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Factors related to the prevention of covid-19 in people with diabetes: a cross-sectional study

Fatores relacionados à prevenção da covid-19 em pessoas com diabetes: estudo transversal

Factores relacionados con la prevención del covid-19 en personas con diabetes: un estudio transversal

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ABSTRACT
Objective: to analyze the factors related to covid-19 prevention practices in users living with diabetes mellitus. **Method**: a cross-sectional, analytical and exploratory study, developed with 300 individuals part of the Family Health Strategy and who had a medical diagnosis of type 1 or type 2 diabetes mellitus. In the bivariate analysis, comparisons between quantitative and categorical variables were performed through *mann-whitney u tests, Kruskal-Wallis,* and dunn's multiple comparison test. **Results**: there was a relationship between the total score of the level of prevention practices of the covid-19 and the variables sex (p<0.001), age group (p=0.003), formal educational level (p=0.018) and comorbidities (p=0.014). **Conclusion:** It was concluded that females, in older age groups and higher levels of education, and with a comorbidity presented a total score of the highest level of covid-19 prevention practices.
DESCRIPTORS: Diabetes Mellitus; SARS virus; Coronavirus infections; Disease Prevention; Nursing.

RESUMO
Objetivo: analisar os fatores relacionados às práticas de prevenção da covid-19 em usuários que vivem com diabetes mellitus. **Método:** estudo de corte transversal, analítico e exploratório, desenvolvido com 300 indivíduos acompanhados na Estratégia Saúde da Família e tinham diagnóstico médico de diabetes mellitus tipo 1 ou tipo 2. Na análise bivariada, as comparações entre variáveis quantitativas e categóricas se deram por meio dos testes *U de Mann-Whitney, Kruskal-Wallis,* e o teste de comparações múltiplas de Dunn. **Resultados:** verificou-se relação entre o escore total do nível de práticas de prevenção da covid-19 e as variáveis sexo (p<0,001), faixa etária (p=0,003), grau de escolaridade (p=0,018) e comorbidades (p=0,014). **Conclusão:** Conclui-se que as pessoas do sexo feminino, com faixas etárias e graus de escolaridade mais elevadas, e com comorbidade apresentaram escore total do nível de práticas de prevenção da covid-19 mais elevado.
DESCRITORES: Diabetes Mellitus; Vírus da SARS; Infecções por Coronavírus; Prevenção de Doenças; Enfermagem.

RESUMEN
Objetivo: analizar los factores relacionados con las prácticas de prevención del covid-19 em usuarios que viven con diabetes mellitus. **Método:** estudio transversal, analítico y exploratorio, desarrollado con 300 individuos seguidos en la Estrategia Salud de la Familia y con diagnóstico médico de diabetes mellitus tipo 1 o tipo 2. En el análisis bivariado se realizaron comparaciones entre variables cuantitativas y categóricas mediante Pruebas U de Mann-Whitney, Kruskal-Wallis y prueba de comparación múltiple de Dunn. **Resultados:** hubo relación entre la puntuación total del nivel de prácticas de prevención del covid-19 y las variables sexo (p <0,001), grupo de edad (p = 0,003), nivel educativo (p = 0,018) y comorbilidades (p = 0,014). **Conclusión:** Se concluyó que las personas del sexo femenino, con mayores grupos de edad y niveles de educación, y con comorbilidad tenían una puntuación total más alta para el nivel de prácticas de prevención de covid-19.
DESCRIPTORES: Diabetes mellitus; Virus del SARS; Infecciones por coronavirus; Prevención de enfermedades; Enfermería.

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INTRODUCTION

The pandemic caused by Corona Virus 19 (*covid 19*) is an international public health problem. Thus, Severe Acute Respiratory Syndrome (SARS-CoV-2) presents mildly in most infected people, however, around 15% need hospitalization, and 5% develop the disease in its severe form[1]. Therefore, an extra demand has been generated for health services, mainly related to hospitalization in an intensive care unit and the need for mechanical ventilation[2].

