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PHYSICAL ACTIVITY AND CARDIOVASCULAR RISK FACTORS IN HOSPITAL EMPLOYEES

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Correspondence: DCE. Perla Lizeth Hernández Cortés,
perla.hernandezcrt@uanl.edu.mx

Rojas-Aboite, CY[1FAB]; Hernández-Cortés, PL[2FD]; Enríquez-Reyna, MC[3FC]; Carranza-García, LE[4FD]; Navarro-Orocio, R[5FC]; Carranza-Bautista D[6FB]

[1]**Rojas-Aboite, CY.** Master in Public Health , Autonomous University of the West, Guasave Regional Unit, Department of Health Sciences, Mexico, cristian.rojas@uadeo.mx

[2]**Hernández-Cortes, PL.** PhD in Nursing Sciences, Autonomous University of Nuevo Leon, Faculty of Sports Organisation., Mexico, perla.hernandezcrt@uanl.edu.mx

[3]**Enríquez-Reyna, MC.** PhD in Physical Culture Sciences, Autonomous University of Nuevo Leon, Faculty of Sports Organisation, Mexico, maria.enriquezryn@uanl.edu.mx

[4]**Carranza-García, LE.** Doctorate in Physical Education and Sports Medicine, Autonomous University of Nuevo León, Faculty of Sports Organisation, Mexico, luis.carranzagr@uanl.edu.mx

[5]**Navarro-Orocio, R.** PhD in Physical Culture Sciences, Autonomous University of Nuevo Leon, Faculty of Sports Organisation, Mexico, ricardo.navarrorc@uanl.edu.mx

[6]**Carranza-Bautista, D.** PhD in Physical Culture Sciences, Autonomous University of Nuevo Leon, Faculty of Sports Organisation, Mexico, daniel.carranzabt@uanl.edu.mx

Responsibilities: [A]Research design. [B]Data collector. [C]Paper writer. [D]Statistical processing. [E]Financial support. [F]Original idea and coordinator of the whole research.

ABSTRACT

Introduction: Occupational tasks and the environment are important influences on individuals' physical activity and sedentary behaviors. **Aim:** To describe the cardiovascular risk and level of physical activity, in addition to exploring the association between these variables in working adults of a health institution. **Methodology:** Cross-sectional correlational descriptive study in hospital employees. **Results:** The sample consisted of 165 workers with an age range of 30 to 58 years ($\bar{x}$ = 43.16, SD = 6.10), female n = 104 (63.0%) and male n = 61 (37%), with respect to health data, it is highlighted that the mean abdominal circumference, SAT and BMI are higher than the health recommendations. **Conclusions:** The CVR factors with the greatest presence in the study population were age, arterial hypertension, smoking, diabetes mellitus and overweight / obesity, all of them highly linked to physical inactivity.

KEY WORDS

sedentary behavior, health personnel, exercise.

INTRODUCTION

Occupational tasks and environment are important influences on individuals' physical activity and sedentary behaviours (1). The World Health Organisation (WHO) states that adults aged 18-64 years should engage in at least 150 minutes per week of moderate-intensity aerobic physical activity (2). In the WHO fact sheet "10 facts about physical activity", fact ten mentions supportive environments and community support that can help people to be physically active and highlights that the promotion of physical activity should be included in workplace and occupational policies (3).

In Mexico, the National Institute of Statistics and Geography (4) classified people over 18 years of age as having an insufficient level of physical and sporting activity; it also reported that 62.3% of the female population is physically inactive, of which 22.3% have never engaged in physical and sporting activity. While 53% of men are physically inactive. The risk of mortality increases by 20-30% in people with an insufficient level of physical activity (5). The World Heart Federation (6) and the World Health Organisation (3) document cardiovascular diseases as the leading cause of morbidity and mortality in almost two thirds of the world's population, and in Mexico the phenomenon is no different. It is estimated that in 2015, 17.5 million people died from this cause, representing 31% of deaths worldwide. Of these deaths, 7.4 million were due to coronary heart disease and 6.7 million to vascular accidents. Nearly 16 million deaths occurred in people under 70 years of age (3).

