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RISK FACTORS FOR TYPE 2 DIABETES MELLITUS IN EMPLOYEES OF A PUBLIC UNIVERSITY

FATORES DE RISCO PARA DIABETES MELLITUS TIPO 2 EM FUNCIONÁRIOS DE UMA UNIVERSIDADE PÚBLICA

FACTORES DE RIESGO PARA DIABETES MELLITUS TIPO 2 EN FUNCIONARIOS DE UNA UNIVERSIDAD PÚBLICA

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ABSTRACT

Objective: to analyze risk factors for diabetes mellitus type 2. **Method:** this cross-sectional, quantitative study, was conducted with 35 general services employees and 27 administrative technicians from a federal public university. Data collection was performed using a questionnaire. Data were analyzed using descriptive statistics. The study project was approved by the Research Ethics Committee, CAAE 0216.0.045.000-11. **Results:** We found that 62.9% of workers were male and 51.6% were 23-33 years old. The presence of altered glucose levels was significant ($p < 0.05$) when compared to the workers' age in both job titles. The most common risk factors found were overweight and abnormal waist circumference. **Conclusion:** The results revealed the presence of risk factors in young workers, which were associated with the possibility of developing cardiovascular disease. Continued clinical evaluation is necessary. **Descriptors:** Occupational Health; Health Promotion; Type 2 Diabetes Mellitus; Risk Factors.

RESUMO

Objetivo: analisar os fatores de risco para o diabetes mellitus tipo 2. **Método:** estudo transversal, de abordagem quantitativa, com 35 trabalhadores do cargo de serviços gerais e 27 técnicos administrativos de uma universidade pública federal. A coleta de dados foi realizada com um formulário e os dados analisados pela estatística descritiva. O estudo teve o projeto aprovado pelo Comitê de Ética em Pesquisa, CAAE 0216.0.045.000-11. **Resultados:** verificou-se que 62,9% eram trabalhadores do sexo masculino e 51,6% tinham de 23 a 33 anos. A ocorrência de taxas glicêmicas alteradas foi significativa ($p < 0,05$) quando comparada à idade dos trabalhadores em ambos os cargos. Os fatores de risco mais presentes foram o excesso de peso e valores alterados da circunferência abdominal. **Conclusão:** os resultados mostraram a ocorrência de fatores de risco em trabalhadores jovens associados à possibilidade de desenvolver doença cardiovascular e direcionaram para a necessidade de avaliação clínica contínua. **Descritores:** Saúde do Trabalhador; Promoção da Saúde; Diabetes Mellitus Tipo 2; Fatores de Risco.

RESUMEN

Objetivo: analizar los factores de riesgo para la diabetes mellitus tipo 2. **Método:** Estudio transversal, cuantitativo, realizado con 35 empleados de servicios generales y 27 técnicos administrativos de una universidad pública. La recolección de datos se realizó a través de un formulario y los datos fueron analizados utilizando estadística descriptiva. El estudio fue aprobado por el Comité de Ética en Investigación, CAAE 0216.0.045.000-11. **Resultados:** se encontró que el 62,9% eran del sexo masculino y el 51,6% tenía entre 23 y 33 años. La ocurrencia de niveles de glucosa alterados fue significativa ($p < 0,05$) en comparación con la edad de los trabajadores en ambas profesiones. Los factores de riesgo más comunes fueron sobrepeso y circunferencia de la cintura aumentada. **Conclusión:** Los resultados mostraron la presencia de factores de riesgo en los trabajadores jóvenes, que se encuentran asociadas a la posibilidad de desarrollar enfermedad cardiovascular. Se observa la necesidad de una evaluación clínica continuada. **Descriptores:** Salud Laboral; Promoción de la Salud; Diabetes mellitus tipo 2; Factores de Riesgo.

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INTRODUCTION

The increasing prevalence of chronic diseases is due to the aging population and the persistence of risk factors for these diseases, which are related to lifestyle. In this context, diabetes mellitus (DM) is highlighted as a global epidemic whose control represents a great challenge for health professionals.

