

Knowledge and attitude about diabetes self-care of older adults in primary health care

Anna Karla de Oliveira Tito Borba ¹
Ilma Kruze Grande Arruda ²
Ana Paula de Oliveira Marques ³
Márcia Carréra Campos Leal ³
Alcides da Silva Diniz ²

Abstract *This study aimed to assess the knowledge about diabetes, the attitude for self-care and associated factors through a cross-sectional study, the baseline of a randomized clinical trial with elderly diabetic in primary health care in Recife, Northeastern Brazil. We used the Diabetes Knowledge Scale (DKN-A) and Diabetes Attitudes Questionnaire (ATT-19). Of the 202 elderly, 77.7% had insufficient knowledge of the disease, especially for ketonuria, food replacement and were unaware of the causes and care of hypoglycemia. As for attitude, 85.6% had a negative psychological adjustment for diabetes. The logistic regression model showed that living alone was a protective factor (OR = 0.24; 95% CI 0.09-0.65; OR = 0.22; 95% CI 0.07 to 0.71), and low education, a risk factor (OR = 7.78; 95% CI 3.36-18.01; OR = 13.05; 95% CI 4.63-36.82) for the insufficient knowledge and the negative attitude for self-care, respectively. The findings reinforce the need for interdisciplinary educational actions that include socioeconomic, psycho-emotional and educational aspects in diabetes management to maintain elderly autonomy and functionality.*

Key words *Diabetes Mellitus, Elderly, Knowledge, attitudes, practice, Primary Health Care*

¹ Departamento de Enfermagem, Universidade Federal de Pernambuco (UFPE). Campus Universitário, Cidade Universitária. 50670-901 Recife PE Brasil. anninhatito@gmail.com

² Departamento de Nutrição, UFPE. Recife PE Brasil.

³ Departamento de Medicina Social, UFPE. Recife PE Brasil.

Introduction

Population growth, improved access to health services, and increased life expectancy have contributed to an increased elderly population and a more significant number of diabetes cases. The overall prevalence of the disease in people aged 60-79 is 18.6%, more than 134.6 million people, accounting for 35% of cases in adults, and is expected to reach 252.8 million¹ by 2035. In Brazil, data from the 2013 National Health Survey (PNS) found a prevalence of diabetes of approximately 20% among the elderly over 65 years, a contingent of more than 3.5 million people².

Given this context, self-care implies the execution of actions directed by and for the very people to satisfy the needs and contribute to the maintenance of life, health and well-being³. In the coexistence with diabetes, the self-care routine covers the use of medication and the adoption of healthy lifestyle habits (balanced diet, regular practice of physical activity, moderate alcohol use and smoking cessation) as an essential condition for metabolic control and the prevention of chronic complications of the disease⁴⁻⁶.

However, in old age, limitations and dependence to perform the activities of daily living that compromise the functional capacity and maintenance of the autonomy emerge, hampering self-care management^{7,8}. Nonetheless, a systematic review on the subject showed that self-care among elderly with diabetes promotes improved lifestyle, functionality and glycemic control through self-efficacy and knowledge about the disease⁹.

The attitude consists in the decision of the individual to adopt or not the self-care measures for diabetes control. Commonly, the maintenance of this behavior is based on knowledge, defined as a set of information, acquired through personal experiences or professional orientations, that individuals must acquire to manage their health condition¹⁰.

Primary health care is the ideal setting for the development of self-care in diabetes by increasing knowledge and attitudinal change^{6,11}. However, studies evaluating the association of knowledge acquisition and self-care preparedness with socioeconomic and clinical variables among older adults with diabetes are still scarce in the literature. Thus, the investigation of these factors may reinforce the capacity of self-care and contribute to the better management of diabetes. To this end, we aimed to assess the knowledge about diabetes, the attitude for self-care and associated factors in the elderly assisted in primary health care.

