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## SELF-CARE ACTIVITIES AND THEIR RELATIONSHIP TO METABOLIC AND CLINICAL CONTROL OF PEOPLE WITH DIABETES MELLITUS<sup>1</sup>

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**ABSTRACT:** Cross-sectional study with the aim to evaluate self-care in people with type 2 diabetes *mellitus* and verify its relationship with sociodemographic and clinical characteristics. The sample included 218 patients under outpatient follow-up. Self-care activities were evaluated by means of a questionnaire that was previously translated and validated for Brazil. The questionnaire items that reached the highest means were related to drug therapy, whereas those with the lowest means were related to the practice of physical activity. Age correlated inversely with physical activity and foot care, and elapsed time since the disease diagnosis showed a direct correlation with blood glucose monitoring. Data showed that self-care activities related to behavioral changes are the ones that require greater investments to achieve its goals, and age and time since diagnosis should be considered in the planning of nursing care for people with diabetes mellitus.

**DESCRIPTORS:** Selfcare. Diabetes mellitus, type 2. Nursing care.

## ATIVIDADES DE AUTOCUIDADO E SUAS RELAÇÕES COM CONTROLE METABÓLICO E CLÍNICO DAS PESSOAS COM DIABETES MELLITUS

**RESUMO:** Estudo transversal que objetivou avaliar as atividades de autocuidado das pessoas com o diabetes mellitus tipo 2 e verificar suas relações com as características sociodemográficas e clínicas. A amostra incluiu 218 pacientes em seguimento ambulatorial. As atividades de autocuidado foram avaliadas por meio de questionário traduzido e validado para o Brasil. Os itens deste questionário que obtiveram maiores médias foram os relacionados à terapia medicamentosa, e os menores, com a prática de atividade física. A idade correlacionou-se inversamente com a prática de atividade física e cuidado com os pés, e o tempo de diagnóstico da doença apresentou correlação direta com a monitorização da glicemia. Os dados mostraram que as atividades de autocuidado relacionadas às mudanças comportamentais são as que requerem maiores investimentos para atingir as metas do cuidado, e a idade e tempo do diagnóstico devem ser considerados no planejamento da assistência de enfermagem a pessoa com diabetes mellitus.

**DESCRIPTORIOS:** Autocuidado. Diabetes mellitus tipo 2. Cuidados de enfermagem.

## ACTIVIDADES DE AUTOCUIDADO Y SUS RELACIONES CON CONTROL METABÓLICO Y CLÍNICO DE LAS PERSONAS CON DIABETES MELLITUS

**RESUMEN:** Estudio transversal que buscó evaluar actividades de autocuidado con el diabetes mellitus tipo 2 y verificar su relación con características sociodemográficas y con datos clínicos. La muestra se constituyó de 218 personas en seguimiento ambulatorio. Las actividades de autocuidado fueron evaluadas utilizando un cuestionario traducido y validado en Brasil. Los elementos de este cuestionario que tuvieron los promedios más altos se relacionan con la terapia con medicamentos, y los menores con la actividad física. Edad inversamente correlacionada con la actividad física y el cuidado de los pies, y el momento del diagnóstico mostró una correlación directa con la monitorización de la glucosa. Los datos mostraron que las actividades de autocuidado relacionadas con los cambios de comportamiento son las que requieren mayores inversiones para alcanzar los objetivos de la atención, y la edad y el diagnóstico de tiempo deben ser considerados en la planificación de los cuidados de enfermería a la persona con el diabetes mellitus.

**DESCRIPTORIOS:** Cuidados personales. Diabetes mellitus tipo 2. Cuidados de enfermería.

## INTRODUCTION

Diabetes *mellitus* (DM) is well known because of its increasing prevalence and high morbimortality. In 2013, approximately 382 million people worldwide had the disease, 77% of which are from low and medium development countries.<sup>1</sup>

In Brazil, an increasing prevalence is also observed. A multicenter study conducted in nine capitals, between the years 1986 and 1988, showed an average prevalence of 7.6% for those aged between 30 and 69 years.<sup>2</sup> In Ribeirão Preto, a study conducted between 1996 and 1997, using similar methods, showed a 12.1% prevalence<sup>3</sup> and, later on, between 2005 and 2007, it increased to 15.02%.<sup>4</sup>

