

Satisfaction with Quality of Life in older Adults with Type 2 Diabetes

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Abstract— Purpose: To assess satisfaction with quality of life in older adults with DM2.

Methods: This is a cross-sectional study of older adults with DM2 receiving specialized care through Brazil's National Health System. We used a questionnaire to assess health status and collect sociodemographic data and the SF-36 to assess QoL. Data were analyzed using the R statistics software and significance level of 5%.

Results: Participants were 248 older adults aged 65-94 years (mean age: 73.2 ± 6.4 years). There was a predominance of: individuals aged 70-79 years (118, 47.6%), women (140, 56.5%), married individuals (142, 57.3%), individuals with up to seven years of study (161, 64.9%), retirees (232, 93.5%), individuals with monthly income of up to two minimum wages (176, 71.0%), diagnosis duration of 1-10 years (129; 52%); foot wound (25; 10.1%); and amputation (15; 6.0%). The variables that remained related to each domain in the regression model were: physical functioning – age ($p=0.007$), education ($p=0.015$), income ($p=0.006$), retirement ($p=0.037$), DM2 duration ($p=0.011$); physical role limitation – income ($p=0.005$); pain – gender ($p=0.031$), income ($p=0.027$); vitality – age ($p=0.007$), race ($p=0.011$), gender ($p=0.011$), education ($p=0.018$); social role functioning – age ($p=0.005$), education ($p=0.043$), income ($p=0.005$); emotional role functioning – income ($p=0.004$); mental health – gender ($p=0.003$), income ($p=0.025$).

Conclusion: Older adults with diabetes were less satisfied with QoL, thus demonstrating that the impact of diabetes cannot be measured solely by using clinical parameters such as glycemic control and the presence of comorbidities.

Keywords— Older adults; Diabetes Mellitus; Quality of life; Chronic Diseases.

Key Messages

- Older adults with diabetes are less satisfied with QoL.
- The impact of diabetes cannot be measured solely by using clinical parameters.
- The SF-36 allows a better view of diabetic older adults' health status and QoL.

I. INTRODUCTION

Population aging is a major global issue as the number of older adults, i.e., people aged 60 and over, is expected to increase from 841 million people in 2013 to more than 2 billion people by 2050, with 80% of this

population living in less developed countries [1,2] such as Brazil, which is expected to rank sixth in the number of older adults worldwide by 2025 [3].

The growth of the older population includes a shift in disease profile in which infectious diseases have been

replaced by chronic diseases such as diabetes mellitus (DM), with potential loss of quality of life [2, 4].

According to the American Diabetes Association, diabetes can be classified into four general categories: type 1 diabetes (DM1), type 2 diabetes (DM2), specific types of diabetes, and gestational diabetes. However, DM2 accounts for 90% of diabetes cases in the population [5, 6].

A DM epidemic is underway. Globally, half a billion people are estimated to have diabetes, with 80% of them living in low-and middle-income countries. Therefore, it is a public health problem that may impair functional capacity, autonomy and quality of life [7].

However, few robust clinical studies have specifically assessed quality of life (QoL) impairment in older adults with diabetes (ADA, 2017; IDF, 2017). In addition, it is important to note that QoL impairment is expressed in different aspects, such as physical health, functional capacity, pain, emotional instability, and depression [8].

QoL is defined as an individual's perception of their position in life in the context of the culture and value system in which they live and in relation to their goals, expectations, standards and concerns [9].

Health-Related Quality of Life (HRQoL) is the assessment of QoL in disease or treatment situations. It is an individual's multidimensional and subjective perception of their health status – or perceived health status [10]. In this regard, the World Health Organization has suggested incorporating the assessment of physical, psychological, social, emotional and functional facets when assessing HRQoL as it is a multidimensional concept [9]. Given that, the objective of the present research was to assess satisfaction with quality of life in older adults with type 2 diabetes mellitus.

II. METHODS

This is a descriptive and analytical cross-sectional study of older adults (aged 65 and over) with type 2 diabetes mellitus receiving specialized care through Brazil's National Health System, also known as the Unified Health System (*Sistema Único de Saúde – SUS*) in the city of Fortaleza, Ceará, Northeastern Brazil. The study was carried out at the Integrated Diabetes and Hypertension Care Center (*Centro Integrado de Diabetes e Hipertensão – CIDH*), which is a reference center of the specialized care network of SUS in the state of Ceará.

