

Barriers and Motivations for the Metabolic Control of Patients with Type 2 Diabetes Assisted in a Tertiary Service in a City in Brazil

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Abstract

Aims: To evaluate the main barriers and motivations for metabolic control in patients with Diabetes Mellitus.

Methods: 101 patients assisted at the Endocrinology and Metabology service with clinical and laboratory diagnosis of Type 2 Diabetes were invited to participate in the research and answer a questionnaire developed by the authors, consisting of 65 questions, to assess barriers and treatment motivations.

Results: There was a predominance of females (75.2%), low education level (57.4%), income between 1.5-3.0 minimum wages (60.4%), Catholic affiliation (65.3%) and use of oral antidiabetic associated with insulin (43.6%). Patients demonstrated knowledge about the disease and the importance of maintaining good metabolic control. Most reported family support and acceptance in respect to the fact of suffering from diabetes, as well as stress related to eventual symptoms. The main motivating factors found were family relationships and personal religiosity.

Conclusion: Ignorance and misunderstanding of some aspects of the disease, lack of support from the health system and non-acceptance of the disease are factors that interfere in the control. On the other hand, family relationships and religious engagement were considered highly motivating factors, encouraging patients to search for metabolic control and quality of life.

Keywords: Barriers to metabolic control, Type 2 Diabetes, motivations for treatment

1. Introduction

Diabetes Mellitus (DM) is one of the most serious public health problems that affects all countries, regardless of the degree of development, and its prevalence is directly linked to factors such as sedentary lifestyle, overweight, obesity, aging and greater population survival (Sociedade Brasileira de Diabetes, 2022). It is characterized by metabolic dysfunctions that result in chronic hyperglycemia and is classified into four main types: Type 1 Diabetes, Type 2 (T2DM), Gestational and other types (Sociedade Brasileira de Diabetes, 2022; American Diabetes Association, 2019).

T2DM is the most prevalent and is due to genetic and environmental factors, resulting in insulin resistance, increased hepatic glucose output and progressive reduction in insulin secretion. It usually affects individuals over 40 years of age, with a sedentary lifestyle, inadequate diet, abdominal visceral obesity (Sociedade Brasileira de Diabetes, 2022) and are not prone to ketoacidosis (Masharani, Karam, & German, 2006; Bandeira et al., 2015; Dennedy, Rizza, & Dinneen, 2016).

Chronic hyperglycemia is associated with the onset of micro and macrovascular complications and increased mortality (Sociedade Brasileira de Diabetes, 2022). To avoid complications related to DM and maintain quality of life, one must maintain metabolic control (World Health Organization, 2016), practice self-care and adequate treatment, which has been demonstrated as a great challenge for patients (Borba et al., 2018), since it requires several lifestyle changes, generating anxiety, stress and depression that contribute to the unfavorable prognosis (Santos et al., 2012). The motivation of patients to adhere to treatment is also a challenge for health professionals (Lima, Menezes, & Peixoto, 2018) who should guide and show them their fundamental role in the management of treatment and in the search for quality of life (American Diabetes Association, 2019; Soares, Sousa, Fernandes, &

Carvalho, 2010), although they are free to decide whether or not to accept the guidelines given (Soares et al., 2010; Delamater, 2006; Pontieri & Bachion, 2010; Boas et al., 2011; Santos, Souza, Gonzaga, & Santos, 2018).

The understanding of the patient is essential to overcome the adversities that diabetes generates in his routine, as well in the family members, because the treatment of a patient with diabetes goes far beyond the interference in metabolic parameters, as it requires multiple care approaches to meet their needs (Shakibazadeh et al., 2011). Some studies have reported that most patients are unable to achieve metabolic control parameters because they face barriers that prevent the use of all available resources in order to achieve the recommended therapeutic targets (Anderson & McKay, 2011; Beliard, Muzykovsky, Vincent, Shah, & Davanos, 2016; McBrien et al., 2017). The topic in question still has many gaps in the literature, and it has not yet been clarified which barriers most affect treatment and the search for therapeutic targets. Therefore, in this study we aim to identify and assess the main barriers faced by patients that may prevent adequate metabolic control as well as the factors that motivate patients to be adequately treated in the face of the limitations imposed by the disease, despite their social condition and the care resources available. This knowledge, especially in our environment, will define strategies to minimize them.

2. Methods

2.1 Study Design, Ethical Aspects and Location

This is a quali-quantitative, cross-sectional and retrospective study, approved by the Research Ethics Committee of the Federal University of Triângulo Mineiro (UFTM), under protocol number: 535.152, conducted at the Endocrinology and Metabology Department of the Clinics Hospital (HC-UFTM) in the period between April/2018 and February/2019.

2.2 Population and Sample

The sample consisted of 101 patients with clinical and laboratory diagnosis of T2DM. The sample size calculation considered a priori coefficient of determination, $R^2 = 0.13$, with a significance level or type I error of $\alpha = 0.05$ and type II error of $\beta = 0.1$, statistical power of 90%. Using the PASS application (Power Analysis and Sample Size), version of 2002 (NCSS, 2008), and introducing the values described above, a minimum sample size of 99 subjects was obtained. Patients were invited to participate on the days of routine consultation when they read and signed the Free and Informed Consent Form.