Methods

Design, population and sample

This is a cross-sectional study nested in the population baseline that composes the study "Promotion of Healthy Habits with Diabetic Elderly: Evaluation of Operative Groups as a Therapeutic Intervention", carried out in the 4.2 micro-region that includes eight teams from the Family Health Strategy of Recife, Northeastern Brazil.

The formula $[z^2p(100-p)/d^2]$ was used in the sample calculation, with an alpha error of 5% (z), a prevalence of insufficient knowledge about diabetes and a negative attitude to self-care of 50% (p), with a 7% error margin (d). The resulting minimum sample size was 196 diabetic elderly. A 10% increase (x) was made to cater for any losses, using the formula $[100 / (100-x)]$, making a total of 218 elderly diabetics.

Eligibility criteria

Participants were randomly selected and stratified according to age brackets every 10 years. The draw was carried out employing a table of random numbers generated by the EPI-INFO 6.04 Program (WHO/CDC/Atlanta, GE, USA) until the stipulated sample size was reached.

We selected people 60 years of age or older of both genders enrolled in the USF of the 4.2 micro-region, with a medical diagnosis of diabetes in the medical records. Exclusion criteria were institutionalized diabetic older adults (residents of long-term care institutions or hospitalized) or unable to walk, with communication or cognition impairment recorded in the medical records, the presence of chronic complications of diabetes in advanced stages and reduced mobility that restricted access to the health unit.

Procedure

Data collection was performed from August 2014 to March 2015 by previously trained field researchers. Initially, the medical records of all the diabetic individuals enrolled in each USF were collected for the identification of the elderly diabetics. After the identification of the population, the interview was scheduled through telephone contact. Due to the poor physical structure of the USF, the community sought a space close to the services to carry out the research activities, emphasizing the comfort and accessibility of the elderly. The interview took place

individually, in a private environment, through a structured instrument, consisting of thematic blocks that included sociodemographic, clinical variables related to diabetes knowledge and self-care attitude.

Sociodemographic variables

The variables gender, age, marital status, household scheme (living alone or with someone), schooling and economic level were investigated, based on the 2014 Brazilian Association of Research Companies (ABEP) Criteria for Economic Classification¹², but the categories were grouped into A/B; C; D/E for analysis.

Clinical variables

The time of diagnosis of diabetes (< 10 years, 10 to 20, ≥ 20 years), presence of comorbidities (hypertension, dyslipidemia), chronic complications of diabetes (retinopathy, nephropathy and neuropathy), tobacco use (smoker, former smoker and never smoked), and alcoholic beverage consumption (yes/no) were evaluated.

In the anthropometric evaluation, the weight (in kilograms) and height (in centimeters) were measured in duplicate. For data consistency, the measurements with differences greater than 100g for weight and 5mm for height¹³ were repeated. The weight was obtained with the barefoot individuals, without head adornments, wearing light clothes, upright position, feet together and arms positioned along the body, with the palm facing the leg¹⁴. The portable digital scale Tanita®, with a capacity of 150 kg and a sensitivity of 100 grams was used to measure body weight. Due to the joint stiffness commonly present in this stage of life, height was measured by the Balmak® anthropometer, with a maximum height of 2.20m and a precision of 1mm. The measurement was taken with the elderly person seated, left leg bent at a 90° angle with the knee, with the base of the anthropometer positioned at the heel of the left foot and with the cursor extended parallel to the tibia to the upper edge of the patella, and reading was performed at the closest millimeter. The estimated height (H) for knee height was obtained by the equations of Chumlea et al.¹⁵, by gender: men = [64.19 - (0.04 x age) + (2.02 x knee height in cm)] and women = [84.88 - (0.24 x age) + (1.83 x knee height in cm)]. The Body Mass Index (BMI) was calculated as per the Quetelet's equation (BMI = weight/height²)¹⁶ and classified as per Lipschitz¹⁷ as underweight, with BMI < 22kg/m²; eutrophy, BMI between 22kg/m² and 27kg/m²; and overweight BMI > 27kg/m².

