

Relationship between social support and the physical and mental wellbeing of older Mexican adults with diabetes

Katia Gallegos-Carrillo,* Carmen García-Peña,**
Carlos Alberto Durán-Muñoz,** Yvonne N. Flores,* Jorge Salmerón*

* Unidad de Investigación Epidemiológica y en Servicios de Salud. Instituto Mexicano del Seguro Social de Cuernavaca.

** Unidad de Investigación Epidemiológica y en Servicios de Salud. Área Envejecimiento. ** División de Evaluación. Coordinación de Investigación en Salud. Instituto Mexicano del Seguro Social. C.M.N. Siglo XXI.

ABSTRACT

Objective. To determine the relationship between social support and certain indicators of physical and mental wellbeing in older adults with type 2 diabetes. **Material and methods.** We undertook a population-based cross sectional study of 705 adults with type 2 diabetes from the Instituto Mexicano del Seguro Social (IMSS). Participants were randomly selected from a list of diabetic patients located in the south of Mexico City. Physical and mental wellbeing were assessed through three indicators: 1) Health related quality of life (HRQL); 2) depressive symptomatology, and 3) glycemic control. Level of social support level was determined using the The Social Support Health Survey instrument. Multiple linear regression models were used to analyze the independent association of social support with the physical and mental wellbeing indicators, controlling for progression time, diabetes complications, co-morbidity and socio-demographic variables. **Results.** High levels of social support were reported by 64% of participants. Social support and HRQL increased in direct proportion: the more social support a participant reported the less depressive distress and better fasting glucose levels they showed. The results maintained their significance in the four social support subscales, with the exception of affectionate and emotional or informational support subscales, which were not significantly correlated with fasting glucose. Multiple linear regression analyses showed that better levels of social support are associated with improved HRQL ($\beta = 0.12$), less incidence of depressive symptoms ($\beta = -0.20$) and lower fasting glucose ($\beta = -0.10$). **Conclusions.** Our findings suggest that greater levels of social support may improve certain indicators of physical and mental wellbeing in older adults with type 2 diabetes, regardless of the presence of diabetes complications and other chronic pathologies. Thus, promoting social support

Relación entre apoyo social y bienestar físico y mental del anciano con diabetes

RESUMEN

Objetivo. Determinar la relación entre apoyo social y algunos indicadores de bienestar físico y mental del adulto mayor con diabetes tipo 2. **Material y métodos.** Estudio transversal de base poblacional en 705 adultos mayores con diabetes tipo 2 del Instituto Mexicano del Seguro Social (IMSS). Los participantes fueron seleccionados por muestreo aleatorio del listado nominal de pacientes diabéticos del sur de la ciudad de México. Se evaluó el bienestar físico y mental por medio de tres indicadores: 1) Calidad de vida relacionada a la salud; 2) sintomatología depresiva, y 3) control glucémico. El nivel de apoyo social se determinó con el instrumento "The Social Support Health Survey". Se usaron modelos de regresión lineal múltiple para analizar la asociación independiente del apoyo social con indicadores de bienestar físico y mental, ajustando por tiempo de evolución, complicaciones de la diabetes, comorbilidad y variables sociodemográficas. **Resultados.** 64% reportó niveles altos de apoyo social. El apoyo social y la calidad de vida se incrementan juntos, a mayor apoyo social menor presencia de sintomatología depresiva y mejores niveles de glucosa en ayuno. Resultados que mantienen su significancia en las cuatro subescalas de apoyo social, con excepción de las subescalas de afecto y apoyo emocional y de información que no fueron significativas para control glucémico. Los análisis de regresión lineal múltiple mostraron que mejores niveles de apoyo social se asocian con mejor calidad de vida ($\beta = 0.12$), menor presencia de sintomatología depresiva ($\beta = -0.20$) y menores cifras de glucosa en ayuno ($\beta = -0.10$). **Conclusiones.** Nuestros resultados sugieren que el apoyo social puede mejorar ciertos indicadores de bienestar físico y mental de los ancianos con diabetes tipo 2, independientemente de la presencia de complicaciones y otras patologías crónicas. De ahí la im-

for the IMSS' diabetic patients could be a useful intervention.

Key words. Diabetes. Social support. Quality of life. Depression. Older adult.

INTRODUCTION

Type 2 diabetes a metabolic disorder caused by a combination of resistance to insulin and an inadequate compensatory insulin secretory response, is a chronic disease that has become a serious global public health problem over the past few decades.

In Mexico the prevalence of diabetes has increased from 6.7% in 1993¹ to 10.7% in 2000.^{2,3} In recent years diabetes has become the leading cause of mortality in women and the second leading cause among men.⁴ Almost 9% of the Instituto Mexicano del Seguro Social (IMSS) patient population has been diagnosed with the disease,⁵ and 27% of IMSS beneficiaries aged 70-79, suffer from diabetes, which is the leading cause of death in this age group.^{5,6} Treating type 2 diabetes represents a major financial burden for the IMSS, which assigns 6.5% of its budget to diabetes care.⁷

A diabetic's health status is influenced by multiple psychological, social and behavioral factors, leading to very different experiences of the illness and health outcomes.⁸ Some studies have concluded that individuals with strong social ties tend to present less morbidity and mortality related to chronic diseases,⁹⁻¹¹ and are more likely to recover from acute diseases.^{12,13} Social support, a multi-dimensional concept that includes real or perceived resources provided by other persons, allows older adult to feel cared for, loved, valued and belonging to a community,¹⁴⁻¹⁶ and seems to positively influence individuals' health outcomes.^{17,18}

Both diabetics and older adults may especially benefit from good social support. Studies have documented that older adults' family, friends and organizations play both an important emotional role, and aid them in performing self-care.¹⁹ In addition, the availability of social support may directly affect an individual's capacity and ability to adapt to changes associated with both aging and the presence of chronic diseases, including diabetes. Individuals with this condition face the challenges of managing healthy behavior lifestyles to improve metabolic control and minimize the incidence of diabetes complications.

