (family history, obesity, altered ABI, hypertension, diabetes mellitus, sedentary lifestyle, high waist circumference and history of cardiovascular disease).

For data analysis, a database was structured by double typing. With the data included, descriptive and inferential statistics were performed in the software Statistical Package for the Social Sciences for Windows® (IBM® SPSS 23.0). The prevalence of the altered ABI measure was estimated with a 95% confidence interval. Shapiro-Wilk normality tests were performed to verify the normality of the quantitative variables. Descriptive statistical analysis was performed. Continuous variables were presented as means and standard deviation, and categorical variables as absolute and relative frequencies. For the analysis of the categorical qualitative variables, chi-square or Fisher's exact tests were used, considering the level of significance of 5%. The predictive variables that showed $p \leq 0.20$ in the bivariate analysis were evaluated in the simple or crude Poisson regression model, using the prevalence ratio (PR) and the 95% confidence interval (95% CI) as a measure.

RESULTS

Table 1 presents the analysis of the proportion of socioeconomic and demographic characteristics of nursing workers. From the total, 17% were nurses, and 83% were nursing technicians. About the participants, 91.5% were female (p = 0.027), the mean age was 41.05 (SD ± 10.9), and 66% were categorized in the age range between 18 and 45 years-old (p = 0.007). Regarding the skin color self-reported, 69.1% are white (p = <0.000), 52.1% were categorized in economy class A/B (p = <0.000) and 52.1% reported they do not have a partner. From the participants, 75.5% reported having more than 5 years of training (p = 0.009), and 72.3% reported having a job.

The data presented in Figure 1 demonstrate the prevalence of changes in ABI measures among nursing workers. The ABI<0.90, without DAOP, was 6.3% in nurses and 10.3% in nursing technicians, and 25% and 21.8% in the range ≥ 1.31, respectively. Among the total number of professionals, the prevalence of alteration of ABI measurement was 30 (31.9%, CI, 22.3-42.6). = Among the categories, the occurrence among the nurses of the alteration of any of the measures was of 9.6%, and of 22.3% among the nursing technical workers. Proportion analysis was performed using the chi-square test, but no statistically significant difference was found.

Table 2 presents the clinical characteristics of nursing workers, according to the ABI measures. In the bivariate analysis, it was verified that the lack of physical activity and having more than four cardiovascular risk factors were associated with the outcome of altered ABI measurement (p <0.05). However, BMI, smoking and waist circumference presented marginal significance.

Regarding the clinical health characteristics associated with ABI measurements, physical activity (PR: 2.36, 95% CI: 1.29-4.32) was independently associated with the altered ABI measure. In this analysis, it should be noted that, among participants who do not perform physical activity, the prevalence of altered ABI is 36% higher than among those with ABI measures ≥ 0.90 ≤ 1.3. Regarding the number of risk factors for cardiovascular disease, smoking and BMI, the confidence interval does not confirm the significance.

Table 1. Socioeconomic and demographic characteristics of 94 nursing workers. Jataí, GO, Brazil, 2017.

Variables	Sample distribution	Nurse	Nursing Technician	p*
	n (%)	n (%)	n (%)	
Gender				0,027
Female	86 (91,5)	12 (14)	74 (86)	
Male	8 (8,5)	4 (50)	4 (50)	
Age (average: 41,05 DP±10,9)				0,007
18 - 45	62 (66)	15 (24,2)	47 (75,8)	
≥ 46	32 (34)	1 (3,1)	31 (96,9)	
Skin color				<0,000
White	65 (69,1)	4 (25)	61 (78,2)	
Non-white	29 (30,9)	12 (75)	17 (21,8)	
Marital status				0,852
With partnet	45 (47,9)	8 (50)	37 (47,4)	
Without partner	49 (52,1)	8 (50)	41 (52,6)	
Economical class				<0,000
A/B	49 (52,1)	15 (93,8)	34 (43,6)	
C	45 (47,9)	1 (6,3)	44 (56,4)	
Time after graduation (Years)				0,009
1- 5	23 (24,5)	8 (50)	15 (19,2)	
≥ 5	71 (75,5)	8 (50)	63 (80,8)	
Nº jobs				0,114
1	68 (72,3)	9 (56,3)	59 (75,6)	
≥ 2	26 (27,7)	7 (43,8)	19 (24,4)	