Cardiovascular risk (CVR) is a person's probability of having a cardiovascular event in a given period (3), the risk is determined by the individual's own risk factor profile. Risk factors may be non-modifiable, such as age, gender, genetic factors/family history, or modifiable, such as hypertension, smoking, hypercholesterolaemia, diabetes mellitus and overweight/obesity, often coupled with physical inactivity (7). The modifiable CVR factors mentioned above, with the exception of smoking, are a consequence of physical inactivity, secondary to sedentary habits. In the last decade, cardiovascular diseases have been recognised as the leading cause of morbidity and mortality in women (8). People with physical inactivity have a higher risk of heart attack than people who are physically active on a regular basis (7). However, cardiovascular risk scores are currently the best predictor (9).

Regardless of the type of occupation, people are more sedentary at work than during leisure time (1). In this context, there are institutions in the health sector that provide 24-hour care and their workers perform different activities depending on their role in

their daily work. The functions performed by these workers are classified as administrative and operational. Administrative duties are performed by managers, programme managers and assistants (secretaries), while operational duties are performed by health care staff (doctors, nurses, radiologists, chemists, orderlies), stewards and maintenance staff, depending on their function.

Studying sedentary time is complex, especially when its correlation with health is to be determined. Most health professionals meet the minimum physical activity recommendations, however, they have a high amount of sedentary time determined by their type of employment. Sitting in front of the computer and other situations such as transport are typical of a society in constant technological progression. It is of vital importance that health professionals can be agents of change and make correct prescriptions to their patients, being themselves an example of life for the general population (10). The purpose of this study is to describe cardiovascular risk and physical activity level, and to explore the association between these variables in working adults in a health care institution.

MATERIALS and METHODS

Study design: Cross-sectional descriptive correlational (11). The population of interest is made up of 348 adults aged 30 to 59 years who are current employees of a hospital in the municipality of Guasave, Sinaloa; non-probabilistic sampling. The sample was calculated using the programme G*Power (v. 3.1.9.7) for a two-tailed bivariate correlation model, including parameters for a correlation of ρ=0.3, error α=0.05, statistical power of .95 obtaining a total sample size of 143, considering a non-response rate of 15% the final sample was 165 subjects. Basic personnel were included, since they have a fixed service and shift, in addition the health sector provides them with a period of extraordinary holidays called "medium risk", adults without medical contraindication for exercise who comply with a minimum of 30 hours per week within their working day. Employees with a history of cardiac surgery, pacemakers and people with physical limitations to exercise were excluded.

Measurement of cardiovascular risk: To measure cardiovascular risk, a test designed specifically for this study was applied based on the Framingham cardiovascular risk assessment criteria and recommendations of European societies (12). The test includes personal pathological history (hypertension, diabetes, cholesterol, triglycerides, heart disease), parental history of cardiovascular risk (hypertension or obesity). Work status,

type of work, working hours per week, usual consumption of medication, blood pressure, body mass index, abdominal circumference were recorded in a data sheet and tobacco consumption in the Fagerström test (13).

For statistical purposes, cardiovascular risk was assessed according to the presence of risk factors with values from zero to 10 points. Where zero represents the absence of risk factors and the higher the score, the higher the cardiovascular risk. The selection of indicators follows information from the Framingham cardiovascular risk assessment criteria and recommendations of European societies (14). In sum, there are 10 risk factors, in which 0 points are awarded according to the considerations that classify the person out of cardiovascular risk and 1 point if the participant presents the condition that classifies him/her with risk, the sum of the points of these factors indicates the guideline to classify the person with greater or lesser cardiovascular risk.

Measurement of physical activity: Physical activity was measured with the World Health Organization's Global Physical Activity Questionnaire (GPAQ) Spanish version. This questionnaire has been developed by WHO for the monitoring of physical activity worldwide. The questionnaire consists of 15 questions, divided into 3 subgroups: 1) work activities, 2) travel and 3) leisure time; and one question on sitting time. The answer options for the questions on whether you do the activity are yes or no, if you answer yes, continue by answering how many days a week and finally, how much time you spend on the activity in hours and minutes. The measurement parameter for physical activity is the Metabolic Equivalent (MET =1 kcal/kg/hour). For analysis purposes, the question about the time spent on the activity is transformed into minutes, to obtain the Mets with the equation [Mets x minutes x days per week] considering MET value = 4 for moderate activities, cycling and walking and 8 for vigorous activities. Physical activity was classified as 1) adequate physical activity if 150 minutes of moderate-intensity physical activity or 75 minutes of vigorous-intensity physical activity or an equivalent combination of moderate-intensity physical exercise and vigorous activity achieving at least 600 MET-minutes was reported and 2) low physical activity if the minimum requirements mentioned above were not met.

