DOI: 10.1590/1413-81232018233.03722016

Factors associated with elderly diabetic adherence to treatment in primary health care

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Abstract *This study aimed to investigate factors associated with the treatment adherence of 150 elderly diabetics assisted in gerontogeriatric outpatient service in northeastern Brazil. Full adherence to therapy was self-reported by 27.3% of the elderly. In the bivariate analysis, adherence was associated with self-perceived health, beliefs in the use of medication, understanding explanations about diabetes and professional responsible for treatment guidance. After analysis adjustment, only beliefs in medicine were significant when comparing non-adherence with full adherence (OR = 9.65; CI95% 1.6; 56.6) and non-adherence with partial adherence (OR = 18.15; CI95% 3.5;95.4). It can be concluded that full adherence to diabetes treatment is low and is associated with beliefs in medications for disease control. It is necessary to develop additional studies to better define the role of health beliefs and practices of care among elderly assisted in primary health care.*
Key words *Adherence to treatment, Elderly, Diabetes Mellitus, Primary health care*

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Introduction

Diabetes in the elderly is associated with higher rates of premature death, functional disability and coexisting diseases, such as hypertension, coronary disease and stroke. In addition, it contributes to the so-called geriatric syndromes characterized by polypharmacy, cognitive dysfunction, urinary incontinence, falls and persistent pain[1,2].

For metabolic control and prevention of complications of diabetes, a self-care routine involving the use of medication and the adoption of healthy lifestyle habits (balanced diet, regular practice of physical activity, moderate alcohol use and smoking cessation)[1,3]. However, behavioral changes are challenging for the diabetic elderly and health services, resulting in non-adherence in more than 80% of individuals with the disease and predisposing to the occurrence of disabilities that negatively affect their quality of life[4].

Adherence is a multidimensional phenomenon[5] and, according to Leite and Vasconcelos[6], it corresponds to the agreement between medical prescription and patient's own conduct. However, many factors contribute to the lack of adherence among the elderly, such as access to medication, disease and treatment characteristics, social support, professional health-patient relationship, old age, low purchasing power, illiteracy, depression, anxiety, denial or fear of illness, and health-related beliefs[7].

Given the variety and complexity of factors that contribute to non-adherence to treatment, the professional responsible for treatment must implement an individualized approach that considers the singularities of each situation[7,8]. Thus, studies that identify the prevalence of adherence to different treatment modalities for glycemic control and associated factors are important to guide individual and collective health care actions to the older segment of society. In this context, this study sought to investigate the factors associated with therapeutic adherence in diabetic elderly patients attended in primary health care.

Methods

This is an observational-sectional study developed at the Elderly Care Center (NAI) of the Federal University of Pernambuco (UFPE), a gerontogeriatric service of an outpatient nature. The convenient sample consisted of 244 elderly diabetic patients of both genders, who entered the service from January 2006 to December 2010. Impaired communication and/or cognition recorded in the medical records, elderly individuals with mobility difficulty or impossibility due to muscle weakness, joint problems, pain or neurological conditions that restricted access to the outpatient clinic were adopted as exclusion criteria.

Losses recorded because of death (15), refusal to participate in the study (21) and incorrect record of address and/or telephone number in the medical records (58) contributed to the final sample composition of 150 diabetic elderly.

Data was collected from February to September 2011 through a structured script with closed-ended questions. Interviews were conducted by physiotherapy and nursing students trained to apply the tool and evaluated and recycled throughout the survey period.

The dependent variable corresponded to the referred therapeutic adherence, which corroborates with the Guidelines for the Treatment and Follow-up of Diabetes Mellitus[9]. In this study, full adherence corresponded to the positive response in questions related to the use of medications (oral hypoglycemic agents and/or insulin) according to medical prescription (except those with no medication prescribed for diabetes), regular aerobic and/or resistance exercise, minimum frequency of three times a week and minimum duration of 30 minutes per session or 150 continuous minutes/week, according to recommendations of the Brazilian Society of Diabetes Guidelines[9] and food intake control. Regarding elderly who reported not having medication prescribed for diabetes, full adherence was considered regarding the regular practice of physical activity and food intake control. Partial adherence was defined by a positive answer in one of the questions (medication use, regular physical activity and dietary control) and non-adherence defined by negative answers in all three questions.