Social support has been studied as a social factor that can affect diabetics, including its possible impact on the development and control of this illness. Some studies have suggested a positive relationship between social

portancia de promover acciones tendientes a mejorar el apoyo social entre los pacientes diabéticos del IMSS.

Palabras clave. Diabetes. Apoyo social. Calidad de vida. Depresión. Adulto mayor.

support and diabetics' health outcomes, for example improving glycemic^{20,21} and metabolic control.²² However, other studies have found less support for the importance of strong social ties. Kaplan and Hartwell found that social support influenced diabetes control, measured by glycosilated hemoglobin, in women but not in men.²³ On the other hand, a study of Mexican-American individuals concluded that social support provided by family members was associated with better self-care, though only in terms of diet and exercise.²⁴ Finally, a study by Chlebowy and Garvin did not find significant relationships between social support and diabetics' self-care behavior or glycemic control.²⁵

Despite these conflicting results and due to the high incidence of diabetes among older adults in Mexico⁶ its financial drain on health services,⁷ it is important to determine whether social support might improve physical and mental aspects and the diabetes management in this population. This information could be used to design interventions to improve the health and self-care behaviors of diabetics by strengthening their social ties. The aim of this study was to examine the relationship between social support and certain indicators of physical and mental wellbeing in older Mexican adults with diabetes. We used quality of life variables and measurements of depressive distress and fasting glucose, and also took into account the participants' medical histories.

MATERIAL AND METHODS

Study design and population

We undertook a population-based cross sectional study with type 2 diabetes patients aged 55 years and older, who lived in southeastern Mexico City. Participants were selected by random sampling from the listing of diabetic patients kept by the IMSS Family Medicine Units issued by the IMSS Epidemiology Surveillance System. We estimated the sample size by considering the number of subjects needed to prove the study hypotheses about the relationships between social support and quality of life, depressive symptoms and fasting glucose levels. A representative sample of 705 individuals was used; and all participants signed informed consent forms. Information was collected from two sources: a questionnaire purposely designed for this study and

applied at the participants' homes by trained personnel, and the participants' medical records. The Local IMSS Research Committee reviewed and approved this study.

Measurement of events of interest

- **Quality of life.** This variable was measured based on the concept of Health Related Quality of Life (HRQL),²⁶ as measured by a Spanish language version of The Medical Outcomes Study 36-item-Short-Form Health Survey (SF-36) instrument,²⁷ which has been validated in the Mexican population.²⁸ This instrument consists of 36 items that measure HRQL in a period of up to four weeks prior to the application of the questionnaire, which are combined to form eight multi-item scales or dimensions: physical functioning; role limitations due to physical problems, bodily pain, social functioning, general mental health (which includes psychological stress, role limitations resulting from emotional problems); vitality, energy and fatigue, and general health perception. For the purpose of our analysis and to generate a global measurement of the participants' physical and mental health, a scale was estimated based on the eight dimensions using a Z transformed score ranging from 0-100. Higher scores reflected better functioning and less limitations. It is worth mentioning that a convergent validity of the SF-36 scales has been shown among people with different medical conditions, including type 2 diabetes.²⁹
- **Depressive distress.** Depressive symptoms were assessed with the 30-item version of the Geriatric Depression Scale (GDS).³⁰ This instrument was specifically developed to be applied in older adults, and has shown adequate levels of sensitivity and specificity in several studies,³¹⁻³³ including studies using its Spanish version.³⁴ Furthermore, this instrument has been widely used to detect depression in primary care contexts.^{35,36} In this study, the GDS was not used as a diagnostic tool, but to identify participants with some level of depressive distress. Participants scoring 11 or higher on the GDS were classified as suffering from depressive distress.
- **Fasting glucose.** Fasting glucose levels were taken from participants' medical records. Measurements taken during the previous six months were combined with measurements taken during the study period to estimate the average glucose measurement for each patient. Nearly 87% of the participants had two or more fasting glucose as-

sessments during the study period. The level of concordance between the measures of fasting glucose estimates with Kappa-Cohen³⁷ showed a value of 0.72.

- **Social support.** The MOS Social Support Survey (MOS-SSS) was developed for application to individuals with chronic diseases.³⁸ The MOS-SSS is a multidimensional questionnaire which has shown good psychometric properties,³⁹⁻⁴¹ is easy to understand and relatively short. A Spanish language version of this instrument has been validated with individuals with chronic diseases.⁴²

The MOS-SSS consists of 19 items, with a five point response scale. In its original form, this instrument was designed to measure five types of social support. However, empirical analysis demonstrates that emotional and practical support must be measured together.³⁸ Thus, social support in this study was measured with four sub-scales:

1. Tangible support (provision of practical resources and material help).
2. Affection (physical displays of love and tenderness).
3. Positive social interaction (relaxing and having fun with other people).
4. Emotional/informational support (the ability of the social network to satisfy individual needs related to emotional problems, and the need for advice and guidance).