2.3 Inclusion Criteria

Individuals over 18 years of age diagnosed after two fasting blood glucose tests equal to or greater than 126 mg/dL or a random blood glucose equal to or greater than 200 mg/dL in a symptomatic patient or after 120 minutes of an Oral Glucose Tolerance Test (OGTT).

2.4 Study Instruments

The data obtained in the study resulted from the analysis of the following instruments:

1) - Identification: containing personal demographic data, clinical history of DM, habits and lifestyles. Presence of chronic complications, family history, associated diseases were obtained by consulting the patient's electronic medical records available in the -UHMA- University Hospital Management Application. Anthropometric data such as weight, height, body mass index, waist circumference and blood pressure were performed by the team.

2) - Semi-structured questionnaire: self-administered and easy-to-understand questionnaire, devised by the authors, and validated by 3 independent expert judges. It consists of 62 questions divided into five domains with the purpose of assessing the barriers to treatment and one domain to assess motivations for DM treatment. Some questions required yes or no or multiple-choice answers, and some questions were open-ended, giving the patient the option to elaborate their answers.

1st domain: denominated Education and Self-knowledge - consisted of 25 questions, which assessed: 1 to 5: patient's knowledge about diabetes; 6 to 13: self-monitoring of diabetes; 14 to 19: patient's knowledge about diseases and complications due to diabetes; 20 to 25: knowledge about the relevance of diet and physical exercise for the treatment.

2nd domain: denominated Assistance of the Service and the Brazilian Health System - consists of 10 questions that evaluated the public health system where the patient is accompanied regarding the frequency and quality of attendance, the difficulty in making appointments and return queries, waiting in lines as well as monthly expenses with supplies.

3rd domain: denominated Social Group - consists of 9 questions that assessed family support in diet and metabolic control and patient self-care in their social contact, both in their work environment and in social events.

4th domain: denominated Physical Barriers - consisted of 4 questions that assessed whether patients were able to perceive symptoms of diabetes and whether these interfered with treatment.

5th domain: denominated Psychological Barriers - consisted of 7 questions that assessed patient acceptance and self-assessment of the ability to maintain metabolic control.

6th domain: denominated Motivations for Treatment - consisted of 7 questions that evaluated the motivations to seek adequate metabolic control.

3) - Parameters that express metabolic control and lipid profile: Fasting Glycemia (FG), Postprandial Glycemia (PPG), Glycated Hemoglobin (HbA1c), Fructosamine (FRUCTO), Triglycerides (TGL), Total Cholesterol (T-COL), Low-Density Lipoprotein Cholesterol (LDL-c), High-Density Lipoprotein Cholesterol (HDL-c) and Non-HDL Cholesterol (N-HDL-c) were obtained from the medical records at different times: 12 months prior to the start of the study and thereafter every 4 months including baseline measurement. These data were obtained by consulting the application called Esmeralda Visual (esmeralda.htm.ebserh.net/ev) available for the HC-UFTM. The average of at least 3 results obtained for each exam was calculated. Serum concentrations of T-COL, HDL-c and TG were measured using the enzymatic colorimetric method and fasting blood glucose was determined by the enzymatic method with hexokinase. The turbidimetry technique was used to measure glycated hemoglobin. All samples were processed on the COBAS 6000-module C501. (Roche-Hitachi). LDL-c was calculated using the Friedewald, Levy and Fredrickson (1972).

2.5 Statistical Analysis

Continuous variables were analyzed for normality using the Kolmogorov – Smirnov test and homogeneity of variances was verified using the Levene test. The results were descriptively evaluated and expressed in measures of central tendency (mean and median) and dispersion (standard deviation, minimum and maximum), as well as percentage frequencies. The relationship between consultation attendance and metabolic control was determined by the classic chi-square with residual analysis. Differences were considered significant at the 5% level ($p \leq 0.05$). The analyzes were carried out using the Statistical Package for the Social Sciences version 23 software.

3. Results

In the evaluated population, there was a predominance of females (75.2%), low education level (0-8 years; 57.4%), monthly income between 1.5-3.0 minimum wages (60.4%), and mostly Catholic (65.3%) (Table 1). Regarding the type of treatment, 43.6% were on oral antidiabetic drugs, 43.6% were on antidiabetic drugs associated with insulin and 10.8% used only insulin. The main associated diseases were Systemic Arterial Hypertension (SAH), followed by dyslipidemia (DLP) and primary hypothyroidism. Glycemic and lipid parameters of the patients are described in Table 2.

