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Maria de Nazareth de Lima Carneiro , Arthur Andrade da Fonseca * , Rachel Coelho Ripardo , Layla Sandia Cezário Alves , Manuela Maria de lima Carvalhal , Daniela Lopes Gomes

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Relationship between Perception of Quality of Life and Nutritional Status of Mothers Caring for Childrew with Type 1 Diabetes Mellitus

Maria de Nazareth de Lima Carneiro [1,*,†], Arthur Andrade da Fonseca [2,†], Rachel Coêlho Ripardo Teixeira [1], Layla Sandia Cezário Alves [2], Manuela Maria de Lima Carvalhal [2] and e Daniela Lopes Gomes [1]

[1] Nucleus of Behavior Theory Research, Federal University of Pará, Belém 66087-110, Brazil
[2] Faculty of Nutrition, Health Sciences Institute, University of Pará; Belém 66087-110, Brazil
* Correspondence: mnath_lima@hotmail.com; Tel.: +55-91985442628
† These authors contributed equally to this work.

Abstract: Mothers of children with a specific clinical condition such as type 1 diabetes mellitus (T1DM) may experience higher levels of stress predisposing them to a poorer perception of quality of life and alterations in nutritional status. The aim of this research was to evaluate the relationship between nutritional status and quality of life perception of mothers caring for children with Type 1 Diabetes Mellitus. This research was conducted from July to September 2022, with mothers of children aged 5 to 10 years with diabetes. Data were collected through an online questionnaire including socioeconomic information, anthropometric data, clinical data of the children, and the WHOQOL-abbreviated quality of life questionnaire. For statistical analysis, Statistical Package for Social Science 24 was used. Fifty-five mothers of children with diabetes were evaluated. Over 33% of the mothers were overweight and reported a regular perception of quality of life. Higher BMI was associated with poorer perception of quality of life in the psychological and self-assessment domains, and longer diagnosis time was associated with better perception of quality of life in the physical, psychological, and environmental domains. Therefore, it is understood that actions aimed at improving the quality of life of these mothers are necessary.

Keywords: quality of life; health of caregivers; nutritional status; type 1 diabetes

1. Introduction

Diabetes Mellitus (DM) is characterized as a chronic disease in which the production of insulin by the pancreas is affected, or when the insulin produced is not metabolized correctly, leading to a state of instability in bodily homeostasis [8,9]. Diabetes mellitus is classified into type 1 (T1DM), type 2 (T2DM), gestational (GDM), and other less common types. The classification of the type of DM allows for appropriate treatment according to its conditions, clinical characteristics, family history, presence of obesity, insulin resistance, and other clinical aspects [16].

In DM1, the pancreas does not produce insulin, leading to a severe deficiency of this hormone. Additionally, T1DM is most commonly diagnosed in children and adolescents. Clinical improvement is directly related to adequate metabolic control, which triggers greater attention to different aspects of health care, challenging and changing the entire routine of the patient and their family members, especially mothers who are generally the primary caregivers of the child or adolescent [3].

Treatment of T1DM is highly complex, requiring frequent checks of capillary blood glucose, careful monitoring of diet, regular physical exercise, and administration of multiple doses of insulin daily, as well as managing acute complications such as episodes of hypoglycemia or hyperglycemia [1]. Consequently, the family environment of a child with DM1 is completely altered, as it must meet all the child's demands regarding care and disease control. The necessity for various self-care

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behaviors places a burden on the family, requiring them to adapt to a different routine due to having a child with this condition, demanding the direct or indirect participation of the entire family, including the child [17]. A child with T1DM requires much attention, with the mother typically assuming the primary responsibility for necessary care, bringing significant responsibility into the life of the maternal caregiver, involving ensuring control of the entire treatment for her child's healthy life and, most importantly, raising awareness in the child about their lifelong condition [5].

The experience of mothers caring for children with T1DM brings a significant emotional burden in dealing with their child's condition. Increased emotional problems in parents are related to higher levels of suffering in their children, leading to maternal depressive symptoms, which are some of the strongest risk factors for worsening the mother's quality of life and, consequently, potentially affecting the mental and emotional health of the children [10]. Increased emotional problems and diminished quality of life can result in inadequate dietary habits in the caregiver due to the high demand for child care, characterized by neglecting their own health in favor of their child's [20].

