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ORIGINAL RESEARCH

Comparison of Metabolic, Lifestyle and Mental Health Parameters in People with Diabetes and Relatives with and without Family Support

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Purpose: To analyze and compare metabolic, lifestyle and mental health parameters in relatives and people-with-T2DM (PDM) with and without support.

Patients and Methods: We included 160 patients with <5 years of diagnosis of T2DM, without disabling complications, and non-smokers, attending a multidisciplinary program for diabetes control, and their accompanying relatives. If the patients or relatives abandoned the program, we contacted them and asked to take laboratory tests and answer surveys regarding anxiety, depression, and perception of their family support. Variables distribution was assessed with the Kolmogorov–Smirnov test. We used ANOVA or Kruskal Wallis Tests, according to variable distribution. Frequencies and percentages are used for categorical values and analyzed with a chi-square test. We separated the participants in four groups: relatives with and without support and PDM with and without support.

Results: We included 160 participants, age 51±10, and 54.3% women. Total cholesterol (188±36 vs 204±43 vs 170±34 vs 181±35 mg/dL, p=0.001), LDL-cholesterol (113±35 vs 125±27 vs 101 ±30 vs 109±29, p=0.008), and non-HDL cholesterol (143±32 vs 154 ±30 vs 129±33 vs 135±35 mg/dL, p=0.010) were higher in the group without support. Although patients without family support had lower values, they did not achieve metabolic goals. Weight (75±17 vs 77±19 vs 74.2±10.5 vs 90.2±17.3 kg) and body mass index (28.9±4.8 vs 30.1±4.7 vs 27.4±3.3 vs 33±4.3 kg/m^2) were higher in PDM without family support (p<0.001 for both).

Conclusion: Support in PDM and their families is important in metabolic control. However, raising awareness among family members to screen for diabetes and changes in lifestyle are points to improve. Including the evaluation of social and family support will allow a more complete assessment to identify barriers to achieving goals.

Keywords: family support, social support, relatives, patients, type 2 diabetes

Introduction

Effective management of diabetes requires ongoing medical attention and self-management. These activities include monitoring blood glucose, taking medications, and making lifestyle changes.[1]

Family support has shown to be an important factor in the successful treatment of diabetes. Supportive networks facilitate practices for patients to achieve better glycemic control. A negative network can diminish the effort implemented by patients, leading to therapeutic abandonment.[2] If family members share self-care activities with patients, they may benefit from better metabolic control in contrast to a patient without support.[3] It provides emotional, physical, and logistical support to individuals living with chronic metabolic diseases.[3,4] Individuals with diabetes who receive family and friend support are more likely to have better blood glucose control, higher rates of medication adherence, and better quality of life.[5–7] Support may also be associated with shared disease burden.[2]

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Including relatives in diabetes education and treatment is critical since they affect the environment in which the patient develops. It is known that active support from relatives improves self-management, diabetes care, and long-term outcomes. Their involvement must include emotional support and practical actions in diabetes care.[8]

Despite the well-established benefits of family support in diabetes management, there are several barriers that may prevent individuals from receiving adequate support. These barriers may include a lack of understanding or knowledge about diabetes, conflicting beliefs or values about diabetes self-management, and inadequate social or financial resources.[3,4] Additionally, certain cultural and societal norms may discourage individuals from seeking or accepting support from their family or community.[2]

This study analyzes and compares the support in relatives and their people with diabetes mellitus attending a multidisciplinary program and their association with metabolic, anthropometric, and mental health variables.

Materials and Methods

This is an observational, transversal study. The subjects included in this study were relatives of people with T2DM (RG) and people with T2DM (PDM) who attended the first appointment in the Center of Comprehensive Care for the Patient with Diabetes" (CAIPaDi, for its name in Spanish), at the Instituto Nacional de Ciencias Médicas y Nutrición Salvador Zubirán (INCMNSZ), in Mexico City. CAIPaDi is a multidisciplinary program for PDM with less than five years of diagnosis, without disabling complications, ≥18 years old, and non-smokers.[9] We excluded patients with chronic advanced complications of diabetes, people with uncontrolled cancer, requiring surgery in a near future, or pregnancy. We asked the people with diabetes to come accompanied by a relative. The first phase of the program includes four monthly visits with a duration of 6 hours. The second phase consists of annual evaluations. All the visits include sessions with a physician, nutritionist, psychologist, psychiatrist, physical activator, diabetes educator, dentist, foot care specialist, and an ophthalmologist or optometrist. We included relatives of people with diabetes (spouse, offspring, or relatives who live with the patient >4 days/week) who were 18 to 65 years old, and without diabetes.