Table 1. Sociodemographic characterization of patients with T2DM assisted at the Diabetes Outpatient Clinic of the Federal University of Triângulo Mineiro, Uberaba-MG, Brazil

Variables	T2DM	
	n	%
Sex		
Female	76	75.2
Male	25	24.8
Age Group (Years)		
≥ 60	65	64.3
31 – 59	35	34.7
18 – 30	1	1.0
Labor Activity		
Retiree	50	49.5
Liberal professional	21	20.8
Unemployed	14	13.9
Private sector worker	13	12.8
Public Server	3	3.0

Income (in minimum wages Brazilian currency)[#]		
Between 1.5 and 3	61	60.4
≤ 1.5	22	21.8
≥ 3	18	17.8
Education (Years in school)		
0 – 8	58	57.4
9 – 11	22	21.8
≥ 12	21	20.8
Marital status		
Married	65	64.4
Single	21	20.8
Widower	9	8.9
Separate	6	5.9
Religion		
Catholic	66	65.3
Spiritist	16	15.8
Evangelical	14	13.9
Agnostic	3	3.0
Atheist	1	1.0
Jewish	1	1.0

Source: the author, 2019.

Note: [#]: Minimum salary of R\$998.00 in the period equivalent to US\$192,91

Table 2. Metabolic control and lipid profile of patients with T2DM treated at the Diabetes Outpatient Clinic of the Universidade Federal do Triângulo Mineiro, Uberaba-MG, Brazil

Variables analyze	Mean ± SD	Adequate		Inadequate	
		n	%	n	%
\bar{X} FG (mg/dL) [#]	165.22 ± 46.77	23	22.8	78	77.2
\bar{X} PPG (mg/dL) [#]	206.81 ± 71.88	48	47.5	53	52.5
\bar{X} HbA1c (%) [#]	8.16 ± 1.65	31	30.7	70	69.3
\bar{X} FRUCTO (μmol/L) [#]	328.09 ± 69.07	35	34.7	66	65.3
\bar{X} T-COL (mg/dL) [#]	168.60 ± 39.86	84	83.2	17	16.8
\bar{X} HDL-c (mg/dL) [#]	48.01 ± 15.41	35	34.7	66	65.3
\bar{X} n-HDL-c (mg/dL) [#]	120.26 ± 41.31	85	84.2	16	15.8
\bar{X} LDL-c (mg/dL) [#]	86.43 ± 34.01	92	91.1	9	8.9
\bar{X} TGL (mg/dL) [#]	173.64 ± 99.55	53	52.5	48	47.5

Source: the author, 2019.

Note: FG: fasting glucose (mg/dL); PPG: postprandial blood glucose (mg/dL); HbA1c: glycated hemoglobin (%); ΔHbA1c: variation of glycated hemoglobin; FRUCTO: Fructosamine (μmol/L); T-COL: total cholesterol (mg/dL); HDL-c – high density lipoprotein cholesterol (mg/dL); n-HDL-c: non high density lipoprotein cholesterol (mg/dL); LDL-c: low density lipoprotein cholesterol (mg/dL); TGL: triglycerides (mg/dL);

[#]: Average of the three values obtained over a year.

When evaluated about knowledge related to the 1st domain, 84.1% knew their diabetes classification, and 95.0% knew what was their most appropriate treatment. About the usefulness of HbA1c, 58.4% knew its purpose and

only 18.8% knew the value considered as therapeutic treatment target; 51.5% said that the doctor had explained it but did not remember the value informed. About home self-monitoring, 71.3% of those who used insulin performed capillary blood glucose at home, with 12.3% reporting a frequency of four times a day. When assessing whether patients who regularly attended appointments had better metabolic control, we found no significant difference ($p=0.392$). More details in Table 3.

Table 3. Frequencies of answers regarding the knowledge of patients with T2DM assisted at the Diabetes Outpatient Clinic of the Federal University of Triângulo Mineiro, Uberaba-MG, Brazil

Variables	T2DM	
	n	%
Diabetes type		
Type 1	2	2.0
Type 2	85	84.1
Do not know	14	13.9
Type of treatment		
Insulin + Oral antidiabetics	44	43.6
Oral antidiabetics	44	43.6
Insulin	11	10.8
Do not know	2	2.0
Purpose of glycosylated hemoglobin		
The doctor never explained	38	37.6
Reflects the glycemic average of the last 3 months	26	25.7
Assess diabetes control	23	22.8
Assess the need for medication adjustment	10	9.9
Do not know	3	3.0
Assess for anemia	1	1.0
Glycosylated hemoglobin target		
Doctor informed but the patient don't remember	52	51.5
Doctor did not inform	25	24.8
Must be <7%	19	18.8
Must be <10%	4	3.9
Did not answer	1	1.0
Capillary blood glucose done		
At home	72	71.3
At Basic Health Unit	20	19.8
Do not do it anywhere	9	8.9

Source: the author, 2019

The questions regarding the patient's knowledge about lipid control, blood pressure and complications of DM are shown in Table 4.