These subscales do not focus on who provides the support, but rather on how often it is available.

Each subscale transforms into a rating with 0-100 values, where a higher score indicates more social support. A total score was estimated based on the means of the four multi-item subscales, which was also transformed into a 0-100 range that enabled us to comprehensively measure study participants' levels of social support.³⁸ For the purpose of this analysis, we generated new dichotomous social support variables, based on the average of each sub-scale and of the summary scale in the study's population. Each variable and summary scale score under and over the mean was considered low or high social support, respectively.³⁸

- **Health and medical record variables.** Information about the disease's duration and chronic co-morbidities was obtained, through self-report and the patient's medical records. For each patient, the total number of chronic diseases in addition to diabetes, were integrated in a sum-

mary scale generated by the chronic co-morbidity variable.

Information about diabetes complications during the last six months was obtained from patients' medical records. Staff searched these records for reports of the four types of complications related to diabetes: renal, ophthalmic, neurological and of the peripheral vascular system.

- **Socio-demographic variables.** Socio-demographic information on sex, age, marital status and educational level was obtained by self-report.

Statistical analysis

A descriptive analysis was carried out to examine the characteristics of the study population and to assess differences in the summary scales of the health related quality of life (HRQL), frequency of depressive symptoms (Geriatric Depression Scale or GDS) and distribution of fasting glucose levels, as related to the social support available for the study's participants (MOS-SSS), and to the variables of health, medical record of diabetes and socio-demographic characteristics. Variance analysis and t test were conducted, with a significance level of $p < 0.05$.

To determine the relationship between social support (MOS-SSS) and the three measurements of interest (which had nearly normal distributions for each variable), separate analyses were conducted using multiple linear regression models. The following variables were included in the models:

- HRQL summary rating obtained from SF-36.
- Depressive distress estimated with the GDS.
- Average fasting glucose measurements.

These analyses were adjusted by duration of diabetes, number of diabetes complications and chronic co-morbidity, and by socio-demographic variables (sex, age, marital status and education level).

RESULTS

Complete information was obtained from 666 of the 705 study participants. Descriptive analyses indicate that the study population is predominantly female (65%), with a mean age of 66.8 years. A total of 14% of participants had no education, 22% had a secondary school education or higher, and 28% were widowed. Regarding the variables associated with diabetes, 60% of participants were diagnosed more than 10 years ago, almost 80% suffer from another chronic disease, and 58% had a diabetes complication during the last six months (Table 1).

Table 1. General characteristics of the study population (n = 666).

| Variables | n | % |
|----------------------------------|-----|------|
| Gender | | |
| Male | 235 | 35.3 |
| Female | 431 | 64.7 |
| Age group | | |
| 50-60 | 104 | 15.7 |
| 60-69 | 317 | 47.7 |
| 70-79 | 194 | 29.2 |
| ≥ 80 | 49 | 7.4 |
| Educational level | | |
| No formal education | 93 | 14 |
| Primary | 425 | 63.8 |
| Secondary or higher | 148 | 22.2 |
| Marital status | | |
| Married | 430 | 64.6 |
| Single/divorced | 48 | 7.2 |
| Widowed | 188 | 28.2 |
| Duration of diabetes | | |
| < 1 year | 6 | 0.9 |
| 1-5 years | 103 | 15.6 |
| 5-10 years | 153 | 23.1 |
| > 10 years | 400 | 60.4 |
| Chronic co-morbidity | | |
| Only diabetes | 135 | 20.3 |
| 1 chronic co-morbidity | 205 | 30.8 |
| 2 or more chronic co-morbidities | 326 | 48.9 |
| Diabetes complications | | |
| None | 280 | 42 |
| 1 complication | 166 | 24.9 |
| 2 or more complications | 220 | 33 |

Nearly 65% of the study participants reported having high social support (over the mean) in the summary scale (MOS-SSS). High tangible support was reported by 72% of participants, 67% reported high levels of affection, 60% had above average ratings on the positive social interaction sub-scale and 64% had high emotional and informational support. No significant differences were found between the social support and health variables scores, medical history related to diabetes (duration, chronic co-morbidity, and complications) or socio-demographic variables (data not shown).

Participants with more social support scored higher on the quality of life summary scale (SF-36) with a mean of 62.6, compared to a mean of 56.1 for those with low social support. Similar differences between those with high and low support were found in the quality of life means of the four subscales of social support: tangible support, affection, positive social interaction, and emotional and informational support. The t test analyses revealed a similar difference in the Geriatric Depression Scale (GDS) scores; those with high social support had a mean score of 9.3, while those with low social support had a mean of

Table 2. Mean scores of quality of life (SF-36), depressive symptoms (GDS) and fasting glucose as related to the social support of older adults with diabetes (n = 666).