Procedure: The research was approved by the Bioethics Committee of the Universidad Autónoma de Occidente (Oficio CM-UAdeO 04.10/2020) and by the authorities of a hospital in the municipality of Guasave, Sinaloa, Mexico. Likewise, informed consent was given and requested from the participants. A data form was filled out to obtain sociodemographic data.

Statistical analysis: Data were processed with the statistical package SPSS (Statistical Product and Service Solutions) version 22.0. Descriptive statistics and measures of central tendency and dispersion were used for the analysis of socio-demographic data and measurement results. measurements. Tests of equality suggested rejecting the hypothesis of homogeneity so non-parametric tests are performed. To determine the difference in proportions of each CVR factor by sex, medical area and shift, the Chi-square test was performed. For the difference in medians of the total CVR factors by sex and area, the Mann-Whitney U test was performed, and for the difference by shift, the Kruskal-Wallis test was used. For the association of variables between age, time of physical activity at work, commuting, free time and sedentary time with the number of CVR factors, a Spearman correlation was performed.

RESULTS

Socio-demographic data: The sample consisted of 165 workers aged 30 to 58 years (= 43.16, SD = 6.10), female n=104 (63.0 %) and male n=61 (37%). With regard to health data, it should be noted that the mean abdominal perimeter, TAS and BMI are higher than the health recommendations (Table 1). With regard to employment information, 72 % (f=120) are from the medical area and 45 % (f=27.3) from the administrative area, with regard to the shift, the largest proportion work the night shift, 40 % (f=66).

Table 1. Descriptive socio-demographic, health and occupational data.

Variable	$\bar{x}$	SD	Mdn	Min-Max
Age	43,16	6,10	42,00	30-58
Abdominal Perimeter (n=165)	95,63	12,12	95,00	72-144
Women (n=104)	93,54	13,25	93,00	72-144
Men (n=61)	99,20	8,94	99,00	77-124
TAS	117,39	11,42	120	90-160
TAD	72,21	8,76	80,00	60-120
BMI	29,49	5,27	28,40	19,30-54,70
No. CVR Factors	3,78	1,86	4,00	0-9
Variable		**f**		**%**
Gender				
Female		104		63,0
Male		61		37
Marital Status				
Single		38		23,0
Married		99		60,0
Divorced		8		4,8
Free Union		18		10,9
Widower		2		1,2
Area				
Medical		120		72,7
Administrative		45		27,3
Shift				
Morning		35		21,2
Evening		37		22,4
Night		66		40,0
Accumulated Journey		27		16,4
Working hours				
6 to 8 hours		70		42,4
9 to 12 hours		95		57,6

Source: Own elaboration, $\bar{x}$ Mean, SD Standard deviation, Mdn Median, Min-Max Minimum and Maximum value, TAS, Systolic blood pressure, TAD Diastolic blood pressure, BMI Body mass index, % Percentage, f Frequency, n Sample, CVR= Cardiovascular risk, No. No. Number

Cardiovascular risk: To describe cardiovascular risk, 10 factors were considered according to the Framingham test and recommendations of European societies; the greater the number of factors present, the greater the cardiovascular risk. On average the sample had 3.78 (SD=1.86) risk factors present. To identify people with higher risk factors, the population was selected on the basis of the mean 75th percentile, which corresponds to 5 or more risk factors. 60 people (36.3%) were classified as having a higher cardiovascular risk. The analysis of proportions between men and women showed statistical significance in cardiovascular risk in the following factors: age 40 years ($p = 0.046$) with a higher proportion of CVR in women, and abdominal circumference ($p = 0.026$) and smoking ($p = 0.015$), both with a higher proportion in men. On the total number of cardiovascular risk factors in the total sample, a mean of 3.7 factors was observed (SD = 1.86, Mdn = 4.00). The contrast analysis between men (mdn = 4.00) and women (mdn = 3.00) was non-significant (Mann-Withey U = 3424.5, p=0.387). The frequencies for each risk factor are presented in table 2.

Table 2. Frequency of cardiovascular risk factors and Chi-square test by sex.