Table 4. Frequency of answers regarding knowledge of complications and associated diseases of patients with T2DM treated at the Diabetes Outpatient Clinic of the Federal University of Triângulo Mineiro, Uberaba-MG, Brazil

Variables	T2DM	
	n	%
Cholesterol influence on diabetes		
Metabolic control worsens resulting in complications	30	29.7
Increased cholesterol worsens diabetes	29	28.7
Lack of metabolic control influences heart diseases	28	27.7
Never been informed about it	8	7.9
It has no relation	5	5.0
Did not answer	1	1.0
Influence of high blood pressure on diabetes		
Yes, it influences	47	46.5
Do not know	20	19.8
No influence	18	17.8
Never tried to know	8	7.9
The doctor never informed	6	6.0
Did not answer	2	2.0
Complications related to lack of control		
Affect the legs	99	98.0
Affect the feet	94	93.1
Can lead to heart complications	92	91.1
Can cause a stroke	89	88.1
Decrease vision	89	88.1
Makes you lose your vision	87	86.1
Decreases kidney function	87	86.1
Can lead to kidney failure	85	84.1
All the complications	85	84.1
Do not interfere with vision or kidneys	1	1.0

Source: the author, 2019.

Regarding the diet, 99.0% considered important to follow a diet as part of the treatment and 93.1% had already been instructed on it. Of these, 23.8% said they fully followed the guided diet, while 42.6% reported doing well only at the beginning, not being able to continue with the necessary changes. As for the practice of physical exercises, 98.0% considered relevant to combine them with the treatment and 47.5% reported practicing some physical activity. Most patients (99%) stated that uncontrolled diabetes can cause complications and were fully aware of the long-term consequences of uncontrolled diabetes.

The patients were asked about the health service where they have been assisted and the answers are shown in Table 5. The frequency of endocrinological appointments recommended by the Brazilian Diabetes Society (BDS) is 3 to 4 times a year, which was found in 41.6%. Visits to an ophthalmologist and a nutritionist once a year was found in 58.4% and 30.7% respectively. However, 81.2% reported no barriers in scheduling appointments, while 50.5% reported difficulty in obtaining medication and reagent strips to determine capillary blood glucose and 29.7% attributed this difficulty to supply failure by the city public health program. 27.7% reported not spending on the purchase of inputs, but 27.7% responded that they spend, on average, from US\$40.00 to US\$100.00 per month on the purchase of these. Most patients (92.1%) have no difficulty in attending appointments.

Table 5. Frequency of answers regarding the health system of patients with T2DM assisted at the Diabetes Outpatient Clinic of the Federal University of Triângulo Mineiro, Uberaba-MG, Brazil

Variables	T2DM	
	n	%
Endocrinologist consultations		
Twice a year	48	47.5
Three times a year	27	26.7
Four times a year	15	14.9
More than four times	11	10.9
Consultations with the ophthalmologist		
Once a year	59	58.4
Once every two years	18	17.8
Twice a year	13	12.9
Every five years	7	6.9
Never	4	4.0
Nutritionist consultations		
Never	40	39.6
Once a year	31	30.7
Can't make appointment	15	14.9
Twice a year	7	6.9
Four times a year	7	6.9
Three times a year	1	1.0
Difficulty making appointments and returns		
No	82	81.2
Yes	19	18.8
Obtaining medications and reagent strips		
Don't get it easily	51	50.5
Easily get it	48	47.5
Did not answer	2	2.0
Average spending on reagent strips and medications (per month)		
Don't spend	28	27.7
Up to US\$ 39.80	26	25.7
US\$ 40.00 – US\$ 100.00	28	27.7
More than US\$ 100.00	9	8.9
Could not inform	10	10.0
Difficulty attending appointments		
No	93	92.1
Yes	8	7.9
It is well received by professionals		
Yes	99	98.0
No	2	2.0
Difficulty waiting for service		
No	64	63.4
Yes	37	36.6
Transport difficulty		
No	87	86.1
Yes	14	13.9

Source: the author, 2019.

Regarding the questions about the perception of symptoms related to DM, 67.3% reported having some symptoms, including pain in the lower limbs in 18.8%, adynamia in 12.9% and blurred vision in 11.9%, but even with symptoms, 94.1% said these symptoms do not prevent them from controlling their diabetes or attending appointments. Most patients, 58.4%, report being aware when glucose is elevated and 71.3% when they have hypoglycemia.

When asked if they feel bad or unhappy about being diabetic, 41.6% said yes. Most patients, 79.2%, think that the emotional state interferes with the control of diabetes, 87.1% have already incorporated diabetes into their routine of life, and 89.1% have already accepted the fact that they are diabetic and 77.2% feel able to control diabetes.

Regarding the questions about what motivates the patient to control diabetes and seek their own health, 91.1% said they felt motivated and 20.8% reported that the family is directly linked to this motivation. Religious beliefs or faith motivate the self-care in 83.2% of patients and 81.2% believe that religion motivates them to face the difficulties in the glycemic control. 34.7% of the patients said that the family dependence motivates the search for health (Table 6).

Table 6. Frequency of answers referring to motivational factors of patients with DM assisted at the Diabetes Outpatient Clinic of the Federal University of Triângulo Mineiro, Uberaba-MG, Brazil

Variables	T2DM	
	n	%
Feel motivated to control diabetes		
Yes	92	91.1
No	9	8.9
What motivates you to seek health		
Self esteem	19	18.8
Relatives	21	20.8
Friends / social environment	2	2.0
Religion	2	2.0
All the above	55	54.4
None of the above	2	2.0
Beliefs and faith motivates in self-care		
Yes	84	83.2
No	17	16.8
Religion motivates to face difficulties		
Yes	82	81.2
No	19	18.8
Family depends on you for subsistence		
No	65	64.4
Yes	36	35.6
Family dependence motivates		
No	66	65.3
Yes	35	34.7

Source: the author, 2019.