The independent variables selected for analysis were sociodemographic characteristics (gender, age, schooling, marital status, family arrangement, social security situation, monthly income of the elderly, contribution to the household); health conditions and treatment-related factors (self-perceived health, diabetes diagnosis time, time of treatment, medications prescribed by the physician used for diabetes, means of medication acquisition, side effects, perceived daily use of medicines, use of antidiabetic teas instead of medicines); perception of disease (knowledge about the disease, types of treatment - categorized into none, basic [medication or

diet or exercise], moderate [medication and diet or medication and exercise or diet and physical exercise], advanced [medication, diet and physical activity], perception of the occurrence of complications, beliefs in the use of medication, diet follow-up and practice of physical activity to control the disease, beliefs in the measurement of glycemic level and changes in life routine with treatment); social support (social support assessed through the Family's APGAR[10], whose denomination represents an acronym in English, derived from the following realms: Adaptation, Partnership, Growth, Affection and Resolve, professional relationship/health-patient team investigated through trust in the doctor and in the multi-professional team, understanding explanations about diabetes, clarifying treatment issues at the time of consultation, professional responsible for the guidelines on treatment and participation in educational groups for diabetes).

Statistical Package for Social Sciences (SPSS) for Windows, version 17.0 was used to analyze data. The association between independent variables and therapeutic adherence was examined through bivariate analysis using Pearson's Chi-square of independence test or Fisher's exact test, the latter when the results did not meet the requirements for the first test, both with a significance level of 5% and 95% confidence intervals.

In the multivariate analysis, the multinomial regression model was used with the inclusion of all variables with $p<0.20$ and the variables with $p < 0.05$ remained in the final model. The results were interpreted in terms of odds ratio and respective confidence intervals (CI), calculated for each statistically significant variable ($p < 0.05$).

The research protocol was approved by the Ethics and Research Committee of the Health Sciences Center of the Federal University of Pernambuco. Respondents signed or fingerprinted the Informed Consent Form, which explained the research objectives and information requested, ensuring confidentiality of the information obtained.

Results

Of the 150 diabetic elderly interviewed, 73.3% were female, 54.7% were in the 60-69 years age group and only 10.6% were over 80 years old. We verified that 51.3% lived with a partner and 60% with spouse and relatives. With regard to schooling, 58.7% had up to 8 years of schooling. We found that 73.3% were retired, 52.7% received from 1-2 minimum wages and 66% contributed totally to the household's livelihood (Table 1).

Analyzing the aforementioned adherence, we observed that 78.7% used regular medications for diabetes, followed by 16% who had no indication for medication. Only 38.7% practiced regular physical activity and 60% followed nutritional recommendations prescribed by a physician or nutritionist. When evaluating the therapeutic follow-up of the diabetic elderly, partial adherence was predominant (66.7% of the participants), followed by 27.3% of full-time adherents and 6% of non-adherents (Table 1).

In the bivariate analysis, the variables associated with therapeutic adherence were self-perceived health ($p = 0.038$), beliefs in the use of medicines to control diabetes ($p = 0.001$), understanding explanations about diabetes ($p = 0.005$) treatment guidelines ($p = 0.028$) (Tables 2, 3 and 4).

In the multinomial analysis, variable "Belief in medication to control diabetes" was significant when comparing non-adherence with full adherence (OR = 9.65, 95%CI 1.6;56.6) and non-adherence with partial adherence (OR = 18.15, 95%CI 3.5;95.4) in the final model adjustment. Thus, elderly diabetics who take and believe that medications control diabetes are 9.65 times more likely to achieve full adherence to treatment when compared to the elderly who do not use medications and do not adhere to treatment. In contrast, elderly diabetics who take and believe that medications control the disease are 18.15 times more likely to achieve partial adherence to treatment when compared to elderly who do not adhere. The likelihood ratio test was significant ($p = 0.003$), indicating that the proposed model could be used (Table 5).

Discussion

Full adherence to diabetes therapy was low among the diabetic elderly interviewed. A similar result was also observed in a study conducted with people with type 2 diabetes in southeastern Brazil[11] and in the urban and rural areas of the seven states of the Mexican Republic[12].

