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PREVALENCE OF RISK FACTORS FOR DEVELOPING DIABETES MELLITUS IN BASIC CARE USERS

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ABSTRACT

This study aimed to identify the prevalence of risk factors for type 2 Diabetes Mellitus in users seen at health units. Cross-sectional, descriptive study with a quantitative approach, conducted with 266 users of family health units in João Pessoa-Paraíba, from April to June 2016. A questionnaire with sociodemographic data and the Finnish Diabetes Risk Score scale was used. In relation to risk factors, the high body mass index, use of hypertension medication, alteration of blood glucose and family history of diabetes were those that were statistically significant for the development of diabetes. Thus, the study warns that preventive measures are taken to combat the risk factors found, with the incorporation of physical activity, clinical and nutritional monitoring, by a multidisciplinary team, to reduce the rates of development of diabetes.

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INTRODUCTION

The latest Diabetes world atlas published by the International Diabetes Federation (IDF) in 2019, identified that worldwide, in 2019, there were 463 million people with diabetes mellitus (DM), aged 20 to 79 years, this number is expected to increase to 700 million in 2045. Brazil ranks fourth with the largest number of adults with diabetes second only to India, China and the United States. Worldwide, it is estimated that DM in 2019 was responsible for a mortality of 400.000 people from causes related to diabetes. This same atlas reveals that half of the world population has not yet been diagnosed, so that some people remain undiagnosed until they show signs of complications (IDF, 2019).

The Brazilian Diabetes Society classifies diabetes mellitus into type 1 and type 2. Type 1 diabetes mellitus (DM1) occurs due to destruction of pancreatic beta cells, generating an absolute or relative insulin deficiency. Its etiology may be related to autoimmune or not (idiopathic). Type 2 diabetes mellitus (DM2) presents between 90 and 95% of cases and has defects in insulin action and secretion. There are no specific indicators for DM2, which may result in a strong genetic predisposition for its development in conjunction with environmental interactions (SBD, 2019). DM2 is a silent and asymptomatic disease, thus hampering its diagnosis, and favoring the appearance of other comorbidities, as people with DM take time to notice the manifestations of the first symptoms (GOUVEIA et al., 2020; SBD, 2019). Several risk factors are

responsible for the development of DM2, among them: age> 45 years, overweight (Body Mass Index BMI> 25), central obesity (abdominal waist> 102 cm for men and> 88 cm for women,family history (mother or father) with diabetes, high blood pressure (> 140/90 mmHg), cholesterol (HDL "d 35 mg/dL and/or triglycerides "150 mg / dL), history of macrosomia or gestational diabetes , poor nutrition during pregnancy, previous diagnosis of polycystic ovary syndrome and moderate cardiovascular risk, physical inactivity, glucose intolerance (BRASIL, 2013; IDF, 2015). Research conducted in Japan on the risk factors for DM2 found that family history of diabetes was associated with increased risk for developing the disease, and this association was independent of the interaction of other factors that included lifestyle and obesity (SAKURAI et al., 2013). However, a research carried out in Australia on the risk factors for DM2 listed that there was no statistically significant difference between the predictor for DM2 by family history, that is, the patterns of associations between the incident risk factors for participants with or without family history were similar, pointing out that the prevalent factors were those associated with lifestyle (DING et al., 2015). Given the potential for risk factors for the development of DM2, the following question arose: what are the most prevalent risk factors for the risk of developing DM2 in primary health care users?. Understanding the risk factors for the onset of DM2 may help to identify populations at risk and allow the development of preventive strategies to combat the increase in diabetes. Thus, the present study aimed to identify the prevalence of risk factors for type 2 Diabetes Mellitus in users seen at family health units in João Pessoa Paraíba-Brazil.

METHODS

This is a cross-sectional, descriptive study, with a quantitative approach carried out in the family health units of João Pessoa-PB, in the sanitary district III. This location was chosen because it is the largest of the health districts of this city. District III is divided into 50 health units, representing a total of 201.951 registered users in 2015. This information was provided by the Municipal Health Secretary of the municipality of João Pessoa. To obtain the sample, the following inclusion criteria were taken into account: 1) be registered in health units; 2) age between 20 and 59 years old. The following were excluded: pregnant women and individuals with a confirmed diagnosis of Diabetes Mellitus. The selection of participants was composed of two stages. In the first step, the units that made up the research site were randomly selected. Twenty-one health units were randomly selected, represented by N_1, ..., N_{21}. The number of elements selected in each health unit was represented by n_1…, n_{21} Each subset of the population with the same number of elements has the same chance of being included in the sample, so we considered the proportion p of each subset, that is, of each health unit, among those selected for the study:

$$p_1 = \frac{n_1}{N_1}, \dots, p_{21} = \frac{n_{21}}{N_{21}}$$

The sample of the research on screen is non-probabilistic, for convenience, the individual who attended the unit was waiting for the medical and / or nursing consultation or seeking other assistance in the morning and afternoon shifts, from Monday to Friday, and were invited by researchers to participate in the study. For the sample design, the choice of subjects was according to the registration data of the units in the municipality, composed of 201.951 people, and in line with the inclusion criteria, age between 20 and 59 years (134.091 people) and exclusion. The sample was calculated from the formula indicated for cross-sectional studies of infinite population, considering significance level α of 5% and sampling error of 6%. The proportion of individuals in the study municipality in 2014 aged between 20 and 59 years old, according to data from the Brazilian Institute of Geography and Statistics, was 56%, excluding the prevalence of patients with diabetes who, according to data from the Risk Factors Surveillance and Protection for Chronic Diseases by Telephone Survey 2014, was 6.9% in the study's interest category. Therefore, the prevalence of 52.3% was considered (BRASIL, 2015). Through the calculation, a sample size of 266 people was arrived at.

Sample size n was calculated by:

$$n = \frac{N \cdot p \cdot q \cdot \left(Z_{\frac{\alpha}{2}}\right)^2}{p \cdot q \cdot \left(Z_{\frac{\alpha}{2}}\right)^2 + (N-1)E^2}$$

$$= \frac{134.091 \cdot 0{,}523 \cdot (1-0{,}523) \cdot (1{,}96)^2}{0{,}523 \cdot (1-0{,}523) \cdot (1{,}96)^2 + (134.091-1) \cdot 0{,}06^2} = 265{,}7$$

Data collection took place from April to June 2016, at the selected units. For the selection of units, random sampling by clusters was used. In this type of sampling, the subpopulations, which in this case are represented by the health units, have internally heterogeneous elements, called clusters. A questionnaire built by the researchers was used, containing sociodemographic variables and the instrument: the Finnish Diabetes Risk Score scale. Developed and validated in Finland by the Department of Public Health at the University of Helsinki with a sensitivity of 81% and specificity of 76%, it is a questionnaire with eight questions that address age, waist circumference, body mass index, daily consumption of fruits and vegetables, physical activity, use of antihypertensive drugs, family history of diabetes and history of high blood glucose (ZARDO et al., 2015). The scale assesses a person's risk of developing diabetes mellitus 2 in 10 years, using a risk rating of: low (<7 points); slightly moderate (between 7 and 11 points); moderate (between 12 and 14 points); high (between 15 and 20 points); and very high (more than 20 points) (LIMA et al., 2018). The original questionnaire was translated by the State Reference Center for Diabetes Assistance and Endocrinology (ARAUJO et al., 2015).

In Brazil, the Ministry of Health indicates the use of this scale for health professionals to use as a tool in tracking people at risk of developing diabetes (SBD, 2019). To assist in the collection, a 16-hour training was conducted with the field researchers: two students from the undergraduate nursing course and one from the master's course in nursing. In this training, the research project, the collection instrument used and a class on risk factors for DM2 were discussed. The interviews took place in a private location, previously agreed between the research team and the participants. To aid in the collection, a digital scale with a capacity of 150 kg and precision 0.1 kg was used to measure the weight and an inelastic measuring tape fixed to the wall, with a maximum length of 2 m for the height. Users were instructed to remove their shoes, remain upright, immobile, with hands flat on their

thighs and heads adjusted to the Frankfurt plan. The abdominal circumference was measured with an inelastic measuring tape, placed over the skin at the midpoint between the last rib and the upper border of the iliac crest, at the end of the expiratory movement (VALENTE et al., 2012). The glycemia value was self-reported by the participants, being confirmed by consulting the laboratory tests of the last six months included in the medical records. According to the Ministry of Health, plasma glucose is altered from 110 to 126 mg/dl (BRASIL, 2013). Data were organized in a Microsoft Excel spreadsheet, through double typing and later validation to control possible errors and exported to the Statistical Package for the Social Sciences software, version 20.0. To present and analyze the results, descriptive statistics were used to calculate the frequency, in absolute number and percentage. Subsequently, the Finnish Diabetes Risk Score was categorized in a dichotomous way to facilitate the interpretation of results in <15 points and ≥ 15 points, as proposed by other authors, representing, respectively, low to moderate risk and high to very high risk (VIVEIRO et al ., 2015; LIMA[b] et al., 2018). Considering these independent variables and the dichotomized classification of risk as high or low, the binary logistic regression model was used to determine which of these independent variables offer the greatest contribution to the risk of diabetes. The variables included in this model are associated with the outcome, with a p-value <0.20. In applying this model, the general model adequacy test (omnibustest) assesses whether the parameters are null. The p <0.001 value showing that it is possible to use this model for these data and that the Nagelkerke R2 showed a value of 44.9%, this percentage being how much the independent variables explain the outcome variability (risk of diabetes). The classification matrix shows a percentage of 75.6% correct in evaluating the outcome. The study respected the formal requirements contained in the national and international regulatory standards for research involving human beings and was approved by the Ethics Committee of the Health Sciences Center of the Federal University of Paraíba with the number 2.043.362.