The DM is considered one of the major chronic diseases affecting humans worldwide, in countries with different biological, social and economic development stages.¹ Many individuals with DM are unable to continue working due to chronic complications. Others continue working with some limitation in their professional performance. This productivity loss has a very high social cost, costing the same or more than direct health care costs.²

On average, half of Brazilian patients with DM are unaware of their condition. About a fifth of those who are aware of their condition do not follow any treatment regimen. This situation creates the need for more comprehensive health practices, in order to minimize the appearance of risk factors for DM or to reduce people's exposure to these factors.³

It is known that DM does not qualify as an occupational disease, nor is associated with a specific professional category. Nevertheless, it has been shown that the lifestyle adopted by workers may potentiate the risk of developing the disease. Shift workers, who have difficulties in maintaining or adopting a healthy lifestyle, are insidiously threatened by health risks.⁴

It is considered that the performance of any labor activity is filled with risks to physical and mental health. Therefore, it is crucial that nurses get involved in the care of workers, encouraging them to adopt healthy lifestyles. The identification of risks factors and diagnosis of diseases make it possible to invest in educational activities for the promotion of health at work, which may contribute to reducing the prevalence of DM in this population.

The creation of spaces dedicated to the diffusion and adoption of new health practices and the promotion of workers' welfare contributes significantly to the avoidance of risks to their health. Such risks arise from lack of information and poor eating habits, which can be prevented or timely identified in order to promote behavioral changes through educational activities.

Given the importance of early detection of risk factors for DM and the awareness that

several of these factors are potentially modifiable, this study aims to:

- Analyze the risk factors for diabetes mellitus type 2.

METHOD

This cross-sectional study was conducted with employees of a public university in Picos-PI. The sample consisted of 35 administrative technicians and 27 general services workers. Exclusion criteria were: subjects with a previous diagnosis of diabetes, employees on vacation or on leave.

Data were collected in March 2011. We used a questionnaire addressing the following: personal data, occupation, daily workload, height, weight, Body Mass Index (BMI), Abdominal Circumference (AC), capillary blood glucose (CBG) and physical activity practice.

Subjects' height was measured using an inelastic tape with 0.5cm accuracy. In order to ensure the accuracy of the measurements, subjects were asked to remain erect and motionless, place their hands on their thighs and lean the back of their head against the wall.⁵ Weight was measured while the subjects wore light clothing but no shoes. We used an analog portable scale that read to the nearest 0.1 kg and had a capacity of 150 kg. The BMI was calculated from these two values.⁶

The WC measurement was performed with an inelastic tape, at the midpoint between the anterior superior iliac crest and the lowest rib, with 0.1 cm accuracy. Values below 80.0 cm for women and 94.0 cm for men were considered to be adequate.⁷

The measurement of capillary blood glucose concentrations were obtained using a glucometer and test strips. The results were analyzed according to the indicators of the Brazilian Diabetes Society.²

Physical activity practice was categorized in practice and no practice. Practice was considered to be exercising at least 30 minutes three times a week.⁸

Data were initially analyzed using the Statistical Package for Social Sciences (SPSS) version 17.0, by calculating measures of central tendency of continuous variables (mean and standard deviation). In addition, we performed statistical tests to verify the association between the variables: age and glucose levels; BMI and job title; job title, gender and waist circumference.

This study followed the ethical guidelines regulating research involving human subjects. The study project was approved by the

Research Ethics Committee of the Federal University of Piauí, under the Protocol No. 0216.0.045.000-11. All participants were informed about the objectives and risks of the research and signed the Informed Consent Form (ICF).

RESULTS

We found that employees aged 23-33 years had predominantly normal glucose values, unlike the group of workers aged 56-66 years, in which only two subjects presented normal values. Statistically significant association

between the variables suggests that increasing age predisposes to impaired glucose tolerance, which was observed in the age group 45-66 years ($p < 0.05$). (Table 1).
No association was found between glucose levels and job title ($p > 0.05$). Nevertheless, it was observed that, 43.5% of general services employees had normal CBG values, and 1.8% had impaired glucose tolerance. With regard to administrative technicians, 48.3% had normal CBG values and 6.4% had impaired glucose tolerance.

