

# Factors related to negative self-care adherence in individuals with diabetes mellitus\*

Fatores relacionados com a adesão negativa ao autocuidado em indivíduos com diabetes mellitus

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## ABSTRACT

**Objective:** to detect factors related to negative adherence to self-care in individuals with diabetes mellitus. **Methods:** observational, cross-sectional, analytical, and exploratory study, conducted with individuals diagnosed with type 2 diabetes mellitus and followed-up by the Family Health Strategy. The sample consisted of 250 participants. The Summary of Diabetes Self-Care Activities Questionnaire was used for self-care assessment. Association tests, prevalence ratio and Poisson regression with robust variance were performed in the analysis. **Results:** negative attitudes related to self-care increased by 21% for single/divorced/widowed, 20% for retired, 54% for those who did not diet, 28% for those who did not practice physical activity, 24% for hypertensive, 30% for those with dyslipidemia, and 44% for those with retinopathy. **Conclusion:** socioeconomic factors, behavioral factors, presence of comorbidities and complications related to diabetes mellitus were related to negative adherence to self-care.

**Descriptors:** Diabetes Mellitus; Diabetes Complications; Self Care; Nursing; Medication Adherence; Patient Compliance.

## RESUMO

**Objetivo:** detectar os fatores relacionados com a adesão negativa ao autocuidado em indivíduos com diabetes mellitus. **Métodos:** estudo observacional, transversal, analítico e exploratório, realizado com indivíduos diagnosticados com diabetes mellitus tipo 2 e acompanhados pela Estratégia Saúde da Família. A amostra foi composta de 250 participantes. Foi utilizado o *Summary of Diabetes Self-Care Activities Questionnaire* para avaliação do autocuidado. Na análise realizaram-se testes de associação, razão de prevalência e regressão de Poisson com variância robusta. **Resultados:** as atitudes negativas relacionadas com o autocuidado aumentaram em 21% para solteiros/divorciados/viúvos, 20% para aposentados, 54% para quem não fazia dieta, 28% para quem não praticava atividade física, 24% para hipertensos, 30% para quem tinha dislipidemia e 44% para quem tinha retinopatia. **Conclusão:** fatores socioeconômicos, comportamentais, presença de comorbidades e complicações relacionadas com o diabetes mellitus estiveram relacionados com a adesão negativa ao autocuidado.

**Descritores:** Diabetes Mellitus; Complicações do Diabetes; Autocuidado; Enfermagem; Adesão à Medicação; Cooperação do Paciente.

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## Introduction

Diabetes mellitus is considered a cluster of metabolic imbalances that has hyperglycemia as a common denominator. It presents as outcomes some complications, usually divided into two main categories: macrovascular, including cardiovascular diseases, such as ischemic heart disease, cerebrovascular and peripheral vascular disease; and microvascular, becoming one of the main causes for blindness, kidney problems and lower limbs mutilation<sup>(1-2)</sup>.

In view of the epidemiological impact related to diabetes mellitus, it has been perceived as a public health problem, mainly because of its relation to the increase of investments in health directed to people who present complications associated with the disease, added to the situation of morbidity and mortality caused<sup>(2-3)</sup>.

The prevention of the disease and related secondary aggravations is fundamental. In this sense, it involves skills such as the resignification of the disease and the integration of a new routine, since people affected by diabetes are challenged to change their lifestyle<sup>(4)</sup>.

The adoption of satisfactory self-care measures in diabetes enhances therapeutic success, providing the achievement of results, such as: better control of metabolism, quality of life, symptoms related to anxiety, depression, and reduction of cardiovascular risk<sup>(1)</sup>. Thus, self-care is considered a key component in the life of people with diabetes. Thus, there is a need to awaken users to build specific skills to become capable and responsible for self-care<sup>(5)</sup>.

The important role of the multi-professional health team is emphasized with regard to the stimulation of self-care actions, so that influential factors in the adherence process are identified, and also that there is a dialogic relationship about the individual's needs regarding his disease, in order to propose a care plan focused on the priorities elected through effective negotiation between the individual and the professional<sup>(6)</sup>.

National and international studies have sought to study self-care behavior and associate it with clinical, socioeconomic, and behavioral predictors. However, different findings were observed, namely: drug therapy corresponding to a self-care activity with higher mean, diet rich in fruits and vegetables, blood glucose monitoring and physical exercise presenting lower mean<sup>(1)</sup>. Another study pointed out that hypoglycemic diet and the use of oral hypoglycemic agents were predictors for glycemic control<sup>(5)</sup>.