Patients with DM were diagnosed during regular consultations at CIDH according to the ADA criteria: polyuria, polydipsia and weight loss plus casual plasma

glucose ≥ 200 mg/dL; fasting plasma glucose ≥ 126 mg/dL (7 mmol/L) and plasma glucose ≥ 200 mg/dL 2 hours after a 75g glucose drink [5].

The sample size was estimated using a finite population formula that considered the number of older adults in the city of Fortaleza ($n=242,430$) according to the last DATASUS Report [11]. We considered a minimum sample size to estimate the population proportion with a maximum expected proportion of 20%, a significance level of 5% and a maximum permissible error of 5%.

The medical records were systematically selected out of 1978 records of older adults with at least a one-year diagnosis of DM2. We selected one in every eight records following the original numbering. Inclusion criteria were: people aged 65 years and over diagnosed with DM2 for at least one year. People under 65 years of age and people with type 1 diabetes or without diabetes were excluded from the study.

The selected older adults were invited to participate in the research and data were collected during their visit to CIDH for routine consultation. Data were collected using a questionnaire addressing sociodemographic variables (age, gender, education, economic status) and health status (self-reported diseases, medication use, treatment duration) and the SF-36 (QoL).

Several types of generic questionnaires are used to assess QoL from a health perspective. In our study, we used the 36-item Medical Outcomes Study (SF-36 Short-Form Health Survey) as it was designed for use in clinical practice and research.

The SF-36 is a valid and reliable instrument to assess QoL in patients with DM2 [12, 13]. Although the SF-36 is designed for self-administration, the researcher is allowed to ask questions to the respondents. This was important in our research as some older adults were not able to self-administer the questionnaire.

In Brazil, the SF-36 was translated and validated and the questionnaire was sensitive to detect changes in QoL [14]. The SF-36 assesses physical and cognitive aspects and produces an index measure of health status that incorporates several dimensions. It has been widely used for the assessment of patients with chronic diseases. The questionnaire contains 11 questions and 36 items distributed into the following eight domains [15,16]:

1. Physical Functioning (PF): ten items that assess the performance of activities of daily living (ADL), such as self-care, dressing, bathing and climbing stairs.

2. Physical Role Limitation (PRL): two items that assess the impact of physical health on the performance of ADL and/or work activities.
3. Pain: two items that assess the level of pain and its impact on the performance of ADL and/or work activities.
4. General Health Perceptions (GHP): five items that assess the subjective perception of general health status.
5. Vitality: four items that assess the subjective perception of health status.
6. Social Role Functioning (SRF): two items that assess the impact of physical health status on social activities.
7. Emotional Role Functioning (ERF): three items that assess the impact of emotions on the performance of ADL and/or work activities.
8. Mental health (MH): five items, a mood and well-being scale, and a question to compare respondents' current health status to their health status one year ago.

The SF-36 assesses both negative (disease) and positive aspects (well-being). Each domain is scored on a 0-100 range, with 0 corresponding to the worst health status and 100 indicating the best health status [14].

The data were collected from March to June 2017 by the main researcher (nurse), a dental student, two medical students and a geriatrician, who were previously trained in a pilot study.

Data were analyzed using the R statistics software version 3.4.2 [17]. Qualitative variables are described as absolute and relative frequencies and quantitative variables are described as mean, median, quartiles and standard deviation values. The Shapiro-Wilk test was used to test the normality of the quantitative variables. The p-value obtained was less than 0.001, thus rejecting the null hypothesis that the data are normally distributed.

Given the non-normal distribution of the data, we used the Mann-Whitney and Kruskal-Wallis tests to check for associations between variables. Variables with a descriptive value of less than 0.20 in the bivariate analysis were included in the multiple analysis. Given the characteristics of the dependent variables analyzed in our study, we opted not to use a linear regression model. Instead, we used a beta regression model as described by [18] Ferrari e Cribari-Neto (2004), which is appropriate for categorical outcomes (proportions). All the inferential analyses were performed adopting a significance level of 5%.

The scores of the QoL domains range 0-100, and the lower the score the worse the QoL. However, it should

be noted that in the regression model the dependent variables were measured using a proportion scale.

