



Family Support and Its Association with Glycemic Control in Patients with Type 2 Diabetes Mellitus in the DiabetIMSS Program



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Abstract

Objective: To determine the association between family support and glycemic control in patients with type 2 diabetes mellitus (T2DM) enrolled in the DiabetIMSS program at a Family Medicine Unit (FMU) in Zacatecas, Mexico.

Methods: An observational, cross-sectional, analytical study was conducted. A total of 170 patients with T2DM from FMU No. 4 of the Instituto Mexicano del Seguro Social (IMSS) in Guadalupe, Zacatecas, were included. The Instrument for Assessing Family Support in Patients with T2DM and the Graffar-Méndez Castellanos scale were applied. Glycemic control was defined as fasting serum glucose ≤ 130 mg/dL. χ^2 tests, the Mann-Whitney U test, and binary logistic regression were used. Statistical significance was set at $p \leq 0.05$.

Results: The median age was 58 years, with a range from 30 to 83 years. The prevalence of glycemic control was 48.2% (n=82). Family support was moderate in 69.4% (n=118) and high in 30.6% (n=52). No statistically significant association was found between the level of family support and glycemic control ($p=0.314$). Multivariate analysis showed that T2DM duration of less than 5 years (adjusted odds ratio [aOR]=2.14, 95% confidence interval [95% CI]: 1.12-4.08, $p=0.021$) and the presence of systemic arterial hypertension (aOR=1.98, 95% CI: 1.01-3.88, $p=0.045$) were independently associated with better glycemic control.

Conclusions: In this population, perceived family support was not associated with better glycemic control. Disease duration and the presence of comorbidities such as hypertension were the main related factors. Strategies that go beyond perceived family support are needed, with emphasis on joint diabetes education and lifestyle modification.

Keywords: Type 2 Diabetes Mellitus; Social Support; Glycemic Control; Family Practice; Primary Health Care

Introduction

Type 2 diabetes mellitus (T2DM) is a public health problem of epidemic proportions worldwide, with an estimated global prevalence of 9.3% in 2019 and a projected prevalence exceeding 10% by 2030 [1]. Mexico occupies an unfavorable position in this epidemiological scenario, ranking among the six countries with the highest number of people living with diabetes. The 2018-2019 National Health and Nutrition Survey (ENSANUT) reported a national prevalence of previously diagnosed T2DM of 10.3%, while the state of Zacatecas exceeded this average with a prevalence of 10.9% [2]. This high prevalence translates into a substantial burden of morbidity, mortality, and costs for the health system, including the Instituto Mexicano del Seguro Social (IMSS).

Adequate glycemic control is the cornerstone for preventing the microvascular and macrovascular

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complications of T2DM. However, despite institutional efforts such as the DiabetIMSS program, which seeks to provide comprehensive, high-quality care, optimal glycemic control rates at the primary care level remain suboptimal [3, 8]. Multiple factors influence therapeutic adherence and metabolic control, including clinical, socioeconomic, and psychosocial determinants.

Among psychosocial factors, family support has traditionally been considered a fundamental pillar for the successful management of chronic diseases. Family members may positively influence patients with diabetes by facilitating adherence to diet, physical activity, medication use, and medical follow-up [4]. Nevertheless, the evidence regarding its actual association with glycemic control has been contradictory. Some studies have reported a strong positive association [5, 7], whereas others have failed to demonstrate this relationship [6], suggesting that the quality of support, rather than its mere presence, or clinical factors such as disease duration, may be more decisive.

Recently, several Mexican and international studies have reassessed this relationship. García-Ulloa et al. (2024) found that patients with T2DM and their relatives who lacked family support had worse metabolic profiles, including higher total cholesterol and LDL cholesterol, as well as a higher prevalence of anxiety and depression [9]. Del Valle Ruiz et al. (2025) identified family support as an independent predictor of therapeutic adherence in older adults with T2DM receiving primary care at IMSS (odds ratio [OR]=0.13, 95% CI: 0.04-0.38) [10]. A 2024 systematic review and meta-analysis including 1,265 patients showed that family-based interventions significantly reduced HbA1c levels in patients with T2DM [11]. Therefore, the present study aimed to determine the association between perceived family support and glycemic control in a specific cohort of patients with T2DM enrolled in the DiabetIMSS program in Zacatecas.