It is important to point out that the main causes for the development of severe forms of the disease and death are hypertension, diabetes mellitus, cardiovascular and/or previous pulmonary disease[1]. Thus, people living with type 1 or type 2 diabetes mellitus, once infected, may present conditions with a worse prognosis, especially elderly individuals with uncontrolled blood glucose, and who have other comorbidities[3].

Ratifying this data, in a meta-analysis whose objective was to determine the association of metabolic and cardiovascular diseases with the development of covid-19, it was concluded that the incidence of diabetes mellitus was twice as high in those who developed the disease in its severe form, compared to patients who did not[4].

Moreover, although some countries still need to develop robust studies, the literature already presents some results, such as: one study developed by the Chinese Center for Disease Control and Prevention, with data from 44,672 confirmed cases of covid-19, reported deaths of 1,023 people. Among the most frequent comorbidities in patients who evolved to death, diabetes mellitus stands out, present in 7.3% of cases[5]. Preliminary data from the U.S. Centers for Disease Control and Prevention estimated that 32% of patients who required admission to the Intensive Care Unit had diabetes mellitus[6]. The Italian National Institute of Health also reported the prevalence of diabetes mellitus in patients who died, in 35.5%, when infected by covid-19, suggesting that diabetes mellitus may be a significant risk factor for mortality[7].

Diabetes mellitus is considered a risk factor for rapid progression and poor prognosis of covid-19, due to the release of mediators that promote tissue injury, responses to the uncontrolled inflammatory process, and prothrombotic state, associated with lack of control in glucose metabolism. These findings are evidenced by imaging and laboratory tests, the latter point to an increase in serum levels of biomarkers related to inflammation, such as interleukin 6, c-reactive protein, serum ferritin and coagulation factors[8].

Moreover, it is worth mentioning that diabetes mellitus is considered one of the main causes of morbidity and mortality worldwide, and this condition is associated with the development of several other public health problems[9]. Thus, a new conjuncture arises with the interaction between two countries, which represents challenges in different areas.

Thus, reducing exposure to the virus is necessary to control/delay the spread of the disease and negative impacts, such as increased mortality[10]. A study aimed at showing prevention strategies against the spread of covid-19 showed that the implementation of prevention practices

potentially impacted on the reduction of the spread of the vitreous[11].

Thus, it is necessary to verify the prevention practices adopted by users with diabetes, to develop strategies that may encourage or empower them to cope with covid-19. In addition, it will be possible to promote the adequacy and effectiveness of prevention measures, by means of self-care, given that individuals who live with the disease need to be part of or take a leading role in the decision-making process related to their own health.

Therefore, this research aims to analyze the factors related to covid-19 prevention practices in users living with diabetes mellitus.

METHOD

This is a cross-sectional, analytical and exploratory study.

The study was developed in a municipality located in Curimataú Paraibano (Cuité-PB). The selection criteria included users of the Family Health Strategy, with a medical diagnosis of type 1 or type 2 diabetes mellitus, selected from simple random probabilistic sampling. Those under 18 years of age and with attention deficit and/or difficulty in answering the questions were excluded, according to nursing records contained in the medical records.

In order to know the population, information was requested from the Municipal Health Department of the municipality, which consulted individual registration reports, obtained through e-SUS and e-SUS PEC (Electronic Citizen's Medical Record), which selected a total of 855 users. In the sample calculation, the confidence level of 95%, sampling error of 5% and an increase of 10% for losses was considered, obtaining a sample number of 300 individuals.

Data were collected from November 2020 to February 2021. The collection occurred in person, with the use of personal protective equipment and maintenance of a distance of two meters during its execution. It was performed through a form which contained two parts: the first, with sociodemographic, clinical aspects, behavioral habits; and the second, with data to measure the level of covid-19 prevention practices. The latter was composed of questions involving general prevention measures (hand hygiene/antisepsis, social distancing, mask use, care when returning home, environmental hygiene), and specific prevention measures (capillary glucose monitoring, hypoglycemic diet, oral medications/insulin, physical activity, seeking medical attention, vaccination against other respiratory diseases).