This research was approved by the Research Ethics Committee under Approval No. 1.666.717. The patients were informed about the objectives of the study and anonymity was guaranteed. All the participants gave their written informed consent.

III. RESULTS

Descriptive analysis of sociodemographic and health variables.

Participants were 248 older adults with DM2 whose age ranged 65-94 years, with a mean age of 73.2 ± 6.4 years. There was a predominance of individuals aged 70-79 years (118; 47.6%), women (140; 56.5%), married individuals (142; 57.3%), mixed-race Brazilians (128; 51.6%), individuals with seven years of study (161; 64.9%), retirees (232; 93.5%), and individuals who received up to two minimum wages (176; 71.0%), as shown in Table 1.

Table 1. Sociodemographic characteristics of diabetic older adults. Fortaleza, Ceará, 2017.

Variables	n	%
Age group		
65-69 years	92	37.1
70-79 years	118	47.6
80 years and older	38	15.3
Gender		
Men	108	43.5
Women	140	56.5
Marital status		
Single	13	5.2
Married	142	57.3
Divorced	16	6.5
Widowed	72	29.0
Race		
White	112	45.2
Black	8	3.2
Pardo	128	51.6
Education		
None	35	14.1
Up to 7 years	161	64.9
8-12 years	35	14.1

Variables	n	%
More than 12 years	17	6.9
Retired		
Yes	232	93.5
No	16	6.5
Income		
Less than 1 MW	16	6.5
Up to 2 MW	176	71.0
2-5 MW	36	14.5
More than 5 MW	10	4.0

Source: own construction (2017).

Table 2 depicts the health variables. Most participants reported a diagnosis duration of one to ten years (129; 52%), insulin therapy (133; 53.6%), and use of three medications/day (217; 87.5%). Use of hypoglycemic agents and diet (115; 46.4%), foot wound (25; 10.1%) and amputation (15; 6.0%) were also predominant.

Descriptive analysis of the quality of life domains.

Table 3 shows the descriptive analysis of the eight domains of the SF-36. Social Role Functioning exhibited the best mean score (82.9±24.6), followed by General Health Perceptions (77.6±13.9), Mental Health (68.6±23.9) and Emotional Role Functioning (28.2±34.3).

Table 3. Descriptive statistics of SF-36 domains among diabetic older adults. Fortaleza, Ceará, 2017.

Domains	Mean	Standard Deviation	1 st quartile	Median	3 rd quartile
Physical functioning	45.4	35.2	10	45	80
Physical role limitation	29.1	35.1	0	12.5	50
Pain	57.2	33.7	21	61	100
General health perceptions	77.6	13.9	67	77	92
Vitality	56.6	23.8	40	55	75
Social role functioning	82.9	24.6	50	100	100
Emotional role functioning	28.2	34.3	0	0	66.7
Mental health	68.6	23.9	52	76	88

Source: Own construction (2017).

Bivariate analysis of mean scores of quality of life (SF-36) domains according to sociodemographic variables.

Table 4 shows the means and standard deviations of the QoL scores in each domain of the SF-36 in relation

Table 2. Diabetic older adults' health problems. Fortaleza, Ceará. 2017.

Variables	n	%
Duration of type 2 diabetes		
1-10 years	129	52.0
11-20 years	78	31.5
More than 20 years	41	16.5
Foot wound (current)		
Yes	25	10.1
No	223	89.9
Amputation		
Yes	15	6.0
No	233	94.0
Insulin		
Yes	133	53.6
No	115	46.4
Number of medications used		
Up to 3	31	12.5
More than 3	217	87.5

Source: Own construction (2017).

to the sociodemographic variables. PF (p<0.001), Vitality (p=0.029) and SRF (p<0.001) scores differed across age groups. Patients aged 80 years and older scored lowest in PF (26.7±32.9) and SRF (68.8±24.1) while those aged 65

to 69 years exhibited better QoL (PF=51±33.5 and found in the population aged 70 to 79 years (52.7±23.9). SRF=87.4±23.3). As for vitality, the lowest scores were

Table 4. Bivariate analysis of SF-36 domains according to the sociodemographic characteristics of the diabetic older adults. Fortaleza, Ceará, 2017.