| Social support | n | % | Quality of life (SF-36) | | Depressive symptoms (GDS) | | Fasting glucose | |
|--|-----|------|-------------------------|-------|---------------------------|-----|-----------------|------|
| | | | Mean | SD | Mean | SD | Mean | SD |
| Social support summary scale (MOS-SSS) | | | 60.28 | 21.1 | 10.2 | 6.1 | 168.9 | 56.9 |
| High social support | 427 | 64.1 | 62.6* | 21.1 | 9.3* | 5.9 | 165.8 | 53.8 |
| Low social support | 239 | 35.9 | 56.1 | 20.3 | 11.6 | 6.2 | 174.3 | 61.9 |
| Tangible support | | | | | | | | |
| High tangible support | 480 | 72.1 | 61.4* | 21.3 | 9.6* | 6 | 165.6* | 52.5 |
| Low tangible support | 186 | 27.9 | 57.2 | 20.1 | 11.5 | 6.3 | 176.6 | 63.9 |
| Affection | | | | | | | | |
| High affection | 446 | 66.9 | 62.5* | 21.04 | 9.5* | 6.1 | 166.5 | 53.1 |
| Low affection | 220 | 33.0 | 55.6 | 20.4 | 11.5 | 6.2 | 173.5 | 63.9 |
| Positive social interaction | | | | | | | | |
| High positive social interaction | 400 | 60.0 | 63.1* | 21 | 9.3* | 5.9 | 165.4* | 54.2 |
| Low positive social interaction | 266 | 39.9 | 55.9 | 20.4 | 11.4 | 6.1 | 174.1 | 60.6 |
| Emotional and informational support | | | | | | | | |
| High emotional and informational support | 428 | 64.3 | 62.9* | 20.8 | 9.5* | 6 | 166.2 | 52.9 |
| Low emotional and informational support | 238 | 35.7 | 55.4 | 20.5 | 11.4 | 6.2 | 173.8 | 63.6 |

* Differences statistically significant $p < 0.05$. P values were obtained by T test. SD: Standard deviation.

Table 3. Mean scores of quality of life (SF-36), depressive symptoms (GDS) and fasting glucose by socio-demographic and health characteristics of older adults with diabetes (n = 666).

| | Quality of life | | Depressive symptoms | | Fasting glucose | |
|----------------------------------|-----------------|------|---------------------|-----|-----------------|------|
| | Mean | SD | Mean | SD | Mean | SD |
| Total | 60.3 | 21.1 | 10.2 | 6.1 | 168.9 | 56.9 |
| Gender | | | | | | |
| Male | 64.3* | 20.9 | 9* | 5.5 | 163.1 | 55.4 |
| Female | 58.1 | 20.8 | 10.8 | 6.4 | 172.3 | 57.7 |
| Age group | | | | | | |
| 50-60 | 60.3 | 21.1 | 11.1 | 6.9 | 184.7* | 65.2 |
| 60-69 | 61.1 | 20.6 | 10.1 | 6.1 | 179.5 | 60.1 |
| 70-79 | 60.1 | 21.4 | 9.7 | 5.8 | 154.8 | 46.8 |
| ≥ 80 | 55.6 | 22.7 | 10 | 5.5 | 142.3 | 40.1 |
| Educational level | | | | | | |
| No formal education | 52.5* | 22.1 | 12.5* | 7.1 | 162.6 | 51.3 |
| Primary | 60.4 | 20.5 | 10.1 | 5.8 | 170.3 | 57.3 |
| Secondary or higher | 64.8 | 20.8 | 8.8 | 5.9 | 169.4 | 60.1 |
| Marital status | | | | | | |
| Married | 60.8 | 20.6 | 10.2 | 6.1 | 170.8 | 58.9 |
| Single/divorced | 57.9 | 22.7 | 11.3 | 7.6 | 168.3 | 56.1 |
| Widowed | 59.8 | 21.7 | 9.6 | 5.8 | 164.5 | 52.5 |
| Duration of diabetes | | | | | | |
| < 1 year | 54.4* | 25.6 | 12.4 | 6.8 | 196.5* | 13.4 |
| 1-5 years | 64.8 | 21.1 | 9.3 | 6.1 | 148.7 | 41.7 |
| 5-10 years | 64.1 | 19.3 | 9.7 | 5.7 | 186.2 | 56.2 |
| > 10 years | 57.6 | 21.2 | 10.5 | 6.3 | 167.5 | 59.1 |
| Chronic co-morbidity | | | | | | |
| Only diabetes | 64* | 21.1 | 8.8* | 5.6 | 177 | 61.8 |
| 1 chronic co-morbidity | 63.1 | 20.1 | 9.7 | 6.1 | 161 | 47.5 |
| 2 or more chronic co-morbidities | 56.9 | 21.2 | 10.9 | 6.3 | 170.4 | 59.1 |
| Diabetes Complications | | | | | | |
| None | 65.3* | 19.9 | 9.4* | 6.0 | 167.5 | 53.2 |
| 1 complication | 60.6 | 20.7 | 10.2 | 6.2 | 177.9 | 62.6 |
| 2 or more complications | 53.6 | 20.9 | 11.1 | 6.2 | 162.6 | 55.8 |

* Differences statically significant $p < 0.05$. P values were obtained by T test and variance analysis. SD: Standard deviation.

11.6. These differences maintained their significance for the four social support subscales. Tangible support and positive social interaction were significantly associated with lower fasting glucose results ($p < 0.05$) (Table 2).