4. Discussion

Some studies have shown that even though there has been a great technological advance to the treatment of DM, most patients are unable to reach the recommended targets of metabolic control (Mendes, Fittipaldi, Neves, Chacra,

& Moreira Jr, 2010; Lira Neto et al., 2017). In the present study, we evaluated the barriers encountered by patients that could explain the limitations in achieving these goals and, for that purpose, we applied an easy-to-understand questionnaire prior to a routine consultation.

The assessment of metabolic control showed inadequate glycemic parameters in 69.3% of patients, as has been reported in the literature (Souza & Oliveira, 2020; Rossaneis, Andrade, Gvozd, Pissinati, & Haddad, 2019). Most patients were using insulin plus an oral antidiabetic (metformin and gliclazide or glibenclamide). Some were using bedtime insulin plus oral antidiabetics and others were on full insulin therapy. It is noteworthy that, to date, low-income patients treated at public health services do not have access to the most effective drugs for glycemic control. Regarding self-monitoring of capillary blood glucose, it is observed that a minority of insulin users do it properly for active self-care, in order, to guide them in the application of fast-acting insulin before meals, 51.5% report that they have no difficulty in obtaining reagent strips for self-monitoring, while the others refer to buy them, which is understandable because while the patient is not on full insulin, test strips are not available in health programs to patients with T2DM, indicating that this is a barrier to be overcome: more appropriate medications and means of monitoring blood glucose.

Some questions in domain 1 tested the knowledge about diabetes, and most know that “uncontrol” is associated with complications, but understandable knowledge about the role of HbA1c, SAH and DLP is still deficient in most patients. The association between SAH, dyslipidemia and diabetes are synergistic as risk factors for cardiovascular events (Rückert et al., 2012; Fukui et al., 2011; Carolino, Molena-Fernandes, Tasca, Marcon, & Cuman, 2008) and the percentage of such abnormalities in diabetics (Gus, Fischmann, & Medina, 2002; Daniele, Vasconcelos, & Coutinho, 2014) justifies education about the need to treat all of them. Many patients do not have clear understanding about therapeutic targets as the study demonstrates by the answers about HbA1c: either “the doctor never talked about it”, or “I don’t remember”. This can be explained by the shame that the patient has in admitting to the doctor that he did not understand his explanation at the time of the consultation, not expressing his doubts, or because the volume of information does not allow them to distinguish which data must be memorized (Nam, Chesla, Stotts, Kroon, & Janson, 2011). This data reinforces the importance of improving communication with patients so that they feel safe in questioning the doctor about any doubts. It also reinforces the importance of a post-consultation moment with another health professional, a diabetes educator, who can test what was understood by the patient (Pimentel, Santos, Barreto Neto, & Souza, 2021).

With regard to the public health services in our service, there is a considerable percentage of patients who are unable to attend consultations with endocrinologists and nutritionists every 3-4 months, as recommended by the BDS (Sociedade Brasileira de Diabetes, 2022) suggesting the need to resize the number of professionals in the service for the number of patients seen, as there is always an excess of patients for the number of professionals, interfering with the quality and quantity of human care resources (Moraes, Mengue, Molina, & Cade, 2020) which tends to worsen with the increasing prevalence of the T2DM in the Brazilian population (Pimentel et al., 2021).

The study points out that the average expenditure of the population with test strips and medicines is US\$40.00 – US\$100.00 monthly, a fact that reflects the Brazilian reality and shows great difficulty in supporting treatment by the government although it is guaranteed by a federal law (Ministério da Saúde, 2007). Since many patients live with 1 to 3 minimum wages, considering the expenses with comorbidities and complications of diabetes, it is clear that such patients need care and prevention measures provided by public services (Baptista et al., 2019).

Regarding the social domain, many patients (36.6%) answered that they did not have any help from family members, while a minority (11.0%) reported that friends and family members disrupt the diet, reinforcing the need for public policies to guide the general population on the importance of diabetes treatment and associated comorbidities. According to the Brazilian Institute of Geography and Statistics, the prevalence of obese people aged 20 and over in Brazil increased between 2003 and 2019, jumping from 12.2% to 26.8% (Instituto Brasileiro de Geografia e Estatística, 2022). Participants reported that most friends know about their disease, but most prefer not to comment at work because they feel inhibited or just because they think it is unnecessary for them to know about their condition. They emphasize the willingness to exchange experiences with other people with diabetes, signaling that workshops or group practices involving people with diabetes and their families could adjust many of these issues (Baron-Epel, Heymann, Friedman, & Kaplan, 2015).