Variables	Domains							
	PF	PRL	PAIN	GHP	Vitality	Social	Emotional	Mental health
Age group								
65-69 years	51.0±33.5	33.7±38.8	57.9±34.9	77.2±14.2	61.8±22.1	87.4±23.3	33.7±37.8	69.1±22.4
70-79 years	47.1±35.6	28.6±31.9	59.4±31.9	78.9±13.4	52.7±23.9	84.0±24.2	26.0±30.2	68.0±25.4
80 years and older	26.7±32.9	19.7±34.0	48.6±35.7	74.3±14.8	55.9±25.3	68.8±24.1	21.9±36.6	69.5±23.0
p value	<0.001 ²	0.088 ²	0.275 ²	0.302 ²	0.029 ²	<0.001 ²	0.139 ²	0.988 ²
Marital status								
Single	42.7±33.8	34.6±46.3	65.8±28.4	83.5±11.1	59.2±21.0	89.4±20.3	33.3±45.1	74.8±20.5
Married	48.7±36.1	30.6±36.0	58.1±33.3	78.2±13.4	57.7±24.5	84.0±24.3	30.5±35.2	71.5±24.2
Divorced	45.0±36.4	34.4±41.7	53.8±37.3	77.0±13.8	58.8±21.3	86.7±21.1	33.3±40.4	65.0±23.8
Widowed	39.5±33.4	25.3±29.8	55.1±34.2	75.0±15.3	53.4±24.1	79.3±25.7	23.1±29.4	62.3±23.2
p value	0.382 ²	0.865 ²	0.705 ²	0.164 ²	0.604 ²	0.379 ²	0.618 ²	0.012 ²
Race								
White	40.0±33.2	27.2±32.6	56.4±33.4	77.6±13.6	52.8±21.6	81.4±24.1	26.2±32.1	68.8±23.3
Black	53.1±28.0	37.5±42.3	62.4±28.3	83.8±12.1	54.4±23.5	93.8±17.7	41.7±42.7	71.5±24.9
Pardo	49.6±36.9	30.3±36.8	57.5±34.5	77.1±14.4	60.1±25.2	83.6±25.3	29.2±35.7	68.3±24.5
p value	0.070 ²	0.746 ²	0.924 ²	0.496 ²	0.033 ²	0.271 ²	0.547 ²	0.918 ²
Sex								
Men	50.7±37.0	33.1±35.8	63.5±31.8	76.7±13.9	61.8±20.6	85.4±23.9	31.8±35.1	75.0±20.8
Women	41.3±33.4	26.1±34.3	52.3±34.4	78.2±14.0	52.6±25.3	81.0±25.0	25.5±33.6	63.7±25.0
p value	0.056 ¹	0.071 ¹	0.013 ¹	0.433 ¹	0.006 ¹	0.142 ¹	0.119 ¹	<0.001 ¹
Education								
None	32.1±35.1	13.6±28.7	49.1±34.7	76.6±16.3	55.9±22.5	72.9±25.3	12.4±28.1	68.7±22.8
Up to 7 years	43.7±34.8	30.1±34.7	56.1±33.2	77.1±13.6	54.7±23.9	81.3±25.8	29.0±34.0	67.6±24.3
8-12 years	51.7±30.2	32.9±38.2	63.0±35.1	78.7±14.6	59.7±23.4	93.9±15.6	33.3±37.1	69.0±23.2
More than 12 years	75.6±32.5	44.1±35.9	72.1±29.6	81.2±10.6	69.7±22.5	96.3±10.6	43.1±34.9	77.2±23.1
p value	<0.001 ²	0.006 ²	0.077 ²	0.676 ²	0.088 ²	<0.001 ²	0.003 ²	0.344 ²
Retired								
Yes	44.5±35.2	28.7±34.8	56.4±33.6	77.3±14.1	56.1±23.7	83.4±24.1	27.4±33.7	68.6±23.6
No	58.1±33.6	35.9±39.8	67.9±34.9	81.1±11.7	64.4±23.7	75.8±31.1	39.6±42.6	69.3±27.7
p value	0.149 ¹	0.473 ¹	0.236 ¹	0.404 ¹	0.226 ¹	0.336 ¹	0.264 ¹	0.701 ¹
Income								
Less than 1 MW	36.6±37.2	15.6±22.1	48.9±38.3	75.1±14.7	49.7±27.0	63.3±28.7	10.4±26.4	55.0±28.2
Up to 2 MW	41.9±34.2	26.8±34.5	53.2±32.9	77.2±14.1	54.5±23.3	83.2±24.3	26.3±33.5	67.7±23.9
2-5 MW	69.0±28.4	46.5±37.4	78.8±27.2	80.8±12.1	69.4±17.8	91.3±18.9	44.5±35.6	77.4±17.1
More than 5 MW	45.5±40.6	40.0±41.2	61.1±28.1	78.9±16.0	55.5±33.4	90.0±16.5	40.0±41.0	74.8±30.3
p value	<0.001 ²	0.006 ²	<0.001 ²	0.470 ²	0.004 ²	0.003 ²	0.002 ²	0.013 ²