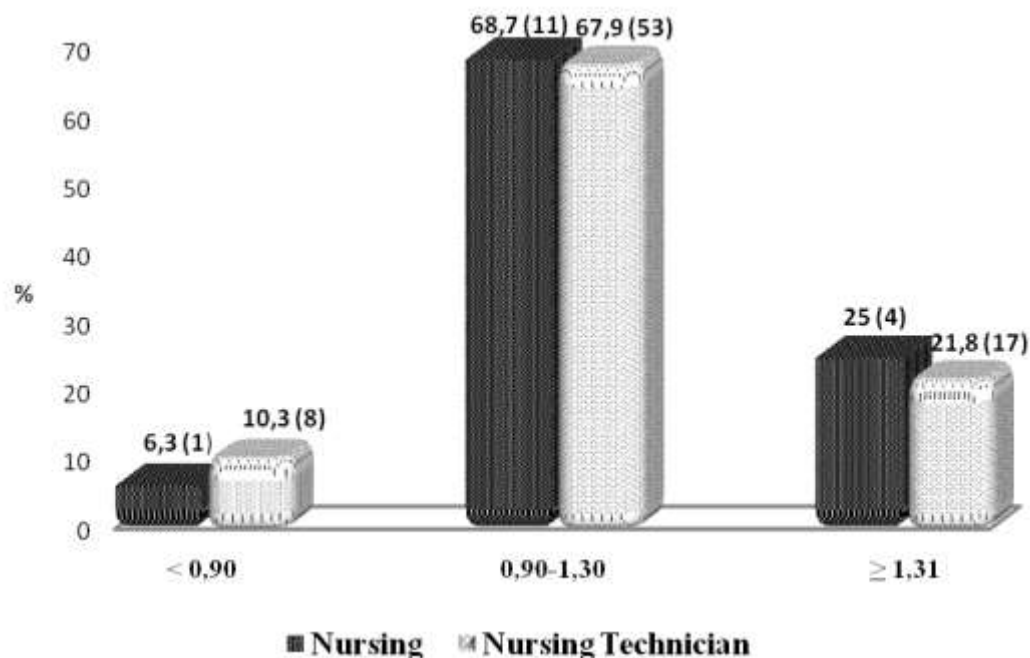*Chi-square test or Fisher's exact test.Value of p<0,05.

Figure 1. Prevalence of ABI changes in nursing workers. Jataí, GO, Brazil, 2017.

Table 2. Prevalence of cardiovascular risk factors associated with ABI measurement in nursing workers. Jataí, GO, Brazil, 2017.