The acceptance of diabetes is an important step towards the effectiveness of the treatment and most of the participants in this study revealed to have accepted and incorporated this fact into their routine of life (Alzubaidi, Namara, Browning, & Marriott, 2015). Some of the patients reported feeling unhappy about having to live with the disease because they were forced to change their lifestyle and eating habits and felt deprived of many foods with high sucrose content. All these challenges affect the emotional state of patients and stress directly influences

glycemic control, suggesting the need for more targeted guidance on food quality (Junges & Camargo, 2020; Gonçalves et al., 2020). Despite all the difficulties, most patients feel motivated to control their diabetes and our data show that family members are one of the pillars that lead to the search for their own health, followed by the self-esteem factor. Religiosity and spirituality also play a fundamental role in the process of acceptance and motivation of these patients and are beginning to be addressed in studies with patients with diabetes (Arcury et al., 2007; Alzahrani & Sehlo, 2013).

5. Limitations

The study had some limitations. As it is an original instrument, it was not possible to compare the data found with the literature. During data collection, some patients showed difficulty in understanding some questions and were afraid of missing the appointment or having to perform blood collection at the moment of the interview. Despite the difficulties, it was possible to know patients treated in our diabetes clinic and to draw a profile regarding the barriers that may hinder, as well as the factors that motivate them to face the difficulties in the search for their metabolic control.

6. Conclusion

We conclude that knowing the patient thoughts and understanding about their own treatment is essential to help them face the challenges of diabetic disease, in their daily life, in social and family environment. Assuming that the patients should be cared for in their entirety, well beyond metabolic control, is an important learning experience for the team that assists them. Attention to individual barriers and limitations is a concern of recent practices, encouraging a multidisciplinary approach and the institution of more humanistic approaches and inclusive policies.

Ethics

Approved by the Ethics Committee in Research-CEP of the Federal University of Triângulo Mineiro under protocol number 535.152.

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Data Availability Statement

The data underlying this article will be shared on reasonable request to the corresponding author.

Authors Contributions

Conception and design of the research: Janaíne Machado Tomé, Maria de Fátima Borges, Beatriz Pires Ferreira; Data collection: Janaíne Machado Tomé, Daniela Cristina Silva Resende and Isabela Aparecida Gonçalves Prada; Analysis and interpretation of data: Janaíne Machado Tomé, Adriana Paula da Silva and Maria de Fátima Borges; Statistical analysis: Janaíne Machado Tomé and Adriana Paula da Silva; Writing of the manuscript: Janaíne Machado Tomé, Maria de Fátima Borges and Beatriz Hallal Jorge Lara; Critical review of the manuscript for to intellectual content: Maria de Fátima Borges, Elvi Cristina Rojas Fonseca and Beatriz Hallal Jorge Lara.

Competing Interests Statement

The authors have no conflicts of interest to declare.

References

- Alzahrani, H. A., & Sehlo, M. G. (2013). The impact of religious connectedness on health-related quality of life in patients with diabetic foot ulcers. *Journal of Religion and Health*, 52(3), 840-850. <https://doi.org/10.1007/s10943-011-9529-x>
- Alzubaidi, H., Namara, K. M., Browning, C., & Marriott, J. (2015). Barriers and enablers to healthcare access and use among Arabic-speaking and Caucasian English-speaking patients with type 2 diabetes mellitus a qualitative comparative study. *BMJ Open*, 5(11), e008687. <https://doi.org/10.1136/bmjopen-2015-008687>
- American Diabetes Association. (2019). Standards of Medical Care in Diabetes – 2019. *Diabetes Care*, 42(suppl. 1), S1-S193. <https://doi.org/10.2337/dc19-Sint01>
- Anderson, B. J., & McKay, S. V. (2011). Barriers to glycemic control in youth with type 1 diabetes and type 2 diabetes. *Pediatric Diabetes*, 12(3 pt 1), 197-205. <https://doi.org/10.1111/j.1399-5448.2010.00667.x>
- Arcury, T. A., Stafford, J. M., Bell, R. A., Golden, S. L., Snively, B. M., & Quandt, S. A. (2007). The Association