Note: ¹ Mann-Whitney U test; ² Kruskal-Wallis test

Source: Own construction (2017).

Single older adults presented better mean scores in all the domains, except in PF. However, only the MH scores differed significantly from those obtained in the other domains ($p=0.012$). Vitality scores differed significantly ($p=0.033$) across races, with mixed-race Brazilians presenting the best scores. In the other domains, White individuals exhibited the worst QoL scores.

Women presented worse scores for Pain ($p=0.013$), Vitality ($p=0.006$) and MH ($p<0.001$). Older adults with more than 12 years of study presented better QoL scores in all the domains compared with their uneducated peers, with statistically significant differences in the PF ($p<0.001$), PRL ($p=0.006$), SRF ($p<0.001$) and ERF ($p=0.003$) domains. Also, non-retirees presented better mean scores in all the domains, except in SRF. However, the differences were not statistically significant. In addition, individuals who received less than one minimum wage presented the worst scores in PF ($p<0.001$), PRL ($p=0.006$), Pain ($p<0.001$), Vitality

($p=0.004$), SRF ($p=0.003$), ERF ($p=0.002$) and MH ($p=0.013$).

Bivariate analysis of mean scores in the domains of quality of life (SF-36) according to health problems

Table 5 compares QoL scores in each domain according to health conditions. Older adults with foot wound had worse QoL scores in all the domains, with significant differences in the PF ($p=0.014$), PRL ($p=0.037$) and SRF ($p=0.010$) domains. Likewise, older adults without amputation presented worse scores compared to amputees, with a significant difference in the MH domain ($p=0.004$). Insulin users exhibited better scores, with a significant difference in the Vitality domain ($p=0.041$). Additionally, older adults who used up to three medications/day presented better scores, but with no significant differences.

Table 5. Bivariate analysis of SF-36 domains according to diabetic older adults' health problems. Fortaleza, Ceará, 2017.

Variables	Domains							
	PF	PRL	Pain	GHP	Vitality	Social	Emotional	Mental Health
Diabetes duration								
1-10 years	49.5±35.9	30.6±35.9	59.1±34.4	77.9±13.9	58.4±22.5	83.1±25.0	30.0±35.3	69.1±22.5
11-20 years	44.4±35.3	31.1±36.5	55.8±33.7	76.1±14.4	56.8±25.2	80.9±25.5	29.1±35.4	69.7±23.3
More than 20 years	34.5±31.2	20.7±28.5	53.7±32.0	79.3±13.3	50.4±24.2	86.0±21.5	21.1±28.6	65.2±28.9
p value	0.082 ²	0.359 ²	0.539 ²	0.503 ²	0.224 ²	0.605 ²	0.443 ²	0.883 ²
Foot wound (actual)								
Yes	30.2±35.5	17.0±31.2	45.3±37.5	77.5±15.5	51.8±25.8	70.0±29.5	17.3±30.6	60.8±24.8
No	47.1±34.9	30.5±35.3	58.5±33.1	77.6±13.8	57.1±23.5	84.4±23.6	29.4±34.6	69.5±23.7
p value	0.014 ¹	0.037 ¹	0.065 ¹	0.985 ¹	0.260 ¹	0.010 ¹	0.065 ¹	0.072 ¹
Amputation								
Yes	36.0±32.1	36.7±32.6	61.9±33.6	82.3±12.7	63.0±16.9	88.3±18.0	31.1±34.4	84.0±15.6
No	46.0±35.4	28.6±35.2	56.9±33.8	77.2±14.0	56.2±24.1	82.6±24.9	28.0±34.4	67.6±24.0
p value	0.324 ¹	0.202 ¹	0.696 ¹	0.186 ¹	0.327 ¹	0.481 ¹	0.677 ¹	0.004 ¹
Insulin								
Yes	43.7±34.6	28.4±34.8	54.9±34.5	76.8±14.0	53.8±23.5	82.6±25.3	27.3±33.8	68.5±24.4
No	47.4±36.1	30.0±35.5	59.7±32.8	78.4±13.8	59.8±23.7	83.3±23.9	29.3±35.1	68.8±23.3
p value	0.476 ¹	0.704 ¹	0.241 ¹	0.323 ¹	0.041 ¹	0.916 ¹	0.687 ¹	0.970 ¹
Number of medications used								
Up to 3	39.8±34.5	25.0±32.9	56.7±39.9	80.4±13.7	58.2±23.6	76.6±27.7	25.8±34.1	66.2±23.5
More than 3	46.2±35.4	29.7±35.4	57.2±32.8	77.2±14.0	56.4±23.8	83.8±24.0	28.6±34.4	69.0±24.0
p value	0.378 ¹	0.498 ¹	0.916 ¹	0.137 ¹	0.630 ¹	0.143 ¹	0.683 ¹	0.451 ¹