In the evaluation of the serum concentrations of glycated hemoglobin (HbA1c), approximately 10 ml of blood was collected by venipuncture in the ulnar fossa area at the Family Health facilities or Community Associations. The vials containing EDTA were packed in thermal boxes containing recyclable ice, which were sealed and transported for the processing of the samples at the clinical analysis laboratory LAPAC in Recife (PE), within a maximum period of 2 hours. The blood sample was aliquoted for high-performance liquid chromatography (HPLC) dosage as a preparative method and tandem mass spectrometry for quantification as per the National Glycohemoglobin Standardization Program (NGSP) standardization. Recommendations were adopted from the American Diabetes Association⁴, which defines good glycemic control for HbA1c values below 7% for healthy elderly.

Knowledge about diabetes

Knowledge was evaluated through the Portuguese version validated for Brazil of the Diabetes Knowledge Scale (DKN-A), a 15-item, multiple choice answers questionnaire about the different aspects related to the general diabetes knowledge. It shows five realms: basic physiology, hypoglycemia, food groups and their replacements, managing diabetes in the occurrence of some disease and the general principles of care concerning the disease. The measurement scale is 0-15 and each item is gauged with a "1" score for the correct answer and "zero" for the wrong answer. Items 1 through 12 require a single correct answer. Regarding items 13 to 15, only a few answers are correct and all must be referred for assignment of a "1" score. A score equal to or greater than eight indicates sufficient knowledge about diabetes¹⁸.

Self-care attitude

The Brazilian version of the Diabetes Attitudes Questionnaire (ATT-19), which evaluates the psychological adjustment measure for diabetes, developed in response to the needs of assessing psychological and emotional aspects of the disease was used. It consists of 19 items that include six factors: stress-associated diabetes, treatment receptivity, treatment confidence, personal efficacy, health perception and social acceptance. Questions 11, 15, and 18 begin with the reverse score. Each response is measured by the five-point Likert scale ("I completely disagree" - score 1 to "I completely agree" - score 5). The total score ranges from 19 to 95 points. A score ≥ 70 points indicates a positive attitude toward diabetes¹⁸.

Statistical analysis

The data were double-entered in a spreadsheet of the Excel program for Windows®, and verified with VALIDATE, Epi-info Program module version 6.04 (WHO/CDC/Atlanta, GE, USA) to check for consistency and validation. Data were then transferred to the Statistical Package for Social Sciences (SPSS) version 12.0 (SPSS Inc., Chicago, IL, USA).

Continuous variables were tested for normality of distribution by the Kolmogorov-Smirnov test. Data with a normal distribution were described by means and standard deviation (SD), while the non-normal ones, by median and interquartile range (IQR). In the description of the proportions, the binomial distribution was approximated to the normal distribution by the 95% confidence interval.

The descriptive statistics were used to characterize the sample regarding sociodemographic and clinical variables. The Pearson's Chi-square test of Independence or Fisher's exact test was used in the association between knowledge about diabetes and sociodemographic and clinical variables. This procedure was also performed to evaluate the statistical association between self-care attitude and the variables investigated.

The logistic regression model was used for the crude and adjusted analyses, considering the individuals with insufficient knowledge or negative attitude for self-care as reference categories. The stepwise backward method was used with the inclusion of all variables with $p < 0.30$ in the univariate analysis, and those with $p < 0.05$ remained in the final model. The results were interpreted by Odds Ratio and the respective Confidence Intervals (CI) of 95%, calculated for each statistically significant variable ($p < 0.05$). Five patients were excluded in the analysis due to the lack of HbA1c data.

The study was approved by the Human Research Ethics Committee of the Federal University of Pernambuco. All respondents were previously informed of the research objectives, as well as the methods to be adopted. With the consent of the elderly, the signature or fingerprint was used in the Informed Consent Form.

Results

Of the 218 elderly diabetic patients selected, 16 questionnaires had inconsistent data, and only 202 diabetic elderly were included in the analysis.