- of health and functional status with private and public religious practice among rural, ethnically diverse older adults with diabetes. *The Journal of Rural Health*, 23(3), 246-253. <https://doi.org/10.1111/j.1748-0361.2007.00097.x>
- Bandeira, F., Mancini, M., Graf, H., Griz, L., Faria, M., & Lazaretti-Castro, M. (2015). *Endocrinologia e Diabetes* (3rd ed.). Rio de Janeiro: Medbook.
- Baptista, M. H. B., Dourado, F. C., Gomides, D. D. S., Teixeira, C. R. S., Freitas, M. C. F., & Pace, A. E. (2019). Education in Diabetes Mellitus for blood glucose self-monitoring: a quasi-experimental study. *Revista Brasileira de Enfermagem*, 72(6), 1601-1608. <https://doi.org/10.1590/0034-7167-2018-0731>
- Baron-Epel, O., Heymann, A. D., Friedman, N., & Kaplan, G. (2015). Development of an unsupportive social interaction scale for patients with diabetes. *Patient Preference and Adherence*, 9, 1033-1041. <https://doi.org/10.2147/PPA.S83403>
- Beliard, R., Muzykovsky, K., Vincent, W., Shah, B., & Davanos, E. (2016). Perceptions, barriers, and knowledge of inpatient glycemic control a survey of health care workers. *Journal of Pharmacy Practice*, 29(4), 348-354. <https://doi.org/10.1177/0897190014566309>
- Boas, L. C. G. V., Foss, M. C., Foss-Freitas, M. C., Torres, H. C., Monteiro, L. Z., & Pace, A. E. (2011). Adesão à dieta e ao exercício físico das pessoas com diabetes mellitus. *Texto Contexto – Enfermagem*, 20(2), 272-279. <https://doi.org/10.1590/S0104-07072011000200008>
- Borba, A. K. O. T., Marques, A. P. O., Ramos, V. P., Leal, M. C. C., Arruda, I. K. G., & Ramos, R. S. P. S. (2018). Factors associated with elderly diabetic adherence to treatment in primary health care. *Ciência e Saúde Coletiva*, 23(3), 953-961. <https://doi.org/10.1590/1413-81232018233.03722016>
- Carolino, I. D. R., Molena-Fernandes, C. A., Tasca, R. S., Marcon, S. S., & Cuman, R. K. N. (2008). Fatores de risco em paciente com diabetes mellitus tipo 2. *Revista Latino-Americana de Enfermagem*, 16(2), 238-244. <https://doi.org/10.1590/S0104-11692008000200011>
- Daniele, T. M., Vasconcelos, J. P., & Coutinho, F. G. (2014). Avaliação do autocuidado de pacientes com Diabetes Mellitus tipo 2 em uma unidade de atenção básica. *Cinergis*, 15(3), 135-139. <https://doi.org/10.17058/cinergis.v15i3.4990>
- Delamater, A. M. (2006). Improving Patient Adherence. *Clinical Diabetes*, 24(2), 71-77. <https://doi.org/10.2337/diaclin.24.2.71>
- Dennedy, M. C., Rizza, R. A., & Dinneen, S. F. (2016). Classification and Diagnosis of Diabetes Mellitus. In Jameson, J. L., & DeGroot, L. J. (Eds.), *Endocrinology: Adult and Pediatric* (pp. 662-671). Philadelphia: Elsevier Saunders.
- Friedewald, W. T., Levy, R. I., & Fredrickson, D. S. (1972). Estimation of the concentration of low-density lipoprotein cholesterol in plasma without use of the preparative ultracentrifuge. *Clinical Chemistry*, 18(6), 499-502.
- Fukui, M., Tanaka, M., Toda, H., Senmaru, T., Sakabe, K., Ushigome, E., ... & Nakamura, N. (2011). Risk factors for development of diabetes mellitus, hypertension and dyslipidemia. *Diabetes Research and Clinical Practice*, 94(1), e15-18. <https://doi.org/10.1016/j.diabres.2011.07.006>
- Gonçalves, L. H. T., Silva, A. P., Fernandes, D. S., Cunha, C. L. F., Castro, R. L. P., & Uchôa, V. S. (2020). Conhecimento e atitude sobre diabetes mellitus de usuários idosos com a doença atendidos em unidade básica de saúde. *Nursing*, 23(260), 3496-3500. <https://doi.org/10.36489/nursing.2020v23i260p3496-3500>
- Gus, I., Fischmann, A., & Medina, C. (2002). Prevalence of risk factors for coronary artery disease in the Brazilian State of Rio Grande do Sul. *Arquivos Brasileiros de Cardiologia*, 78(5), 484-490. <https://doi.org/10.1590/S0066-782X2002000500005>
- Instituto Brasileiro de Geografia e Estatística. (2022). *Pesquisa Nacional de Saúde 2019 – Ciclos de Vida*. Brasil.
- Junges, J. R., & Camargo, W. V. (2020). A percepção do corpo e o autocuidado em sujeitos com diabetes mellitus 2: uma abordagem fenomenológica. *Physis: Revista de Saúde Coletiva*, 30(3), e300318. <https://doi.org/10.1590/S0103-73312020300318>
- Lima, C. R., Menezes, I. H. C. F., & Peixoto, M. R. G. (2018). Educação em saúde: avaliação de intervenção educativa com pacientes diabéticos, baseada na teoria social cognitiva. *Ciência & Educação*, 24(1), 141-156. <https://doi.org/10.1590/1516-731320180010010>