Although prevalent, adherence to medication therapy was below the recommended level of 80%[6]. A systematic review highlights that the low follow-up of drug therapy in the elderly is due to complex drug regimens, coupled with lack of understanding, forgetfulness, decreased visual acuity and manual dexterity[13]. Similar results were also found in the city of Bagé/RS, where low

Table 1. Therapeutic adherence according to socioeconomic and demographic factors of elderly diabetics in primary health care. Recife, PE, 2011.

Variable	Therapeutic adherence							p - value
	Total (n = 150)	Full (n = 41; 27.3%)		Partial (n = 100; 66.7%)		Non-adherence (n = 9; 6.0%)		
	n (%)	n	%	n	%	n	%	
Gender								
Male	40 (26.7)	10	25.0	26	65.0	4	10.0	0.453*
Female	110 (73.3)	31	28.2	74	67.3	5	4.5	
Age group (years)								
60 to 69	82 (54.7)	27	32.9	51	62.2	4	4.9	0.364**
70 to 79	52 (34.7)	11	21.2	38	73.1	3	5.8	
80 and over	16 (10.6)	3	18.8	11	68.8	2	12.5	
Marital status								
With partner	77 (51.3)	17	22.1	55	71.4	5	6.5	0.484**
Without partner	73 (48.7)	24	32.9	45	61.6	4	5.5	
Household scheme								
Living alone	27(18.0)	11	40.7	15	55.6	1	3.7	0.197**
Living with spouse only	33(22.0)	9	27.3	20	60.6	4	12.1	
Living with spouse + family members	90(60.0)	21	23.3	65	72.2	4	4.4	
Years of schooling								
≤ 8 years	88 (58.7)	20	22.7	64	72.8	4	4.5	0.696**
> 8 years	62 (41.3)	21	33.9	36	58.0	5	8.1	
Social security situation								
Retired	110 (73.3)	28	25.4	75	68.2	7	6.4	0.869**
Not retired[a]	40 (26.7)	13	32.5	25	62.5	2	5.0	
Elderly monthly income (MW)b								
< 1	18 (12.0)	5	27.8	12	66.7	1	5.6	0.805(2)
1- 2	79 (52.7)	20	25.3	55	69.6	4	5.1	
2 - 4	29 (19.3)	10	24.5	18	62.1	1	3.4	
≥ 4	24 (16.0)	6	25.0	15	62.5	3	12.5	
Contributes to household livelihood								
Yes, totally	99 (66.0)	29	29.3	63	63.6	7	7.1	0.841**
Yes, partially	39 (26.0)	10	25.6	27	69.2	2	5.1	
No	12 (8.0)	2	16.7	10	83.3	-	-	

[a] Pensioner and not retired; [b] MW (Minimum Wage) in force at the time of the research (in Reals) = R$ 545,00. *: Pearson's Chi-square test. **: Fisher's Exact Test.

adherence was associated with age, lack of health plan, purchase of medications, use of more than three medications and instrumental incapacity for daily life[14].

The regular practice of physical activity and nutritional follow-up were also not adequate. Lifestyle change is part of the treatment for chronic diseases, but habits are social behaviors culturally constructed throughout life, wrapped in symbolic aspects that materialize the tradition in the form of rites and taboos, which are difficult to modify.

Franchi et al.[15] compared the practice of physical activity in 88 diabetic and non-diabetic elderly subjects and observed that approximately half of the participants of both groups did not practice any physical activity, data that corroborate with that found in this study. Several barriers contribute to physical inactivity among the elderly, with emphasis on health problems and family commitments[16]. However, it is known that the progressive reduction of physical fitness and muscular strength contributes to the loss of autonomy and functional capacity in this phase of life, making it preventable by regular practice of physical activity[17]. Thus, it is necessary to adopt public programs to encourage the practice of physical activity, which consider community spaces, the possibilities and limitations of the elderly to the type of exercise, and clarifications

Table 2. Therapeutic adherence according to health conditions and factors related to the treatment of elderly diabetics in primary health care. Recife, PE, 2011.