We found that the quality of life of older adults with diabetes is lower among women, among individuals with less education, patients diagnosed with diabetes in the last 12 months, and among people with diabetes complications and chronic co-morbidity. Approximately 40% of diabetic patients suffer depressive symptoms ($GDS \geq 11$), which are also more frequent among women, individuals with less education, and participants with chronic co-morbidity and diabetes complications. Similarly, younger patients, and those more recently diagnosed with diabetes –particularly those diagnosed within the past year– have significantly higher fasting glucose levels than their counterparts (184.7 mg/dL and 196.5 mg/dL, respectively, t -test, $p < 0.05$) (Table 3).

Our multivariate linear regression results show that, both in the summary scale and in the four subscales, better

social support scores are associated with improved HRQL (standardized coefficients in the summary scale $\beta = 0.12$) and lower social support scores are related to depressive symptoms (summary scale $\beta = -0.20$) and to lower fasting glucose levels (summary scale $\beta = -0.10$). The fasting glucose association maintained its significance for the subscales of tangible support ($\beta = -0.08$) and positive social interaction ($\beta = -0.11$). Having diabetes complications is associated with lower HRQL and an increase in GDS scores that indicates depressive distress. The presence of two or more co-morbidities is significantly associated with depressive symptoms (Table 4).

DISCUSSION

Type 2 diabetes can have numerous consequences on the daily quality of life, curtailing patients' family relationships, social lives and physical and leisure activities.⁴³ Diabetes treatment entails a strict management of one's blood glucose through a variety

Table 4. Relationship of social support with quality of life (SF-36), depressive symptoms (GDS) and fasting glucose levels in older adults with diabetes.

| Variables | Quality of life Multivariate models* | | Depressive symptoms Multivariate models* | | Fasting glucose Multivariate models* | |
|--|---|-------|---|-------|---|-------|
| | B^\dagger | p | B^\dagger | p | B^\dagger | p |
| Social support summary scale | 0.12 | 0.001 | -0.20 | 0.000 | -0.10 | 0.037 |
| Social support subscales | | | | | | |
| Tangible support [†] | 0.08 | 0.019 | -0.13 | 0.000 | -0.08 | 0.039 |
| Affection [†] | 0.12 | 0.001 | -0.18 | 0.000 | -0.07 | 0.102 |
| Positive social interaction [†] | 0.11 | 0.002 | -0.18 | 0.000 | -0.11 | 0.020 |
| Emotional and informational [†] | 0.12 | 0.001 | -0.20 | 0.000 | -0.08 | 0.082 |
| Duration of diabetes [§] | | | | | | |
| < 1 year (reference) | | | | | | |
| 1-5 years | 0.11 | 0.412 | -0.09 | 0.548 | -0.38 | 0.115 |
| 5-10 years | 0.13 | 0.419 | -0.10 | 0.543 | -0.21 | 0.452 |
| > 10 years | 0.03 | 0.859 | -0.05 | 0.784 | -0.35 | 0.282 |
| Chronic co-morbidity [§] | | | | | | |
| Only diabetes (reference) | | | | | | |
| 1 chronic co-morbidity | 0.02 | 0.661 | 0.05 | 0.310 | -0.12 | 0.051 |
| 2 or more chronic co-morbidities | -0.08 | 0.082 | 0.15 | 0.003 | -0.06 | 0.339 |
| Diabetes complications [§] | | | | | | |
| None (reference) | | | | | | |
| 1 complication | -0.08 | 0.033 | 0.04 | 0.327 | 0.06 | 0.201 |
| 2 or more complications | -0.23 | 0.000 | 0.09 | 0.025 | -0.06 | 0.217 |

SF-36: The medical Outcomes Study 36-item-Short-Form Health Survey. **GDS:** Geriatric Depression Scale.

* We are presenting the results of only the multivariate models since we did not observe important changes between the multivariate and bivariate models that justify presenting both set of results. Significance level $p < 0.05$.

[†] Standardized regression coefficients indicating the change in standard units of the dependent variables due to the increase in the standard unit of the independent variable, controlled by the duration of diabetes, chronic co-morbidity and diabetes complications, in addition to socio-demographic variables (gender, age, educational level and marital status).

[‡] Standardized regression coefficients of social support sub-scales are the results of multiple linear regression that included each sub-scale as an independent variable, controlled by all the variables that are presented in the model.

[§] Standardized regression coefficients of duration of diabetes, co-morbidity and diabetes complications that are presented in the table were obtained with regression models in which only the social support summary scale was used as the fundamental independent variable.

of self-care behaviors including lifestyle change. Meeting these demands may require support from individuals involved in the patient's social world. We sought to elucidate the ways in which social relations contribute to improved physical and mental health, by assessing social support. Our findings suggest that social support plays an important role for older diabetics, emerging as probable predictor of improved quality of life, decreased depressive distress, and more favorable fasting glucose levels. Although these hypotheses need to be corroborated in longitudinal studies, our results could have important implications for the health of older adults with diabetes, especially those treated at the Instituto Mexicano del Seguro Social.