Of these, 73.3% (95% CI 66.6; 79.2) were females, with a median age of 66.0 years (CI 63.0;72.0), 46.0% (CI 95% 39.0; 53.2) were married or in common-law marriage and 83.7% (95% CI 77.8;88.5) lived with someone. Regarding schooling, they had a median of 5.0 (IQR 2.0;8.0) years of study and in the socioeconomic classification of the households, 53% (95% CI 45.8;60.0) were included in class C and 29.7% (95% CI 23.5;36.5) in the classes D/E.

Regarding the clinical variables, 50.5% (95% CI 43.4;57.6) of the elderly had been diagnosed with diabetes for less than 10 years, with a median of 9 years (IQR 4.0;15.0). The main self-reported comorbidities were: 83.7% (95% CI 77.8;88.5) and 47.0% (95% CI 39.9, 54.2) dyslipidemia and 79.2% (95% CI 72.9;84.6) chronic complications, 64.9% (95% CI 57.8;71.4) retinopathy, 34.7% (95% CI 28.1;41.7) neuropathy and 6.9% (95% CI 3.84;11.4) nephropathy. Tobacco use was found in 7.4% (95% CI 4.2;11.9) of the interviewed elderly, and alcohol use in 15.8% of them (95% CI 11.1;21.6). Regarding metabolic control, 51.0% (95% CI 43.9;58.1) had overweight, mean abdominal circumference of 100.1 cm (± 11.7 ;SD) and 76.7% (95% CI 73.3; 84.2) adequate glycemic control, with HbA1c levels below 7%.

The general evaluation of the knowledge showed that 77.7% (95% CI 71.4, 83.3) of the diabetic elderly had insufficient knowledge regarding their disease and treatment, with a median of 5.5 points (IQR 4.0;7.5). Of the 15 items in the DKN-A questionnaire, the ones with the highest proportion of correct answers were those related to the amount of blood glucose in the disease lack of control, normal value of capillary glycemia and fat as the primary component of the butter (Table 1).

On the other hand, the items referring to the presence of ketonuria as bad control of diabetes and food replacements within the food groups had the highest error rate. Also in this context, worth noting is the high proportion of seniors who were unaware of the causes and the care with hypoglycemia, which are the primary measures of self-care in diabetes (Table 1).

The analysis of the potential factors related to the insufficient knowledge scores was positively associated with older age, living with other people, low educational level, low socioeconomic level and a positive attitude towards the disease and treatment (Table 2). However, in the multivariate model, it was observed that age between 60 and 69 years old and living alone are protective

factors for insufficient knowledge. The likelihood of the diabetic elderly with low educational level to evidence insufficient knowledge about the disease was almost eight-fold that of the elderly with more than eight years of study (Table 3).

The overall attitude score for self-care in diabetes showed that 85.6% (95% CI 80.0; 90.2) of the diabetic elderly had a negative attitude of the psychological adjustment measure regarding the disease, with a median of 58.0 (IQR 52.0;65.0) points, ranging from 40 to 79 points.

The analysis of the potential factors related to the negative attitude towards diabetes showed an association with females, co-residence with other people, low educational level, low socioeconomic status, no smoking and poor glycemic control (Table 4). However, in the multivariate model, being a man, living alone and having some chronic complication of diabetes are protective factors for the negative attitude towards the disease. The diabetic elderly with low schooling were thirteen times more likely to have a negative

attitude toward the disease than older adults with more than eight years of study (Table 5).

Discussion

The use of validated instruments enables the establishment a common language among health professionals and of related areas. It is a fundamental tool for evaluating responses to treatments, comparing data over time, understanding and studying the problems observed¹⁹. The choice of DKN-A and ATT-19 instruments, translated into Portuguese and validated in Brazil, is justified by allowing the investigation of the level of knowledge about diabetes, understanding the extent of acceptance of the disease, as well as establishing reorientation or confirming the effectiveness of the actions of health professionals directed to individuals with diabetes¹⁸.

Thus, it was observed that insufficient knowledge was the most prevalent among the elderly

Table 1. Proportion of correct answers, errors and did not reply of the items related to knowledge about diabetes, answered by diabetic elderly people assisted by the Family Health Strategy, Recife (PE), Brazil, 2015.