Variable	n (%)	Therapeutic adherence						p value
		Full		Partial		Non-adherence		
		n	%	n	%	n	%	
Self-perceived health								
Excellent to good	39 (26.0)	15	38.5	21	53.8	3	7.7	0.038*
Fair	93 (62.0)	24	25.8	66	71.0	3	3.2	
Poor	18 (12.0)	2	11.1	13	72.2	3	16.7	
Diagnostic time								
≤ 5 years	50 (33.3)	15	30.0	30	60.0	5	10.0	0.524*
6 a 10 years	35 (23.3)	10	28.6	23	65.7	2	5.7	
≥ 11 years	65 (43.3)	16	24.6	47	72.3	2	3.1	
Pharmacological treatment time								
< 5 years	44 (34.9)	12	27.3	30	68.2	2	4.5	0.676*
5 - 10 years	33 (26.2)	9	27.3	23	69.7	1	3.0	
≥ 10 years	49 (38.9)	12	24.5	37	75.5	-	-	
Non-pharmacological treatment time[a]								
< 5 years	54 (48.2)	22	40.7	32	59.3	-	-	0.654**
5 - 10 years	26 (23.2)	8	30.8	18	69.2	-	-	
≥ 10 years	32 (28.6)	11	34.4	21	65.6	-	-	
Medication for Diabetes[c]								
Oral hypoglycemic	107 (84.9)	26	24.3	78	72.9	3	2.8	0.471*
Insulin	9 (7.1)	2	22.2	7	77.8	-	-	
Oral hypoglycemic and insulin	10 (7.9)	5	50.0	5	50.0	-	-	
Purchase of medication for Diabetesc								
Totally from the SUS	67 (53.2)	18	26.9	46	68.7	3	4.5	0.448*
Partially from the SUS	23 (18.2)	8	34.8	15	65.2	-	-	
Own resources	36 (28.6)	7	19.4	29	80.6	-	-	
Side effect report[b]								
Yes	29 (23.0)	5	17.2	22	75.9	2	6.9	0.097*
No	97 (77.0)	28	28.9	68	70.1	1	1.0	
Perception regarding the use of medicines every day?[c]								
Good	61 (48.4)	18	29.5	42	68.9	1	1.6	0.841*
Indifferent	38 (30.2)	8	21.1	29	76.3	1	2.6	
Bad / Poor	27 (21.4)	7	25.9	19	70.4	1	3.7	
Use of antidiabetic teas instead of medicines[c]								
Yes	5 (4.0)	1	20.0	4	80.0	-	-	1.000*
No	121 (96.0)	32	26.4	86	71.1	3	2.5	

*: Fisher's Exact Test. **: Pearson's Chi-square test. [a] Adjusted for individuals who self-reported physical activity and / or nutritional follow-up. [b] Adjusted for individuals who had prescribed medication for diabetes.

about the contributions of physical activity to the biopsychosocial health of the elderly[16,18].

Besides the practice of physical activity, the follow-up of a food plan is extremely important for glycemic control[1,3]. In the evaluation of nutritional follow-up in diabetes, Broadbent et al.[19] identified that adherence was associated with a lower occurrence of complications, greater personal control and treatment, fewer symptoms and emotional disorders. Thus, dietary and therapeutic guidelines must be individualized based on preferences, culture, traditions and metabolic goals, with emphasis on healthy food choices[20].

Current self-perceived health was associated with therapeutic adherence in this investigation, in agreement with a study carried out in southeastern Brazil[21]. This variable represents the way individuals see their state and understand their illness, which is a mortality risk marker. According to Fonseca et al.[22] in defining health as good

Table 3. Therapeutic adherence according to the perception of the disease of elderly diabetics in primary health care. Recife, PE, 2011.