- Lira Neto, J. C. G., Silva, A. P., Araújo, M. F. M., Damasceno, M. M. C., Landim, M. B. P., & Freitas, R. W. J. F. (2017). Metabolic control and medication adherence in people with diabetes mellitus. *Acta Paulista de Enfermagem*, 30(2), 152-158. <https://doi.org/10.1590/1982-0194201700024>
- Masharani, U., Karam, J. H., & German, M. S. (2006). Hormônios pancreáticos e diabetes melito. In: Gardner, D. G., & Shoback, D. (Eds.), *Endocrinologia Básica e Clínica* (pp. 541). Rio de Janeiro: McGraw Hill Interamericana do Brasil.
- McBrien, K. A., Naugler, C., Ivers, N., Weaver, R. G., Campbell, D., Desveaux, L., ... & Manns, B. J. (2017). Barriers to care in patients with diabetes and poor glycemic control-A cross-sectional survey. *PLoS One*, 12(5), e0176135. <https://doi.org/10.1371/journal.pone.0176135>
- Mendes, A. B., Fittipaldi, J. A., Neves, R. C., Chacra, A. R., & Moreira Jr, E. D. (2010). Prevalence and correlates of inadequate glycaemic control: results from a nationwide survey in 6,671 adults with diabetes in Brazil. *Acta Diabetologica*, 47(2), 137-145. <https://doi.org/10.1007/s00592-009-0138-z>
- Ministério da Saúde. (2007). Portaria nº 2.583, de 10 de outubro de 2007. Brasil. Retrieved March 05, 2019, from https://bvsms.saude.gov.br/bvs/saudelegis/gm/2007/prt2583_10_10_2007.html
- Moraes, H. A. B., Mengue, S. S., Molina, M. D. C. B., & Cade, N. V. (2020). Factors associated with glycemic control in a sample of individuals with Diabetes Mellitus taken from the Longitudinal Study of Adult Health, Brazil, 2008-2010. *Epidemiologia e Serviços de Saúde*, 29(3), e2018500. <https://doi.org/10.5123/S1679-49742020000300017>
- Nam, S., Chesla, C., Stotts, N. A., Kroon, L., & Janson, S. L. (2011). Barriers to diabetes management patient and provider factors. *Diabetes Research and Clinical Practice*, 93(1), 1-9. <https://doi.org/10.1016/j.diabres.2011.02.002>
- Pimentel, J. O., Santos, I. M., Barreto Neto, A. C., & Souza, V. P. (2021). Self-care of users with diabetes mellitus entered into a program of capillary blood glucose self-monitoring. *Revista de Pesquisa Cuidado é Fundamental*, 13(2), 737-743. <https://doi.org/10.9789/2175-5361.rpcf.v13.7985>
- Pontieri, F. M., & Bachion, M. M. (2010). Crenças de pacientes diabéticos acerca da terapia nutricional e sua influência na adesão ao tratamento. *Ciência e Saúde Coletiva*, 15(1), 151-160. <https://doi.org/10.1590/S1413-81232010000100021>
- Rossaneis, M. A., Andrade, S. M., Gvozdz, R., Pissinati, P. S. C., & Haddad, M. C. L. (2019). Factors associated with glycemic control in people with diabetes mellitus. *Ciência & Saúde Coletiva*, 24(3), 997-1005. <https://doi.org/10.1590/1413-81232018243.02022017>
- Rückert, I. M., Schunk, M., Holle, R., Schipf, S., Völzke, H., Kluttig, A., ... & Meisinger, C. (2012). Blood pressure and lipid management fall far short in persons with type 2 diabetes: results from the DIAB-CORE Consortium including six German population-based studies. *Cardiovascular Diabetology*, 11, 50. <https://doi.org/10.1186/1475-2840-11-50>
- Santos, E. K. M., Souza, V. P., Gonzaga, I. A. A. S., & Santos, E. C. B. (2018). The Self-Care of Users Bearing Diabetes Mellitus: Socio-Demographic, Clinical and Therapeutic Profiles. *Revista de Pesquisa Cuidado é Fundamental*, 10(3), 720-728. <https://doi.org/10.9789/2175-5361.2018.v10i3.720-728>
- Santos, M. A., Marques, L. A. S., Oliveira-Cardoso, E. A., Mastropietro, A. P., Teixeira, C. R. S., & Zanetti, M. L. (2012). Percepção de pacientes com diabetes mellitus tipo 1 sobre o transplante de células-tronco hematopoéticas. *Psicologia: Teoria e Pesquisa*, 28(4), 425-433. <https://doi.org/10.1590/S0102-37722012000400002>
- Shakibazadeh, E., Larijani, B., Shojaezadeh, D., Rashidian, A., Forouzanfar, M., & Bartholomew, L. (2011). Patients' perspectives on factors that influence diabetes self-care. *Iranian Journal of Public Health*, 40(4), 146-158.
- Soares, A. L., Sousa, M. O., Fernandes, A. P. S. M., & Carvalho, M. G. (2010). Hemostatic changes in patients with type 2 diabetes mellitus. *Revista Brasileira de Hematologia e Hemoterapia*, 32(6), 482-488. <https://doi.org/10.1590/S1516-84842010000600013>
- Sociedade Brasileira de Diabetes. (2022). *Diretrizes da Sociedade Brasileira de Diabetes 2022*. Brasil.
- Souza, C. L., & Oliveira, M. V. (2020). Fatores associados ao descontrole glicêmico de diabetes mellitus em pacientes atendidos no Sistema Único de Saúde no Sudoeste da Bahia. *Cadernos Saúde Coletiva*, 28(1), 153-164. <https://doi.org/10.1590/1414-462X202028010319>

World Health Organization. (2016). *Global Report on Diabetes*. Geneva: WHO.

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