

Quality of life and characteristics of diabetic patients

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Abstract *This study aimed to assess the association between quality of life and clinical and socio-demographic variables in type 2 diabetes patients, after they had started treatment in Primary and Specialized Health Care. This is an analytical cross-sectional study with a sampling of diabetic patients from Primary (n = 385) and Specialized (n = 385) Health Care. The dependent variable, quality of life, was evaluated by the Diabetes Quality of Life Measure - Brazil. Clinical and sociodemographic data were collected. Bivariate analysis by chi square test tested the association between the dependent variable with the independent ones. Next, we performed an analysis of multiple logistic regression. In Specialized Health Care, individuals who practice physical activity had less chance of having worse quality of life and those with less time of diagnosis presented higher chance of worse quality of life. In Primary Health Care, those who performed diets and presented glycated hemoglobin $\leq 7\%$ had less chance of having worse quality of life. Women presented higher chances of worse quality of life than men. We concluded that with exception to the time of diagnosis and sex, other variables that influenced quality of life of diabetics were modifiable factors (glycated hemoglobin, alimentary diet and physical activity).*

Key words *Diabetes Mellitus, Quality of life, Chronic diseases, Health Care*

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Introduction

Higher longevity of the population, along with changes in lifestyle, especially regarding sedentary lifestyle and alteration in feeding patterns, contribute to the growth of the risk profile to chronic diseases such as diabetes mellitus (DM). The prevalence of this disease has risen dramatically, and represents an important public health problem in countries of Latin America¹.

In developing countries, the rise of diabetes occurred in all age groups. In the group of 45 to 64 years, the prevalence will be tripled until 2030 and doubled on the age groups 20 to 44 years and above 65 years².

According to the Brazilian Society of Diabetes³, there are currently above 12 million carriers of the disease. Type 2 diabetes patients (DM2) represent 90% to 95% of cases, most of them being overweight or obese. Despite occurring in any age group, in general, DM2 is diagnosed in patients aged above 40 years³. It is important to highlight that diabetes have high morbimortality, being the main causes of death, renal failure, amputation of a lower limb, blindness and cardiovascular disease, including coronary diseases and cerebrovascular accident⁴.

Studies indicate that the quality of life (QOL) of patients with DM is lower than that of those without the disease, and the aspects involved in this relation are not yet totally known. It is noteworthy that some variables such as type of DM, use of insulin, age, complications, social level, psychological factors, ethnicities, education, knowledge on the disease, type of assistance, among others, may interfere in the QOL of these patients^{5,6}.

Improvements in the quality of assistance are a concern in world public health, since it has important consequences on the success of treatments and on reduction of damages⁷. Under that perspective, one of the actions of the Ministry of Health was the Plan for the Reorganization of Care for Arterial Hypertension and Diabetes, which created guidelines and goals for restructuring and enlarging the resolute assistance and quality for carriers of these pathologies within the public health services network⁸. The referral for other levels of the health care system was established (within the own municipal area and neighboring ones) for those in need of specialized or hospital care⁹. Thus, the importance of higher integration between basic and special-

ized units of SUS is emphasized¹⁰. Despite the negative impact of diabetes in its carriers quality of life being recognized, as well as with the presence of many variables involved in that process, studies that reveal which disease factors influence QOL are scarce. Therefore, facing the importance that DM has been gathering in the scenery of the world's public health care, studies that aim to identify that relation are providential.

Therefore, this study aimed to assess the association between quality of life and clinical and sociodemographic variables in type 2 diabetes patients, following the start of their treatments on Primary and Specialized Health Care in the city of Piracicaba, São Paulo, Brazil.

Material and methods

Study type and location

Analytical cross-sectional study performed in the city of Piracicaba, São Paulo, Brazil. The city is located at 160 Km from the state's capital with an estimated population of 385,287 inhabitants, distributed throughout 63 neighborhoods¹¹.

Universe of study

This study was conducted in the Specialized Health Care and in 12 Family Health Units (FHU) with patients aged between 25 and 90 years, between November, 2012, and September, 2013.