Questions (n = 15)	Correct answers n (%)	Errors n(%)	Did not reply n(%)
1. Blood sugar is high in uncontrolled diabetes	136(67.3)	23(11.4)	43(21.3)
2. Poor diabetes control may result in a greater likelihood of complications later	110(54.5)	32(15.9)	60(29.7)
3. The normal blood glucose range is 70-110 mg / dL	135(66.8)	21(10.4)	46(22.8)
4. Butter is mainly composed of fat	121(59.9)	19(9.5)	62(30.7)
5. Rice is mainly composed of carbohydrates	67(33.2)	51(25.3)	84(41.6)
6. The presence of ketones in urine is a bad sign	40(19.8)	25(12.4)	137(67.8)
7. Changes in the lungs are not usually associated with diabetes	64(31.7)	64(31.7)	74(36.6)
8. If someone taking insulin has a high blood sugar or urine, as well as the presence of ketones, he/she should keep the same amount of insulin and the same diet, and have a blood and urine test	71(35.1)	65(32.2)	66(32.7)
9. If someone with diabetes is taking insulin and gets sick or cannot eat the prescribed diet he/she should use oral hypoglycemic for diabetes instead of insulin	7(3.5)	79(39.1)	116(57.4)
10. If hypoglycemia is starting, one should eat or drink something sweet immediately	78(38.6)	36(17.8)	88(43.6)
11. Someone with diabetes can eat as much lettuce and watercress as he/she wants	95(47.0)	65(32.2)	42(20.8)
12. Hypoglycemia is caused by excess insulin	23(11.4)	73(36.1)	106(52.5)
13. 1 kg corresponds to a unit weight and is equal to 1,000 grams	54(26.7)	49(24.3)	99(49.0)
14. 1 French bread equals 4 cream crackers; 1 egg is equal to 1 serving of ground meat	19(9.4)	89(44.1)	94(46.5)
15. Replacement of French bread with 4 cream crackers or 2 medium cheese breads	2(1.0)	157(77.7)	43(21.3)

Table 2. Potential factors associated with insufficient knowledge scores on diabetes of elderly diabetics assisted by the Family Health Strategy. Recife (PE), Brazil, 2015.

Variable	Insufficient knowledge (< 8 points)			p-value*
	N (%)	n	%	
Gender				
Male	54(26.7)	42	77.8	0.991
Female	148(73.3)	115	77.7	
Age (years)				
60-69	132(65.3)	95	72.0	0.007
≥ 70	70(34.7)	62	88.6	
Marital status				
Married/common-law marriage	93(46.0)	74	79.6	0.423
Single/divorced	44(21.8)	31	70.5	
Widower	65(32.2)	52	80.0	
Household scheme				
Living alone	33(16.3)	20	60.6	0.010
Living with someone	169(83.7)	137	81.1	
Schooling (years)				
≤ 8	162(80.2)	140	86.4	<0.001
> 8	40(19.8)	17	42.5	
Economic class				
B	35(17.3)	21	60.0	0.003
C	107(53.0)	82	76.6	
D and E	60(29.7)	54	90.0	
DM diagnosis time				
Less than 10	102(50.5)	80	78.4	0.283
10 - 20	60(29.7)	43	71.7	
20 and over	40(19.8)	34	85.0	
DM complications				
Yes	160(79.2)	127	79.4	0.271
No	42(20.8)	30	71.4	
Tobacco use				
Yes	15(7.4)	13	86.7	0.529**
No	187(92.6)	144	77.0	
BMI				
No overweight	99(49.0)	78	78.8	0.721
Overweight***	103(51.0)	79	76.7	
Glycated hemoglobin				
≤ 7%	155(78.7)	117	75.5	0.158
> 7%	42(21.3)	36	85.7	
Attitude for self-care				
Positive	173(85.6)	144	83.2	<0.001
Negative	29(14.4)	13	44.8	

*Pearson's Chi-Square test p-value for proportions' heterogeneity; **Fisher's Exact Test; ***BMI >27kg/m2.

interviewed. Understanding the disease is fundamental for the development of skills in managing self-care in diabetes. It is expected that the longer the diagnosis time, the more information about the disease and the treatment. However, insufficient knowledge was also found in people with

type 2 diabetes treated at in Primary Healthcare facilities in southeastern Brazil^{10,11}.