Clinical features	Total ofworkers	ABI $\geq 0,90 \leq 1,3$	ABI $< 0,90 \geq 1,31$	p*
	n = 94 (%)	n (%)	n (%)	
HAS				0,341
Yes	14 (14,9)	8 (12,5)	6 (20,0)	
No	80 (85,1)	56 (87,5)	24 (80,0)	
DM				0,689
Yes	3 (3,2)	2 (3,1)	1 (3,30)	
No	91 (96,8)	62 (96,9)	29 (96,7)	
Ethicism				0,921
Yes	32 (34)	22 (34,4)	10 (33,3)	
No	62 (66)	42 (65,6)	20 (66,7)	
Smoking				0,080
Yes	6 (6,4)	2 (3,1)	4 (13,3)	
No	88 (93,6)	62 (96,9)	26 (86,7)	
Physical activity				0,019
Yes	43 (45,7)	24 (37,5)	19 (63,3)	
No	51 (54,3)	40 (62,5)	11 (36,7)	
Family history of DCV				0,624
Yes	69 (73,4)	46 (71,9)	23 (76,7)	
No	25 (26,6)	18 (28,1)	7 (23,3)	
Current history of CVD				0,280
Yes	16 (17,2)	9 (14,3)	7 (23,3)	
No	77 (82,8)	54 (85,7)	23 (76,7)	
N° of risk factors of DCV**				0,037
1 - 3	25 (26,6)	21 (32,8)	4 (13,3)	
≥ 4	69 (73,4)	43 (67,2)	26 (86,7)	
BMI				0,070
$\leq 24,9$ kg/m²	30 (31,9)	24 (37,5)	6 (20,0)	
≥ 25 kg/m²	64 (68,1)	40 (62,5)	24 (80,0)	
Waist circumference				0,076
Suitable	34 (36,2)	27 (42,2)	7 (23,3)	
Moderate risk	22 (23,4)	13 (20,3)	9 (30,0)	
High risk	38 (40,4)	24 (37,5)	14 (46,7)	

*Chi-square or Fisher's exact test. Value of p < 0,05.** Cardiovascular disease.

Table 3. Analysis of cardiovascular risk factors associated with ABI measurements of nursing workers. Jataí, GO, Brazil, 2017.

Variable	RP* gross(IC# 95%)	p*
N° of risk factors of DCV		
1 - 3	1	-
≥ 4	0,34 (0,13 – 0,87)	0,025
Smoking		
Yes	1	-
No	0,95 (0,92-0,98)	0,002
Physical activity		
Yes	1	-
No	2,36 (1,29 – 4,32)	0,005
BMI		
$\leq 24,9$ kg/m²	1,87 (0,85 – 4,10)	0,115
≥ 25 kg/m²	1	
CC		
Suitable	1	-
Moderate risk	0,90 (0,59-1,35)	0,615
High risk	0,91 (0,63-1,31)	0,615

*Prevalence ratio. # Confidence Interval of 95%.

DISCUSSION

In this study, as in others that were seen in the literature, we identified the highest frequency of females and a population of young adults, aged <45 years-old. However, this is a predominant characteristic inherent to the category of the worker in the nursing area. The greater participation of women in nursing is a historical characteristic of the profession, making it possible for women to conquer the labor market and highlight their potential. Faced with this, "care" is centered as a characteristic of the woman and, either professionally or personally, experiences the health and illness process in some way[16-17].

Regarding the ABI measure, this study demonstrated that ABI was altered in a little more than a third of nursing professionals without DAOP symptomatology. This change, concomitant with the presence of other cardiovascular risk factors, may be a predictor of cardiovascular disease[4]. Early detection of ABI changes can prevent the onset of fatal clinical outcomes if preventive interventions are instituted[1,5]. Preventive activities that incorporate the practice of using the ABI measure should be employed, aiming at the detection of early cardiovascular disease. In this sense, there is a need in the public health institution for projects in the area of continuing education that aggregate activities aimed at health professionals, as long as they are guided by strategies of continuing education in a training program in order to guarantee the reproducibility and accuracy of the method[12]. We emphasize that the use of the ITB measure to evaluate nursing workers can also contribute to the incorporation of this parameter of low cost and good specificity as a tool to be incorporated by the professionals themselves in the screening of people exposed to cardiovascular risk factors under their care[11].

An ABI with values> 1.30 is peculiar when associated with vascular wall stiffness[3]. Nursing workers with this characteristic were detected, and this may be related to a calcification of the middle layer of the arteries, with the possibility of making them non-compressible[1]. We emphasize that these alterations may also increase the risk of mortality due to cardiac alterations, as evidenced in some studies[4,18-20].

It is reported in this study that the lack of physical activity concomitant with the association with high BMI, waist circumference and altered ABI measure may together raise the risk of fatal cardiovascular events and the occurrence of arterial hypertension.