The Specialized Health Care functions as the diabetes reference service in the city and had a population of 1,312 users. A total of 4,213 diabetic patients was registered and monitored by the Family Health Units.

From the total of 46 USF implanted in the city, 17 had no physicians on the team (due to the lack of this professional in the city's public health care network) and therefore were not selected, because it would impair the referral of patients. From the 29 Units left, the 12 USF in which there was a specific day for care of diabetic patients were chosen to facilitate data collection and performance of interviews, considering the number of subjects of the sampling.

Type 2 diabetes patients older than 18 years under monitoring of Primary or Specialized Health Care for at least 12 months were included, except pregnant women and individuals with mental or neurological disorders.

Sampling

A sampling number of 385 volunteers was calculated for each group, considering a confidence interval of 95% and sampling error of 5%, being the proportion of 0.50 (50% of the same answer to any question in the survey form) a calculation criteria.

Collection of clinical and sociodemographic data

The clinical (time of diagnosis, remedies in use, fasting glycemia last values, glyated hemoglobin last values, body mass index (BMI) and presence of disease complications) and sociodemographical (gender, age, education and marital status) data were collected from the patients' medical record.

Application of the questionnaire Diabetes Quality Of Life Measure (DQOL-Brazil)

It is a validated instrument, whose objective is to measure the subjective individual perception of the quality of life, such as impact, satisfaction and social concern related to DM. It is capable of determining changes after a therapeutic intervention, be it educational or pharmacological¹². It was developed by the Diabetes Control and Complications Trial (DCCT) group, originally in English, for patients with type 1 diabetes and, later, used also to type 2 diabetes, being guided for application on adolescents and adults, under different types of diabetes treatments^{13,14}.

The DQOL-Brazil contains 44 multiple choice questions organized under four domains: satisfaction (15 questions), impact (18 questions), social/vocational concerns (7 questions), and diabetes-related concerns (4 questions). The answers are organized in a 5 points Likert scale. The satisfaction is distributed in an intensity scale (1 = very satisfied; 2 = quite satisfied; 3 = medium satisfied; 4 = little satisfied; 5 = not satisfied). The answers for the domains of concerns and impact are distributed in a frequency scale (1 = never; 2 = almost never; 3 = sometimes; 4 = almost always; 5 = always). That way, the closer from 1 the result is, the better the evaluation of quality of life^{12,15}.

The survey form was self applied, with supervision from the researcher in a reserved room, following the medical appointment. For subjects with reading difficulties, the questions were integrally read by the researcher, and the answer

options were proposed to the patients in each question.

Data analysis

The quality of life was considered a dependent variable, dichotomized by the median in ≤ 2.32 (best QOL) and > 2.32 (worst QOL) for the Specialized Health Care and ≤ 2.02 (best QOL) and > 2.02 (worst QOL) for the USF groups. On both groups, the worst quality was the category adopted as reference for dependent variable in the data analysis.

The independent variables were: sex (female and male), age (adults: < 65 years and older adults: ≥ 65 years), Body Mass Index - BMI (adequate weight, overweight and obesity), diabetes mellitus diagnosis time in years (dichotomized by the average in ≤ 13 and > 13 for Special Health Care and ≤ 05 and > 05 for the USF), last fasting glycemia value - considered the glycemic target suggested by the International Diabetes Federation¹⁶ - ($\leq 100\text{mg/dl}$ and $> 100\text{mg/dl}$), last glyated hemoglobin value - considering the target considered by the Brazilian Society of Diabetes³ - ($\leq 7\%$ and $> 7\%$), presence of complications (yes and no), performance of diet for diabetes (yes and no), practice of physical activity (yes and no), medication in use (solely oral anti-diabetic and insulin) and education in years of study (≤ 08 - incomplete elementary school and > 08 - complete elementary school).

