

Coping strategies and adherence to treatment in patients with type 2 diabetes mellitus

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ABSTRACT

Introduction. Diverse psychosocial and cultural factors are related to adherence to treatment of type 2 Diabetes mellitus (DM2) such as social support, coping styles and the cost of medical attention. **Objective.** To study the influence of diverse psychosocial factors on adherence to treatment in patients with DM2. **Material and methods.** In a cross sectional design we studied adherence to diet and medication, and its relationship with CS for diabetes, belief in conventional medicine, social support, and the perception of the burden of treatment cost on family finances. **Results.** We included 210 patients a mean age of 56.3 years, 9.4 years since diagnosis. Male DM patients had better adherence to medication ($p < 0.016$) and social support ($p < 0.004$), and higher rates for supportant CS (31.8 vs. 29.0; $p < 0.009$). Adherence to diet was associated with belief in conventional medicine ($p < 0.035$) and marginally related to fatalistic CS ($p < 0.05$). After testing social security coverage as dummy variable, a marginal association was found ($p < 0.15$). Adherence to medication was associated with supportant CS ($p < 0.02$) and marginally with avoidant CS ($p < 0.05$). **Conclusions.** Supportant CS was more frequent in men. Belief in conventional medicine, and supportant CS were associated with adherence to treatment. These factors should be considered for a more rational approach for the management of disease.

Key words. Type 2 diabetes mellitus. Coping strategies. Adherence to treatment.

INTRODUCTION

The treatment of type 2 diabetes mellitus (DM2), requires an appropriate adherence to indications for diet, exercise, medication and blood glucose monitoring. However, those profound behavioral changes

Estrategias de afrontamiento y adherencia al tratamiento en pacientes con diabetes mellitus tipo 2

RESUMEN

Introducción. Diversos factores psicosociales y culturales contribuyen a la adherencia al tratamiento de la diabetes mellitus tipo 2 (DM2), como el apoyo social, las estrategias psicológicas de afrontamiento y el costo de la atención médica. **Objetivo.** Estudiar la influencia de diversos factores psicosociales en la adherencia al tratamiento en pacientes con DM2. **Material y métodos.** En un diseño transversal se estudió la adherencia a la dieta y los medicamentos, y su relación con estrategias de afrontamiento (EA), la creencia en la medicina convencional, el apoyo social, y la carga del costo del tratamiento en las finanzas de la familia. **Resultados.** Se incluyeron 210 pacientes con una media de edad de 56.3 y 9.4 años desde el diagnóstico. Los hombres tenían mejor adherencia a la medicación ($p < 0.016$), apoyo social ($p < 0.004$) y tasas más altas de EA de apoyo (31.8 vs. 29.0, $p < 0.009$). La adherencia a la dieta se asoció con la creencia en la medicina convencional ($p < 0.035$) y marginalmente con EA fatalista ($p < 0.05$). Al analizar la cobertura de seguridad social como variable de confusión, se encontró asociación marginal ($p < 0.15$). La adherencia a la medicación se asoció con EA de apoyo ($p < 0.02$) y con EA evasiva ($p < 0.05$). **Conclusiones.** La EA de apoyo fue más frecuente en los hombres. La creencia en la medicina convencional y EA de apoyo se asociaron con la adherencia al tratamiento. Estos factores deben ser considerados para un tratamiento más racional de la DM2.

Palabras clave. Diabetes mellitus tipo 2. Estrategias de afrontamiento. Apoyo social.

are achieved by only a minority of patients in most societies.¹ Many factors contribute to adherence to treatment such as age, complexity of treatment, duration of disease,^{2,3} depression,^{4,5} psychosocial issues such as social support,^{6,7} cultural belief about the illness,^{8,9} and quality of life.¹⁰

The diagnosis of a chronic illness such as DM is a major stressful event that might initiate adaptive responses in order to deal with the new health situation. Acceptance of disease and adaptation to stress may occur in the course of disease evolution, depending on different psychosocial factors.¹¹ Coping is defined as the behavioral and cognitive efforts used in an attempt to deal with stressful events,^{12,13} and may have different styles depending on personality characteristics. The coping response is another aspect of coping that includes both cognitive and affective components.

