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Original Article

Associated factors with the self-care of people with diabetes mellitus in the COVID-19 pandemic

Fatores associados ao autocuidado das pessoas com diabetes mellitus na pandemia de COVID-19

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ABSTRACT
Objective: to analyze the factors associated with self-care in people with diabetes during the COVID-19 pandemic. **Methods:** cross-sectional analytical and exploratory online study with 70 participants, using the Summary Diabetes Self-Care Activities Questionnaire. The clinical and sociodemographic profile was portrayed with a descriptive analysis. Fisher's exact test, the Chi-square test and Poisson regression with robust variance were used to determine the association between the variables. **Results:** after regression, the items Physical Activity, Use of Medication and General Diet from the Summary Diabetes Self-Care Activities Questionnaire showed, respectively, a significant association with the variables Physical Exercise ($p<0.001$), Occupation ($p=0.005$) and Age ($p=0.01$). **Conclusion:** the physical exercise, medication use and general diet items on the self-care questionnaire were related to the variables of age, occupation, and physical exercise, respectively. **Contributions to practice:** health services should intensify the investigation of factors associated with the difficulties of people with diabetes, to offer a better quality of life and adequate health promotion for this population.
Descriptors: Diabetes Mellitus; Diabetes Complications; Self Care; COVID-19; Health Personnel.

RESUMO
Objetivo: analisar os fatores associados ao autocuidado em pessoas com diabetes durante a pandemia de COVID-19. **Métodos:** estudo transversal analítico e exploratório *online* com 70 participantes, utilizando o Questionário de Atividades de Autocuidado com o Diabetes. O perfil clínico e sociodemográfico foi retratado com uma análise descritiva. Já para a associação entre as variáveis, aplicaram-se o teste exato de Fisher, o teste Qui-quadrado e regressão de Poisson com variância robusta. **Resultados:** após a regressão, os itens Atividade física, Uso de medicação e Alimentação geral do Questionário de Atividades de Autocuidado com o Diabetes apresentaram, respectivamente, associação significativa com as variáveis exercício físico ($p<0,001$), ocupação ($p=0,005$) e idade ($p=0,01$). **Conclusão:** os itens de exercício físico, uso de medicação e alimentação geral do questionário de autocuidado se relacionaram com as variáveis de idade, ocupação e prática de exercício físico, respectivamente. **Contribuições para a prática:** os serviços de saúde devem intensificar a investigação dos fatores associados às dificuldades das pessoas com diabetes, para oferecer uma melhor qualidade de vida e uma promoção de saúde adequada para essa população.
Descritores: Diabetes Mellitus; Complicações do Diabetes; Autocuidado; COVID-19; Pessoal de Saúde.

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Introduction

Diabetes mellitus (DM) is a chronic metabolic condition of multiple origins, which occurs when there are permanently high levels of glucose in an individual's blood. Due to its growing incidence and prevalence around the world, it is now a concern for health systems and represents around 5 to 20% of all health expenditure in developing countries, such as Brazil. There are tangible costs for people with diabetes, such as the costs of users not being assisted by health services, but also intangible costs, such as pain, anxiety, and loss of quality of life[1].

People with diabetes have higher morbidity, infection prevalence and mental health problems. As such, these individuals tend to manifest depressive symptoms two to three times more often than the general population, which can be associated with reduced self-care, low participation in treatment, sedentary lifestyle, social isolation, weight gain, among others[2].

The World Health Organization (WHO) corroborates the need for people with DM to acquire self-care skills that enable them to manage their condition. However, barriers to adherence to diet and physical activity include little family support, work or occupation, stress, safety, and the cost of places to exercise[3].

In addition to these barriers, people with DM have had to deal with another difficulty: the pandemic declared in March 2020 by the WHO of the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), responsible for Coronavirus Disease 2019 (COVID-19), which has had a huge impact on health and social systems around the world. The world's population has had to take social distancing and isolation measures, and some services that generate crowds have been temporarily closed. In addition, hospitals and other health services have had to adapt their forms of care to prevent further transmission of the virus[4].

There were groups of people who, if they contracted COVID-19, could develop serious complications, and become seriously ill, the so-called risk groups, and in this group would be people with DM, as poorly managed hyperglycemia would increase severity and mortality in COVID-19 patients[5].

This disease also threatened to contribute to worse management of the condition due to interruptions caused by the pandemic, with changes in routine. It was found that more than a third of people with diabetes interviewed now had a less healthy diet, and half reported exercising less, thus increasing the factors that can alter blood glucose[6].