Our finding that greater social support correlates with better quality of life in older adults with diabetes is consistent with the results of other studies. In a study of Turkish diabetics aged 30 years and older, Göz, *et al.* concluded that quality of life increases as social support increases.⁴⁴ Likewise, a study of South African diabetics who demonstrated low social support, as measured with the MOS-SSS, reported poorer general health and wellbeing than patients with more social support.⁴⁵ Similar results have come from a study of an African-American population in the United States.⁴⁶

Several studies have reported that depressive distress⁴⁷⁻⁴⁹ is more prevalent among diabetics, especially among Mexican^{50,51} and Hispanic populations.⁵² Our findings support this hypothesis, suggesting a relationship between better social support and lower levels of depressive distress. However, this is a correlational rather than causal finding, since, as Sacco, *et al.* argue, there is a bi-directional relationship between social support and depression.⁵³ Nevertheless, our findings concur with those of previous studies, which strongly suggest that levels of social support are associated with depression,⁵⁴ particularly among Latino populations.⁵⁵ Our results also indicate that specific types of social support have a direct impact on depression among diabetics. Coffman⁵⁶ found that tangible support is significantly associated with lower depression among diabetics, which was also one of the findings of this research. These results have not been previously documented among older adults with diabetes in Mexico. The importance of these results is clear if we take into account the prevalence of diabetes among this population in Mexico. Although, better summary scale scores of general social support were associated with lower fasting glucose levels in our study, certain types of support stood out as important. Tangible support and positive social interaction had a marked impact on the self-care indicator, provision of instrumental or tangible support, as well as the availability of recreational social interaction, were associated with better glucose levels

among study participants. These results are consistent with previous findings.^{20,21,57} Eriksson and Rosenquist indicated that higher levels of emotional, informational, and practical support improved men's glycosylated hemoglobin levels, while high social support in general positively influenced women's.²⁰ These findings suggest that in the case of glucose; an indicator of the quality of a diabetic's self-care; particular types of support may be more useful, in some groups, than good general support. However, these findings cannot be directly compared to ours, since different variables were measured.

It is important to consider some explanations for the increased levels of fasting glucose among the younger cases with a more recent diagnosis of diabetes. This could be due to a lower compliance to take diabetes medication as well as some possible resistance to the necessary life style changes to improve control the disease. Newly diagnosed diabetic patients may need some time to adjust to and implement these lifestyle changes that will help control their glucose levels.

Other studies have reported that the relationship between social support and glucose levels is not yet clear. Some research studies have suggested that social support is not a significant predictor of improved glycosylated hemoglobin levels.^{23,25,58} These results are probably contradictory because of the different ways in which social support can be defined and the different scales with which it can be measured. The social support scale we used for this research (MOS-SSS) was designed to be used with patients who have one or more chronic conditions, such as hypertension, diabetes, heart disease and depression. The MOS-SSS may also be used in surveys and epidemiological studies related to diabetes.³⁸ In this study the MOS-SSS was successfully used to examine the relationship between social support, glucose levels, quality of life and depression.

Although this study was designed and implemented to protect the integrity of the results, there are limitations that should be discussed. Due to the cross sectional nature of the study, it is difficult to clearly establish any causal relations. Future studies that use longitudinal data must be carried out to determine causality. It is also necessary to list some limitations, concerning how certain variables were determined, including the fact that even though the MOS-SSS instrument has been validated in Spanish speaking countries,⁴² it has not been validated in Mexico. Additionally, by measuring social support with the MOS-SSS instrument, we were not able to assess the quantity, quality, and source of social support provided. Future studies should use additional instruments that complement their assessment and may adequately capture the multi-dimensionality of the social support

concept, and are developed and validated in the Mexican population.

Another limitation of the study has to do with the use of fasting glycemia as an indicator of the glucose variable. A measure that reflected the average levels of glucose during the previous weeks, such as glycosylated hemoglobin, could have been better than fasting glycemia. Finally, it is important to notice that this study was conducted with IMSS type 2 diabetes patients, and for this reason the results can not necessarily be generalized to other groups in the population.

CONCLUSION

Self-care is a continuous challenge for older adults with diabetes, which may require help and resources from their social networks. Our results suggest that social support can have a positive impact on the physical and mental health of older Mexicans with diabetes, leading to a better quality of life, less depressive symptoms, and improved glucose levels. Health providers should actively promote better social support for these patients, starting by assessing the patient's levels of social support, then working with patients and members of their social networks to establish care objectives and strategies. Health providers should also become key actors in their social worlds, providing tangible support, information and even emotional support to diabetic patients. The present findings can be used to create self-care interventions, and educational programs for the ever-increasing population of Mexican older adults with diabetes in Mexico.