Due to the inherent demands of caring for a child with T1DM, few considerations have been given to the health of the caregiving mother. Extreme concerns trigger episodes of loss of appetite, anxiety, and other emotional disturbances, as the pressure of caring for a child with an incurable condition reflects in a worsening of maternal quality of life [4].

However, the nutritional risks of mothers of children with T1DM have not yet been researched. Yet, in studies on the nutritional profile of mothers caring for other chronic diseases, such as cancer, the results found by Zortéa et al. (2018) have shown weight changes, with multiple fluctuations between weight gain and loss, directly linked to inadequate self-care regarding their own nutrition. Furthermore, the hustle and bustle of daily life, childcare responsibilities, and household demands directly impact free time, hindering regular physical activity, which negatively affects their nutritional status and perception of quality of life. In light of the above, the aim of this study was to analyze the relationship between quality of life perception and nutritional status of mothers caring for children with T1DM residing in Brazil.

2. Materials and Methods

2.1) Type of Study

This study is cross-sectional, descriptive, and analytical, carried out with a convenience sample. Data were collected from July to September 2022, and the collection was performed using an online form, built on the Google Forms® platform. Participants were recruited through the researchers' Instagram®, Facebook®, Telegram® and WhatsApp® social networks and specific diabetes-themed social networks.

2.2) Participants, Inclusion and Exclusion Criteria

A total of 55 adult mothers from all over Brazil participated in this research.

The inclusion criteria were being an adult, living in Brazil, being their child's main caregiver, the child being between 5 and 10 years old and agreeing to take part in the research online. As exclusion criteria, the mother could not have shared custody and be responsible for the child for only half a month, the child could not have a chronic illness other than T1DM, live outside Brazil and incompletely fill in any of the survey instruments. After applying these criteria, a total of 45 mothers remained.

2.3) Research Instruments

As instruments, a sociodemographic and clinical questionnaire were used and the WHOQOL-abbreviated questionnaire.

a) The sociodemographic and clinical questionnaire designed for this study collected information on age, marital status, schooling, time since the child was diagnosed, average family income, as well as anthropometric measurements such as self-reported height and weight. With the help of these latter variables, it was possible to calculate the body mass index (BMI), which is

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recognized as the international standard for assessing the degree of overweight and obesity in populations. This index is calculated by dividing weight (kg) by the square of height (in meters). By calculating BMI, it was possible to estimate the mothers' nutritional status. The classification of nutritional status according to BMI was carried out according to the interpretations of the World Health Organization (WHO) for adults.

b) WHOQOL-abbreviated questionnaire to measure the perception of quality of life. The questionnaire consists of 26 questions, with question 1 related to the perception of quality of life and question 2 related to satisfaction with health, and the average of these two questions assumes the self-assessment of quality of life. The remaining 24 facets make up 4 domains which are: physical, psychological, social relations, and environment. The answers for each domain and the first two questions follow a Likert scale from 1 to 5, and the higher the score, the better the perception of quality of life. For its measurement, it is necessary to recode the value of the answers to questions 3, 4, and 26, as shown in the parentheses (1=5) (2=4) (3=3) (4=2) (5=1). All results are expressed as an average both in the domain and in the first two facets, as follows:

Self-assessment of quality of life (Q1 + Q2) / 2

Domain 1 - Physical (Q3 + Q4 + Q10 + Q15 + Q16 + Q17 + Q18)/7.

Domain 2 - Psychological (Q5 + Q6 + Q7 + Q11+ Q19 + Q26) /6.

Domain 3 - Social relationships (Q20 + Q21 + Q22) /3

Domain 4 - Environment (Q8+Q9+Q1+Q13+Q14+Q23+Q24+Q25) /8

*Q = Question.

After checking the averages above, the responses are classified into: needs improvement (when it is 1 to 2.9); regular (3 to 3.9); good (4 to 4.9), and very good (5).

2.4) Ethical Issues

This study was approved by the Human Research Ethics Committee (CEP) of the Tropical Medicine Center of the Federal University of Pará (UFPA), under opinion No. 5,447,240. When the participants were invited to participate in the research, they received a link, and when opened, they had access to the Free and Informed Consent Form (TCLE). It contained information about the research procedure and objectives of the work, after reading this term and before starting to fill in the research instruments, the participants had the option of clicking on the item "I have read the Free and Informed Consent Form (TCLE) and I agree to participate in the research", otherwise, just click on "I disagree" and send the form.