A national study aimed to estimate the frequency and distribution of risk and protective factors for chronic diseases in 26 Brazilian states and the Federal District showed that the frequency of self-reported DM ranged from 3.6% in Palmas to 8.2% in São Paulo.<sup>5</sup>

Referring to morbimortality attributable to DM, literature shows that poor control over a long period of time is associated with significant morbidities, such as retinopathy, nephropathy, neuropathy, macrovascular diseases and foot injuries,<sup>6</sup> and mortality, in 2000, was estimated at 2.9 million, equivalent to 5.2% of all deaths worldwide.<sup>7</sup>

It is worth highlighting that self-care is critical when it comes to controlling the disease, and the person with DM is the main responsible for performing daily activities related to treatment.<sup>8</sup>

In the treatment of DM, seven behaviors are essential to self-care: eating healthy, being active, monitoring, taking medication, problem solving, healthy coping and reducing risks.<sup>9</sup>

To develop appropriate care for the disease, it is essential that the person have the necessary skills. However, these skills can be influenced by personal factors, such as gender, age, self-esteem, psychological issues, interpersonal factors and environmental factors (socioeconomic status, housing and living conditions), besides the knowledge about the disease, its treatment, duration, access to health services, among others.<sup>10</sup>

The knowledge of personal characteristics that can interfere with self-care activities and with impaired performance will subsidize care planning with interventions to their specific needs.

Given the above, the aim of this study was to evaluate self-care activities and verify their

relationship to sociodemographic characteristics, metabolic control and clinical data of people with type 2 diabetes (2DM), under outpatient follow-up.

## METHODOLOGY

A cross-sectional study was developed at the diabetes clinic of a tertiary care unit, from June 2011 to June 2012. The sample was selected through a weekly review of the medical records of people scheduled for treatment in the clinic and who met the following inclusion criteria: having a 2DM diagnosis, of any gender, being aged  $\geq 40$  years, capable of dialoguing, whose drug treatment was insulin, oral anti-diabetic and/or associations and not having complications in advanced stage.

Complications considered in advanced stage were: hemodialysis, blindness, disabling sequelae from stroke / heart failure, amputations and/or active ulcer in the lower limbs, people in wheelchairs and/or stretcher. Thus, the sample consisted of 218 adults with 2DM.

The results of laboratory tests were obtained by consulting the electronic records on the same date as the interviews.

Self-care activities were obtained through the Summary of Diabetes Self-Care Activities Questionnaire (SDSCA), using a version that was translated, adapted and validated to the Brazilian culture<sup>11</sup> based on the original English version.<sup>12</sup> The questionnaire was used upon authorization of the authors of the original scale and those of the translated and adapted version.

The SDSCA has 15 DM self-care assessment items, divided into seven dimensions: "general nutrition" (two items), "specific nutrition" (three items), "physical activity" (two items), "monitoring of blood glucose" (two items), "foot care" (three items) and "use of medication" (with three items, used in accordance with the drug regimen). It also includes three other items for the evaluation of smoking.<sup>11</sup>

The SDSCA evaluates the performance of a particular behavior in days per week, so the scores of each item may vary from 0 to 7, with higher scores indicating better results.<sup>13</sup> In the items from the "specific nutrition" dimension, the values were reversed (if 7=0, 6=1, 5=2, 4=3, 3=4, 2=5, 1=6, 0=7, and vice versa) as suggested in the SDSCA revised version.<sup>12</sup> Data on smoking were classified as smokers and nonsmokers, and, for the

analysis of this variable, the proportion of smokers and the average number of cigarettes smoked per day were considered.<sup>11</sup>

As people were invited to participate in the study, its objectives were presented and, those who agreed were asked to sign a Free and Informed Consent Form. The interviews' average length was 70 minutes.

Data were double-entered and validated in the Microsoft Excel program. The database was later exported to the Statistical Analysis System (SAS) for Windows, version 9.2, for univariate and bivariate exploratory analysis with measures of central tendency (mean and median) and variability (standard deviation - SD). Numerical variables were submitted to the Komolgorov-Smirnov and Levene tests to verify, respectively, the normal distribution and homogeneity of variances.