It is important to highlight that, as there was no accurate form for measuring the above-mentioned activities, a review was conducted in the literature in order to identify the measures to prevent covid-19 in people living with diabetes[12]. This review supported the construction of a form containing twenty questions in general prevention measures and six issues in specific prevention measures, according to the above subcategories. Both questions presented answers distributed on a Likert scale ranging from zero to four (0-never, 1-few times, 2- sometimes, 3-many times and 4-always). Therefore, the level of general covid-19 prevention practices had a minimum score of zero and maximum of eighty, the level of specific covid-19 prevention practices had a

minimum score of zero and a maximum of 24, and the level of prevention practices for covid-19 in total had a minimum score of zero and a maximum of 104.

In the analysis, the total, general and specific scores of the level of prevention practices of covid-19 were submitted to the *Shapiro Wilk* test to verify the normality of the data. From the result of asymmetric distribution, the median and quartiles 25 and 75 were used as a measure of central tendency and dispersion, and the comparisons between quantitative and categorical variables were performed through the *Mann-Whitney U tests, Kruskal-Wallis,* and Dunn's multiple comparison test.

The correlation between quantitative variables was performed through *spearman's correlation test,* considering the values: 0 - no correlation; 0 to 0.30 - weak correlation; 0.30 to 0.70 - moderate correlation; > 0.70 - strong correlation. In all tests, a significance level of 5% was considered.

The research followed the ethical principles governed by Resolution No. 466/2012 of the National Health Council, so that its project was appreciated and approved by the Research Ethics Committee of the teaching hospital scenario of the study, where it was approved according to opinion no. 4.306.495/2020 and Certificate of Presentation for Ethical Appreciation No. 35726820.2.0000.5182.

RESULTS

A sample of 300 individuals participated in the study, of which 295 (98.3%) had type 2 diabetes mellitus, 183 (61.0%) were female, most were elderly, with an average of 63.5 (±13.1) years of age, 170 (56.6%) lived on less than one minimum wage, 174 were married or lived in a civil union relationship (58.0%), and 231 (77.0%) had less than eight years of formal education.

Table 1 shows the general, specific and total scores of the level of covid-19 prevention practices in people living with diabetes mellitus.

Table 1 - Level of practices to prevent covid-19 in people living with diabetes mellitus. Cuité, PB, Brazil, 2020-2021. (n=300)

Variables	median	(Q_{25}-Q_{75})	Minimum-Maximum
Overall score	53.0	45.0-62.0	12.0-80.0
Specific score	13.0	10.0-16.7	1.0-24.0
Total score	67.0	57.0-76.0	17.0-95.0

Source: Elaborated by the authors, 2021.

*Descriptive analysis of data that presented asymmetric distribution.

It is important to mention that the overall score comprised the general covid-19 prevention measures, such as: hand hygiene/antisepsis, social distancing, mask use, care when returning home, hygiene of the environment); the specific score comprised specific care with diabetes mellitus, which consist of specific prevention measures for covid-19, namely:

capillary glucose monitoring, hypoglycemic diet, oral/insulin medications, physical activity, search for medical care, vaccination against other respiratory diseases. Finally, the total score comprised the sum of the overall score and the specific score.

Table 2 shows a comparison between the sociodemographic, clinical and behavioral habits of users living with diabetes mellitus with the total score of the level of covid-19 prevention practices.