These findings were also identified in studies conducted in the general population[4-6].

Nursing workers are expected to be aware of the importance of physical activity practice and its health benefit, but the exhaustive workload and lack of adherence to healthy practices interfere with this habit. Individuals who practice physical activity are more active in their work activities and have a shorter working day[19].

In this study, the prevalence of BMI $\geq$ 25 kg/m² among nursing professionals was evidenced, similar to the study on the profile of overweight and obesity in nursing workers in an intensive care unit and emergency room, which showed 68.9% BMI above 25 kg/m² (overweight and obesity) among the 75 workers investigated[18]. In another study, measures of high BMI were also associated with DAOP, and more prevalently in women[1].

In the present study, the distribution of abdominal fat in the participants revealed similar data to another study[18]. Thus, as we pointed out in this study, more than 60% of the workers presented waist circumference classified as moderate to high risk for the development of cardiovascular alterations and tendency for the development of changes in ABI measure, observed in bivariate statistics with marginal significance. Abdominal fat associated with overweight indicates health impairment, besides being one of the main risk factors for cardiovascular events, mainly for coronary artery disease and stroke[15].

It is reported that workers presented coexistence of four or more cardiovascular risk factors, and this finding may increase the chance of cardiovascular disease and/or trigger a worse prognosis among those with altered ABI even without symptomatology that sedentary life, presence of family history of cardiovascular changes and abdominal fat were the most prevalent and are strongly associated with the onset of DAOP[1,5].

In addition to the exposure to multiple risk factors, as evidenced in this study, nursing workers, when working in hospital settings, are more exposed to cardiovascular complications due to several factors: among them, decisions of greater complexity; unfavorable working conditions; stress; work overload; and unhealthy environment. In addition, they work on weekends and holidays, which deprives them of correctly performing physical activity and balanced eating[16,18].

Health professionals, in their general scope, need to have a vision of the importance of taking care of

themselves, given that they are responsible for various professional and family responsibilities, and in order to fulfill them successfully, health should receive special attention. Health institutions can provide moments for professionals to practice self-care and to recognize the importance of their health[19]. The prevention of cardiovascular risk factors reduces the chances of cardiovascular diseases and their consequences, such as disability and death[4,6].

Regarding the other cardiovascular risk factors, the lack of physical activity was the most evident finding of this study, with statistical significance. Sedentary patients are twice as likely to develop DAOP, as confirmed by a study that determined the prevalence of ABI changes in asymptomatic patients with DAOP - sedentary lifestyle was more evident in females[1].

In the multivariate analysis presented, it was evident that the lack of physical activity was independently associated with changes in the ABI measure. Changes in anthropometric measures corroborate these findings, since there is prevalence among participants of changes in BMI and waist circumference. These evidences suggest a multiple association of health risks of these workers and, therefore, should be considered, highlighting these vulnerabilities in health education programs aimed at stimulating the change of habits of life in the constant search for a better quality of life.

The adoption of healthy living habits should guide the practice of nursing care. In this perspective, the practice of physical activity brings benefits, in several aspects, to the health of the people[6,19]. On the other hand, the labor demands should not be an obstacle to not performing physical activity, since in a study conducted in the United States with nurses, 31% were overweight and 18% were obese. The results of this study revealed that among those professionals who had higher demands on the job, we observed a prevalence of regular physical activity such as aerobics than among professionals who had positions with more quiet or passive jobs[19].

It should be noted that despite the contributions, this study presented some limitations, considering the type of transversal cut, and thus, the impossibility of distinguishing the cause of the effect. In addition, some information about previous health was derived from self-report, and prevalence may be under or underestimated.

CONCLUSION

In this study, the prevalence of altered ABI in nursing workers was 31.9%; IC; 22.3-42.6. Among the nurses, the occurrence was 9.6%, and 22.3% of nursing technicians. Regardless of the outcome, among the ABI measures, considering both groups, physical activity, number of risk factors and BMI were associated (p <0.05). Other clinical characteristics evaluated, such as smoking and waist circumference, had a marginal association.