Few studies analyzed the 15 items of DKN-A, which hampered comparison with the literature. Among the evaluated questions, more correct answers were found for the altered glycemic val-

Table 3. Model of Logistic Regression of insufficient knowledge about diabetes of diabetic elderly people assisted by the Family Health Strategy. Recife (PE), Brazil, 2015.

Variables	Crude model			Adjusted model*		
	OR	(CI 95%)	p-value**	OR	(CI 95%)	p-value
Age (years)						
60-69	0,33	(0,13 – 0,80)	0,007	0,33	(0,12 – 0,88)	0,027
≥ 70	1,00	-		1,00	-	
Household scheme						
Living alone	0,36	(0,15 – 0,86)	0,00	0,24	(0,09 – 0,65)	0,005
Living with someone	1,00	-		1,00	-	
Schooling (years)						
≤ 8	8,61	3,73 – 20,10	<0,001	7,78	(3,36 – 18,01)	< 0,001
> 8	1,00	-		1,00	-	

* Model adjusted for the variables: economic class, time of diagnosis of diabetes mellitus, complications of diabetes mellitus, glycated hemoglobin and attitude for self-care; ** Pearson's Chi-Square Test.

Table 4. Potential factors associated with insufficient scores of attitude for self-care scores of diabetic elderly people assisted by the Family Health Strategy. Recife (PE), Brazil, 2015.

Variable	Negative attitude for self-care (< 70 points)			
	n(%)	n	%	p-value*
Gender				
Male	54(26.7)	43	79.6	0.141
Female	148(73.3)	130	87.8	
Age (years)				
60-69	132(65.3)	111	84.1	0.387
≥ 70	70(34.7)	62	88.6	
Marital status				
Married/common-law marriage	93(46.0)	82	88.2	0.074
Single/divorced	44(21.8)	33	75.0	
Widower	65(32.2)	58	89.2	
Household scheme				
Living alone	33(16.3)	23	69.7	0.011**
Living with someone	169(83.7)	150	88.8	
Schooling (years)				
≤ 8	162(80.2)	150	92.6	<0.001
> 8	40(19.8)	23	57.5	
Economic class				
B	35(17.3)	26	74.3	0.037
C	107(53.0)	91	85.0	
D and E	60(29.7)	56	93.3	
DM diagnosis time				
Less than 10	102(50.5)	88	86.3	0.210
10 - 20	60(29.7)	48	80.0	
20 and over	40(19.8)	37	92.5	
DM complications				
Yes	160(79.2)	134	83.8	0.134
No	42(20.8)	39	92.9	
Tobacco use				
Yes	15(7.4)	10	66.7	0.046**
No	187(92.6)	163	87.2	
BMI				
No overweight	99(49.0)	81	81.8	0.128
Overweight***	103(51.0)	92	89.3	
Glycated hemoglobin				
≤ 7%	155(78.7)	126	81.3	0.002
> 7%	42(21.3)	42	100.0	

Table 5. Logistic regression model of the negative attitude for self-care of diabetic elderly people assisted by the Family Health Strategy, Recife (PE), Brazil, 2015.