To compare the numerical variables between two groups, the Mann-Whitney test was used, and between three or more groups the Kruskal-Wallis test was used, due to the absence of normal variable distribution. Correlations between numerical variables were investigated using the Spearman correlation coefficient. Differences were considered significant when the significance level (p) was less than 0.05.

This study is part of a project entitled "Impact of a care program for people with DM centered in educational interventions and in social support" approved by the Research Ethics Committee of the Clinical Hospital of the *Faculdade de Medicina de Ribeirão Preto da Universidade de São Paulo*, case no. 9510/2010.

## RESULTS

Regarding sociodemographic characteristics, the mean age of the participants was 60.7 years (SD=8.2). Higher frequencies were found for women (53.6%), people who were married/cohabiting (71.5%), retired (50.9%), from Ribeirão Preto and/or its region (82.5%) and who had a low education level (82.1%). The mean household monthly income was R\$ 1,806.10.

Regarding clinical data, the mean body mass index (BMI) was 32.1 kg/m<sup>2</sup>, with 131 (60%) obese participants. Waist circumference was above normal limits for 107 (92.2%) women and 68 (68%) men.

The mean time of diagnosis was 15.2 years (SD=8.0). Of the 218 participants, 172 (78.9%) were using an oral antidiabetic (OAD) and 20 (11.6%) used OAD associations. The mean duration of use was 11.9 years, and they were taken, on average, 2.6 times a day. As to insulin, 46 (21.1%) only used insulin, with the mean usage time of 8.3 years; the frequency of application was, on average, 2.2 times a day; and the most widely used insulin regimen (56.3%) was NPH+ regular insulin.

For the laboratory tests, the means and respective percentages of the results considered to be altered in the participants were highlighted as follows. Mean hemoglobin was 9.5% (SD=2.0) and it was abnormal ( $\geq 7\%$ ) in 194 (90.6%) participants; mean fasting plasma glucose was 158.4 (SD=69.3) mg/dl and it was abnormal ( $\geq 130$ mg/dl) in 132 (61.1%) participants; mean cholesterol was 174.59 (SD=1.8) mg/dl and it was abnormal ( $\geq 200$ mg/dl) in 54 (27.3%) participants; mean HDL cholesterol was 35.76 (SD=8.6) mg/dl and it was abnormal ( $\leq 45$ ) in 166 (87.5%) participants; mean LDL cholesterol was 102 (SD=34.5) mg/dl and it was abnormal ( $\geq 100$ ) in 86 (48.4%) participants; mean triglycerides was 199.58 (SD=142.7) mg/dl and it was abnormal in 115 (58.1%) participants.

For the evaluation of self-care activities, the items that had the highest and lowest values are highlighted, respectively. The item "taking insulin injections as recommended" achieved the greatest mean (score close to seven) in the activities referred by the respondents, and the item "perform specific exercise" obtained the lowest (score close to zero) among all dimensions (Table 1).

It is noteworthy that, although a normal distribution in the scores of the self-care activities has not been identified, they were expressed as a mean with the respective SD (standard deviation), in accordance with the study of translation and validation of the instrument.<sup>11</sup>

**Table 1 - Evaluation of the items in the Summary of Diabetes Self-Care Activities Questionnaire (SDSCA) in the sample studied. Ribeirão Preto, São Paulo, 2012**

SDSCA Items	Mean* (SD†)	1st Quartile	Median	3rd Quartile
1. Following a healthy diet.	5.0 (SD=2.5)	3.0	6.0	7.0
2. Following professional dietary guidelines.	3.7 (SD=2.8)	0.0	4.0	7.0