Variable	n (%)	Therapeutic adherence						p - value
		Full		Partial		Non-adherence		
		n	%	n	%	n	%	
Is diabetes a disease with a cure?								
Yes	22(14.7)	8	36.4	12	54.5	2	9.1	0.417*
No	128(85.3)	33	25.8	88	68.8	7	5.5	
Do you know the treatment types?								
None	28 (18.7)	5	17.9	21	75.0	2	7.1	0.292**
Basic	25 (16.7)	5	20.0	19	76.0	1	4.0	
Moderate	48 (32.0)	11	22.9	34	70.8	3	6.3	
Advanced	49 (32.7)	20	40.8	26	53.1	3	6.1	
Do you believe it brings complications?								
Yes	146(97.3)	40	27.4	97	66.4	9	6.2	1.000**
No	4(2.7)	1	25.0	3	75.0	-	-	
Do you know two organs that can be affected?								
Yes	82 (54.7)	24	29.3	53	64.6	5	6.1	0.888**
No	68 (45.3)	17	25.0	47	69.1	4	5.9	
Belief in medicines to control diabetes?								
Uses and believes in medicines	125(83.3)	33	26.4	89	71.2	3	2.4	0.001**
Uses and does not believe in medicines	7 (4.7)	3	42.9	3	42.9	1	14.3	
Does not use medicines	18 (12.0)	5	27.8	8	44.4	5	27.8	
Belief in diet and physical activity to control diabetes?								
Yes	144(96.0)	41	28.5	95	66.0	8	5.6	0.171**
No	6 (4.0)	-	-	5	83.3	1	16.7	
Concern about checking blood glucose level								
Yes	104(69.3)	29	27.9	71	68.3	4	3.8	0.248*
No	46 (30.7)	12	26.1	29	63.0	5	10.9	
Changes in the routine with treatment								
Yes	76 (50.7)	23	30.3	50	65.8	3	3.9	0.453**
No	74 (49.3)	18	24.3	50	67.6	6	8.1	

*: Pearson's Chi-square test. **: Fisher's Exact Test.

or reasonable, the elderly are not characterized as a disease-free person, but as an autonomous subject capable of acting on the environment. In this study, the elderly who self-perceive their health as fair perform a greater routine of care with the disease in relation to those who self-assess it as bad. A similar result was also found by Luz et al.[23] when identifying that the prevalence of non-adherence was associated with poorer self-perceived health.

The information received and the understanding of the explanations about diabetes influence the behavior of individuals when deciding whether to follow the prescribed therapy for diabetes[24]. The lack of knowledge about the disease and the inadequate training and integration of health professionals are associated with non-adherence to treatment, and it is necessary to incorporate new technologies in the health services in order to equip and motivate individuals with diabetes to change their behavior[25].

The physician was the professional responsible for the diabetes treatment guidelines through individual consultations, but partial adherence was predominant among the respondents. Leite and Vasconcelos[6] affirm that adherence to treatment is not determined exclusively by the physician's power to make the client follow the prescription. However, certain prescriber's attitudes, such as language, time taken for consultation, respect for questions and motivation for therapy compliance may interfere with adherence. How-

Table 4. Therapeutic adherence according to social support of elderly diabetics in primary health care. Recife, PE, 2011.

Variable	n (%)	Therapeutic adherence						p - value
		Full		Partial		Non-adherence		
		n	%	n	%	n	%	
Family APGAR								
High family dysfunction	17(11.3)	2	11.8	13	76.5	2	11.8	0.177*
Moderate family dysfunction	21(14.0)	8	38.1	11	52.4	2	9.5	
Good family functionality	112(74.7)	31	27.7	76	67.9	5	4.5	
Trust in doctor								
Yes	44(96.0)	39	27.1	96	66.7	9	6.3	1.000*
No	6 (4.0)	2	33.3	4	66.7	-	-	
Trust in the professional team								
Yes	146(97.3)	39	26.7	98	67.1	9	6.2	0.673*
No	4 (2.7)	2	50.0	2	50.0	-	-	
Understands explanations about diabetes								
Yes	117(78.0)	36	30.8	78	66.7	3	2.6	0.005*
No	18 (12.0)	2	11.1	14	77.8	2	11.1	
Does not receive explanations	15(10.0)	3	20.0	8	53.3	4	26.7	
Treatment issues clarified during consultation								
Yes	131(87.3)	37	28.2	87	66.4	7	5.3	0.587**
No	19 (12.7)	4	21.1	13	68.4	2	10.5	
Professional providing guidance on the treatment								
Doctor	122(81.3)	33	27.0	85	69.7	4	3.3	0.028*
Nurse	1 (0.7)	-	-	1	100.0	-	-	
Nutritionist	10 (6.7)	4	40.0	6	60.0	-	-	
Community Health Worker	5 (3.3)	1	20.0	3	60.0	1	20.0	
Doctor and nutritionist	3 (2.0)	1	33.3	1	33.3	1	33.3	
Does not receive guidance on the treatment	9 (6.0)	2	22.2	4	44.4	3	33.3	
Participation in educational groups on diabetes								
Never participated	120(80.0)	30	25.0	82	68.3	8	6.7	0.389*
Participated	30(20.0)	11	36.7	18	60.0	1	3.3	