2.5) Data Analysis

For the statistical analysis, the Statistical Package for the Social Sciences, version 24, was used, considering the significance level of $p < 0.05$. The Chi-square test and G-test were used to categorically classify nutritional status and perceived quality of life. The Spearman correlation test was used to verify the perceived relationship between nutritional status and quality of life.

3. Results

The participating mothers in the study had, on average, 35.0±6.0 years of age, and their children had, on average, 28.4±21.4 months since the diagnosis of T1DM. Regarding nutritional status, the majority of mothers were classified as having normal weight according to BMI (53.3%), but there was also a high frequency of overweight (33.3%), with only one mother classified as underweight and five mothers classified as obese (Table 1).

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Table 1. Characterization of the nutritional status of mothers of children with Type 1 Diabetes Mellitus, Brazil 2022.

Nutritional status	N	%	p-value*
Malnutrition	1	2,2	
Eutrophy	24	53,3	
Overweight	15	33,3	
Obesity level 1	4	8,9	0,000
Obesity level 3	1	2,2	

* Chi-square test/G-test.

Regarding the perception of quality of life, the majority of mothers of children with DM1 considered their quality of life as regular in the physical domain (68.9%), regular in the psychological domain (60.0%), regular in the domain of social relationships (68.9%), regular in the environmental domain (55.6%), and regular in the self-assessment domain (64.4%) (Table 2).

Table 2. Characterization of the perception of quality of life of mothers of children with Type 1 Diabetes Mellitus, Brazil 2022.

Physical domain	N	%	p-value*
Good	3	6,7	
Regular	31	68,9	0,000
Need to improve	11	24,4	
Psychological domain	**N**	**%**	**p-value***
Good	5	11,1	
Regular	27	60,0	0,000
Need to improve	13	28,9	
Domain of social relationships	**N**	**%**	**p-value***
Good	3	6,7	
Regular	31	68,9	0,000
Need to improve	11	24,4	
Domain of the environment	**N**	**%**	**p-value***
Good	3	6,7	
Regular	25	55,6	0,000
Need to improve	17	37,8	
domain Self-assessment	**N**	**%**	**p-value***
Very good	2	4,4	
Good	6	13,3	0,000
Regular	29	64,4	
Need to improve	8	17,8	

* Chi-square test/G-test.

The BMI of the mothers showed a significant negative correlation with the psychological domain (r^2= -0.284; p=0.029) and the self-assessment domain (r^2= -0.235; p=0.049) of maternal quality of life, indicating that higher BMI was associated with poorer perception of quality of life in these domains. The duration of DM1 diagnosis in children showed a significant positive correlation with the physical domain (r^2= 0.242; p=0.045), the psychological domain (r^2= 0.357; p=0.008), and the environmental

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domain (r^2= 0.602; p>0.0001), indicating that longer diagnosis time was associated with better perception of quality of life in these domains. (Table 3).

Table 3. Correlation between the perception of quality of life and nutritional status of mothers and time of diagnosis of Type 1 Diabetes Mellitus of their children, Brazil 2022.

		Physical	Psychological	social relationships	Environment	Self-assessment
Body Mass Index (kg/m²)	p²	-0,223	-0,284	-0,098	-0,175	-0,235
	p-value*	0,070	**0,029**	0,260	0,126	**0,049**
Diagnostic time (months)	p²	0,242	0,357	-0,038	0,602	0,177
	p-value*	**0,045**	**0,008**	0,402	**0,000**	0,122

* Spearman correlation test.

4. Discussion

One of the findings in this research was the statistically significant relationship between being the mother of a child diagnosed with T1DM and a poorer perception of quality of life and nutritional status in almost all domains. Additionally, there was also a statistically significant relationship between scores related to poorer perception of quality of life and the nutritional status of these mothers, where higher BMI of the mothers was associated with worse perception of quality of life. This corroborates with data found in the literature, where being a mother of children diagnosed with T1DM demands a different dynamic, mainly because they often develop the role of primary or exclusive caregiver, having to manage their child's entire treatment, such as insulin administration, glucose monitoring, and dietary care [4]. Similarly, having to take on other tasks, whether household, professional, marital, or caring for other children who also require various care, the accumulation of responsibilities ultimately triggers physical and psychological problems in these caregiving mothers, impacting their perception of quality of life [14].