Materials and Methods

Study Design, Setting, and Period

An observational, prospective, cross-sectional, analytical study was conducted at Family Medicine Unit (FMU) No. 4 of the IMSS in Guadalupe, Zacatecas, Mexico. Data collection was carried out from June to December 2022.

Population and Sample

The study population consisted of 405 patients with T2DM enrolled in the DiabetIMSS program at FMU No. 4. A sample size of 170 patients was calculated using the finite population proportion formula, with a 95% confidence level, an expected prevalence of high family support of 74.2%, based on a previous study by García-Morales et al. [7], and a 5% margin of error. Simple random sampling was used.

The inclusion criteria were patients of any sex, older than 18 years, with a diagnosis of T2DM according to the American Diabetes Association (ADA) criteria, enrolled in the DiabetIMSS program, with at least three follow-up visits during the previous year, and who attended accompanied by a family member. Patients with chronic complications of diabetes, incomplete clinical records, or no laboratory results within the previous 4 months were excluded. Questionnaires with more than 10% missing responses were eliminated.

Variables and Instruments

The dependent variable was glycemic control, defined as fasting serum glucose obtained from the clinical record ≤ 130 mg/dL (controlled) or >130 mg/dL (uncontrolled).

The main independent variable was family support, measured using the Instrument for Assessing Family Support in Patients with T2DM by Valadez-Figueroa et al. (2003) [12], a 24-item questionnaire using a Likert scale from 1 to 5 points. The total score classifies support as low (61-119), moderate (120-187), or high (188-265).

Sociodemographic variables were collected, including age, sex, marital status, occupation, and educational attainment. Clinical variables included duration of T2DM, comorbidities, treatment, and physical activity. Socioeconomic status was assessed using the Graffar-Méndez Castellanos scale. Family typology was classified according to Huerta's proposal.

Procedure and Statistical Analysis

After approval by the local Research and Ethics Committees (R-2022-3301-027), written informed consent was obtained from all participants. The questionnaire was administered through a direct interview.

Statistical analysis was performed using SPSS version 25. Descriptive statistics were used, including means, medians, and frequencies. For bivariate analysis, the χ^2 test or Fisher's exact test was used for categorical variables, and the Mann-Whitney U test was used to compare nonparametric continuous variables. A binary logistic regression model using the enter method was built to identify factors associated with glycemic control, adjusting for variables with $p < 0.20$ in the bivariate analysis, including age, T2DM duration, arterial hypertension, and family support. A p value ≤ 0.05 was considered statistically significant.

Results

A total of 170 patients were analyzed. The median age was 58 years, with an interquartile range (IQR) of 51 to 65 years, and women predominated (62.4%). Overall, 72.9% were married, and 70.6% had only basic education. Most participants lived in urban areas (77.6%). The prevalence of glycemic control was 48.2% ($n=82$). Table 1 summarizes the sociodemographic characteristics, with no statistically significant differences between controlled and uncontrolled patients.

Regarding clinical variables (Table 2), patients with better glycemic control had a significantly shorter duration of T2DM (median: 3 vs. 8 years, $p < 0.001$) and a higher frequency of systemic arterial hypertension (71.9% vs. 54.5%, $p = 0.050$). Type of pharmacological treatment, physical activity, and the presence of other comorbidities, including thyroid disease, did not show statistically significant differences.

The distribution of family support level was similar between groups: moderate support was observed in 68.3% of controlled patients versus 70.5% of uncontrolled patients, while high support was observed in 31.7% versus 29.5%, respectively, without a statistically significant association ($p = 0.314$). Figure 1 illustrates the absence of association.