3. Eating five or more servings of fruits and/or vegetables.	4.1 (SD=2.8)	2.0	5.0	7.0
4. Ingesting meat and/or whole milk derivatives.	3.0 (SD=2.7)	0.0	3.5	7.0
5. Eating sweets.	6.0 (SD=1.2)	6.0	6.0	7.0
6. Performing physical activity for at least 30 minutes.	2.4 (SD=2.7)	0.0	2.0	5.0
7. Performing specific physical exercises (swimming, walking, etc.).	2.1 (SD=2.6)	-	-	4.0
8. Testing blood sugar.	4.5 (SD=2.8)	2.0	6.0	7.0
9. Testing blood sugar as often as recommended.	3.3 (SD=3.0)	0.0	3.0	7.0
10. Performing foot examination.	4.5 (SD=3.1)	1.0	7.0	7.0
11. Inspection of shoes before putting them on.	4.2 (SD=3.3)	-	7.0	7.0
12. Drying the spaces between the toes, after washing them.	6.2 (SD=2.2)	7.0	7.0	7.0
13. Taking insulin injections, as recommended.	6.8 (SD=1.0)	7.0	7.0	7.0
14. Taking the indicated number of diabetes pills.	6.6 (SD=1.4)	7.0	7.0	7.0

\*Mean in days per week for self-care activities; † SD: standard deviation

Regarding smoking, 194 (89%) participants said they had not “smoked a cigarette in the previous seven days”, 24 (11%) responded affirmatively that they did, with consumption ranging from one to 30 cigarettes a day, mean of 9.3 (SD = 9.1).

For  $p < 0.05$ , it was observed that age was weakly and inversely correlated to “physical activ-

ity” and “foot care”. The number of people living in the house was weakly and inversely correlated to “general nutrition”. The dimension “foot care” had a weak and direct correlation with education. There was also a direct and weak correlation between “monitoring of blood glucose” and the time since diagnosis of 2DM (Table 2).

**Table 2 – Relation of sociodemographic and clinical variables to self-care activities in the sample studied. Ribeirão Preto, São Paulo, 2012**

Scores of the variables	Self-care											
	General nutrition		Specific nutrition		Physical activity		Monitoring of blood glucose		Foot care		Medication	
	Statistics*	p-value†	Statistics*	p-value†	Statistics*	p-value†	Statistics*	p-value†	Statistics*	p-value†	Statistics*	p-value†
Age (full years)	0.03	0.61	-0.04	0.55	<b>-0.13</b>	0.04	-0.03	0.61	<b>-0.15</b>	0.01	-0.07	0.27
Schooling (total years of completed education)	0.07	0.27	0.07	0.24	0.11	0.07	-0.03	0.61	<b>0.14</b>	0.03	-0.05	0.43
Number of people in the household	<b>-0.19</b>	0.00	-0.05	0.41	-0.03	0.63	-0.04	0.55	-0.09	0.17	0.02	0.66
Monthly <i>per capita</i> income	-0.05	0.42	-0.03	0.61	0.02	0.74	0.00	0.96	-0.01	0.78	-0.08	0.23
Time since diagnosis (years)	0.09	0.18	0.06	0.36	-0.00	0.97	<b>0.14</b>	0.03	0.12	0.07	0.01	0.79
Time of insulin use (years)	-0.01	0.81	-0.04	0.54	-0.04	0.50	-0.06	0.34	0.12	0.08	0.01	0.88
Daily frequency of application	-0.06	0.34	0.05	0.41	0.05	0.44	0.05	0.45	0.02	0.76	0.07	0.28
OADs‡ time of use (years)	0.06	0.36	-0.03	0.63	-0.03	0.66	0.05	0.44	0.12	0.09	-0.02	0.78
Daily frequency of OAD ingestion	-0.10	0.19	0.13	0.06	<b>0.15</b>	0.03	-0.02	0.70	<b>0.17</b>	0.02	0.01	0.83

\* The statistics value corresponds to Spearman’s correlation coefficient; † Statistical significance ( $p < 0.05$ ); ‡ OAD: oral antidiabetic

For the nominal nature variables, there was a significant difference in the SDSCA scores as regards physical activity (lower scores for women and those who reported working at home) and monitoring of blood glucose (lower scores for people who did not make use of insulin and those using OADs) (Table 3).

In the variables referring to occupation and

drug treatment, Dunn’s *post-hoc* test was used, and differences in scores related to physical activity and blood glucose monitoring were shown, respectively, between people who were inactive in the labor market and those who worked at home ( $p = 0.015$ ), between the use of OAD and the use of insulin ( $p < 0.001$ ), and also between the use of OAD and associations ( $p < 0.001$ ).