Variable	TOTAL (n= 165)		Male (n= 61)		Female (n= 104)		÷²	p-value
	ƒ	%	ƒ	%	ƒ	%		
Age ≥ 40 years	122	73,9	40	65,6	82	78,8	3,515*	0,046
HTA ≥ 140 / 90	40	24,2	15	24,6	25	24,0	0,006	0,540
Obesity	62	37,6	23	37,7	39	37,5	0,001	0,554
Variable	**TOTAL (n= 165)**		Male (n= 61)		Female (n= 104)		÷²	p-value
	ƒ	%	ƒ	%	ƒ	%		
Abdominal Perimeter ≥ 80 Women (n=104)	90	86,5					4,555*	0,026
≥ 94 men (n=61)	59	96,7						
Smoking	35	21,2	19	31,1	16	15,4	5,746*	0,015
Disease								
Diabetes mellitus	36	21,8	17	27,9	19	18,3	2,007	0,107
Cholesterol	57	34,5	23	37,7	34	32,7	0,427	0,313
Triglycerides	54	32,7	24	39,3	30	28,8	1,925	0,112
Family History of Heart Disease	47	28,5	15	24,6	32	30,8	0,721	0,025
Menopause (n= 104 women)	22	21.2						

Source: Own elaboration, % percentage, f frequency, x2 Chi-square calculated for a 2x2 table, *p < .05, ≥ Greater than or equal to, n Sample

The factors that presented differences in proportions by shift of the workers (morning/evening/evening/night shift/ cumulative shift) were: Age ($p < 0.01$), Obesity ($p = 0.023$), both with higher proportion in the accumulated day shift, smoking ($p < 0.01$) with higher proportion in the night shift, family history with heart disease ($p = 0.013$) with higher proportion in the morning shift, Menopause ($p < 0.01$) with higher proportion in the accumulated day shift. The contrast of the number of risk factors by shift, morning (mdn = 5.00), evening (mdn = 2.00), night (mdn = 4.00) and accumulated shift (mdn = 5.00), was analysed by means of the Kruskal-Wallis test, with a statistically significant result ($p=0.001$), with the highest number of risk factors in the accumulated shift (table 3).

Table 3. Cardiovascular Risk Factors with Chi-square test by shift.

Variable	Morning (n= 5)		Evening (n= 37)		Night (n= 66)		Accumulated Journey (n= 27)		÷²	p-value
	ƒ	%	ƒ	%	ƒ	%	ƒ	%		
Age ≥ 40 years	31	88,6	23	62,2	41	62,1	27	100	20,852**	0,000
HTA ≥ 140 / 90	10	28,6	5	13,5	14	21,2	11	40,7	7,008	0,072
Obesity	14	40,0	8	21,6	24	36,4	16	59,3	9,556*	0,023
Abdominal Perimeter	33	94,3	30	81,1	60	90,9	26	96,3	5,363	0,147
Smoking	7	20,0	3	8,1	24	36,4	1	3,7	17,851**	0,000
Disease										
Diabetes mellitus	11	31,4	7	18,9	14	21,2	4	14,8	2,868	0,412
Cholesterol	12	34,3	14	37,8	22	33,3	9	33,3	0,239	0,971
Triglycerides	12	34,3	10	27,0	24	36,4	8	29,6	1,099	0,777
Family History of Heart Disease	16	45,7	5	13,5	21	31,8	5	18,5	10,848*	0,013
Menopause	6	17,1	1	2,7	1	1,5	14	51,9	46,705	0,000

Source: Own elaboration, % percentage, f frequency, x2 Chi-square calculated for a 2x2 table, *p < .05, ≥ Greater than or equal to, n Sample

Level of physical activity: The level of physical activity was assessed with the GPAQ which explores the activity performed at work (intense and moderate), commuting, leisure time (intense and moderate) and sedentary time. 100% reported no intense physical activity at work, and regarding sedentary time, a mean of 416.6 minutes (SD =54.83) was reported, which represents almost 7 hours per day. The rest of the data are presented in table 4.

Table 4. Physical Activity Level.

Variable	ƒ	%
PA at work		
Moderate (Si)	19	11,5
Days ($\bar{x}$SD)	2,63	1,16
Daily minutes ($\bar{x}$SD)	45,52	32,39
Displacement (Si)	11	6,7
Días ($\bar{x}$SD)	3,27	0,90
Daily minutes ($\bar{x}$SD)	18,18	6,80
PA in leisure time		
Intense (Si)	7	4,2
Days ($\bar{x}$SD)	4,42	0,97
Daily minutes ($\bar{x}$SD)	66,42	29,54
Moderate (Si)	103	62,4
Days ($\bar{x}$SD)	4	1,55

daily minutes ($\bar{x}$ SD)	54,51	30,57
Sedentary Time (daily minutes $\bar{x}$ SD	416,60	54,83
Sedentary	49	29,7

Source: Own elaboration, f Frequency, % Percentage, PA Physical Activity, $\bar{x}$ Mean, SD Standard deviation.