In the multivariate analysis (Table 2), the factors that remained independent predictors of better glycemic control were T2DM duration of less than 5 years (adjusted OR=2.14, 95% CI: 1.12-4.08) and the presence of systemic arterial hypertension as a comorbidity

Table 1: Sociodemographic characteristics of patients with T2DM according to glycemic control.

Characteristic	Controlled (n=82)	Uncontrolled (n=88)	p value
Age (years), median (IQR)	59 (52-66)	58 (50-64)	0.123*
Female sex, n (%)	51 (62.2)	55 (62.5)	0.734†
Marital status (married), n (%)	54 (65.9)	70 (79.5)	0.491†
Educational attainment (basic), n (%)	50 (61.0)	70 (79.5)	0.374†
Socioeconomic stratum (worker), n (%)	34 (41.5)	51 (58.0)	0.416†

*Mann-Whitney U test, †Pearson χ^2 test.

Table 2: Clinical characteristics and family support associated with glycemic control.

Variable	Controlled (n=82)	Uncontrolled (n=88)	p value (bivariate)	aOR (95% CI)*
T2DM duration <5 years, n (%)	52 (63.4)	33 (37.5)	<0.001†	2.14 (1.12-4.08)
Arterial hypertension, n (%)	59 (72.0)	48 (54.5)	0.050†	1.98 (1.01-3.88)
Family support, n (%)				
Moderate	56 (68.3)	62 (70.5)		
High	26 (31.7)	26 (29.5)	0.314†	1.45 (0.70-3.00)

*Binary logistic regression model adjusted for age (p=0.163), T2DM duration, systemic arterial hypertension, and family support. aOR: adjusted odds ratio. †Bivariate comparison using Pearson χ^2 test. 95% CI: 95% confidence interval.