Variables	Crude model			Adjusted model*		
	OR	(IC 95%)	p-value**	OR	(IC 95%)	p-value
Gender						
Male	0.54	(0.22 – 1.34)	0.141	0.32	(0.11 – 0.90)	0.030
Female	1.00	-		1.00	-	
Household scheme						
Living alone	0.29	(0.11 – 0.77)	0.011***	0.22	(0.07 – 0.71)	0.011
Living with someone	1.00	-		1.00	-	
Schooling (years)						
≤ 8	9.24	(3.62 – 23.93)	< 0.001	13.05	(4.63 – 36.82)	< 0.001
> 8	1.00	-		1.00	-	
Complications						
Yes	0.40	(0.09 – 1.48 ^a)	0.134	0.19	(0.04 – 0.87)	0.032
No	1.00	-		1.00	-	

ue and lower number of correct answers for the presence of ketonuria. The lack of knowledge of the term ketone may be related to the lack of use of this word in the daily dialogue between health professionals and people with diabetes, which is translated by the difficulty of interpreting the word by the elderly interviewed. A study performed with individuals with diabetes and cardiopathy obtained a similar result when evaluating the main questions related to self-care, among which, besides ketonuria, hypoglycemia management obtained a lower score²⁰.

In this casuistry, the results are even more of concern, since most of the respondents are unaware of the management of hypoglycemia and do not know how to identify the causes of its occurrence. Elderly with diabetes are at increased risk for hypoglycemia due to impaired renal function, altered metabolism of oral hypoglycemic agents and insulin, as well as cognitive impairments that compromise the management of self-care⁴. Also, studies have shown that hypoglycemia is a risk factor for cognitive decline in this population^{21,22}. For this reason, glycemic goals should be individualized and the promotion of greater knowledge regarding hypoglycemia and its treatment and prevention are required^{4,22}.

Age between 60 and 69 years and living alone were protective factors for insufficient knowledge about diabetes. A systematic review found that age is a factor impeding the acquisition of competences regarding self-care and its management⁹. A study carried out in China with 108 seniors with diabetes evidences consonant

results by showing that age was negatively associated with diabetes knowledge, that is, the lower the age of the elderly the higher the level of knowledge about the disease²³.

The growth of single-person households across all age groups is a worldwide reality. The fact that the elderly live alone can be a motivating factor for the search for knowledge about diabetes to increase autonomy, independence and maintenance of their functionality. While most of the sample is consists of a population of older adults under 69 years of age, a declining cognitive and motor capacity and an increased need for support for the management of diabetes self-care⁹ is noted with age. Thus, age is an indicator that must be carefully analyzed in the perception and acceptance of the household scheme, since longevity imposes demands for ever-increasing care, bringing consequences for the elderly, family and community, also including Family Health Strategy professionals^{8,24}.

Schooling was directly related to insufficient knowledge about diabetes. It is recognized that low schooling is common among people who seek public health services and in the elderly population this is even more frequent and may reflect the difficulty of access to education in times past. Thus, awareness of health professionals about the quality and clarity of the guidelines given on the disease and the treatment is crucial.

In this study, the elderly with diabetes and with low schooling are almost eight times more likely to have poor knowledge about diabetes when compared to those with high schooling.

The low educational level may hinder diabetes self-care management, notably the acquisition of knowledge, understanding of therapeutic behaviors and adoption of new lifestyle habits⁹. This relationship has also been found in other national and international studies^{23,25}.

Studies in this area indicate that the high educational level is often a protective factor for diabetes, and may be directly related to the possibility of access and use of information and health services. On the other hand, the low level of education can hamper the understanding of the disease and treatment and is a determinant variable for glycemic control^{23,25,26}.

The level of understanding of medical health information, called functional health literacy, is directly related to the level of knowledge about diabetes and self-efficacy, especially among the elderly^{27,28}. Souza et al.²⁹, when investigating seniors with diabetes assisted in the Brazilian public health service, identified that inadequate literacy was found in 56.6% of the respondents. Another longitudinal study with 751 older adults with diabetes in primary care found that literacy decreased with age and a smaller decline was observed in those with higher levels of education³⁰. Thus, it can be affirmed that the age advancement and the low educational level are predictors for inadequate functional health literacy and, consequently, worse glycemic control.