Table 2 - Comparison between the median score of the total level of prevention practices for covid-19. Cuité, PB, Brazil, 2020-2021. (n=300)

Variables		n (%)	Total score of the level of prevention practices of COVID-19	
			Median (Q_{25}-Q_{75})	p-valor
Sex	male	117 (39.0)	62.0 (52.0-73.0)	<0.001*
	female	183 (61.0)	69.0 (61.0-78.0)	
Age group	28 to 59 years old	110 (36.7)	65.0 (56.0-73.2)	0.003†
	60 to 74 years old	125 (41.7)	71.0 (59.0-80.0)	
	75 to 92 years	65 (21.6)	64.0 (55.0-70.0)	
Self-reported skin colour	white	91 (30.3)	67.0 (57.0-79.0)	0.902†
	Black/Brown	106 (35.3)	66.5 (54.7-75.0)	
	other	103 (34.3)	67.0 (57.0-76.0)	
Home arrangement	Lives alone	30 (10.0)	65.0 (53.7-77.2)	0.657*
	Lives with someone	270 (90.0)	67.0 (57.0-76.0)	
Education level	illiteracy	69 (23.0)	64.0 (55.5-73.0)	0.018†
	Incomplete/complete elementary school	169 (56.3)	66.0 (55.5-77.0)	
	Incomplete/complete high school	44 (14.7)	65.5 (57.2-73.0)	

	Incomplete/complete higher education	18 (6.0)	76.5 (69.7-83.2)	
Working activity	retired	192 (64.0)	66.5 (5.2-77.0)	0.952†
	Active worker	74 (24.7)	66.0 (57.0-75.0)	
	unemployed	34 (11.3)	67.0 (57.2-77.0)	
Monthly family income	0 to 1 minimum wage	170 (56.7)	66.0 (56.0-75.0)	0.093†
	2 to 3 minimum wages	97 (32.3)	66.0 (56.5-73.0)	
	4 or more minimum wages	33 (11.0)	72.0 (60.0-82.5)	
Type of Diabetes	Type 1	05 (1.7)	64.0 (58.0-82.5)	0.716*
	Type 2	295 (98.3)	67.0 (57.0-76.0)	
Diagnosis time	Less than 1 year	10 (3.3)	68.5 (62.0-82.2)	0.631†
	1 to 3 years	71 (23.7)	66.0 (56.0-75.0)	
	4 years and over	219 (73.0)	67.0 (57.0-77.0)	
Comorbidities	Yes	216 (72.0)	68.0 (57.0-78.0)	0.014*
	No	84 (28.0)	63.0 (54.0-73.0)	
Chronic complications	Yes	101 (33.7)	64.0 (56.0-74.5)	0.299*
	No	199 (66.3)	68.0 (57.0-77.0)	
Smoker	Yes	27 (9.0)	64.0 (49.0-77.0)	0.389*
	No	273 (91.0)	67.0 (57.0-76.0)	
Consumes alcohol	Yes	44 (14.7)	64.5 (50.2-79.0)	0.296*
	No	256 (85.3)	67.0 (57.2-76.0)	

Source: Elaborated by the authors, 2021.

* Body of U de Mann-Whitney

† Kruskal-Wallis Test

There was a relationship between the total score of the level of covid-19 prevention practices and the variables gender, age group, educational level and comorbidities.

Moreover, the multiple comparison test indicated that, for the level of practices, there was a statistically significant difference between the age groups from 28 to 59 years, when compared to those aged 60 to 74 years (p=0.026), and between the age groups 75 to 92 years, when compared to those aged 60 to 74 years (p=0.008).

The multiple comparison test also indicated that, regarding the level of practices, there was a statistically significant difference between the levels of illiteracy when compared to higher education (p=0.010), high school when compared to higher education (p=0.045), and elementary school, when compared to higher education (p=0.031).

In Table 3 there is evidence of a correlation between the general and specific scores of the covid-19 prevention practice level of users living with diabetes mellitus.

Table 3 - Correlation between the general and specific scores of the level of covid-19 prevention practices of users living with diabetes mellitus. Cuité, PB, Brazil, 2020-2021. (n=300)

Scores	Overall score of the level of covid -19 prevention practices
	ρ (p value)*
Specific score of the level of covid-19 prevention practices	0.359 (<0.001)

Source: Elaborated by the authors, 2021.

* Spearman Correlation Test (ρ - Correlation coefficient).