Participants arrived at 7 a.m. in every visit for blood samples and anthropometric measurements. Laboratory tests were fasting glucose, creatinine, lipid profile, and urinary albumin/creatinine ratio (ACR) (SYNCHRON CX system with the colorimetric method), and HbA1c (Bio-Rad Variant II Turbo HbA1c Kit 2, with HPLC method). Weight, height, and body composition were assessed by bioimpedance (body composition analyzer JAWON medical ioi353). All results were available in 1 hour so specialists could adjust the treatment according to results.

Each intervention follows a procedure manual to achieve a specific goal, a self-management strategy, and prespecified indicators. Each session was 30 minutes long.

Patients and relatives answered standardized and validated questionnaires. For exercise evaluation, the International Physical Activity Questionnaire [IPAQ] was answered,[10] and the 6-minutes walking test was done on every visit.[11] Patients completed a 3-days food record to register calories consumed per day.[12] The Hospital Anxiety and Depression Scale (HAD) was applied to evaluate anxiety and depression.[13,14]

To evaluate support, we applied the Support from Parents and Friends Scale (AFA-R) in its Spanish version.[15] The test has an internal consistency of 0.92. The response format is a Likert scale with five response alternatives and consists of two dimensions: family support with eight questions and support from friends with seven items. The maximum score is 75, and the minimum is 15. A cut-off point of 55 points is considered to group PMD and their relatives as those with support and those without support.[15]

We analyzed information of RG and PDM who attended the Center from June 2017 and December 2020. Due to the COVID-19 emergency, some patients and relatives were contacted by phone or mail, asked to answer questionnaires, and send laboratory tests. For this analysis, we divided the participants in four groups: relatives with support, relatives without support, PDM with support and PDM with diabetes without support.

The CAIPaDi relative's program was accepted by the INCMNSZ Research and Ethics Board (Ref 2145) and registered in ClinicalTrials.gov (NCT03234946). All participants signed an informed consent form. By the Helsinki Declaration, all subjects were informed about the study objectives and provided written consent to participate. The sample size for this analysis was for convenience, as it is a subanalysis.

Statistical Analysis

Analysis of distribution was assessed with the Kolmogorov–Smirnov test for continuous variables. Data are presented as media and standard deviation (SD) or median with interquartile ranges (IQR; 25–75) according to normality in distribution. For the characteristics of the population, we used ANOVA or Kruskal Wallis Tests, according to the distribution of variables compared between groups. *P* value was adjusted for Bonferroni correction. Frequencies and percentages are used for categorical values and analyzed with a chi-square test.

For analysis, we separated the participants in four groups: RG with support, RG without support, PDM with support, and PDM without support.

All statistical analyses were performed using the SPSS and a p value <0.05 was considered statistically significant.

Results

This study analyzed 160 participants. PDM were 95 patients, 40 (42.1% women) with a mean age of 51.1 ±9.9 years and 1 (0–5) years of T2DM diagnosis. RG were 85 relatives, 47 (58.7% women) with a mean age of 48.2 ±9.9 years. Table 1 shows the characteristics and differences between the four groups.

Table 1 Characteristics and Differences Between the Four Groups

Variable	Relative with Support (n=40)	Relative without Support (n=25)	DM with Support (n=61)	DM without Support (n=34)	*p*
Age (years)	49 ±12	54 ±13	54 ±8	57 ±8	0.01
Women (%)	31 (77.5%)	16 (64%)	24 (39.3%)	16 (47%)	0.001
SBP (mmHg)	120 ±8	119 ±9	121 ±8	120 ±9	0.753
DBP (mmHg)	73 ±4	74 ±6	75 ±6	75 ±6	0.476
HR (bpm)	72 ±6	70 ±7	73 ±5	74 ±8	0.107
Tg (mg/dL)	193 (122–220)	237 (109–239)	197 (118–221)	170 (115–205)	0.563
TC (mg/dL)	188 ±36	204 ±43	170 ±34	181 ±35	0.001
HDL-c (mg/dL)	46 ±11	46 ±13	42 ±10	45 ±9	0.131
LDL-c (mg/dL)	113 ±35	125 ±27	101 ±30	109 ±29	0.008
Non-HDL-c (mg/dL)	143 ±32	154 ±30	129 ±33	135 ±35	0.010
FG (mg/dL)	93 ±9*	98 ±17*	150** (108–171)	133**(104–150)	*0.16 **0.19
HbA1c (%)	5.5 ±0.4*	5.7 ±0.5*	7.6 ±2.4**	7.4 ±1.7**	*0.20 **0.70
HAD depression	4 (1–6)	6 (3–10)	3 (1–5)	5 (3–7)	0.001
HAD anxiety	5 (2–8)	8 (4–12)	5 (2–7)	7 (4–9)	0.004
Family Support	36 ±3	24 ±5	36 ±4	23 ±6	0.000
Social Support	31 ±3	21 ±4	32 ±3	19 ±6	0.000
Total Support	68 ±6	46 ±6	68 ±6	42 ±10	0.000
Weight (kg)	75.1 ±17	77 ±19	74.2 ±10.5	90.2 ±17.3	0.000
BMI (kg/m^2)	28.9 ±4.8	30.1 ±4.7	27.4 ±3.3	33 ±4.3	0.000

(*Continued*)

Table 1 (Continued).