Note: ¹ Mann-Whitney U test; ² Kruskal-Wallis test.

Source: Own creation (2017).

Table 6 shows the results of the Regression Analysis of the mean scores obtained in the quality of life domains (SF-36) in relation to sociodemographic variables and health conditions. Age \geq 80 years (p=0.007), more than 12 years of study (p=0.015) and income of 2-5 minimum wages (p=0.006) remained associated with worse

scores in the PF domain in the regression model. In addition, income of 2-5 minimum wages (p=0.005) remained associated with worse scores in the PRL domain while female gender (p=0.031) and income of 2-5 minimum wages (p=0.027) remained associated with worse scores in the Pain domain.

Table 6. Variables that remained in the regression model.

Variables	Domains							
	PF	PRL	Pain	GHP	Vitality	Social	Emotional	Mental Health
Age group								
65-69 years	-	-	-	-	-	-	-	-
70-79 years	0.925	-	-	-	0.007	0.567	-	-
80 years and older	0.007	-	-	-	0.567	0.005	-	-
Race								
White	-	-	-	-	-	-	-	-
Black	-	-	-	-	0.806	-	-	-
Pardo	-	-	-	-	0.011	-	-	-
Gender								
Men	-	-	-	-	-	-	-	-
Women	-	-	0.031	-	0.011	-	-	0.003
Education								
None	-	-	-	-	-	-	-	-
Up to 7 years	0.513	-	-	-	0.927	0.367	-	-
8-12 years	0.275	-	-	-	0.253	0.043	-	-
More than 12 years	0.015	-	-	-	0.018	0.144	-	-
Retired								
Yes	-	-	-	-	-	-	-	-
No	0.037	-	-	-	-	-	-	-
Income								
Less than 1 MW	-	-	-	-	-	-	-	-
Up to 2 MW	0.379	0.231	0.991	-	-	0.005	0.12	0.025
2-5 MW	0.006	0.005	0.027	-	-	0.009	0.004	0.004
More than 5 MW	0.677	0.144	0.892	-	-	0.248	0.067	0.072
Duration of type 2 diabetes								
1-10 years	-	-	-	-	-	-	-	-
11-20 years	0.263	-	-	-	-	-	-	-
More than 20 years	0.011	-	-	-	-	-	-	-

Source: Own construction (2017).

Age 70-70 years ($p=0.007$), mixed-race Brazilians ($p=0.011$) and female gender ($p=0.011$) remained associated with worse scores in the Vitality domain. Also, it should also be noted that more than 12 years of study ($p=0.018$) entered into the model while income and insulin use were removed from the regression model.

Age ≥ 80 years ($p=0.005$), 8-12 years of study ($p=0.043$) and income of up to 2 minimum wages ($p=0.005$) and of 2-5 minimum wages ($p=0.009$) remained associated with worse scores in the SRF domain in the regression model. In addition, only income of 2-5 minimum wages ($p=0.004$) remained associated with worse scores in the ERF domain in the regression model.