The relationship between the overall score and the specific score of the level of covid-19 prevention practices showed statistical significance and moderate positive correlation, indicating, however, that the higher the overall score, the higher the specific score.

DISCUSSION

The majority of the participants in this research were female, which can be explained due to the fact that women were more concerned with their own health than men, and because of this they to search for health services[13]. They had type 2 diabetes mellitus, and this is often evidence of food inadequacy, especially with the aging process, since the mean age was 63.5 years[9]. Also, they had an income below a minimum wage and had less than eight years of formal education, which can be considered as predictors to the onset of chronic diseases, since the low purchasing power tied to the level of decreased practices leads to the individual being vulnerable. This information is ratified in a study whose data show that users with higher education and greater purchasing power sought health services more[14].

In this study, it was observed that the prevention measures against covid-19 were satisfactory, since people reached scores close to the maximum score. This data was observed

both in relation to the score of general, specific and total prevention measures.

A study showed the importance of the practice of prevention care to reduce the spread of the virus, among them, social isolation, hand hygiene and the use of a face mask[15]. In relation to specific prevention measures, scientific evidence shows that to prevent, people with diabetes mellitus need to pay attention to the proper intake of liquids, improve food consumption, especially complex carbohydrates, maintain treatment with oral hypoglycemic agents and insulin therapy, monitor blood glucose levels, perform physical exercise, under the supervision of physical education professionals; cease the use of tobacco, seek vaccination against respiratory diseases, and seek medical attention by telemedicine[12].

In the case of the gender variable, it was found in this study that females had more skills in relation to prevention than males, with a greater tendency of this public to adhere to care. These findings confront a research that shows that women during the pandemic, when compared to men, eat more cookies, instead of healthy foods, adhered less to physical activities, besides being more susceptible to cigarette consumption[16]. On the other hand, the authors point out that historically, women care for themselves more and are more concerned about prevention than men, as culturally speaking, care is related to the female gender, making the frequency and search for health services higher among women, and mortality rates higher in men[13].

Regarding the age group, it was perceived that the elderly have a higher level of covid-19 prevention practice than young people of different age groups, as they have a higher rate of chronic diseases, they are more susceptible to the development of covid-19 complications. Corroborating this data, authors report that the elderly, since the beginning of the pandemic, had more care, especially with social isolation, especially those who had comorbidities such as diabetes mellitus and hypertension. This fact is the result of the high mortality rate due to complications in this age group and also by an overprotection of the younger population to these people[17].

Regarding the level of education, it is possible to infer that people with complete and incomplete higher education had a different level of covid-19 prevention practices, and demonstrated to have a higher score when compared to peers with the other categories. Other authors ratify this information, stating that the level of knowledge, or in other words, The higher the level of training, the higher the level of knowledge will be on prevention and practices[18].

It was also noted that people who had comorbidities had more attitudes of prevention regarding covid-19 than those who did not. This greater care may be related to the high risk of developing complications related to covid-19 in these people. One study brought evidence that corroborates this hypothesis[19].

From the relationship between the overall score and the specific score of the level of covid-19 prevention practices, it was evident that the research participants had an equivalent level of general and specific practices. Moreover, one study brought contrary data, whose people demonstrated to have more attention to

general prevention practices than to specific ones, and this factor is justified by the absence of a more present professional follow-up during the pandemic. This reality may present itself in different ways, depending on the region in which the individual resides[20].

As a limitation of the research, retrocausality is pointed out, due to the cross-sectional design, although this is advantageous due to speed and low cost. Therefore, longitudinal studies are suggested to clarify bias.

CONCLUSION

The analysis of sociodemographic, clinical and behavioral habits showed a relationship with covid-19 prevention practices in users living with diabetes mellitus.

Therefore, females, in older age groups and higher levels of education, with a comorbidity, presented a total score of the highest level of covid-19 prevention practices.

The research shows the need to maintain educational actions focused on the prevention of covid-19, in order to improve and maintain the practices of users with diabetes mellitus, in view of the greatest risks to which this population is exposed.

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