**Table 3 - Relation of sociodemographic characteristics of nominal nature to the self-care activities in the sample studied. Ribeirão Preto, São Paulo, 2012**

Scores of the variables	Self-care											
	General nutrition		Specific nutrition		Physical activity		Monitoring of blood glucose		Foot care		Medication	
	Mean (SD)*	p-value†	Mean (SD)*	p-value†	Mean (SD)*	p-value†	Mean (SD)*	p-value†	Mean (SD)*	p-value†	Mean (SD)*	p-value†
Gender												
Male	4.5 (2.2)	0.36	4.4 (1.4)	0.97	2.9 (2.5)	<0.00	3.9 (2.8)	1.00	5.2 (1.8)	0.08	6.7 (1.0)	0.94
Female	4.3 (2.2)		4.2 (1.3)		1.7 (2.3)		3.9 (2.5)		4.7 (2.1)		6.8 (0.8)	
Occupation												
Active	4.5 (2.1)	0.84	4.5 (1.3)	0.60	2.1 (2.1)	0.01	3.6 (2.9)	0.35	5.3 (1.8)	0.40	6.8 (0.8)	0.76
Inactive	4.4 (2.2)		4.1 (1.4)		2.6 (2.6)		3.9 (2.7)		4.8 (2.2)		6.7 (1.0)	
At home	4.2 (2.4)		4.3 (1.2)		1.5 (2.4)		4.4 (2.5)		5.1 (1.8)		6.8 (0.8)	
Drug treatment												
Associations	4.3 (2.2)	0.25	4.4 (1.3)	0.64	2.1 (2.5)	0.25	4.2 (2.6)	<0.00	5.0 (2.9)	0.25	6.8 (0.9)	0.79
OAD‡	3.9 (2.5)		4.1 (1.4)		2.4 (5.6)		1.1 (1.9)		4.4 (2.1)		6.7 (1.0)	
Insulin	4.8 (2.0)		4.1 (1.4)		2.7 (2.3)		4.7 (2.3)		5.0 (1.7)		6.8 (0.9)	

\* SD: standard deviation; †Statistical significance (p<0.05); ‡ OAD: oral antidiabetic

Regarding the clinical and metabolic variables, there was a weak and inverse association of the item "general nutrition" with HbA1c (-0.17), and with total cholesterol (-0.14). Statistics values correspond to the Spearman coefficient.

## DISCUSSION

In the assessment of self-care activities, the use of drug therapy presented the highest mean, whereas physical activity had the lowest. These results were similar to those of two other studies using the same instrument.<sup>13-14</sup> The first one, a cross-sectional study, had the aim to evaluate self-care activities of Brazilian adults with DM and complications in the lower limbs. It found higher scores for activities related to drug therapy than for physical activities,<sup>13</sup> which agrees with the study carried out in India, whose objective was to estimate self-care behavior and the factors that influence it among adults with 2DM.<sup>14</sup>

Literature has shown that behavior related to eating habits is one of the challenges for health care, especially because of the cultural, economic, emotional, and environmental issues surrounding them.<sup>10</sup>

A qualitative study with the aim to characterize the difficulties found in changing eating habits for people with 2DM from a highly complex clinic in Teresina, Piauí (Brazil), found that people recognize the importance of a balanced nutrition for healthy living, but do not fully follow dietary prescriptions. The authors noted that some people

only follow the recommendations properly when blood glucose is altered, abandoning prescriptions once it is back to normal.<sup>15</sup>

The sample seems to be aware of the restrictions on simple sugars because the item related to the consumption of sweets obtained a mean of 6.0 days/week, close to the maximum score, seven. Nutrition education is one of the essential points in the treatment of DM; without adequate nutrition, good metabolic control is not possible. However, people with DM and healthcare professionals report that changing eating habits is one of the most challenging aspects in self-care.<sup>6</sup>

A cross-sectional study conducted in Várzea Grande, Mato Grosso (Brazil), in order to characterize people with 2DM from Family Health Units in relation to sociodemographic variables and self-care practices, evaluated the consumption of fruits and vegetables separately and found that 34.6% of the participants consume fruits two to three times a week, whereas the consumption of vegetables is observed in 38.5% of them, who said they consumed it two to three times per week,<sup>16</sup> suggesting lower intake of these food groups in relation to the present study findings.