A descriptive analysis was performed by means of average, standard deviation, absolute and relative frequency. Student's t test was applied to compare the general quality of life score average and the respective domains between the studied groups. Then, a bivariate analysis by the chi-square test was performed to test the association between the dependent variable with the independent ones. Following, the variables that presented value of $p < 0.20$ were tested in the multiple logistic regression model with stepwise procedure. The Odds Ratio (OR) and the respective ranges of 95% confidence interval (CI) were estimated for the variables that remained in the model. All the statistic tests were performed by the SAS 9.2 program considering a significance level of 5%.

Ethical aspects

This study was approved by the Ethic and Research Committee of the School of Odontology of Piracicaba - FOP/Unicamp.

Results

In the Specialized Health Care sample there was a predominance of the female sex (65.2%), 86.5% reported to have 8 or more years of study and 37.9% were older adults (≥ 65 years), being that the age average in this group was 62 years (SD = 10.6). As for the time of diagnosis of diabetes, 45.5% declared presence of the disease for over 13 years. Regarding BMI, most patients presented obesity (60.6%), while 26.2% were overweight and only 13% within the adequate weight. We observed that 82.8% of the diabetics presented a last fasting glycemia above 100mg/dl and 85.3% had the most recent value of glycated hemoglobin above 7%. As for the non-medication treatments, 44.2% of the interviewed declared performing diet to control the diabetes and 28.3% practiced physical activity. Regarding the medication in use, most (94.8%) used insulin.

There was a significant difference between the averages of general score and of each domain of the DQOL-Brazil between the studied groups, being that the Specialized Health Care group presented the highest values and, consequently, worst quality of life (Table 1).

Only the variable physical activity, under the bivariate analysis, presented significant association with the worst quality of life for patients of Specialized Health Care (Table 2). Table 3 presents the variables that remained in the multiple logistic regression model. The individuals that practiced physical activity had less chance (OR = 0.49) of presenting quality of life worse than that of those who did not practice physical exercises. Those with diagnosis of diabetes mellitus for ≤ 13 years presented 1.52 times more chance of having worse quality of life than those with longer time of diagnosis.

By the bivariate analysis presented in Table 4, it can be observed that the variables sex, diet, glycated hemoglobin and medication had significant association with the worst quality of life for the patients from the USF. Female sex was a risk factor for the worst quality of life. On the other hand, performing diet, presenting glycated hemoglobin values $\leq 7\%$ and making use of oral medication were protection factors from the worst quality of life.

Table 5 presents the variables that remained in the multiple logistic regression model. Individuals who performed diet (OR = 0.33) to control diabetes and that presented glycated hemoglobin $\leq 7\%$ (OR = 0.55) had less chance of having a worse quality of life. But female patients had 1.61 times more chance of presenting a worse quality of life than those of men within the scope of USF patients.

Discussion

The maintenance of a satisfactory metabolic control decreases risk of these complications to diabetes patient^{17,18}. For it to occur, it is necessary that these individuals have access to quality health care services, which assure a continuous and integral assistance in the different complexity levels demanded for handling the disease¹⁹. It is clear that Primary Health Care does not depletes its therapeutic resources, referring a gigantic demand of patients to the Secondary Health Care, that many times acts in a reductionist fashion upon the individual, solely considering the disease.

The results of this study revealed certain homogeneity between the two groups regarding the sociodemographic data. There was a predominance of the female sex, corroborating with the

Table 1. Comparison between domains of the quality of life instrument of patients cared at the Specialized Health Care and in Family Health Units. Piracicaba, São Paulo, Brazil, 2013.

Domains	Specialized Health Care			Family Health Units			p-value
	average	standard deviation	95%CI	average	standard deviation	95%CI	
Satisfaction	2,67	0,73	2,60-2,74	2,42	0,75	2,34-2,49	< 0,0001
Impact	2,43	0,79	2,35-2,51	2,10	0,76	2,03-2,18	< 0,0001
Social and vocational concerns	1,50	0,69	1,43-1,57	1,25	0,51	1,20-1,30	< 0,0001
Concerns related to diabetes	2,68	1,09	2,57-2,79	2,19	1,06	2,09-2,30	< 0,0001
General	2,39	0,62	2,31-2,44	2,08	0,58	2,01-2,13	< 0,0001

CI = Confidence Interval.