The differentiation between those two definitions is important because coping skills training, a cognitive-behavioral intervention, may improve competence and mastery by retraining inappropriate or non-constructive coping styles into a constructive behavior.¹⁴ Positive styles such as confrontive, optimistic, supportant and self-reliant are associated with better psychosocial adjustment,¹⁵ and with better chronic glycemic control. Improved metabolic and psychosocial outcomes may result after coping skills training.¹⁴ Evasive and emotive coping styles are associated with adjustment problems, regimen non-adherence, and worse transient glycemic control.¹⁶

Lo and McLean,¹⁷ reported that some type 2 DM patients use avoidance, denial and fantasy strategies while others use more positive coping techniques. Coelho R, *et al.*,¹⁸ found worse quality of life in diabetic patients who used avoidance coping style compared with those who used active confrontation styles. However, the effect of strategies for coping with diabetes-related issues on HbA_{1c} seems to be only partially mediated by adherence to treatment.¹² The selection of the coping style depends on the severity and duration of disease, with the interaction of factors such as social support, and her or his personal experiences, including emotional and cognitive factors.^{15,19}

Among cognitive factors, belief in conventional medicine,⁹ and personal concepts related to diabetes²⁰ should be examined in the study of coping behavior for a better knowledge of adaptation to disease. The perception of increased cost of treatment may also hinder adherence to treatment.²¹ Previous investigations indicate that patient's belief and attitudes, rather than knowledge, are major barriers to adherence to treatment.^{22,23} In traditional societies, belief in conventional medicine hinders compliance with medical indications.²⁴ In a previous work we found the influence of two more factors: Patients with less than 5 years since diagnosis have higher scores of denial of disease, and patients

without social security coverage show higher perceived stress.²⁵

A better understanding of coping behaviors may induce better strategies for the management of diabetes. In this work, we examined the possible association of coping strategies to diabetes on adherence to treatment, and the influence of social support, belief in conventional medicine, and perception of the burden of treatment cost on family finances. The possible interaction of gender, social security coverage, and time since diagnosis of diabetes was also examined.

MATERIALS AND METHODS

Study design

We studied DM2 patients, diagnosed according to the criteria of the American Diabetes Association²⁶ in a cross sectional design. We compared them according to gender and social security coverage. The first group was recruited, from the Instituto Mexicano del Seguro Social (IMSS) in Leon, Mexico; the IMSS affiliation is mandatory for all workers from non-governmental enterprises. The group without social security, was recruited from patients attending the Institute of Medical Research, that gives only diagnosis services for patients without medical coverage. The investigators were not involved in medical attention. The purpose of study was explained and the acceptance rate was close to 80%. Most patients who did not accept argued lack of time. The Informed consent was obtained before inclusion in the study.

Inclusion Criteria

For inclusion in the study, we considered patients with type 2 diabetes mellitus non-hospitalized, without pregnancy, or chronic infectious, metabolic or neoplastic diseases. Patients included had not severe diabetic complications that required additional treatment such as end-stage renal disease, or amputations. The patients showed adequate physical and mental capacity to answer questions about their disease and their feelings about it.

Questionnaire

The questionnaire was answered by each patient by oral inquiry of an investigator at the facilities of our institution. The following data were collected: Age, schooling in years, and years since diagnosis of

diabetes. In regards to complications, we inquired about previous diagnosis of retinopathy, neuropathy and nephropathy. Weight (kg), and standing height (M) were obtained to calculate body-mass index (BMI). Metabolic control was evaluated with a fasting glucose (enzymatic method GODPAP, Lakeside, México City) and HbA_{1c} (Sigma, St Louis, MO).

- **Adherence to treatment.** Was evaluated separately for adherence to diet and to medication using a questionnaire previously reported and validated by us.^{7,27,28} Adherence to diet was assessed with seven questions, with scores range from 7 to 35. Adherence to medication was assessed with three questions, and results ranged from 3 to 15. Higher scores indicated better adherence to treatment.

We used the Jalowiec Coping Scale (JCS),²⁹ that evaluates 43 coping behaviors in four subscales:

- **Cognitive:** Problem resolving, autonomy-oriented, goal-directed, purposive, or reality-oriented (13 items, range of scores 13 to 65);
- **Avoidant:** Tension-modulating, avoidant/evasive, morale-maintaining, acquiescent, or palliative (9 Items, range 9 to 45).
- **Fatalistic:** Powerlessness, pessimistic, impotency-related, nugatory, or regressive (12 items range of scores 12 to 60).
- **Supportant:** Dependency-oriented, support-related, or linkage-directed (9 items, range of scores 9 to 45).

The scores of the coping methods range from a 1 to 5 in the ordinal scale, with descriptive end points from never to almost always. The scale was translated to the Spanish language and validated for comprehension and reproducibility. Higher scores indicate a more extensive use of the coping behavior.