There have also been changes in the routine of people with this condition in some cases related to access to medicines, supplies and health services, which have been disrupted by COVID-19[6]. There are reports that doctors were often unavailable, and refills on prescriptions were difficult, adding a stressor for these people[2]. Some interventions aimed at optimizing the self-management of people with diabetes are possibly feasible in a pandemic scenario, including text messaging, web- or computer-based interventions, cell phone apps and self-monitoring of blood glucose, but they still need to be better evaluated[6].

The literature evaluating the association of self-care in people with diabetes during the pandemic period of the SARS-CoV-2 virus is limited. Therefore, this study aimed to analyze the factors associated with self-care in people with diabetes during the COVID-19 pandemic.

Methods

This is a cross-sectional, analytical, and exploratory study, carried out online[7]. The population was made up of individuals aged over 18 of both sexes, living in Brazil, diagnosed with type 1, type 2, gestational or other types of diabetes, such as Latent Autoimmune Diabetes in Adults (LADA), Mature Onset Diabetes of the Young (MODY), pre-diabetes, and who had equipment with internet access. The inclusion of different types of diabetes in the study was aimed at

reaching a wider range of people and the need to observe the self-care of all people with DM. Individuals who did not answer all the survey questions were excluded. Sampling was non-probabilistic and by convenience (n=70).

The study was communicated to the participants by means of a text and image on social media such as WhatsApp, Facebook, Instagram, and groups aimed at people with diabetes, with the aim of reaching as many individuals as possible in a short space of time. On receiving the announcement, individuals were sent a link to read the text and agree to take part in the research by agreeing to the informed consent form and the questionnaire created using Google Forms. Data collection took place entirely in a virtual environment between November 2021 and March 2022.

The questionnaire for data collection, designed by the author, contained sociodemographic variables (age, marital status, city, state, education, occupation, family, and individual income), lifestyle habits (smoking, alcohol use, diet, and physical activity) and clinical variables (type of DM, time since diagnosis, acute and chronic complications, medication, comorbidities, weight, height, blood glucose monitoring, metabolic management, and health service coverage).

Self-care behavior was assessed using the Summary of Diabetes Self-Care Activities (SDSCA) questionnaires, adapted, and validated for use in Brazil. When users are assessed with the questionnaire, they report how often they carried out the activities or behaviors in the previous seven days. The answers range from zero to seven, with the scores indicating performance in self-care activities, with zero to four being undesirable, and five to seven being desirable depending on the type of activity[8].

The statistical software SAS version 9.4 was used to carry out the analyses. Categorical variables were described by absolute and relative frequencies and continuous variables by mean, standard deviation, minimum and maximum, due to the normal distribution confirmed by the Shapiro-Wilk test. Pearson's Chi-square test[9] was used to assess associations between the SDSCA and the other qualitative variables. In cases where the assumptions of the Chi-square test were not met, Fisher's exact test was applied[10].

Poisson's regression models with robust variance[11] were also built, considering the SDSCA as the dependent variable. The results show the prevalence ratio estimates obtained, as well as their respective 95% confidence intervals, with a significance level of 5%.

This study was approved by the Research Ethics Committee of the Federal University of São Paulo under number 4,726,733/2021.

Results

A total of 70 responses were collected, of which: 37 (52.9%) of the participants had DM1; 26 (37.1%) DM2; 2 (2.9%) Gestational Diabetes; and 5 (7.1%) other types of diabetes. The average time since diagnosis was 13 years (standard deviation (SD): 9.9). The average age of the participants was 40.2 years (minimum of 18 and maximum of 83 years, SD = 17.7), 48 people (68.6%) were female, 59 (84.3%) lived in the state of São Paulo, 43 (61.4%) were from the capital region, 33 (47.1%) were single, 35 (50%) were employed, 49 (70%) had completed higher education or were studying, 36 (51.4%) had an individual income, 23 (32.9%) had a family income of between one and three minimum wages and 32 (45.7%) used the private healthcare system. Regarding changes in income during the pandemic, 35 (50%) people reported a reduction in their family income.

Regarding diet, it is important to note that of those who reported a change in diet and food quality, 37 (52.9%) people reported an increase in carbohydrate consumption, 21 (30%) increased sugar intake, 19 (27.1%) increased protein consumption, 15 (21.4%) increased fat consumption and 15 (21.4%) decreased fruit and vegetable consumption.