Therefore, given the heterogeneous results found in the literature, the findings of this study can contribute to a better understanding of the different self-care behaviors in different social and clinical contexts, which enables the construction and implementation of new health promotion policies for more specific care settings.

This study also highlights Primary Health Care as a structuring scenario and a potential capacity for diabetes mellitus management, since, through the Family Health Strategy model, interventions can be implemented from the perspective of collective and individual care<sup>(7)</sup>.

Given the above, the following research question was formulated: what factors are related to negative self-care adherence in individuals with diabetes mellitus? To answer this question, the aim of this research was to detect factors related to negative adherence to self-care in individuals with diabetes mellitus.

## Methods

Observational, cross-sectional, analytical, and exploratory study conducted with individuals diagnosed with type 2 diabetes mellitus and followed-up by the Family Health Strategy in a municipality located in the microregion of the Western Curimataú of Paraíba, Brazil. Data were collected between September 2019 and February 2020 in the Family Health Strategy units.

We included people monitored by the Family Health Strategy of the city where the study was carried out, with a medical diagnosis of type 2 diabetes

mellitus and aged over 18 years. Individuals who verbalized difficulties in understanding and/or answering the questions in the data collection instruments were excluded.

A minimum sample size of 250 people was estimated based on the survey of the number of registered users with type 2 diabetes mellitus in the year prior to the survey, equal to 682, with a confidence interval of 95% and an error of 5%, a minimum expected proportion of 50%, and by means of the public domain program OpenEpi, version 3.01.

Data were collected between September 2019 and February 2020. Initially, socioeconomic data, behavioral habits, and clinical data were collected using an instrument designed by the researchers, including: gender, age group, marital status, remunerative activity, years of study, monthly family income, self-reported skin color, alcoholic beverage use, tobacco use, hypoglycemic diet, physical activity, systemic arterial hypertension, dyslipidemia, overweight/obesity, acute myocardial infarction, stroke, retinopathy, nephropathy, diabetic foot, and amputation. Subsequently, the Summary of Diabetes Self-Care Activities Questionnaire (SDSCA) was used to measure adherence to self-care activities in the user with diabetes<sup>(8)</sup>.

This questionnaire was translated into Portuguese, culturally adapted, and its psychometric properties were tested, showing interitem correlation ranging from  $\alpha = 0.09$  to  $\alpha = 0.86$  and inter-rater correlation ranging from  $\alpha = 0.29$  to  $\alpha = 1.00$ . It has elements arranged in days per week, from 0 to 7, where zero means the least desired situation and seven the most desired. Adherence is considered positive when self-care activity scores are greater than or equal to five, and negative when they are lower than five<sup>(8)</sup>. Moreover, it presents dimensions related to general diet, specific diet, physical activity, blood glucose monitoring, foot care, medication, and smoking.

For data analysis, adherence to self-care activities was adopted as the outcome, considering as

negative response the score with a score lower than five, as oriented by the authors who tested the psychometric properties of the SDSCA<sup>(8)</sup>. The exposure variables were gender, age group, marital status, remunerative activity, years of study, monthly family income, self-reported skin color, alcohol use, tobacco use, diet (hypoglycemic), physical activity, hypertension, dyslipidemia, overweight/obesity, acute myocardial infarction, stroke, retinopathy, nephropathy, diabetic foot, and amputation, according to risk factors and management of diabetes mellitus.

In the univariate analysis, absolute and percentage frequencies were estimated for qualitative variables, as well as mean and standard deviation for numerical variables. In the bivariate analysis, Pearson's Chi-square and Fisher's exact tests of association were performed, as well as the prevalence ratio (PR), with the respective 95% confidence intervals (CI), were calculated and processed by the public domain program OpenEpi, version 3.01.

The variables with statistical significance in the bivariate analysis were pre-selected and then tested in the multivariate model by means of Poisson regression with robust variance, and the variables with a statistical significance of 5% persisted in the final model. After the evaluation of the model quality, it was found in Model 1 the predictors: marital status (single/divorced/widowed), remunerative activity (retired), hypoglycemic diet (no), physical activity (no), systemic arterial hypertension (yes), dyslipidemia (yes), retinopathy (yes), and diabetic foot (yes), Akaike's Information Criterion (AIC)=467.69 and p-value of the Omnibus Test=0.003. In Model 2, with the predictors: marital status (single/divorced/widowed), remunerative activity (retired), hypoglycemic diet (no), physical activity (no), systemic arterial hypertension (yes), dyslipidemia (yes) and retinopathy (yes), we obtained AIC=465.78 and p-value of the Omnibus Test=0.002. Therefore, the best model, according to the fit criteria, was Model 2, which is presented in Table 3. The data

were processed using IBM Statistical Package for the Social Sciences software version 22.0.