REFERENCES

1. Secretaría de Salud. Encuesta Nacional de Enfermedades Crónicas. México: Dirección General de Epidemiología, SSA.; 1993.
2. Encuesta Nacional de Salud 2000. Programa de acción: diabetes mellitus. México: Secretaría de Salud; 2001, p. 11-22.
3. Olaiz G, Rojas R, Barquera S, Shamah T, Aguilar C, Cravioto P, et al. Encuesta Nacional de Salud 2000. Tomo 2. La salud de los adultos. México: Instituto Nacional de Salud Pública, SSA; 2003.
4. Dirección General de Informática en Salud. Secretaría de Salud. Estadísticas de mortalidad en México: muertes registradas en el año 2003. *Salud Pública Mex* 2005; 47: 171-87.
5. Vázquez-Martínez JL, Gómez-Dantés H, Fernández-Cantón S. Diabetes mellitus en población adulta del IMSS. Resultados de la Encuesta Nacional de Salud 2000. *Rev Med Inst Mex Seguro Soc* 2006; 44: 13-26.
6. Fernández-Cantón S. El IMSS en cifras: la mortalidad en población derechohabiente, 2003. *Rev Med Inst Mex Seguro Soc* 2004; 42: 353-64.
7. Arredondo A, Zúñiga A. Economic consequences of epidemiological changes in diabetes in Middle-income countries. The Mexican case. *Diabetes Care* 2004; 27: 104-9.
8. Due P, Holstein B, Lund R, Modvig J, Avlund K. Social relations: network, support and relation strain. *Soc Sci Med* 1999; 48: 661-73.
9. House JS, Landis KR, Umberson D. Social relations and health. *Science* 1988; 241: 540-5.
10. Olsen O. Impact of social network on cardiovascular mortality in middle aged Danish men. *J Epidemiol Community Health* 1993; 47: 176-80.
11. Kawachi I, Colditz GA, Ascherio A, Rimm EB, Giovannucci E, Stampfer MJ, Willett WC. A prospective study on social networks in relation to total mortality and cardiovascular disease in men in the USA. *J Epidemiol Community Health* 1996; 50: 245-51.
12. Glass TA, Maddox GL. The quality and quantity of social support: stroke recovery as psycho-social transition. *Soc Sci Med* 1992; 34: 1249-61.
13. Vogt TM, Mullooly JP, Ernst D, Pope CR, Hollis JF. Social networks as predictors of ischemic heart disease, cancer, stroke and hypertension: incidence, survival and mortality. *J Clin Epidemiol* 1992; 45: 659-66.
14. Barrera M. Distinctions between social support concepts, measures and models. *Am J Community Psychol* 1986; 14: 413-45.
15. Arling G. Strain, social support, and distress in old age. *J Gerontol* 1987; 42: 107-13.
16. Stroebe W. Moderators of the stress-health relation. In: Stroebe W (ed.). *Social psychology and health*. Philadelphia, PA: Open University Press; 2000, p. 236-73.
17. Falk A, Hanson BS, Isacsson SO, Osterger PO. Job Strain and mortality in elderly men: social network, support, and influence as buffers. *Am J Public Health* 1992; 82: 1136-9.
18. Newsom JT, Schulz R. Social support as a mediator in the relation between functional status and quality of life in older adults. *Psychol Aging* 1996; 11: 34-44.
19. Keefe S, Padilla A, Carlos M. The Mexican-American extended family as an emotional support system. *Hum Organ* 1979; 38: 144-52.
20. Eriksson BS, Rosenqvist U. Social Support and glycemic control in non-insulin dependent diabetes mellitus patients: gender differences. *Women Health* 1993; 20: 59-70.
21. Ford ME, Tilley BC, McDonald PE. Social support among African-American adults with diabetes, part 2: a review. *J Natl Med Assoc* 1998; 90: 425-32.
22. Whittemore R, Melkus GD, Grey M. Metabolic control, self-management and psychosocial adjustment in women with type 2 diabetes. *J Clin Nurs* 2005; 14: 195-203.
23. Kaplan RM, Hartwell SL. Differential effects of social support and social network on physiological and social outcomes in men and women with type II diabetes mellitus. *Health Psychol* 1987; 6: 387-98.
24. Wen LK, Shepherd MD, Parchman ML. Family support, diet, and exercise among older Mexican-Americans with type 2 diabetes. *Diabetes Educ* 2004; 30: 980-93.
25. Chlebowski DO, Garvin BJ. Social support, self efficacy, and outcome expectations: impact on self-care behaviors and glycemic control in Caucasian and African American adults with type 2 diabetes. *Diabetes Educ* 2006; 32: 777-86.
26. Testa MA, Simonson DC. Current concepts: assessment of quality-of-life outcomes. *N Engl J Med* 1996; 334: 835-40.
27. Ware JE Jr, Sherbourne CD. The MOS-36-item-short-form health survey (SF-36): I. Conceptual framework and item selection. *Med Care* 1992; 30: 473-83.
28. Zúñiga MA, Carrillo-Jiménez GT, Fox PJ, Gandek B, Medina-Moreno MR. Evaluación del estado de salud con la Encuesta SF-36: resultados preliminares. *Salud Pública Mex* 1999; 41: 110-18.
29. Ware JE, Snow KK, Kosinski M, Gandek B. SF-36 Health Survey: Manual and Interpretation Guide. Boston: The Health Institute, New England Medical Center; 1993.
30. Yesavage JA, Brink TL, Rose TL, Lum O, Huang V, Adey M, Leirer O. Development and validation of a geriatric depression screening scale: preliminary report. *J Psychiatr Res* 1983; 17: 37-49.