The most reported comorbidities were: 20 (28.6%) people with systemic arterial hypertension, 19 (21.4%) with obesity and 11 (15.7%) with dyslipi-

demia. The chronic complications reported before and during the pandemic were: 9 (12.9%) retinopathy, 5 (7.1%) ischemic heart disease, 5 (5.7%) nephropathy and 5 (5.7%) peripheral Vasculopathy. Regarding the presence of acute complications before and during the pandemic, 19 (27.1%) people reported an increase in complications, among them 23 (32.9%) reported hypoglycemia; 29 (41.4%), hyperglycemia; and 4 (5.7%), diabetic ketoacidosis.

Regarding the medications most used by participants: 30 (42.9%) used oral hypoglycemic agents; 27 (38.6%), injectable hypoglycemic agents; 23 (32.9%), antihypertensive agents; 17 (24.3%), analgesics; 16 (22.9%), hypolipidemic agents; and 12 (17.1%), psychotropic agents.

Regarding glycemic monitoring during the pandemic: 31 (44.3%) participants reported that they monitored their blood glucose as often as before; 17 (24.3%), more than before; 12 (17.1%), less than before; and 10 (14.3%) did not monitor their blood glucose. When asked about blood glucose variation: 32 (45.7%) reported increased blood glucose and 8 (11.4%) reported decreased blood glucose. Regarding tests: 23 (32.9%) participants had a glycated hemoglobin test, and 14 (20%) had not had a test. As for the value of the last fasting blood glucose: 31 (44.3%) participants were within the target; 31 (44.3%) were above the target; 5 (7.1%) were below the target; and 3 (4.3%) did not check the value.

The forms of health care most used by participants during the pandemic were: 52 (74.3%) by face-to-face care at the health service; 20 (28.6%) by video; 14 (20%) by WhatsApp or messages; and 7 (10%) by telephone. When asked about difficulties in accessing health services: 37 (52.9%) participants reported that there were no difficulties; 17 (24.3%) reported that they were unable to schedule appointments; 13 (24.3%) were unable to get supplies; and 11 (15.7%) reported a lack of medication. Regarding the return to pre-pandemic habits, 40 (57.1%) participants reported that they had partially returned; 14 (20%) reported that they had not returned; and 3 (4.3%) had fully returned.

Table 1 shows the clinical profile of the participants. It is important to note that most people reported having increased the number of meals they ate during the pandemic, as well as having reported weight gain and a decrease or absence of physical activity during the pandemic.

Table 1 – Clinical characteristics of participants during the COVID-19 pandemic (n=70). São Paulo, SP, Brazil, 2022

Variables	n (%)
Smoking during the pandemic	
No use	64 (91.4)
Uses the same amount as before the pandemic	1 (1.4)
Increased the amount	2 (2.9)
Decreased quantity	3 (4.3)
Alcohol consumption during the pandemic	
Does not consume	37 (52.9)
Consumes the same amount as before the pandemic	1 (1.4)
Increased the amount	2 (2.9)
Decreased quantity	3 (4.3)
Number of meals during the pandemic	
Same number of meals as before the pandemic	39 (55.7)
The number of meals increased	21 (30.0)
The number of meals decreased	10 (14.3)
Physical exercise during the pandemic	
Does not exercise	25 (35.7)
Does the same amount as before the pandemic	9 (12.9)
Increased the amount	8 (11.9)
Decreased	28 (40.0)
Weight during the pandemic	
Not verified	10 (14.3)
Increased	38 (54.3)
Decreased	22 (31.4)

Table 2 shows diabetes self-care activities on a weekly basis. A satisfactory average frequency of self-care was found only for eating sweets (less than four days a week), drying the spaces between the toes after washing them and taking diabetes medication as recommended (more than five days a week).