The research complied with the ethical principles governed by Resolution No. 466/2012 of the National Health Council and was executed after the project was reviewed by the Research Ethics Committee, under opinion No. 3,541,477/2019 and approval protocol of the Research Ethics Committee and Certificate of Submission for Ethical Appreciation No. 16508819.8.0000.5182.

### Results

A total of 250 users diagnosed with type 2 diabetes mellitus participated in this research, of these, 170 (68.0%) were female, most were elderly, with an average age of 70.3 (±11.8) years, 226 (90.4%) lived on up to two minimum wages per month, 127 (50.8%) were single, divorced, or widowed, and 229 (91.6%) had less than eight years of schooling. Regarding adherence to self-care activities, 172 (68.8%) had negative attitudes and 78 (31.2%) had positive attitudes.

Adherence to the domains general feeding, specific feeding, and medication was positive, whereas adherence to the domain's physical activity, blood glucose measurement, and foot care was negative. Moreover, the value of Cronbach's alpha in the instrument for this population was 0.618 and, regarding the domains, the following results were obtained: 0.806 for general feeding; 0.311 for specific feeding; 0.890 for physical activity; 0.981 for blood glucose monitoring; 0.677 for foot care; and 0.786 for medication.

Table 1 shows the socioeconomic characterization and behavioral habits and their respective relationships with adherence to self-care activities. It was observed that not having a steady companion increased by 22%, retired people by 29%, 69% in people who did not eat hypoglycemic diets and 50% in people who did not practice physical activity in relation to negative adherence to self-care.

**Table 1** – Relationship between socioeconomic characteristics and behavioral habits with adherence to self-care activities of individuals with diabetes mellitus. Cuité, PB, Brazil, 2019-2020

Variables	Adherence to self-care activities				
	Negative n (%)	Positive n (%)	PR <sup>*</sup>	CI 95% <sup>†</sup>	p-value <sup>‡</sup>
Gender					0.237 <sup>‡</sup>
Female	121 (71.2)	49 (28.8)	1.11	0.92-1.35	
Male	51 (63.8)	29 (36.2)	1	-	
Age Group					0,104 <sup>‡</sup>
< 60	26 (81.2)	6 (18.8)	1,21	1.00-1.46	
≥ 60	146 (67.0)	72 (33.0)	1	-	
Marital status					0.019 <sup>‡</sup>
Single/Divorced/Widowed	96 (75.6)	31 (24.4)	1.22	1.03-1.45	
Married/Stable Union	76 (68.8)	47 (31.2)	1	-	
Remuneration activity					0.005 <sup>‡</sup>
Retired	53 (82.8)	11 (17.2)	1.29	1.10-1.51	
Active worker	119 (64.0)	67 (36.0)	1	-	
Years of study					0.826 <sup>‡</sup>
< 8	158 (69.0)	71 (31.0)	1.03	0.75-1.41	
≥ 8	14 (66.7)	7 (33.3)	1	-	
Monthly family income (minimum wages)					0.249 <sup>‡</sup>
≥ 2	19 (79.2)	5 (20.8)	1.16	0.93-1.46	
< 2	153 (67.7)	73 (32.3)	1	-	
Self-reported skin color					0.872 <sup>‡</sup>
White	68 (69.4)	30 (30.6)	1.01	0.85-1.20	
Black/Black	104 (68.4)	48 (31.6)	1	-	
Use of alcoholic beverage					0.228 <sup>‡</sup>
No	160 (69.9)	69 (30.1)	1.22	0.83-1.78	
Yes	12 (57.1)	9 (42.9)	1	-	
Tobacco use					0.539 <sup>‡</sup>
Yes	91 (70.5)	38 (29.5)	1.05	0.89-1.24	
No	81 (66.9)	40 (33.1)	1	-	
Hypoglycemic diet					<0.001 <sup>‡</sup>
No	87 (92.6)	7 (7.4)	1.69	1.45-1.98	
Yes	85 (54.5)	71 (45.5)	1	-	
Physical activity					<0.001 <sup>‡</sup>
No	121 (79.1)	32 (20.9)	1.50	1.22-1.84	
Yes	51 (52.6)	46 (47.4)	1	-	

\*PR: Prevalence Ratio; †CI: 95% Confidence Interval; ‡Pearson's Chi-square

Table 2 shows comorbidities and complications and their respective relationships with adherence to self-care activities. Relationships were observed among the hypertension, dyslipidemia, retinopathy, and diabetic foot groups. Therefore, having hypertension increased negative self-care adherence by 28%, having dyslipidemia by 29%, and having diabetic foot by 48%. It is noteworthy that no relation was identified, from the epidemiological point of view, with the variable retinopathy (CI=0.94-1.98), although statistical significance was presented (p=0.044).