RESULTS

Demographic characteristics reveal that, of the 266 users interviewed, 221 (83.1%) were women and 45 (16.9%) men, 158 (59.4%) in the age group under 45, 76 (28.5 %) between 45 and 54 years old, 32 (12.2%) between 55 and 59 years old. Regarding education, 66 (25%) were illiterate / literate / incomplete elementary, 51 (19%) with complete elementary / incomplete high school, 111 (42%) attended complete high school, 38 (14%) with incomplete higher education /Graduated. Regarding marital status, 144 (54.1%) were single / divorced / widowed / separated and 122 (45.9%) married / in a stable relationship. As for the risk factors associated with the scale, 177 (66.5%) were overweight, 92 (34.5%) were overweight and 85 (32.0%) were obese; in relation to waist circumference, 207 (77.9%) were classified as having central obesity; the vast majority 206 (77.4%) did not practice physical activity, as described in Table 1. It was also observed that 266 (100%) of the interviewees eat vegetables, 160 (60.2%) of whom do not eat this daily; 169 (63.5%) of them do not use medication for Systemic Arterial Hypertension; 210 (79%) of respondents never had a history of hyperglycemia. As for the family history of diabetes, 162 (60.9%) of the individuals reported that there was already a case in the family. Considering these independent variables and the dichotomized classification of risk as high or low, the binary logistic regression model was used to determine which of these independent variables offer the greatest contribution to the risk of diabetes. Table 2 shows that the variables body mass index, medication for hypertension, changes in blood glucose and family history for DM2 are those that make a significant contribution to increasing the high risk of DM2. The reliability analysis of the Finnish Diabetes Risk Score was performed with the ROC Curve, which presented an area of 0.714, with a 95% interval between 0.642 and 0.787 showing that there is compatibility between the outcome observed in patients and that predicted by the applied logistic regression model .

DISCUSSION

Among the variables analyzed, it was found that body mass index was the most representative for increasing the risk of developing diabetes. Several authors point out the altered body mass index in relation to weight gain as a risk factor for developing DM2 (LIMA et al., 2016; MIELKE et al., 2013). A Brazilian survey showed that 18.9% of Brazilians are obese. The presence of overweight / obesity is a known risk factor for the development of DM2 as it increases resistance to the action of insulin and causes hyperinsulinemia (FAYH et al., 2015). This risk factor is also pointed out in an international study (NARAYANAMURTHY et al., 2015). Brazilian population has poor eating habits, considering that it is transitioning from a country of malnourished to a country of obese, which generates an increase in chronic non-communicable diseases such as diabetes (BRASIL, 2017). Regarding the use of medication for hypertension, it was evidenced that 50.5% of the sample that was at high to extremely high risk used antihypertensive drugs. An integrative review of risk factors for DM2 in the scientific literature showed that arterial hypertension was statistically significant for the risk of DM2 (LIMA et al., 2016). It should also be noted that a cross-sectional study conducted with 408 people in southern Brazil showed a significant association between systemic arterial hypertension and DM (p<0.001), and approximately three times more likely to develop DM (RADOWARAVIC et al., 2014). Regarding altered blood glucose, this variable represented a strong factor in the high risk of developing diabetes. Health professionals should be alert whether users who attend health facilities experience changes in fasting blood glucose. This exam must be routinely requested in nursing or medical consultations for possible follow-up and, when the result is changed, a better investigation and follow-up must be continued (BRASIL, 2013). Another aspect to be discussed in relation to the findings refers that most of the participants have a family relationship of Diabetes Mellitus of 1st or 2nd degree. Regarding the risk probability, there is a statistically significant association for the probability of DM2 and heredity. This fact can be confirmed in a survey conducted in Japan that identified an 80% higher risk of developing DM in participants who had a family history of the disease (SAKURAI et al., 2013). Although they did not present statistical significance in the present study, some variables were shown to be important in other studies in the risk stratification for the development of DM2. As the age of the research participants is mostly young people under the age of 45, results found in studies carried out in Southern Brazil (ARAUJO et al., 2015) and in Cuba (NARANJO et al., 2013), and can be explained by the adoption of unhealthy lifestyle habits earlier and earlier, resulting from the urbanization process (SBD, 2019).