Table 2 – Evaluation of the items in the Diabetes Self-Care Activities Questionnaire during the COVID-19 pandemic (n=70). São Paulo, SP, Brazil, 2022

Items	Frequency (days of the week)		
	0 to 4 n (%)	5 to 7 n (%)	Mean* (SD)†
General nutrition			
Follow a healthy diet	38 (54.3)	32 (45.7)	3.9 (2.6)
Follow the dietary advice given by a professional	41 (58.6)	29 (41.4)	3.4 (2.5)
Specific diet			
Eat five or more portions of fruit and/or vegetables	46 (65.7)	24 (34.3)	3.5 (2.2)
Eat red meat and/or whole milk products	37 (52.9)	33 (47.1)	4.2 (3.3)
Eat sweets‡	47 (67.1)	23 (32.9)	3.6 (2.1)
Physical activity			
Perform physical activity for at least 30 minutes	53 (75.7)	17 (24.3)	2.5 (2.3)
Perform specific physical exercise (swimming, walking, etc.)	57 (81.4)	13 (18.6)	2.1 (2.5)
Monitoring blood glucose			
Check blood sugar	24 (34.3)	46 (65.7)	4.7 (2.7)
Check blood sugar as often as recommended	35 (50.0)	35 (50.0)	3.8 (3.2)
Foot care			
Examine your feet	37 (52.9)	33 (47.1)	4.0 (2.8)
Examine the inside of your shoes before putting them on	43 (61.4)	27 (38.6)	2.9 (3.2)
Dry the spaces between the toes after washing them	16 (22.9)	54 (77.1)	5.4 (2.7)
Use of medication			
Take diabetes medication as recommended	8 (11.4)	62 (88.6)	6.4 (1.7)

*Average adherence, in days per week, to self-care activities over the previous seven days. The higher the average, the more satisfactory the situation; †SD: standard deviation; ‡Item with reverse score and inverse evaluation

When evaluating the associations and comparisons between clinical and socioeconomic variables with the SDSCA during the COVID-19 pandemic, it was observed that the SDSCA Physical Activity item showed a significant association with the physical exercise variable by Fisher's exact test ($p<0.001$). In addition, the item Use of medication from the SDSCA was significantly associated with the occupation variable by the Chi-square test ($p=0.04$).

Among those who performed physical activity in an undesirable way, 92.5% reported that they decreased the amount of physical exercise during the pandemic, while among those who performed physical activity in a desirable way, 47.1% reported that they maintained or increased the amount of exercise during the pandemic.

For people who use medication undesirably, 17.4% had a job with a fixed income, while for those who use medication desirably, 52.1% did not have a job with a fixed income.

Table 3 shows that, after analyzing the Poisson Regression with robust variance, the same variables remained related to the Self-Care Questionnaire. However, the age variable was also significantly related to the general diet item in the SDSCA, in which the average age of people with a desirable diet was 43.9 years (SD= 19.5), while among those with an undesirable diet, the average age was 38 years (SD= 16.2).

Table 3 – Factors associated with the self-care of people with diabetes mellitus during the COVID-19 pandemic after Poisson Regression analysis (n=70). São Paulo, SP, Brazil, 2022

Variables	Summary of Diabetes Self-Care Activities questionnaires		
	Physical activity	Use of medication	General nutrition
	RP* (CI†)	RP (CI)	RP (CI)
Physical exercise	6.78 (2.19 – 20.98)	0.87 (0.68–1.11)	1.41 (0.74–2.66)
p-value‡	<0.001	0.260	0.290
Occupation	1.06 (0.43 – 2.64)	1.32 (1.09–1.60)	1.68 (0.89–3.18)
p-value	0.890	0.005	0.110
Age	1.02 (1.0 – 1.04)	1.0 (0.99–1.01)	1.02 (1.01–1.03)
p-value	0.070	0.730	0.010

*RP: Prevalence Ratio; †CI: 95% Confidence Interval; ‡p-value of the multiple analysis model (Poisson Regression with robust variance)

Discussion

Regarding socio-economic data, a recent Brazilian survey on the lifestyle habits of people with diabetes during the pandemic, also carried out online, showed results that were partially in line with this study, in which most people were female, on average 40 years old. but with DM 2. In this study, more than half of the participants also reported a decline in family income, showing the impact of the pandemic on the economic life of this population[12].

Clinical data from a study, like this one, showed that there was a decrease in participants' physical activity during the pandemic, which may be related to spending more time at home and the difficulty of accessing places to exercise[13].

It is important to note that comorbidities, when associated with diabetes, can increase mortality in Coronavirus infection, as shown by a Brazilian systematic review[14]. Considering that 21.4% of the participants in this study were obese, 28.6% were hypertensive and 15.7% had dyslipidemia, it is worth noting that these conditions can be major risk factors in the pandemic period[15].