Table 1. Association between age, blood glucose levels and physical activity of employees from a public university. Picos-PI, 2011.

Normal blood glucose levels				Impaired glucose tolerance values		P
n=57				n=15		
%				%		
Age group						
23-33 years old	32	100.00%	-	-	0.001 *	
34-44 years old	14	100.00%	-	-		
45-55 years old	9	81.80%	2	18.20%		
56-66 years old	2	40.00%	3	60.00%		
Job title						
General Services	27	43.50%	1	1.80%	0.220*	
A.T.	30	48.30%	4	6.40%		
Physical activity						
Yes	26	96.30%	1	3.70%	0.524**	
No	31	88.30%	4	11.40%		

*Likelihood ratio. ** X² with continuing relationship. AT: Administrative Technician.

Although there was no statistically significant association between physical activity and blood glucose levels ($p > 0.05$), as described in Table 1, the study revealed that 96.3% of those who practiced physical activities had optimum blood glucose values.
With regard to BMI, 32.4% of administrative technicians were classified as overweight, and

17.6% were obese. However, no statistically significant relationship between the activity performed and the occurrence of this risk factor ($p > 0.05$) was found, as shown in Table 2.

Table 2. Association between the job title and BMI of the participants. Picos-PI, 2011.

Job title	Body Mass Index (BMI)						
	Normal		Overweight		Obesity		P
	n=	%	n=	%	n=	%	
General Services	33	59.3	20	33.3	3	7.4%	0.485*
A.T.	16	%	9	%			
	17	50.0	11	32.4	6	17.6	
		%		%		%	

* Pearson X² test. AT: Administrative Technician.

Table 3 shows the cardiovascular risk found in the study population. Increased cardiovascular risk was found in women who worked as general services employees (54.55%) and administrative technicians (45.44%). Among women, the smallest waist circumference (WC) value found was 78 cm,

and the biggest was 106 cm. WC values among men ranged between 71 and 125 cm. Mean WC among men was 93.6 ± 10.4 cm. One male general services employee and six male administrative technicians were found to have abnormal WC values.

Table 3. Distribution of participants according to job title and cardiovascular risk (CVR), and based on abdominal circumference values. Picos-PI, 2011.

Job title	Gender	Abdominal Circumference				P
		Normal		Increased		
		n=43	%	n=18	%	
General Services	Male	15	93.75%	1	6.25%	0.009*
	Female	5	45.45%	6	54.55%	
A.T.	Male	17	73.91%	6	26.09%	0.434*
	Female	6	54.55%	5	45.44%	

Fisher's t test. AT: Administrative Technician.

DISCUSSION

Regarding the findings, we observed a prevalence of men, which indicates the predominance of males as general services employees and administrative technicians in this institution.

A study aimed at identifying the prevalence of overweight and obesity among professors of a higher education institution in Fortaleza found that 33% of the sample was obese and 14.5% were overweight. Regarding the association between abnormal BMI and sociodemographic variables, overweight and obesity were more present in males (53.8%), in subjects aged 36-45 years (52.2%) and in those with incomes between 5 and 6 minimum wages (60%).¹⁰

Regarding the risk for type 2 DM, differences between the two genders were observed, particularly with respect to increased cardiovascular risk. A strong correlation between the female gender and changes in cardiovascular risk has been reported¹¹, confirming the findings of this study, in which a higher frequency of increased WC was found among female general services employees.

Abnormal waist circumference measurement is an indicator of cardiovascular risk in adults and it was found in some study participants. WC is easy to measure and interpret, and similar studies have shown a good association of this measurement with cardiovascular disease mortality, especially among women.¹²⁻¹³

With regard to the age groups, we found that most of the sample consisted of young workers who, therefore, had not reached the critical age for the onset of risk factors for type 2 DM.

Risks for elevated blood glucose levels, for example, increase with increasing age, due to factors such as simultaneous occurrence with other chronic diseases and family history.² We observed this association in this study, which corroborates the findings of another research, in which high levels of blood glucose were

found in individuals aged between 60 and 69 years (13.9%).⁸

A multicenter study revealed that 1.7% of cases aged between 30 and 39 years had abnormal glucose levels. In contrast, abnormal values were found in 13.2% of cases aged between 60 and 69 years.¹⁴ Thus, the abnormal blood glucose values related to age found in this study are similar to the results found in similar studies.