In this last study, consumption of sweets was reported by 46.1% of participants, who said they consumed it at least once a week.

Regarding exercises/physical activities, it is emphasized that the sample of this study consisted of adults and elderly, who may find it easier to practice physical activities rather than specific exercises.

Studies in Portugal<sup>17</sup> and in Florianópolis (Brazil)<sup>11</sup> found similar results to this study, presenting higher scores when respondents were asked about performing physical activity for at least 30 minutes and lower scores when asked about performing specific physical exercises.

A parallel can be drawn between the low frequency of days per week for physical exercises and the low percentage of physical activity shown in two other studies, in which this behavior was presented respectively by 15.4% and 19.5% of the participants.<sup>14,16</sup> A descriptive study conducted among adults with 1DM and 2DM, which aimed to compare the performance of physical activity through the IPAQ questionnaire and care related to physical exercise, showed that among 118 people with 2DM, 30.7% were somewhat active, 60.6% were active and 8.7% were very active.<sup>18</sup>

Self-care activity relating to “testing blood sugar as often as recommended” had a low mean. This finding corroborates a study with the aim to evaluate the self-care activities of people with DM and complications in the lower limbs,<sup>13</sup> and which obtained lower mean of days for this item.

This can be attributed to other factors, such as access to inputs provided by the Basic Health Units to implement the measures. However, this variable was not assessed in this study. Literature has pointed out some difficulties for monitoring glucose, such as psychological, economic and social factors.<sup>6</sup> An integrative review study of the literature on self-monitoring blood glucose at home highlights that the main reasons for not having performed this activity, as recommended, were: financial difficulties, fear of needles/lancets and pain, and inability to handle the glucometer, even with the provision of appropriate instructions.<sup>19</sup>

As for the “foot care” dimension, the results differed from the study with people who had foot injuries,<sup>13</sup> which showed higher means for the items that make up this dimension, perhaps because of their needs and closer contact with professionals for performing the injury treatment.

In a controlled clinical trial, conducted among Brazilian adults with 2DM, 56.4% of participants reported to examine their feet daily in the baseline evaluation.<sup>20</sup> In a descriptive study, 38.5% of participants reported to examine their feet every day, however, 69.2% said they did not know the importance of such care.<sup>16</sup>

Foot care measures that stand out include daily examination, inspection of shoes before putting them on and feet hygiene with careful

drying, especially in the interdigital spaces.<sup>6,21-22</sup> Thus, we conclude that the sample is below the recommendations for foot examination activities and inspection of shoes before putting them on.

Self-care activities related to “medication” obtained the highest means in their items and, despite literature reporting the term “adherence to drug treatment” when studying self-care activities on medication, data from this study were similar to those from studies evaluating medication adherence in people with DM.

It is noteworthy that most of the studies relating to drug therapy of DM evaluate this treatment as a behavior of adherence or non-adherence, with the use of different measurement methods and, therefore, the results are expressed in different ways, such as rates (in percentage) or categories (adherent or non-adherent), which can make it difficult to compare studies. Moreover, those that assess the use of medication through rates not always set them out separately from insulin and oral antidiabetics, which also contributes to the difficulty of comparative analysis between these behaviors.

A sectional study with the objective of analyzing the relationship between social support, treatment adherence and metabolic control of people with 2DM, found a higher rate of adherence to drug treatment (95.5%), considering that 64.2% of these people were under use of insulin and OAD associations.<sup>23</sup> Similar results to this last study were found in a sample of adults with 2DM, in which 75.9% reported adherence to drug treatment and 19.1% also made association between insulin and OAD.<sup>16</sup> It is therefore observed that, regardless of the prescribed drug, people with DM appear to perform, with higher frequency, medication-related self-care activities rather than those related to lifestyle changes.