The medications most used by the participants in the survey are in line with the comorbidities reported. The risk of polypharmacy in people with DM stands out, as it can increase the chances of a harmful drug interaction[16]. As for psychotropic drugs, 17.1% of the participants reported using them, and studies have shown that these drugs can have effects on blood glucose, such as worsening glucose metabolism, exacerbation of pre-existing diabetes and diabetic ketoacidosis as a rare complication[17]. In addition, one study showed that during the COVID-19 pandemic it is extremely important that people with diabetes use hypoglycemic drugs continuously and correctly, as strict glycemic management can be an important contributor to containing viral replication and the duration of the SARS-CoV-2 infection[18].

In this study, it was possible to observe that people with DM1 had a higher frequency of glycemic monitoring than people with DM2, which may be due to the need for DM1 to have more intense and frequent daily management. Also, it was observed that 34.3% of people monitored at an undesirable frequency, while 45.7% reported increased blood glucose during the pandemic. It is important to note that research has shown a strong association between increased frequency of blood glucose monitoring and lower glycated hemoglobin (HbA1c) values[19]. In addition, other studies indicate that intense self-monitoring of blood glucose is a great ally in the treatment of coronavirus infection, and it is extremely important to follow the monitoring routine prescribed by the health professional[20].

Regarding access to supplies during the pandemic, an online survey of people with DM during the pandemic reported difficulties for the participants, associated with a decline in the number of capillary glycemia's performed per day, which, added to the irregularity of medical appointments, worsened the self-care of those interviewed[12]. In the present study, although 44.3% of the participants said that there had been no change in the number of capillary blood glucose tests carried out per day, 45.7% reported higher blood glucose levels during the pandemic, and more

than 25% reported difficulty in accessing health services, related to the fact that around 30% of the participants had been treated by an alternative means at a distance, showing that this type of service had a significant impact on the way these individuals self-care.

The SDSCA showed that there was an undesirable result in relation to the low amount of physical activity, the low frequency of foot self-examination and the low frequency of healthy eating, except for eating sweets, which had a satisfactory frequency. In most people with DM2, it was possible to observe a pattern of unsatisfactory results in almost all the items on the questionnaire, except for the medication item, showing that these people have good self-care in drug therapy, but still insufficient in other aspects[21-22]. People with both types of diabetes showed unsatisfactory results only in the physical activity and monitoring items of the questionnaire, which may be related to the difference in sample size, location of the research, customs, among other factors[23].

Study limitations

Due to the pandemic, the online data collection technique was a limitation, as responses depended on people's access to the internet, the reach of the messages and people's engagement in sharing the survey. As a result, the study sample was smaller than initially desired.

As the study design was cross-sectional, it was impossible to make inferences about causality, there was a probable prevalence bias (the estimated prevalence may be higher or lower than the real prevalence), and because the sample was non-probabilistic and for convenience, it was not possible to generalize the results.

In addition, it was possible to note the scarcity of national articles related to the theme of this study in the pandemic, which is a hindrance to the discussion, since cultures in different countries have different health habits.

Contributions to practice

In terms of self-care, this study shows how difficult it is for people with diabetes to carry out certain actions, such as eating a healthy diet, taking part in physical activity, monitoring blood glucose levels properly and looking after their feet, making it extremely important for nurses, who are the main players in diabetes education, to promote health education. In addition, the importance of investigating the factors associated with these difficulties by the health services should be highlighted, so that the health team can put together an appropriate individual therapeutic plan for people with diabetes because as shown in this study, clinical and socioeconomic variables such as age, occupation and physical exercise have an impact on the quality of DM self-management.

The work also shows the importance that health professionals must give to the individual demands of people with diabetes. It is therefore extremely necessary for health institutions to promote multidisciplinary work to provide comprehensive care for this population. In addition to clinical actions, it is necessary to promote public policies for people with this condition, so that a better quality of life and adequate health promotion can be offered to this population.

Conclusion

It was observed that, during the pandemic, people with diabetes had a higher consumption of carbohydrates, a decrease in physical activity, weight gain and the number of complications. Regarding the self-care questions, the answers on the scale were only satisfactory for the medication factor, drying feet and eating sweets. The physical exercise, medication use and general diet items on the self-care questionnaire were related to the variables of age, occupation, and physical exercise, respectively.

Authors' contribution

Conception, design, methods, data analysis, writing of the article and relevant critical review of the intellectual content: Alves BS, Costa PCP.

Final approval of the version to be published, agreeing to be responsible for all aspects of the work and for ensuring that questions relating to the accuracy or integrity of any part of the work are properly investigated and resolved: Alves BS, Monteiro OO, Okuno MFP, Costa PCP.

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