These results suggest that these nursing workers are exposed to cardiovascular risk factors and changes in ABI measures, factors that report the need for health policies focused on worker health in the context of nursing, seeking strategies that minimize health risks and, in particular, the outcome of fatal cardiovascular events. The knowledge of the cardiovascular risk factors of these workers can contribute to the planning of health promotion measures and the prevention of fatal events in these people.

ÍNDICE TORNOZELO-BRAQUIAL E FATORES DE RISCO CARDIOVASCULAR EM PROFISSIONAIS DE ENFERMAGEM

RESUMO

Estudo transversal no qual foram avaliados 94 trabalhadores de enfermagem da rede pública de saúde. O objetivo foi identificar a prevalência da alteração da medida do índice tornozelo-braquial e fatores de risco cardiovascular em trabalhadores de enfermagem. Os aspectos éticos foram atendidos. Os dados foram obtidos por meio de entrevista com roteiro estruturado. A prevalência da medida de ITB alterada foi de 30 (31,9%; IC; 22,3-42,6). Verificou-se que 83% eram técnicos, 91,5% do sexo feminino, idade entre 18 a 45 anos, cor da pele branca, pertencente à classe econômica A/B e com mais de cinco anos de formado. Dos fatores de risco cardiovascular, verificou-se prevalência de histórico familiar de alteração cardiovascular (73,4%), ter mais de quatro fatores de riscos cardiovasculares (73,4%), IMC ≥ 25 kg/m² (68,1%) e apresentar circunferência da cintura com risco moderado a elevado (63,8%). A não realização de atividade física (RP: 2,36; IC95%: 1,29-4,32) foi independentemente associada à alteração da medida de ITB. A coexistência de fatores de risco cardiovascular associados a alterações da medida de ITB nos trabalhadores de enfermagem reporta a necessidade de intervenções na saúde destas pessoas.

Palavras-chave: Doença Arterial Periférica. Doenças Cardiovasculares. Enfermagem do Trabalho. Fatores de risco. Índice Tornozelo-Braço.

ÍNDICE TOBILLO BRAZO Y FACTORES DE RIESGO CARDIOVASCULAR EN PROFESIONALES DE ENFERMERÍA

RESUMEN

Estudio transversal en el cual fueron evaluados 94 trabajadores de enfermería de la red pública de salud. El objetivo fue identificar la prevalencia de la alteración de la medida del índice tobillo brazo (ITB) y factores de riesgo cardiovascular en trabajadores de enfermería. Los aspectos éticos fueron atendidos. Los datos fueron obtenidos por medio de entrevista con guión estructurado. La prevalencia de la medida de ITB alterada fue de 30 (31,9%; IC; 22,3-42,6). Se verificó que el 83% era técnico, el 91,5% del sexo femenino, edad entre 18 a 45 años, color de la piel blanca, perteneciente a la clase económica A/B y con más de cinco años de graduado. De los factores de riesgo cardiovascular, se averiguó prevalencia de histórico familiar de alteración cardiovascular (73,4%), tener más de cuatro factores de riesgos cardiovasculares (73,4%), IMC ≥ 25 kg/m² (68,1%) y presentar circunferencia de la cintura con riesgo moderado a elevado (63,8%). La no realización de actividad física (RP: 2,36; IC 95%: 1,29-4,32) fue independientemente asociada a la alteración de la medida de ITB. La coexistencia de factores de riesgo cardiovascular asociados a alteraciones de la medida de ITB en los trabajadores de enfermería informa la necesidad de intervenciones en la salud de estas personas.

Palabras clave: Enfermedad Arterial Periférica. Enfermedades Cardiovasculares. Enfermería del Trabajo. Factores de riesgo. Índice Tobillo Brazo.

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