Table 1 - Distribution of users according to the characteristics of the Finnish Diabetes Risk Score scale. João Pessoa, PB, Brazil, 2016

Instrument variables	< 15 (n = 190)		≥ 15 (n = 76)	
	N	%	N	%
Age				
<45	130	82,3	28	17,7
45 a 54	46	60,5	30	39,5
55 a 59	14	43,8	18	56,2
Body Mass Index				
< 25	86	96,6	3	3,4
25 a 30	71	77,2	21	22,8
> 30	33	38,8	52	61,2
Abdominal circumference				
Men< 94 / Woman< 80	59	100,0	0	0,0
Men 94 a 102 / Woman 80 a 88	57	91,9	5	8,1
Men> 102 / Woman> 88	75	51,7	70	48,3
Physical activity				
1 = Yes	51	85,0	9	15,0
2 = No	139	67,5	67	32,5
Vegetable Intake.				
Everyday	86	81,1	20	18,9
Sometimes	104	65,0	56	35,0
Medication for Systemic Arterial Hypertension				
1 = No	142	84,0	27	16,0
2 = Yes	48	49,5	49	50,5
History of hyperglycemia				
1 = No	168	80,0	42	20,0
2 = Yes	22	39,3	34	60,7
Family historyof diabetes				
1 =No	97	93,3	7	6,7
2 =Grandparentsunclescousins	40	74,1	14	25,9
3 =Sibling parentsorchildren	53	49,1	55	50,9

Table 2. Logistic regression for the high-risk outcome of type 2 Diabetes Mellitus with independent variables of the scale

Variables	B*	Wald**	p-value	Odds	IC***	a 95%
Age	0.138	1.103	0.294	1.148	0.888	1.484
Body mass index	1.105	34.207	0.000	3.021	2.085	4.375
Waist	-0.724	28.865	0.000	0.485	0.372	0.631
Physical activity	-0.871	25.961	0.000	0.419	0.300	0.585
Vegetablesandfruits	-0.088	0.348	0.555	0.916	0.684	1.226
HypertensionMedication	0.438	6.524	0.011	1.549	1.107	2.168
Blood Glucose Change	0.772	14.956	0.000	2.164	1.463	3.201
Family historyof diabetes	0.222	10.666	0.001	1.249	1.093	1.427

* Estimate of the logistic regression parameter; ** Wald test, *** 95% confidence interval

It is noteworthy that these finding goes against what is recommended by national guidelines (SBD, 2019; BRASIL, 2013), in which screening for the diagnosis of DM2 is only recommended in people aged 45 years or over, which shows the need to expand the investigation of the disease to other age groups. Regarding abdominal circumference, in which most of the sample was increased by the parameters recommended by the Ministry of Health, other studies show a positive relationship between the increase in abdominal circumference and the risk of developing diabetes (ZARDO et al., 2015; LIMA[a] et al., 2018). Considering the practice of physical activity, most did not practice any activity daily, in line with another similar study carried out in Portugal with 203 people, in which 45% did not practice physical activity (VALENTE et al., 2012). This demonstrates the need for the multidisciplinary team, reflected in the nurse's performance, in conjunction with the doctor and the physical educator, to encourage primary health care users to practice physical activity daily as a benefit to their health, taking into account the characteristics of each user. In this sense, some cohort studies have provided evidence that physical activity in conjunction with a healthy diet would avoid most cases of DM2 (KORAT et al., 2014). Regarding the intake of fruits and vegetables, it was observed that most do not consume daily. However, Brazilian research shows an increase in the consumption of fruits and vegetables from 33.0% in 2008 to 35.2% in 2016 (BRASIL, 2017). A slight increase, however, shows that the Brazilian population is more concerned with the intake of fruits and vegetables, which reduces the risks in relation to DM2, since the adoption of a healthy diet predisposes to the reduction of risk factors such as obesity, dyslipidemia and cardiovascular diseases. The limits of the research in focus was cross-sectional design, which does not allow the establishment of cause and effect relationships, non-probabilistic sampling and difficult access to male users, as many refused to participate in the research and not many those attend regularly basic services of health. On the other hand, the implication for nursing refers to encouraging nurses to assume a vigilant attitude regarding the risk factors for DM2 that can contribute to the development of diabetes as a preventive measure and promote health education with an emphasis on individual and collective nursing consultations with the aim of minimizing the risks that users are exposed to.

Conclusion

Characterizing the risk factors that can contribute to the development of DM2 in a population that receives primary health care is a warning measure for managers and health professionals to act with preventive measures, aiming to reduce such factors in the target population. The nurse working

in the primary care team must promote health education measures and strengthen the bond with the user, in order to guide and encourage changes in lifestyle, so that the risk factors for the development of DM2, of a modifiable nature , can be bypassed and thus postpone the possibility of the disease. Here, a great warning is made regarding body mass index as the strongest risk factor for the development of DM2, in addition to the others that were also significantly evidenced by the regression, such as use of medication for hypertension, high blood glucose and family history. Changes are necessary through public policies that encourage and sensitize the population to weight loss and the practice of physical activity, as well as good eating habits, factors that are determinant to the reduction of the risks raised by this study.

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