A study on the prevalence of risk factors for type 2 diabetes mellitus among civil servants, which also analyzed risk factors according to gender and glucose levels, identified as the most prevalent risk factors: abnormal body mass index (66, 1%), age> 45 years (64.6%), increased waist circumference (61.5%) and sedentarism (61.5%). We found an association between blood pressure and abnormal CBG (p = 0.01). Men had a higher prevalence of abnormal CBG (p <0.035) and body mass index values (p <0.007).¹⁵

Regarding abdominal obesity, an important risk factor for diabetes, we found abnormal values among the study subjects, such as overweight (high BMI) in both job titles. This finding reinforces the importance of correlating anthropometric variables, in order to identify individual risks for chronic diseases, such as type 2 DM.

In a study on risk factors for type 2 DM with 419 individuals, the authors found that about two-thirds of individuals had abnormal BMI (73.2%) and waist circumference values (71.4%), and only 7.4% of them regularly practiced physical activity.¹⁶

Another important risk factor for diabetes among workers was sedentarism. These findings confirm the statement that physical activity helps maintaining optimal blood glucose values, as better glucose levels were observed in the group of workers who practiced exercises. Scientific evidence suggests that a sedentary lifestyle, favored by modern life, is a risk factor as important as improper diet in the etiology of tyoe 2 DM.^{8,17} A low-fat and low-calorie diet associated with 150 minutes of walking per week reduce the incidence of diabetes in 58%, whereas the

single use of hypoglycemic drugs lowers blood glucose levels in only 31%.¹⁸

We understand that low physical activity or inactivity may be associated with the work performed by these subjects, because some professions may be perceived as barriers that limit physical activity. In some cases, such as general services employees, the activities performed require frequent displacement, which generates the false idea that they are practicing bodily activity. Nevertheless, it is known that physical activity should be regularly practiced, continuous and follow a proper degree of intensity in order to have a protective effect on health.⁴

Although the advantages of this habit are well known, most of the study subjects are inactive or only practice physical activity at insufficient levels to achieve satisfactory health outcomes. It is estimated that 50% of individuals who start an exercise program stop them within the first six months of involvement. The literature shows that most dropouts occur within the first three months, with similar results in all age groups and irrespective of gender.¹⁹

Thus, the onset of type 2 diabetes is a combination of genetic, environmental and behavioral factors associated with people's lifestyles. It is characterized by sedentarism and a proportional increase in caloric intake.²⁰

The results found in this study show that the awareness about the health condition of this population should encourage the adoption of institutional policies, through the implementation of intervention programs for healthy eating habits and weight control, in order to reduce type 2 DM morbidity and mortality rates in this population.

CONCLUSION

The study showed increased risk of developing DM among employees aged forty-five years or older, although the study sample was mostly constituted by young adults. The risk factors presented by the participants, such as being overweight and sedentarism, are mostly modifiable.

These findings reveal the urgent need for health practices in the workplace, in order to clarify and encourage proper nutrition and physical exercise, favoring the control of risk factors for diabetes mellitus and other chronic diseases.

No association was found between job title and the emergence of these factors. However, increased cardiovascular risk was identified in female employees. This fact means that this group is more likely to develop cardiovascular

disease. These women therefore should be targeted for educational activities, in order to receive information on new health practices and how to control their diets.

We also stress that the working environment is the appropriate place for implementing educational initiatives that promote changes in nutritional behavior and encourage the practice of regular physical activity. It is essential to focus on the importance of controlling risk factors for diabetes in workers, especially at the university, where students can learn about good health practices and contribute to the reduction of type 2 DM morbidity and mortality rates.

One limitation of this study was the number of participants who met the inclusion criteria. We highlight restrictions in the generalizations made in the analysis of results. We suggest that outpatient clinics for civil servants in higher education institutions are expanded, because the small number of clinics enhances the difficulty in identifying the type of care provided to employees and limits the integration of multicenter studies addressing the health of this population.

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