In the MH domain, only gender ($p = 0.003$) and income ($p = 0.025$) remained in the model. Marital status and amputation were no longer significant.

IV. DISCUSSION

The impact of DM2 on the quality of life (QoL) of older adults is not deeply discussed in the literature. Therefore, this study stands out for analyzing the impact of this chronic disease on the quality of life of this population group.

Using the SF-36 questionnaire to analyze the domains of QoL in older adults with DM2 enabled the participants to take a look at their own health status, which, may assist them in decision-making behaviors [19].

The age of the participants ranged 65 to 94 years and there was a predominance of individuals aged 70 to 79 years (47.6%). This finding depicts the classification of the older population into two age subgroups: individuals aged 65 to 84 years, who are considered the “young old”, and individuals aged 85 years and older, who are called the “very old” [20].

The predominance of the “young old”, represented by the study participants’ mean age of 73.2 years, is in line with research using demographic data [21]. On the other hand, researchers reported an important percentage of older adults over 80 years of age (about 12%) [22], which is also in line with the findings of the present study (15.3%). These people need careful monitoring given the increased risk of health problems in this age group.

The predominance of women (56.5%) demonstrates their health care attendance behavior. Also, because women tend to live longer than men, older women outnumber older men almost everywhere [2]. The predominance of married and widowed older adults is

supported by researchers who reported a predominance of married and widowed older adults in their research [23].

There was a higher percentage of self-declared Black older adults in our study. Studies have reported higher prevalence rates of DM in Black adults [24,25]. However, there are divergences in the contextualization of the use of race and ethnicity in research [26].

Although the development of DM2 does not depend on the level of education [27], in our study the association between DM2 and education of up to seven years of study persisted in the regression analysis of the mean scores in different domains of quality of life (SF-36). These findings are corroborated by a standardized cohort study of eight Western European countries that demonstrated inequalities with an inverse relationship between level of education and risk of DM2 [28].

Education can improve knowledge on and attitudes towards DM [29]. In addition, education can also improve adherence to the treatment plan because patients with low literacy may have difficulty understanding instructions and are hence at increased risk of health problems [30,31]. Retirement, which was reported by 93.5% of the participants, is a social institution that ensures permanent income. However, older adults may face a decrease in income as only 4% of the participants in our study received more than five minimum wages. Low income can have an impact on older adults’ QoL as they may experience difficulty paying their own bills and become expensive to their descendants, thus leading them to experience feelings of low self-esteem [32].

In our study, more than half of the participants (52%) exhibited a diabetes duration of one to ten years. It should be noted that diabetes duration is a risk factor for complications such as diabetic neuropathy and nephropathy [33]. Of all the older adults analyzed in our study, 10.1% exhibited foot wounds and 6.0% were amputees. Diabetic foot is a consequence of infection, ulceration and/or destruction of deep tissues associated with neurological abnormalities and is a common cause of disability. Patients with diabetic foot ulceration are found to be more socially deprived and hence have poorer QoL [34].

The older adults analyzed in our study used insulin and oral hypoglycemic agents and followed a diet plan. In addition, 87.5% of them used more than three medications/day. Patient adherence to treatment is a major problem in clinical practice and a challenge for health professionals [35,36]. It is emphasized that the treatment of DM2 should take into consideration the patient’s age,

cognition, cultural factors, support systems, eating patterns, physical activity, social context, blood glucose levels and drug interactions, adverse reactions and contraindications [5].

The statistical analyses of the mean scores in the SF-36 performed in our study revealed better scores in Social Role Functioning (SRF), General Health Perceptions (GHP) and Mental Health (MH). Assessing the domains of QoL allows the identification of the most and/or least affected areas of the health of a given population [37].

In our study, older adults aged 80 years and older exhibited the worst QoL score compared to younger individuals. The perception of QoL varies according to age, with older individuals exhibiting less satisfactory QoL scores [38]. In addition, advanced age seems to be associated with lower scores in the physical, psychological and social domains of QoL [39].

Another important finding in our study was that single older adults exhibited better QoL scores, which is in line with the findings reported by other researchers [40]. However, worse QoL scores among widowed older adults have also been reported. It is believed that widowhood interferes with the management of DM2 because the loss of a beloved companion can cause health alterations and is associated with increased vulnerability to depressive symptoms, which is a risk factor for poorer QoL [41].