To determine the relationship between age, physical activity time at work, commuting, leisure time and sedentary time with the number of CVR factors, a Spearman correlation was performed (table 5). The factors that showed significant associations were age (rs = 0.326, p < 0.01), minutes of moderate PA in leisure time (rs = -0.165, p < 0.03), and sedentary time (rs = 0.157, p < 0.04).

Table 5. Spearman correlation analysis for CVR.

Variable	Correlation coefficient	P-value
Age	0,326	0,010
Intense PA minutes at work	---	---
Moderate PA minutes at work	-0,028	0,721
Minutes of displacement activity	0,009	0,721
Intense PA minutes in leisure time	-0,069	0,378
Moderate PA minutes in leisure time	-0,165	0,034
Sedntary Time	0,157	0,044

DISCUSSION

The study population consisted of 165 workers aged between 30 and 59 years, predominantly female, mostly married, most of whom were employed in the medical field, working the night shift with working hours ranging from 9 to 12 hours. The analysis of CVR factors in the subjects studied indicates that women are more likely to develop cardiovascular diseases than men. In this context, Fernández E; Sánchez-Ojeda M; Martín-Salvador A and Enrique C, relate cardiovascular risk to the little or no physical activity performed by women (15). These results coincide with García M (1), who states that in the last decade cardiovascular diseases have been recognised as the main cause of morbidity and mortality in women.

According to Ilarraza H (9), cardiovascular risk scores are currently the best method of prediction. Based on the above, this research obtained data using the Framingham Test and recommendations of European Societies to describe the cardiovascular risk factors present in employees of a hospital in the municipality of Guasave, Sinaloa, Mexico. Authors such as López L; Pérez A; Sisa M and Téllez L (7), state that risk factors such as age, arterial hypertension, smoking, diabetes mellitus and overweight/obesity are frequently linked to physical inactivity. In our study, 73.9% of the workers were over

40 years of age, 24.2% had blood pressure above 140/90 mm/hg, 21.8% smoked, 21.8% had diabetes mellitus, 37.5% were obese and only 50.3% reported adequate physical activity. With the results obtained, we can affirm, together with the authors mentioned above, that physical inactivity is highly linked to risk factors for the development of cardiovascular diseases. In this sense, Romero-Barquero, C (16) in a systematic review confirms that the practice of physical activity in leisure time is associated with a lower risk of cardiovascular and coronary heart disease, and high-intensity activities reduce the risk of mortality from the same pathologies.

The low physical activity at work and the sedentary time (approximately 7 hours a day) reported by the study population affirms the findings of Prince, S; Cara, E; Scott, K; Visintini, S and Reed J (1), who state that occupational tasks and the environment are important influences on individuals' physical activity and sedentary behaviours. INEGI classified people over 18 years of age as having an insufficient level of physical and sporting activity, a similar case to the employees of this hospital, since 20% of them are physically inactive and 29.7% report themselves as sedentary. The WHO mentions favourable environments and stresses that the promotion of physical activity should be included in labour and workplace policies, a fact that is very convenient to implement in this type of institutions, since only 11.5% reported that they do moderate physical activity at work, 6.7% during their commute from home to work and 4.2% do intense physical activity in their free time. For their part, Cardozo, I and Casallas, M (17) recommend promoting physical activity in office workers and in those whose jobs require them to be physically active, in order to reduce cardiovascular risk factors such as overweight, high blood pressure, high cholesterol and triglyceride levels.

LIMITATIONS AND FUTURE PATHS

As a possible line of future research, it is recommended that physical activity inclusion interventions be carried out especially in those individuals who are found to have the highest number of modifiable risk factors.

CONCLUSIONS

The CVR factors most prevalent in the study population were age, hypertension, smoking, diabetes mellitus and overweight/obesity, all of which are highly correlated with physical inactivity. Likewise, women are more likely than men to suffer from cardiovascular diseases.

During the working day, commuting and leisure time, the subjects in the study perform low levels of physical activity. On the contrary, they spend a lot of time (approximately 7 hours a day) being sedentary. Undoubtedly, low physical activity and high sedentary time predispose this population to develop cardiovascular diseases.

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