31. Reyes-Frausto S. Population ageing in the Mexican Institute of Social Security: Health Policy and Economic Implications. Instituto Mexicano del Seguro Social. Fundación Mexicana para la Salud. México: FUNSALUD; 2001.
32. Lyness J, Noel TK, Cox C, King D, Conwell Y, Caine E. Screening for depression in elderly primary care patients: a comparison of the Center for Epidemiologic Studies-Depression Scale and the Geriatric Depression Scale. *Arch Intern Med* 1997; 157: 449-54.
33. Montorio I, Izal M. The Geriatric Depression Scale: a review of its development and utility. *Int Psychogeriatr* 1996; 8: 103-12.
34. Fernández-San Martín MI, Andrade C, Molina J, Muñoz PE, Carretero B, Rodríguez M, Silva A. Validation of the Spanish version of the Geriatric Depression Scale (GDS) in primary care. *Int J Geriatr Psychiatry* 2002; 17: 279-87.
35. Sharp L, Lipsky M. Screening for depression across the lifespan: a review of measures for use in primary care settings. *Am Fam Physician* 2002; 66: 1001-8.
36. Onishi J, Suzuki Y, Umegaki H, Endo H, Kawamura T, Iguchi A. A comparison of depressive mood of older adults in a community, nursing homes, and a geriatric hospital: factor analysis of Geriatric Depression Scale. *J Geriatr Psychiatry Neurol* 2006; 19: 26-31.
37. Fleiss JL. Statistical methods for rates and proportions. New York: John Wiley; 1981.
38. Sherbourne CD, Stewart AL. The MOS social support survey. *Soc Sci Med* 1999; 48: 661-73.
39. Bowling A. Measuring social networks and social support. In: Bowling A (ed.). Measuring health: a review of quality of life measurements scales. Open University Press; 1997, p. 91-109.
40. Griep RH, Chor D, Faerstein E, Werneck GL, Lopes CS. Construct validity of the Medical Outcomes Study's social support scale adapted to Portuguese in the Pro-Saude Study. *Cad Saude Pública* 2005; 21: 703-14.
41. Anderson D, Bilodeau B, Deshaies G, Gilbert M, Jobin J. French-Canadian validation of the MOS Social Support Survey. *Can J Cardiol* 2005; 21: 867-73.
42. Costa Requena G, Salamero M, Gil F. Validity of the questionnaire MOS-SSS of social support in neoplastic patients. *Med Clin (Barc)* 2007; 128: 687-91.
43. Tattersall RB, Jackson JGL. Social and emotional factors of diabetes. In: Keen H, Jarrett RJ (eds.). Complications of diabetes. London: Edward Arnold Publishers; 1982, p. 271-85.
44. Göz F, Karaoz S, Goz M, Ekiz S, Cetil I. Effects of the diabetic patients perceived social support on their quality of life. *J Clin Nurs* 2007; 16: 1353-60.
45. Westaway MS, Seager JR, Rheeder P, Van Zyl DG. The effects of social support on health, well-being and management of diabetes mellitus: a black South African perspective. *Ethn Health* 2005; 10: 73-89.
46. Tang TS, Brown MB, Funnell MM, Anderson RM. Social support, quality of life and self-care behaviors among African Americans with type 2 diabetes. *Diabetes Educ* 2008; 34: 266-76.
47. Gavard JA, Lustman PJ, Clouse RE. Prevalence of depression in adults with diabetes. *Diabetes Care* 1993; 16: 1167-78.
48. Peyrot M, Rubin RR. Levels and risks of depression and anxiety symptomatology among diabetic adults. *Diabetes Care* 1997; 20: 585-9.
49. Palinkas LA, Barrett-Connor E, Wingard DL. Type 2 diabetes and depressive symptomatology in older adults: a population based study. *Diabet Med* 1991; 8: 532-9.
50. Téllez-Zenteno JF, Cardiel MH. Risk factors associated with depression in patients with type 2 diabetes mellitus. *Arch Med Res* 2002; 33: 53-60.
51. Garduño-Espinosa, Téllez-Zenteno JF, Hernández-Ronquillo L. Frequency of depression in patients with diabetes mellitus type 2. *Rev Invest Clin* 1998; 50: 287-91.
52. Mier N, Bocanegra-Alonso A, Zhan D, Wang S, Stoltz SM, Acosta-Gonzalez RI, Zúñiga MA. Clinical depressive symptoms and diabetes in a binational border population. *J Am Board Fam Med* 2008; 21: 223-33.
53. Sacco WP, Yanover T. Diabetes and depression: the role of social support and medical symptoms. *J Behav Med* 2006; 29: 523-31.
54. Zhang CX, Chen YM, Chen WQ. Association of psychosocial factors with anxiety and depressive symptoms in Chinese patients with type 2 diabetes. *Diabetes Res Clin Pract* 2008; 79: 523-30.
55. Pineda Olvera AE, Stewart SM, Galindo L, Stephens J. Diabetes, depression, and metabolic control in Latinas. *Cultur Divers Ethnic Minor Psychol* 2007; 13: 225-31.
56. Coffman MJ. Effects of tangible social support and depression on diabetes self-efficacy. *J Gerontol Nurs* 2008; 34: 32-9.
57. Connell CM, Fisher EB, Houston CA. Relations among social support diabetes outcomes, and morale for older men and women. *J Aging Health* 1992; 4: 77-100.
58. Griffith LS, Field BJ, Lustman PJ. Life stress and social support in diabetes association with glycemic control. *Int J Psychiatry Med* 1990; 30: 365-72.

Correspondence and reprint request:

MSc. Katia Gallegos-Carrillo

Unidad de Investigación Epidemiológica y en Servicios de Salud.
Instituto Mexicano del Seguro Social
de Cuernavaca.

Hospital General Regional/Medicina Familiar No. 1.
Av. Plan de Ayala esquina calle Central. 11° piso.
Col. Chapultepec
62450, Cuernavaca. Mor.
Tel. y Fax: 77-71-00-13-64
E-mail: katia.gallegos@gmail.com

Recibido el 17 de diciembre de 2008.

Aceptado el 16 de junio de 2009.