Variable	Relative with Support (n=40)	Relative without Support (n=25)	DM with Support (n=61)	DM without Support (n=34)	*p*
Fat (%)	35.3 ±3.2	36.3 ±3.3	34.4 ±3.5	35.4 ±3	0.17
Fat (kg)	28.2 ± 6.3	28.1 ±4.4	26.1 ±3.6	29 ±5.6	0.05
Exercise (days/week)	2 (0–5)	2 (0–5)	3 (0–5)	3 (0–5)	0.93
Exercise (min/week)	107 (0–200)	144 (0–240)	122 (0–205)	116 (0–210)	0.821

Notes: Kruskal Wallis test. *p between both groups of relatives; **p between both groups of people with diabetes.
Abbreviations: BMI, body mass index; BPM, beats per minute; DBP, diastolic blood pressure; FG, fasting glucose; HAD, Hospital Anxiety and Depression Scale; HbA1c, glycated hemoglobin; HDL-c, high density cholesterol; HR, heart rate; LDL-c, low density cholesterol; non-HDL-c, non-high density cholesterol; TC, total cholesterol; Tg, triglycerides.

Total cholesterol (TC), LDL-cholesterol (LDL-c), and non-HDL cholesterol (non-HDL-c) were significantly higher in relatives without support than in the other groups (TC p=0.001; LDL-c p=0.008; non-HDL-c p=0.010). Triglycerides and HDL cholesterol (HDL-c) were not in goals, without being significant. Regarding blood pressure (BP), all groups remained <130/80 mmHg, without statistical difference.

Relatives without support had higher levels of fasting glucose and glycated hemoglobin. On the contrary, PDM without support had lower levels of glucose and HbA1c. These results were not statistically significant but clinically are different (HbA1c 5.5% vs 5.7%, p=0.2)

For anthropometric measures, weight and body mass index (BMI) were higher in relatives and PDM without support (p<0.001 for both parameters). There was a difference in fat mass (p=0.05), but not in fat percentage (p=0.17). Although days and minutes of exercise were not statistically different between the four groups, PDM exercised an average of 3 days/week and family members 2 days/week. PDM and support are exercised more than PDM without support.

After evaluating HAD questionnaire scores, patients and relatives without support had more anxiety and depression, even when the mean HADa score in PDM without support was normal (HADd p=0.001; HADa p=0.004). AFA-R mean scores were similar between relatives and PDM in both areas, but scores were lower in relatives and patients without support (p<0.001).

Discussion

This study included 160 participants, comprising 95 T2DM and 85 relatives. PDM had an average age of 51.1 years and were diagnosed with T2DM for approximately 1 year, while 58.7% of the relatives were women, with a mean age of 48.2 years. Notably, relatives without support exhibited significantly higher levels of TC, LDL-c, and non-HDL-c compared to other groups. Triglycerides and HDl-c were not within target ranges, while BP remained below 130/80 mmHg in all groups. Relatives without support showed elevated fasting glucose and glycated hemoglobin levels, while PDM without support had lower levels. In terms of anthropometric measures, weight and BMI were higher in relatives and PDM without support. PDM and support engaged in more physical activity. Moreover, patients and relatives without support experienced higher levels of anxiety and depression, while AFA-R scores were lower in these groups.

Year after year, the ADA emphasizes the importance of considering social support and potential barriers to care.[1] Social support is all the informational help and advice given to the patient through relationships and the environment.[16] This is an observational study evaluating social and family support in PDM and their relatives. We compared metabolic, anthropometric, lifestyle and mental health variables between relatives and PDM, with support and without support.

We found statistical differences regarding the age of the participants. It is noteworthy that relatives with support are younger than the PDM without support. Support in people implies that they seek to improve or prevent their health at an earlier stage, unlike PDM without support who take longer to seek medical attention.[17]

Interestingly, relatives without support had higher triglycerides, glucose, HbA1c, LDL-c, weight, BMI, and higher HADa score. The fact that they are relatives without a diagnosis of diabetes makes them more reluctant to lead a healthy

lifestyle. Without support, they do not have the motivation or feel the need to make necessary changes. Although they do more minutes of exercise per week, the days they exercise are the same as family members with support.[18] On the other hand, PDM have lower cholesterol levels, possibly due to having drug treatment, while unsupported family members have higher levels, as they do not seek medical care or check-ups if they do not have diabetes.