**Table 2** – Relationship between comorbidities and complications with adherence to self-care activities of individuals with diabetes mellitus. Cuité, PB, Brazil, 2019-2020

Variables	Adherence to self-care activities				
	Negative n (%)	Positive n (%)	PR*	CI 95% <sup>†</sup>	p-value
Systemic Arterial Hypertension					0.006 <sup>‡</sup>
Yes	119 (74.8)	40 (25.2)	1.28	1.05-1.56	
No	53 (58.2)	38 (41.8)	1	-	
Dyslipidemia					0.009 <sup>‡</sup>
Yes	42 (84.0)	8 (16.0)	1.29	1.10-1.51	
No	130 (65.0)	70 (35.0)	1	-	
Overweight/obesity					0.304 <sup>‡</sup>
Yes	18 (78.3)	5 (21.7)	1.15	0.91-1.45	
No	154 (67.8)	73 (32.2)	1	-	
Acute Myocardial Infarction					0.999 <sup>§</sup>
Yes	162 (68.9)	73 (31.1)	1.03	0.71-1.49	
No	10 (66.7)	5 (33.3)	1	-	
Cerebral Vascular Accident					0.911 <sup>§</sup>
Yes	163 (69.1)	73 (30.9)	1.07	0.72-1.60	
No	9 (64.3)	5 (35.7)	1	-	
Retinopathy					0.044 <sup>‡</sup>
Yes	158 (70.9)	65 (29.1)	1.36	0.94-1.98	
No	14 (51.9)	13 (48.1)	1	-	
Nephropathy					0.221 <sup>§</sup>
Yes	4 (100.0)	00 (0.0)	1.46	1.34-1.59	
No	168 (68.3)	78 (31.7)	1	-	
Diabetic foot					0.009 <sup>§</sup>
Yes	12 (100.0)	00 (0.0)	1.48	1.36-1.62	
No	160 (67.2)	78 (32.8)	1	-	
Amputation					0.472 <sup>§</sup>
Yes	2 (100.0)	00 (0.0)	1.45	1.34-1.58	
No	170 (68.5)	78 (31.5)	1	-	

\*PR: Prevalence Ratio; <sup>†</sup>CI: 95% Confidence Interval; <sup>‡</sup>Pearson's Chi-square; <sup>§</sup>Fisher's exact test

Table 3 shows that after the Poisson Regression analysis with robust variance, the following remained related to negative adherence to self-care activities: marital status, compensation activity, diet, physical activity, hypertension, dyslipidemia, and retinopathy.

Thus, practicing negative attitudes related to self-care was 21% higher in single/divorced/widowed people when compared to married/stable union people, 20% higher in retired people when compared to active workers, 54% higher in people who did not

follow a diet when compared to those who did, 28% higher in people who did not practice physical activity when compared to those who did, 24% higher in people with hypertension compared to people who did not have this condition, 30% higher in people who had dyslipidemia compared to people who did not have this condition, and 44% higher in people who had retinopathy compared to people without this condition.

**Table 3** – Variables related to negative adherence to self-care activities after Poisson Regression analysis. Cuité, PB, Brazil, 2019-2020

Variables	PR*	CI95% <sup>†</sup>	p-value
Marital Status			0.015 <sup>‡</sup>
Single/Divorced/Widowed	1.21	1.03-1.41	
Married/Stable Union	1	-	
Remuneration activity			0.008 <sup>‡</sup>
Retired	1.20	1.04-1.38	
Active worker	1	-	
Hypoglycemic diet			<0.001 <sup>‡</sup>
No	1.54	1.33-1.79	
Yes	1	-	
Physical activity			0.014 <sup>‡</sup>
No	1.28	1.05-1.56	
Yes	1	-	
Systemic Arterial Hypertension			0,010 <sup>‡</sup>
Yes	1.24	1.05-1.47	
No	1	-	
Dyslipidemia			0.001 <sup>‡</sup>
Yes	1.30	1.11-1.54	
No	1	-	
Retinopathy			0.024 <sup>‡</sup>
Yes	1.44	1.04-1.98	
No	1	-	

\*PR: Prevalence Ratio); <sup>†</sup>CI: 95% Confidence Interval; <sup>‡</sup>p-value of the multivariate analysis model (Poisson Regression with robust variance)

## Discussion

The limitations of the results of this research are related to reverse causality bias, inherent to cross-sectional studies, and it is not possible to identify the cause-effect moment of the problem. It is also

noteworthy that the SDSCA scale was applied through an interview, and the response was obtained through self-report, which may reduce the generalizability of the results.