Another interesting finding of this study is the correlation between the duration of diagnosis and the improvement of quality of life perception in the physical, psychological, and environmental domains. These domains demonstrate that fatigue, stress, worry, and leisure may improve over the years as these mothers have contact with their children's illness, interact with healthcare professionals, and even socialize with other mothers experiencing the same reality [12]. Furthermore, with longer diagnosis time, the child's perception of their health becomes more prevalent, and over the years, they develop autonomy, assuming self-care skills such as self-administration of insulin and self-monitoring of glucose, which consequently reflects in the quality of life of caregiving mothers who are no longer solely responsible for 100% of the care [7].

Regarding the nutritional status of the evaluated mothers, with an average age of 35 years, the majority were classified as having normal weight according to BMI (53.3%), but there was also a high frequency of overweight (33.3%). These results are consistent with data from the Brazilian Institute of Geography and Statistics (IBGE) for women in this age group, where in 2019, approximately 30.2% of Brazilian women were overweight (National Health Survey, 2019). It is possible that full-time care for their children may contribute to neglecting their own health. In the literature, increased body fat is directly linked to physical inactivity and poor diet, which is the reality for many mothers caring for children with chronic diseases [13,17]. Furthermore, the results found in the table of quality of life perception of the mothers indicate a high frequency of "regular" and "needs improvement" ratings in all domains addressed. This suggests that quality of life may be affected in various ways. In the psychological domain, when mothers have a predominant or exclusive caregiving role, it corroborates with the research by Veras & Nardi (2008), which states that there is a higher predisposition for female caregivers to develop depressive disturbances compared to male caregivers. When it comes to the other domains of the research, it is evident that lack of time for self-care may have led to the high frequency of dissatisfaction with quality of life in the physical domain,

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as discussed regarding nutritional status. Similarly, the lack of time to socialize with people other than their children and partner affects social relationships. In the findings of Zortéa (2018), a study conducted with mothers caring for children and adolescents with cancer, it was noted that lack of social relationships is common in the lives of these mothers, especially in the early childhood phase where the child's demand for attention is greater.

The present study worked with unique and relevant data, however, some limitations were encountered, such as the lack of a representative sample of the population of mothers of children with T1DM residing in Brazil. Additionally, the research was conducted remotely, which may exclude individuals who do not have good access to the internet, and also complicates the participation of caregivers not familiar with current technologies. Furthermore, the lack of studies in the area serves as a limitation to compare and discuss the findings, which on the other hand demonstrates the novelty of the research.

Despite the limitations, this research provided significant and relevant data by working with samples collected on a national scale and brought results regarding the relationship between perception of quality of life and nutritional status of Brazilian mothers caring for children with T1DM. The study in question may draw greater attention to the health of these mothers who dedicate so much to caring and often are not cared for themselves. Furthermore, future research is suggested to monitor the psychological health of caregivers and the nutritional impacts of prolonged care. Future research should also evaluate the effects of different nutritional and psychological interventions with caregivers of children with T1DM.

5. Conclusions

Mothers of children with type 1 diabetes (T1DM) exhibited a poorer perception of quality of life, particularly in the physical, social relationships, and environmental domains. It was observed that the higher the mother's BMI, the worse the perception of quality of life in the psychological and self-assessment domains. Additionally, a positive correlation was found between the duration of diagnosis and quality of life in the physical, psychological, and environmental domains. In this regard, the inclusion of healthcare provisions for this population should be considered, as the lack of research in this area contributes to the exclusion of caregiving mothers of children with chronic illnesses from public health policies. Psychological and nutritional interventions could alleviate the impacts of caregiving burden, improving the perception of quality of life and mental health of these mothers, consequently enhancing all aspects of self-care and nutritional status.

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Institutional Review Board Statement: This study was approved by the Ethics Committee for Research with Human Beings (CEP) of the Tropical Medicine Center of the Federal University of Pará (UFPA) under opinion No. 5,447,240, on June 3, 2022.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data is not publicly available as it contains the personal information of the participants involved. Therefore, the data of this work are confidential, to maintain the privacy of those involved.

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Conflicts of Interest: The authors declare that there is no conflict of interest

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