Family members without support had a HADa score compatible with moderate anxiety. Upon arrival at the program they are anxious about the results of laboratory studies that could be presented. However, both family members and patients without support had higher scores for anxiety and depression on the HAD questionnaires. To compare the effectiveness between three treatment options: exercise, antidepressants, and their combination for improving depressive symptoms in adults with non-severe depression, Recchia et al reported in a systematic review that the three options were superior in reducing depressive symptoms compared to controls and that there was no difference among them. These results support the adoption of exercise as an adjuvant treatment in adults with non-severe depression.[19] Another systematic review of meta-analyses assessed that multicomponent exercise programs (aerobic, resistance, and yoga) for a mean of 50 minutes per day, 3 times a week, for 16 weeks, improved moderate symptoms in older patients with depression.[20]

Exercise is not significant, but PDM do more minutes of exercise than their relatives. Possibly because PDM know that exercise is part of treatment, while family members without diabetes do not see it as an important part of a healthy lifestyle. The U-TURN study commented that, although PDM did not have previous exercise partners or family support, doing exercise with coaches and in groups or by seeing that they walked more steps/day, motivated them to continue with that habit.[21]

In a study to evaluate care partners' (CP) perceptions of diabetes self-management, education, and support, most of those CP were female (75%) and lived with de PDM. After interviewing the CP, all agreed that diabetes education and support is important to meet the needs of people with diabetes, recognizing that they also need long-term emotional support and flexibility during highs and lows in diabetes. As a problem, they expressed difficulty in helping their PDM without being overwhelming or "bothering" them.[18]

Self-management practices in people with diabetes mellitus help prevent acute and chronic complications (these include diet changes, exercise program implementation, monitoring, medication adherence, and physician attendance).[2,8,22] Educational programs engage patients to accomplish tasks for their benefit. However, we must consider that every patient develops inside a social context that impacts on carrying self-care. It is recommended that family members also modify their habits to a healthier lifestyle to support the implementation of medical therapy by patients.[8,23]

Mogre et al reported that patients and healthcare professionals recognized that family support is key to self-care in diabetes, especially in diet behaviors. For example, male patients who came to their nutrition consultation without their wives or those who live alone are less able to adhere to nutritional recommendations. Likewise, for those members of large families, it is more difficult to follow their diet because they usually cook the same food for everyone, whether or not they have diabetes.[24] As a solution for this barrier, in our Center, we give patients and their relatives healthy nutritional plans that can be followed by all family members (with or without diabetes).

It is important to acknowledge the limitations and strengths of our study. Among the limitations, we identified the lack of assessment of adherence to treatment, motivation to change, and interaction between the patient and relative. It was also not evaluated whether the accompanying family members act as primary caregivers, overseeing cooking or being on the lookout for medications for PDM.

A strength of the work is that PDM and their relatives were included and not by separate groups. Both received information for lifestyle changes for diabetes prevention or prevention of diabetes complications. Despite the interruption due to the COVID-19 emergency, we were able to recover the evaluation of several participants.

Conclusion

Support in people with diabetes and their families is important in metabolic control. However, raising awareness among family members to screen for diabetes and changes in lifestyle are points to improve. In people who are identified as lacking family and social support, it is important to carry out a complete medical, lifestyle, and mental health evaluation to identify factors that can be corrected and slow the progression to diabetes. In people with diabetes, the evaluation of

social and family support by mental health professionals will allow for a more complete evaluation to identify barriers to achieving control goals.

Familial support may have a notable impact on several aspects of health and mental health. Notably, relatives without support exhibited higher cholesterol levels, while PDM without support tended to have better glucose control. Anthropometric measures, such as weight and BMI, were higher in those without support, emphasizing the potential role of family support in promoting healthier lifestyle choices. Furthermore, individuals lacking support reported higher levels of anxiety and depression, highlighting the importance of emotional support within the family unit. These results underscore the significance of family dynamics in influencing the health and well-being of both PDM patients and their relatives, emphasizing the need for further research and interventions to better understand and support these relationships.

Data Sharing Statement

Data will be available upon request. Interested parties may request access to this data by sending a letter to the corresponding author outlining their specific data needs and research intentions. Authors are committed to facilitating data sharing in the spirit of collaboration and transparency. The provided data will be de-identified and will remain accessible for five years following the publication of the manuscript. This information will be made available through digital registries to ensure convenient and efficient access, enabling researchers to harness the valuable insights generated from clinical trials for further scientific exploration and advancement.

Disclosure

The authors declare no potential conflicts of interest concerning the research, authorship, and publication of this article.

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