The results explained contribute to the applicability of strategies aimed at better adherence to self-care activities, including health education and greater home monitoring, to verify changes in attitudes, mainly focused on socioeconomic issues, comorbidities and complications highlighted in this study. This reflects in a better quality of life for these people, as the risks of developing complications are reduced. This study also configures itself in the presentation of a predictive model, thus, can lead more accurate observational studies, whose individuals with higher chances of negative adherence can be inserted into specific strategies, reducing the chance of micro and microvascular complications in target organs.

Based on the socioeconomic profile presented, a higher prevalence of diabetes in the elderly is identified, justified by the demographic and epidemiological transition that has been occurring worldwide, observing an increasingly important contingent of people aged 60 years or more with a consequent increase in chronic diseases<sup>(9)</sup>. It is also noticed a higher number of women, which must be related to a feminization of aging in Brazil and a greater concentration of this public in health services, which implies a greater notification and diagnosis among this public<sup>(10)</sup>.

There is evidence that people who do not live with a partner have a higher rate of negative activities regarding self-care, and that marital status is a determinant of increased mortality in diabetic patients, especially in men<sup>(11)</sup>. This is because married people tend to care more for the disease, since the family arrangement provides greater support for adherence to treatment<sup>(12)</sup>.

Regarding retirees, corroborating the data of this research, the fact of being elderly, diabetic and retired hinders self-care, and this behavior is associated with a construction throughout life, because in youth, due to the need to work, no time is allocated for self-

-care, and such behavior is perpetuated, even after the diagnosis of diabetes<sup>(13)</sup>. Moreover, it is inferred that active workers with multimorbidity have greater difficulty in adhering to self-care when compared to retirees, due to the existence of obstacles in reconciling with work obligations, besides the fact that they do not attend the Basic Health Units, because they work in the same working hours<sup>(14)</sup>.

As for people who did not eat hypoglycemic diet or exercise, an investigation conducted in Korea ratifies the findings of this research, because it shows that when individuals do not do either activity, they show negativity in relation to adherence to other care, and when the opposite occurs, people perform better self-care, especially those related to adherence to drug therapy and foot care<sup>(15)</sup>. It is known that proper nutrition, especially in diabetic individuals, contributes to glycemic control and ideal weight gain<sup>(16)</sup>. In addition, physical exercise contributes to glucose degradation, reducing the need to use insulin, preventing overweight, and improving psychological and emotional well-being<sup>(17)</sup>.

Regarding comorbidities and complications related to diabetes mellitus, the variables related to the presence of hypertension and dyslipidemia were associated with negative attitudes towards self-care. It is suggested that people with hypertension and dyslipidemia take less care of themselves regarding diet, smoking and physical exercise<sup>(18)</sup>. Dyslipidemia and hypertension are frequently associated and account for about 50% of the risk of developing coronary artery disease<sup>(19)</sup>.

In this context, it is worth noting that the association of several chronic diseases in a single person is a problem of multimorbidity, which causes, in most cases, disability in basic activities of daily living<sup>(20)</sup>. Therefore, these obstacles may be associated with lack of adherence to self-care, which can lead to further complications and increased risk of mortality. It should also be recognized that some users have difficulty in adhering to self-care because their behavioral habits are related to their health beliefs, which hin-

ders self-efficacy in care and worsening of the clinical condition.

It is observed that most factors correspond to the social determinants and determinants of health. Thus, transformations are essential in order to provide users with the conditions to perceive themselves as active in the process of care and improvement of their health conditions through self-care and the search for a comprehensive care that ensures them technological support and essential human resources.

In this sense, there is an urgent need to seek actions to promote the health of people with diabetes in a perspective of multidisciplinary and intersectoral care with the re-evaluation of national and/or local programs and proposals, so that they become effective in encouraging and supporting self-care.

## Conclusion

The following factors were found to be related to negative adherence to self-care activities among individuals living with diabetes mellitus: socioeconomic and behavioral factors, presence of comorbidities, and disease-related complications.

## Collaborations

Silva ALDA, Santos CMS, Oliveira MVG and Andrade LL contributed to the conception and design, data analysis and interpretation, article writing and relevant critical review of the intellectual content. Nunes WB, Nogueira MF, and Costa MML contributed to the relevant critical review of the intellectual content and final approval of the version to be published.

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