However, it is necessary to consider that knowledge does not always lead to a change of attitude in individuals with type 2 diabetes¹¹. Thus, in planning health actions, professionals must encourage autonomy and consider psychoemotional factors, such as expressing feelings for greater identification and overcoming of the hardships that the treatment imposes with diabetes³¹ in the daily living.

The negative attitude towards self-care was present in most of the elderly with diabetes interviewed. A similar result was also found in other studies performed in primary health care in southeastern Brazil^{10,11}.

In general, unlike knowledge, the attitude toward self-care in diabetes decreases with time of diagnosis¹⁰. Because it is a chronic disease, diabetes complications arise over the years and the time of diagnosis predisposes the poor motivation for the management of self-care⁹. There is also a mix of conflicting feelings, from sadness, fear, guilt and outrage that must be overcome in order to reach the stage of acceptance of the disease.

Being a man, living alone and having some diabetes complications were protective factors

for the negative attitude toward self-care. The individual's posture towards life and the possibility of adaptation to adversities can influence the coping of the disease and treatment.

A study carried out in France with 1,092 individuals with type 2 diabetes to identify the attitude towards the disease found that the woman presents feelings of outrage, dissatisfaction with the disease, low motivation and difficulty for self-care. However, a man takes responsibility for his illness, does not regard it as a burden and copes well with the emotional and social aspects³². Thus, it can be explained, from a gender perspective, that the men in this series have a positive attitude towards diabetes by inferring that males, historically considered as household providers, are better adapted to adversity and, thus, with a positive attitude towards self-care when compared to females that show a more passive posture.

Living alone in old age is an achievement and, in this study, was related to the positive attitude to self-care in diabetes. Mosnier-Pudar et al.³² state that individuals with a positive psychological and emotional adjustment to diabetes seek to maintain their preserved functionality that allows them to perform their daily living activities autonomously and generally do not require the help of the family. On the other hand, the presence of comorbidities and chronic complications of the disease may contribute to the disabilities and the survival of the elderly with diabetes^{4,7}.

In this study, while most of the respondents had less than 10 years of diagnosis of diabetes, the presence of comorbidities and complications is already identified. A study carried out in primary health care in southeastern Brazil found a direct association between the duration of diabetes and the presence of complications²⁵.

The early occurrence of complications of diabetes may be related to the underdiagnosis of the disease^{4,11} or the less intensive treatment received throughout life²⁵. A study carried out with 219 people with type 2 diabetes, treated in PHC facilities in southern Brazil, also found a similar result when identifying hypertension, dyslipidemia, visual alterations and overweight in the studied population³³. Among the elderly with diabetes, special attention should be given to the presence of complications that significantly impair the functional status, such as the visual and lower limbs that adversely impact on self-care management and quality of life⁴. Thus, the presence of diabetes complications that may lead to dependence to perform activities of daily living and generate more suffering may be an explanatory

factor for a positive attitude towards the self-care found among the respondents.

As in the knowledge about the disease and the treatment, the diabetic elderly with low schooling are thirteen times more likely to have a negative attitude towards self-care when compared to those with high schooling. A similar result was also found in a study carried out with Argentinians with type 2 diabetes in identifying that the low level of education leads to the evaluation of the health situation as irrelevant and a passive attitude towards self-care compared to those with high educational level who have more informa-

tion to assess the situation and actively cope with difficulties for metabolic control³⁴.

The findings of this study are relevant to public health since they point to the need for planning educational actions of an interdisciplinary nature that consider not only the cognitive aspects related to diabetes but also the psycho-emotional aspects that influence self-care. In this perspective, it is fundamental to consider the socioeconomic and educational characteristics of seniors with diabetes assisted in primary health care in order to improve interventions for glyce-mic control.

Collaborations

AKOT Borba: design, implementation of the research, data analysis and interpretation, elaboration and critical review of the paper; IKG Arruda: design, data analysis and interpretation, and critical review of the paper; MCC Leal: design, research planning and critical review of the paper; AS Diniz: research planning and critical review of the paper; APO Marques: design, research planning, data analysis and interpretation, elaboration and critical review of the paper.

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