Regarding “smoking”, of the 218 participants, 51.8% had never smoked, 37.2% reported being former smokers and 11% were smokers. A study that aimed to verify the self-care practices of people with 2DM, in a primary health care unit, found that 19.2% of those studied were smokers, which is higher than the percentage of this study.<sup>16</sup>

In an association analysis between sociodemographic characteristics and self-care activities, this study found a statistically significant and inverse correlation between age and “physical activity” and “foot care”, suggesting that the older the person, the lower the frequency of physical activity and foot care. This finding can reflect the

characteristics of the sample studied, that is, higher frequency of people older than 60 years (57.3%) with abnormal BMI, factors that may hinder or limit physical activities and self-care practices with their feet.

A descriptive study, conducted among people with 1DM and 2DM, investigated the association between sociodemographic and clinical factors, disease perception, social support and adherence to non-pharmacological treatment. It found that the advance of age seemed to predict lower adherence to physical activity.<sup>23</sup>

In contrast, a cross-sectional descriptive study that aimed to analyze the sociodemographic and clinical characteristics and their relationship with knowledge, attitudes towards the disease, self-care and metabolic control of people with 2DM, in Belo Horizonte, Minas Gerais (Brazil), found no statistically significant association between self-care and sociodemographic variables.<sup>24</sup>

In this study, there was a statistically significant correlation between "foot care" and schooling. Similarly to other studies, it was shown that people with high schooling had good capacity for self-care<sup>10</sup> and that education can predict adherence to non-pharmacological treatment.<sup>25</sup>

Another study found different results related to sociodemographic characteristics and activities of self-care with diet and physical activity. Schooling showed an inverse correlation with adherence to these two aspects of the treatment, suggesting that the higher the education, the lower the adherence.<sup>23</sup>

The time elapsed since the disease diagnosis was directly related to "glucose monitoring", that is, the longer the time of diagnosis, the higher the frequency of blood glucose monitoring. It is possible that people with DM, during the long period of illness, have received information or experienced situations that motivated this behavior.

In this sample, lower scores of "glucose monitoring" were found in people who did not use insulin. This may relate to greater emphasis on self-monitoring of blood sugar among people who take insulin, or even the support of the health system in the provision of inputs for these people, because for people with 2DM, who do not take insulin, the practice of blood glucose monitoring is not routinely recommended.<sup>26</sup>

In the present study, lower scores in "physical activity" were observed among women and those who worked at home. A similar result was found in the study aimed to estimate self-care and

factors influencing these behaviors in adults with 2DM in South India, where there was a significant difference in adherence to physical activity, that is, women were less compliant than men.<sup>14</sup>

Relations were observed between "general nutrition" and HbA1c and total cholesterol, with a weak, negative correlation, indicating that the higher the frequency in the performance of a healthy nutrition, the lower the HbA1c levels and total cholesterol.

Despite the significant correlation between "general nutrition" and HbA1c, the mean of this variable was above the normal range, which can be attributed to the type of instrument used, when referring to behaviors from the past seven days. Adherence behaviors are not stable, they may change over time, therefore, they require regular measurements in order to assess the effectiveness of therapy.<sup>27</sup>

Limitations of the present study include: research on the relationship between self-care activities and metabolic control, since other variables may have influenced these results, such as the therapeutic regimen, length of the disease, associated morbidities, age and others; the lack of studies that effectively use the term "self-care activities" and the fragility of the relationship between these activities with clinical variables and metabolic control.

Follow-up studies are suggested to answer questions about the influence of self-care activities on clinical and metabolic control.

## CONCLUSION

In the studied sample, there was a higher performance in self-care activities related to the use of medications, especially the use of insulin, than those relating to activities that require behavioral changes such as diet and physical activity. Data from this study also suggest a relationship between self-care activities and sociodemographic and clinical characteristics, which should be considered during the planning of nursing care for people with 2DM.

Therefore, awareness for people with 2DM regarding the importance of lifestyle changes in self-care activities will help prevention and/or delay of the complications of the disease, besides contributing to an improvement in terms of quality of life.

Health professionals should act as facilitators in the motivation for the desirable behavioral

changes to control the disease and support the development or strengthening of skills for self-care. Therefore, the educational process for self-care activities must be continuous and updated according to specific needs identified in each consultation.

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