Ethnicity is another factor that may influence QoL. In our study, nonwhite older adults exhibited better QoL scores compared to their White peers, particularly with regard to vitality. Studies have identified a predominance of frailty among White older adults compared to Black older adults [42,43]. However, researchers continue to seek biological, psychological, and contextual explanations for such differences [44,45,46].

Gender also seems to influence the perception of QoL. In the present study, men exhibited better scores in all the domains of QoL compared to women. This was also true in a study of Koreans and Americans, in which older women presented lower QoL scores compared to men [48]. This finding may be explained by the fact that women have negative aging perceptions while men have more positive feelings and enjoy life better [47].

Negative perceptions of QoL are associated with low levels of education in diabetic older adults [49,16,28], which is in line with the findings of the present study, in which uneducated older adults exhibited worse QoL scores. Literacy was found to predict self-monitoring and self-care behaviors in diabetic older patients, which may improve QoL.

QoL perceptions also differed between retirees and non-retirees in our study. Retirees presented worse QoL scores. This findings is supported by researchers who also found poorer QoL and higher rates of depression among retirees [19]. Income decreases markedly after retirement, which can influence QoL [51]. In our study, older adults who received less than one minimum wage had worse QoL scores compared to those who received two to five minimum wages.

Diabetes duration had a strong influence on QoL in our study as older adults with a diabetes duration of more than 20 years exhibited worse QoL scores. Diabetes duration and glycemic control are important factors related to the development and severity of diabetic retinopathy, neuropathy, nephropathy [7].

It should be noted that older adults with foot lesions presented worse QoL scores compared to those without foot lesions, mainly with regard to PF, PRL and SRF. Physical, social and emotional aspects of QoL were also the most affected in another study [52]. Similarly, non-amputees also exhibited worse QoL scores compared to amputees, particularly with regard to MH. This finding may be explained by the factors related to this condition, such as pain and emotional aspects, including suffering.

With regard to the therapy used to control DM2, the older adults who used insulin presented better QoL scores compared to those who did not use insulin. Likewise, the participants who used up to three medications/day had better QoL scores compared to those who used more than three medications/day. Glycemic control is the main goal of treatment. Glycemic control with insulin therapy reduces the risk of microvascular complications and may prevent macrovascular complications [53,54,55].

Insulin therapy can be initiated in the early stages of DM2 treatment when only lifestyle changes (diet and exercise) combined with oral hypoglycemic agents are insufficient to achieve glycemic control [5].

The permanence of the variables age, gender, ethnicity, education, income, retirement and diabetes duration in the logistic regression model allowed a better understanding of the relationship between the domains of QoL and these variables. This finding favours the planning of health promotion actions to prepare older adults with DM2 for healthier choices in their daily life with a view to improving their quality of life.

V. LIMITATIONS OF THE STUDY

Although we used a random sampling method, the research population consisted of older adults from one single city. Therefore, the findings of our study cannot be extrapolated. However, it should be noted that the city where the study took place is the fifth largest Brazilian city. Additionally, the CIDH is a reference center for the study of DM2; therefore, its results may also be found in other places and may serve as a basis for the measurement of older adults' quality of life. Finally, the difficulties in accurately defining the duration of DM2 due to the asymptomatic period prior to diagnosis should also be noted.

The findings of our study may assist in the planning of interventions targeted at older adults with DM2. The SF-36 results showed that older adults with diabetes are less satisfied with their QoL, thus demonstrating that the impact of diabetes cannot be measured only by using clinical parameters, such as glycemic control and presence of comorbidities.

Furthermore, knowing the QoL of older adults with DM2 is key to planning and implementing evidence-based interventions and public health policies. Therefore, further research should be carried out because studies carried out to assess QoL in diabetic older adults are still incipient.

VI. CONCLUSION

The findings showed that older adults with diabetes were less satisfied with QoL, which was influenced by age, gender, education, race, income, diagnosis duration, foot wound and use of medication. The findings demonstrated that the impact of diabetes cannot be measured solely by using clinical parameters such as glycemic control and the presence of comorbidities.

The SF-36 provided a better view of older adults' health status and QoL domains, which may assist in the planning of health promotion programs to prepare older adults with DM2 for healthier choices in their daily life and hence improve their quality of life.

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