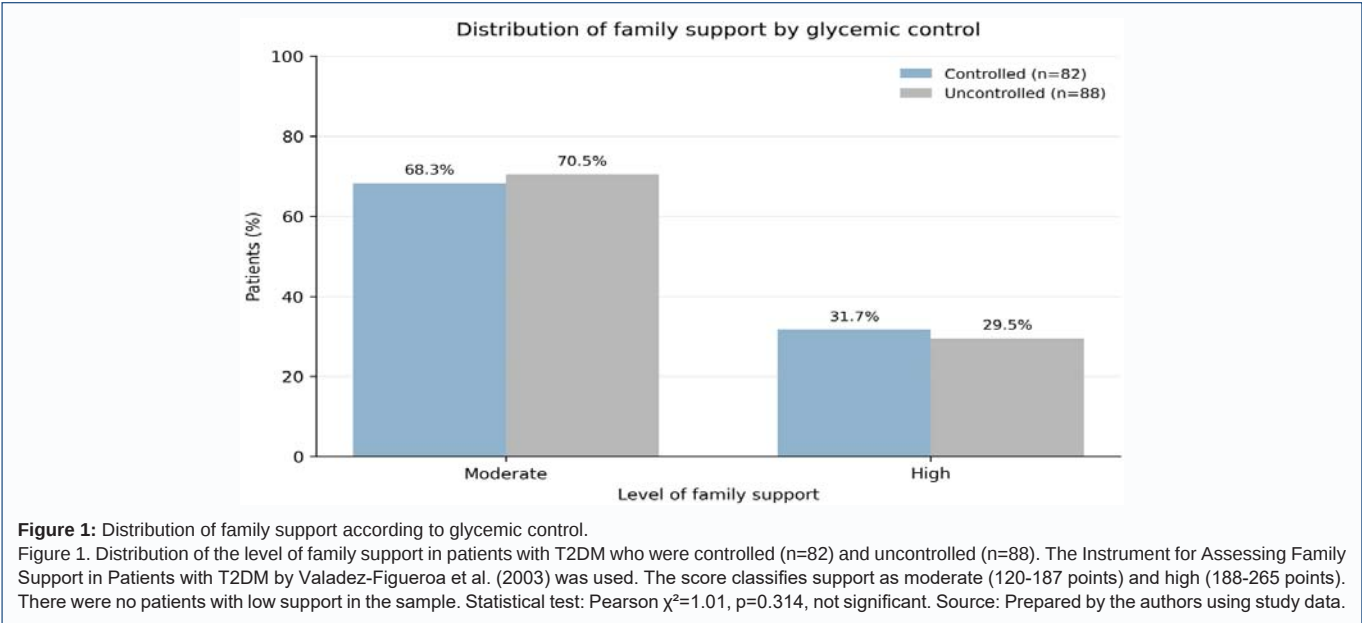


Figure 1: Distribution of family support according to glycemic control. Figure 1. Distribution of the level of family support in patients with T2DM who were controlled (n=82) and uncontrolled (n=88). The Instrument for Assessing Family Support in Patients with T2DM by Valadez-Figueroa et al. (2003) was used. The score classifies support as moderate (120-187 points) and high (188-265 points). There were no patients with low support in the sample. Statistical test: Pearson $\chi^2=1.01$, p=0.314, not significant. Source: Prepared by the authors using study data.

(adjusted OR=1.98, 95% CI: 1.01-3.88). Family support, comparing high versus moderate support, was not statistically significant (adjusted OR=1.45, 95% CI: 0.70-3.00).

Discussion

The main finding of this study was the absence of an association between perceived family support and glycemic control in patients with T2DM treated at the primary care level. This result contradicts the widely accepted notion that family support is a critical factor for therapeutic success in chronic diseases, and it also contrasts with the most recent international and national evidence.

Comparison with Current Evidence

Our findings differ from multiple Mexican and international studies published between 2024 and 2025. García-Ulloa et al. (2024), in a cohort of 160 patients from the Comprehensive Care Center for Patients with Diabetes (CAIPaDi) of the Instituto Nacional de Ciencias Médicas y Nutrición, showed that patients without family support

had significantly higher total cholesterol, LDL cholesterol, body mass index, and prevalence of anxiety and depression [9]. Del Valle Ruiz et al. (2025), in a cross-sectional study conducted at FMU No. 39 of the IMSS in Villahermosa, Tabasco, identified family support as an independent predictor of therapeutic adherence in older adults with T2DM (OR=0.13, 95% CI: 0.04-0.38, p=0.005) [10]. Likewise, a study conducted at FMU No. 69 in Coatzacoalcos, Veracruz (2025) found a significant association between family function measured with the Family APGAR and glycemic control (p<0.0001) [13].

Internationally, a systematic review and meta-analysis by Reyes et al. (2024), which included 1,265 patients, concluded that family and community health interventions significantly reduce HbA1c levels in patients with T2DM, with a more pronounced effect when the intervention lasts longer than 12 months [11]. A 2025 systematic review that included 31 studies confirmed that family-based interventions, particularly those incorporating self-regulation models, improve self-care and metabolic control [14]. Finally, a scoping review by Setyoadi

et al. (2025) reaffirmed that family support has a positive influence on treatment adherence and glycemic control [15].

Why do our Findings Differ?

The discrepancy between our results and the current literature may be explained by at least four methodological factors:

1. Family support measurement instrument. We used the instrument developed by Valadez-Figueroa et al. (2003) [12], which predominantly measures instrumental support actions, such as meal preparation, medication administration, and accompaniment to medical appointments. However, recent studies reporting positive associations have used family function scales such as the Family APGAR [13] or the AFA-r15 scale [10], which assess emotional and communication dimensions that may be more relevant to glycemic control.

2. Definition of glycemic control. Our study used a single fasting serum glucose measurement (≤ 130 mg/dL). This method has high intraindividual variability and may be influenced by acute factors such as stress, diet, or temporary nonadherence. The gold standard in contemporary literature is glycated hemoglobin (HbA1c $< 7\%$), which reflects average glycemic control over the previous 3 months. The meta-analyses supporting a positive association between family support and glycemic control used HbA1c exclusively as the outcome [11,14].