Table 2. Association between quality of life and clinical and sociodemographic variables of patients serviced in the Specialized Health Care. Piracicaba, São Paulo, Brazil, 2013.

	Quality of life				OR crude	95%CI	p-value
	Worst		Best				
	n	%	n	%			
Sex							
Female	125	49,80	126	50,20	1,05	0,69-1,60	0,8928
Male	65	48,51	69	51,49	1		
Age							
< 65 years	117	48,95	122	51,05	0,96	0,63-1,45	0,9250
≥ 65 years	73	50,00	73	50,00	1		
Body Mass Index (IMC)							
Adequate weight	28	56,00	22	44,00	1		
Overweight	46	45,54	55	54,46	0,66	0,33-1,30	0,2999
Obesity	116	49,57	118	50,43	0,77	0,42-1,43	0,5033
Time of diagnosis of Diabetes Mellitus							
≤ 13 years	112	53,33	98	46,67	1,42	0,95-2,13	0,1074
> 13 years	78	44,57	97	55,43	1		
Fasting glycemia							
≤ 100	27	40,91	39	59,09	0,67	0,39-1,15	0,1851
> 100	161	50,79	156	49,21	1		
Glycated hemoglobin							
≤ 7%	22	39,29	34	60,71	0,63	0,35-1,13	0,1551
> 7%	165	50,61	161	49,39	1		
Diabetes complications							
With	49	52,69	44	47,31	1,19	0,75-1,90	0,5352
Without	141	48,29	151	51,71	1		
Diet							
Yes	77	45,29	93	54,71	0,75	0,50-1,12	0,2047
No	112	52,34	102	47,66	1		
Physical activity							
Yes	41	37,61	68	62,39	0,52	0,33-0,81	0,0060
No	148	53,82	127	46,18	1		
Medication							
Oral	6	30,00	14	70,00	0,42	0,16-1,12	0,1216
Insulin	184	50,41	181	49,59	1		
Education							
≤ 8 years of study	165	49,55	168	50,45	1,06	0,59-1,90	0,9614
> 8 years of study	25	48,08	27	51,92	1		

OR = Odds Ratio; CI = Confidence Interval.

Table 3. Multiple logistic regression for the worst quality of life of patients serviced in the Specialized Health Care. Piracicaba, São Paulo, Brazil, 2013.

	Worst Quality of life				
	n	%	Adjusted OR	95%CI	p-value
Physical activity					
Yes	41	37,61	0,49	0,31-0,78	0,0028
No	148	53,82	1		
Time of diagnosis of Diabetes Mellitus					
≤ 13 years	112	53,33	1,52	1,01-2,29	0,0448
> 13 years	78	44,57	1		

OR = Odds Ratio; CI = Confidence Interval.

Table 4. Association between quality of life and clinical and sociodemographic variables of patients cared by the Family Health Units. Piracicaba, São Paulo, Brazil, 2013.