*: Pearson's Chi-square test. **: Fisher's Exact Test.

ever, in this study, we did not evaluate how health professionals transmitted information to the elderly, which is one of the limiting factors.

The belief of the elderly about the use of the medication to control diabetes showed a positive association in both the bivariate and multivariate models, corroborating with the results found by other authors[5,7]. Drug adherence to glycemic control involves behavioral, normative and control beliefs that must be considered while evaluating behavioral determinants[26].

A cohort study conducted with type 2 diabetic subjects in the city of Boston, USA, concluded that the belief in medications to improve symptoms and protect health in the future was associated with higher drug adherence rates when compared to those who did not believe[27]. Thus, the importance of considering the concepts, convictions and attitudes of the elderly related to health and care practices is highlighted.

Limitations of the study were use of a structured script, subject to distortions and bias of the interviewer; adherence analysis performed only from the viewpoint of the elderly diabetics' report regarding prescribed therapy, which differs from other studies that evaluated adherence through glycemic control[12,15]; using the odds ratio association measure, considering that cross-sectional studies use the prevalence ratio, but the measurement of adherence under the three aspects (full, partial and non-adherence) was only possible using the multinomial model, opting to work with

Table 5. Factors associated to therapeutic adherence of diabetic elderly according to multinomial logistic regression model in primary health care. Recife, PE, 2011.

Variables	Non-adherence x Full adherence			
	Crude Model		Adjusted Model*	
	OR (CI95%)	p-value	OR (CI95%)	p-value
Belief in medicines to control diabetes				
Uses and believes in medicines	11.00 (2.0-61.0)	0.006	9.65 (1.6-56.6)	0.012
Uses and does not believe in medicines	3.00 (0.2-39.6)	0.834	2.83 (0.2-41.2)	0.444
Does not use medicines [a]	1.00	-	1.00	-
Variables	**Non-adherence x Partial adherence**			
	Crude Model		Adjusted Model*	
	OR (CI95%)	p-value	OR (CI95%)	p-value
Belief in medicines to control diabetes				
Uses and believes in medicines	18.54 (3.7-92.1)	< 0.001	18.15 (3.5-95.4)	0.001
Uses and does not believe in medicines	1.88 (0.2-23.4)	0.488	1.89 (0.1-25.4)	0.630
Does not use medicines [a]	1.00	-	1.00	-

* Model adjusted for the variables: self-perceived health, understands the explanations about diabetes and professional that provides guidance on the treatment; [a]: Variable reference category; Likelihood ratio test (p-value = 0.003); Predictive power = 68.7%

odds ratio despite the risk of overestimation; a shortage of international and national studies related to adherence of diabetic elderly people under the three aspects studied, hampering comparison with other findings related to this segment, which proved the need for other studies on this subject with the older public.

Findings point to the need for actions that encourage behavioral change towards the adoption of healthy lifestyles and the development of additional studies to better define the role of health beliefs and care practices in this population. In addition, it is inferred that the design of educational practices with active methodologies based on reflection and respect for the autonomy and individuality of the elderly diabetics facilitates the promotion of self-care activities for glycemic control.

Collaborations

AKOT Borba: design, implementation of the research, data analysis and interpretation and paper elaboration and review. APO Marques: design, data analysis and interpretation, and paper elaboration and review. VP Ramos: paper review. MCC Leal: design, research planning and paper review. IKG Arruda: paper review. RSPS Ramos: design and implementation of the research.

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Article submitted 06/10/2015
Approved 20/06/2016
Final version submitted 22/06/2016