3. Sample size and statistical power. With 170 patients, our study had limited statistical power to detect small but clinically important differences. The meta-analyses showing the effectiveness of family-based interventions included aggregate samples of more than 1,000 patients [11,14].

4. Selection bias related to the DiabetIMSS program. The DiabetIMSS program selects patients who agree to participate in a more intensive care model that includes monthly visits, 2-hour educational sessions, and commitment from a support network. This population may not be representative of the overall population of patients with T2DM in primary care, which limits the generalizability of our findings.

Factors Associated with Glycemic Control in Our Study

Although no association with family support was found, two factors were strongly associated with glycemic control. A shorter duration of T2DM (< 5 years) as a protective factor is consistent with the natural history of the disease. Therapeutic fatigue, emotional burden, and progressive beta-cell dysfunction make long-term control more difficult. This finding has been documented in longitudinal studies showing a progressive decrease in glycemic control rates over time [16].

The positive association between arterial hypertension and better glycemic control, although apparently paradoxical, is plausible. It may be explained by a multiple-diagnosis effect, whereby patients with two chronic diseases (T2DM and hypertension) have more frequent contact with the health system, increasing opportunities for diabetes education, pharmacological adjustment, and monitoring. It is also possible that these patients develop greater disease awareness and stronger motivation for self-care.

Implications for Family Medicine

This study underscores that, in the primary care setting, focusing solely on the presence of family support may be insufficient. Family

physicians should:

1. Assess the functionality and emotional quality of family dynamics, rather than only the existence of a support network. Instruments such as the Family APGAR may be more useful than instrumental support scales.

2. Identify patients with a longer disease duration (> 5 years) as a high-risk population requiring a more intensive therapeutic approach, including reinforcement of diabetes education and strategies to address therapeutic inertia.

3. Use the diagnosis of comorbidities, such as arterial hypertension, as a window of opportunity to reinforce lifestyle counseling and treatment adherence.

4. Recognize that family support is not a homogeneous concept. Programs that actively train the family in diabetes care, through joint patient-family education, have shown greater effectiveness than simply having a support network [11].

Strengths and Limitations

Strengths: The study included a homogeneous and well-defined population of patients enrolled in DiabetIMSS, used a family support instrument previously validated in Mexico, although with limitations, and reported objective clinical data.

Limitations: The study had a cross-sectional design, which prevents causal inference. Glycemic control was based on fasting glucose rather than HbA1c, which may introduce misclassification bias. The family support scale, developed in 2003, predominantly measures instrumental support rather than family functionality. The sample size was insufficient for subgroup analyses. There was possible selection bias due to the exclusive inclusion of DiabetIMSS patients. Finally, the family member's perception of the support provided was not evaluated.

Conclusions

In this cohort of patients with T2DM enrolled in the DiabetIMSS program in Zacatecas, perceived family support, measured using an instrumental support tool, was not independently associated with better glycemic control. This finding contrasts with recent international and national evidence, suggesting that the discrepancy is more likely attributable to methodological limitations, including a suboptimal measurement instrument, an outcome based on fasting glucose, and a moderate sample size, rather than a true absence of association.

Shorter diabetes duration (< 5 years) and the presence of arterial hypertension were the strongest predictors of glycemic control in our population. These findings reinforce the importance of identifying patients with longer disease duration as a high-risk population and using comorbidity as an opportunity to strengthen self-care.

Prospective studies are needed with the following characteristics: use of HbA1c as the gold-standard outcome, application of validated family function instruments such as Family APGAR and AFA-r15, sample sizes allowing multivariate and subgroup analyses, inclusion of both patient and family member perceptions, and longitudinal designs that allow temporal relationships to be established.

Meanwhile, family physicians should not abandon the family-centered approach. Instead, they should move from asking whether the patient has family support to assessing the quality and

functionality of that support.

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