	Quality of life				OR crude	95%CI	p-value
	Worst		Best				
	n	%	n	%			
Sex							
Female	138	52,47	125	47,53	1,59	1,03-2,45	0,0468
Male	50	40,98	72	59,02	1		
Age							
< 65 years	123	52,79	110	47,21	1,50	0,99-2,26	0,0688
≥ 65 years	65	42,76	87	57,24	1		
Body Mass Index (IMC)							
Adequate weight	19	39,58	29	60,42	1		
Overweight	62	47,69	68	52,31	1,39	0,71-2,73	0,4269
Obesity	107	51,69	100	48,31	1,63	0,86-3,09	0,1766
Time of diagnosis of Diabetes Mellitus							
≤ 05 years	102	50,00	102	50,00	1,10	0,74-1,65	0,7003
> 05 years	86	47,51	95	52,49	1		
Fasting glycemia							
≤ 100	33	52,38	30	47,62	1,18	0,68-2,02	0,6480
> 100	155	48,29	166	51,71	1		
Glycated hemoglobin							
≤ 7%	91	43,33	119	56,67	0,55	0,36-0,85	0,0084
> 7%	87	58,00	63	42,00	1		
Diabetes complications							
With	32	46,15	42	53,85	0,87	0,53-1,44	0,6870
Without	152	49,51	155	50,49	1		
Diet							
Yes	63	39,38	97	60,63	0,52	0,34-0,78	0,0025
No	125	55,56	100	44,44	1		
Physical activity							
Yes	34	45,33	41	54,67	0,84	0,51-1,39	0,5846
No	154	49,68	156	50,32	1		
Medication							
Oral	139	46,03	163	53,97	0,59	0,36-0,97	0,0481
Insulin	49	59,04	34	40,96	1		
Education							
≤ 8 years of study	162	48,07	175	51,93	0,78	0,43-1,44	0,5247
> 8 years of study	26	54,17	22	45,83	1		

OR = Odds Ratio; CI = Confidence Interval.

results of the study Vigilance of Risk Factors and Protection for Chronic Diseases by Telephone Inquiry (VIGITEL)²⁰, which revealed that women lead the number of diabetes cases. The female prevalence might be related to the inclination of women in being more attendant to health services, favoring the diagnosis of the disease²¹.

Clinical data such as glycated hemoglobin value, insulin use and obesity, suggest, as it is ex-

pected, that patients remitted to the Secondary Health Care have more difficulty in maintaining metabolic control. The cases that require more complex schemes are, in general, monitored by the Specialized Health Care²². Possibly, this justifies the worst quality of life perception for this group (values obtained in the DQOL-Brazil), both in the average of each domain, as in the general score.

Table 5. Multiple logistic regression for the worst quality of life of patients serviced in the Family Health Units. Piracicaba, São Paulo, Brazil, 2013.

	Worst Quality of life				
	n	%	Adjusted OR	95%CI	p valor
Diet					
Yes	63	39,38	0,331	0,331-0,786	0,0023
No	125	55,56	1		
Glycated hemoglobin					
≤ 7%	91	43,33	0,557	0,361-0,859	0,0081
> 7%	87	58,00	1		
Sex					
Female	138	52,47	1,610	1,018-2,547	0,0419
Male	50	40,98	1		

OR = Odds Ratio; CI = Confidence Interval.

Furthermore, in the group referring to Special Care, the results showed that the individuals diagnosed with DM type 2 ≤ 13 years presented less chance of having a worse quality of life than those with more time of diagnosis. Probably, for having less time of adaptation with the disease and its treatment, the individuals with less time of diagnosis suffer with more immediate repercussions, such as difficulty in accepting the treatment with applications of insulin, self glycemic monitoring, alimentary restriction, possible episodes of hypoglycemia, among other conditions related to the illness and its treatment. According to Faria et al.²³, the longer time of diagnosis of DM type 2 result in higher knowledge on the disease, as well as better understanding and handling of the therapeutic scheme. Educative interventions destined to facilitate the development of specific skills to face diabetes may improve the quality of life of patients carrying this disease²⁴.

Diabetes type 2, in general, reveals itself in a stage of life in which the individual already has fairly consolidated habits²⁵, being important to perform educative actions and discussion groups so to acquire knowledge and skills on the daily self-care necessary to handle the disease⁴. Considering the complexity of its treatment, education on diabetes is the cornerstone for handling and controlling the disease, so that patients can achieve or preserve their quality of life²⁶.

For the specialized care group, the results indicated that the patients who practiced physical activities had less chance of having worst QOL. Bennett et al.²⁷ concluded that the best physical fitness intervened positively in the health-related quality of life related (HRQOL) of people with

type 2 diabetes. In another study, Daniele et al.²⁸, concluded that the sedentary diabetes patients presented the worst QOL. According to SBD - Brazilian Society of Diabetes³, the physical exercise acts specifically on the insulin resistance besides acting on the reduction of the body weight that, on its own, reduces the risk of DM2³.

Regarding the PSF group, the results of this study showed that, despite women attending more to health services, they had more chance of having a worse quality of life. This data corroborates with the study of Penckofer et al.²⁹ that showed that the overload of responsibility towards support for the family is a factor that contributes to the non effectuation of the self-care. Krug et al.³⁰ found that marriage and care of children made women stop performing physical activity. Yet, individuals who presented glycated hemoglobin ≤ 7% had less chance of presenting worst quality of life. Goddijn et al.³¹ investigated the association between the improvement of the glycemic control (HbA1c less than 8%) and the quality of life in type 2 diabetic patients during 1 years of treatment and showed positive association between these variables. A metanalysis study demonstrated that reductions above 0.3% of the glycated hemoglobin are clinically beneficial for controlling diabetes and, as consequence, improved the QOL of the carrier³².

The individuals cared by the PSF that reported alimentary diet had less chance of having worst quality of life. It is known that the adequacy of alimentary habits of diabetic patients, along with other cares, is essential for the maintenance of ideal glycemic control, so to avoid possible complications. According to recent report of the

World Health Organization (OMS) on diet, nutrition and prevention of DCNT, the association between gain of weight, abdominal obesity, sedentary lifestyle and the development of type 2 diabetes mellitus is convincing³³. Most part of type 2 diabetes patients, that represents 90% to 95% of the diabetes patients population, is overweight or obese³. However, new studies must be performed so to emphasize the direct impact of diet for diabetes on the quality of life of its carriers.

With exception to time of diagnosis and sex, the other variables that directly impacted in quality of life of diabetics are modifiable factors, reinforcing the importance of education in health on public services for the treatment of diabetes, and also the identification of those factors by health professionals, so to enable the patient in transforming his own attitude towards the disease³⁴.

So, the recognition of these factors must be funded in conceptual models that allow identifying the health deviations of this population, being Orem's conceptual model one of the most utilized by nurses to diagnose patients with chronic diseases³⁵. In this sense, the precise diagnose is elaborated to guide meaningful educational actions.

To Alves and Aerts³⁶, for the education to have meaning to the learner, the knowledges on health must be debated with the patients so to, after this discussion, they can choose a healthier life and changes in their lifestyle. Besides, education in health must be instrumentalized, in its daily practice, with practical, simple, short strategies, of easy application and low cost that can be incorporated to the routine of the multidisci-

plinary team in care to diabetic patient in referral at the public network³⁷.

This study has some limitations. Due to being a cross-sectional study, it seeks interferences to causal factors, without, nevertheless, establishing a temporal relationship. The alimentary issue to diabetes may be understood through different perspectives, depending on the individual and according to what he believes is an adequate diet. In the city concerned, the Primary Health Care does not has a nutritionist on the team and the Specialized Health Care offers such service, but it is not capable of servicing all the demand, thus some cases are prioritized. On practice of physical activity, the nature and frequency of it was not a target in the questions, what may have generated different interpretations on the part of the interviewed.

This study contributes to point the factors that affect the quality of life of patients with type 2 diabetes cared in Basic and Special Health Care. It is concluded that with exception to the time of diagnosis and gender, other variables that influenced quality of life for diabetic were modifiable factors (value of glycated hemoglobin, adhesion to alimentary diet and practice of physical activity), evidencing that the education in health is a essential component on treating diabetes. Identifying these risk factors on the different attention levels in health enables the managers and professionals involved in handling of diabetes to reassess their public policies and services destined to the treatment of this pathology, so to qualify the attention points and assure an adequate assistance for those patients, qualifying the care line.

Collaborations

K Corrêa, GR Gouvêa, MAV Silva, RF Possobon, LFLN Barbosa, AC Pereira, LG Miranda and KL Cortellazzi participated equally in all stages of preparation of the article.

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Article submitted 05/05/2015

Approved 10/05/2016

Final version submitted 12/05/2016