- **Social Support Questionnaire.** Studies the patient's perception of the backing they receive by their relatives and friends to comply with treatment for diabetes.⁷ The score ranges from 4 to 20.
- **Belief in Conventional Medicine.** Was evaluated with an instrument reported by us,⁹ that includes 12 items on the most frequent objections to follow medical indications as mentioned by patients, and to choose instead alternate forms of treatment. The range of response for each question was 1-5 in an ordinal

scale with descriptive end points from never to always; the scores for each questions were added for final score ranging from 12 to 60, higher scores indicating more strong belief in conventional medicine.

- **Perception of the burden of treatment cost on family finances.** Was evaluated with a questionnaire containing 6 items that explored if treatment was restricted by the cost of medication, the possible impact of disease on the patients' economic resources, if monitoring of disease was impaired by their economic capability, if the disease had an impact on job opportunities, or if the expenses derived of disease have an effect on the budget for the provision of goods necessary for the family. Each response ranged for from 1 (never) to 5 (always) with the total score ranging from 6 to 30, high scores means a perceived stronger impact of disease on family finances. We evaluated the internal consistency of the instrument with a pilot study in 20 patients, and calculated their association by means of an α -Cronbach test. The six items with the stronger association were selected.

Statistical analysis

We initially examined the characteristics of the sample obtaining the mean and standard deviation for each variable in the groups of study. Next, we compared the groups by gender, groups according to social security coverage, and groups with ≤ 5 and > 5 years since diagnosis, using the Mann-Whitney test. When differences were found, possible interactions between both grouping variables were examined by means of a two ways analysis of variance.

To analyze the factors associated with adherence to treatment we carried out a stepwise multiple regression procedure, taking as dependent variable the scores of adherence to diet, and adherence to medication. The limit F values were set for inclusion at 3.5 and for removal at 3.4. In this analysis we included as candidate regressors the four coping styles, social support, belief in conventional medicine, and the perception of the economic cost of treatment. After the procedure, the p value was corrected for multiple comparisons.³⁰ In a further step we analyzed the influence of social security coverage, and time since diagnosis of diabetes (>5 or ≤ 5 years), repeating the multiple regression analysis adding as a dummy variable each of them.

RESULTS

For the total group of patients (159 women and 51 men) the mean age was 56.3 years with 9.4 years since diagnosis of diabetes, and 3.5 year of schooling. Forty patients were covered, and 170 were not covered with social security. The total group of patients had deficient metabolic control (mean glycated hemoglobin higher to 11%).

We found the following complications of diabetes: Among male patients 11.76% had clinical evidence of nephropathy, 39.2% retinopathy and 49.0% neuropathy. In female patients, 18.24% had nephropathy, 44.0% retinopathy and 42.1% neuropathy.

The group with social security had more years since diagnosis of diabetes 11.8 ± 7.1 vs. 8.8 ± 6.3 , $p < 0.007$, and adherence to diet 28 ± 6 vs. 26 ± 6 , $p < 0.022$, but they had lower perception of the burden of treatment cost on family finances (13.8 ± 6.7 vs. 18.0 ± 7.0 , $p < 0.0004$).

The groups according to years since diagnosis of diabetes were similar for most variables, excepting that the group with > 5 years since diagnosis of diabetes were older (57.4 ± 10.7 vs. 54.1 ± 9.6 , $p < 0.03$), and higher glycated hemoglobin (12.2 ± 2.7 vs. 11.1 ± 2.7 , $p < 0.001$).

Table 1 shows the characteristics of patients according to gender. Female patients were younger (55.3 ± 10.0 vs. 59.7 ± 11.3 years old), had higher BMI (28.0 ± 4.7 vs. 25.8 ± 3.8), and lower adherence to medication. They also reported lower social support than male patients. In regards to coping style, males had higher scores for supportant style than female patients (31.8 ± 5.6 vs. 29.0 ± 6.5).

Coping strategies to diabetes

In regards to coping style, scores for cognitive (45 ± 11 vs. 40 ± 9 , $p < 0.006$), and supportant styles (32 ± 6 vs. 29 ± 6 , $p < 0.02$) were higher for the group with social security. For these significantly different coping styles, we carried out a two way analysis of variance exploring the possible interaction of the duration of diabetes (≤ 5 years and > 5 years), with social security. No interaction was found. For the cognitive coping style the p values were: Social security $p < 0.02$, years since diagnosis $p = 0.67$, interaction $p = 0.39$. For supportant coping styles the p values were: Social security $p < 0.03$, years since diagnosis $p = 0.48$, interaction $p = 0.19$. We examined the possible association of supportant coping style with social

Table 1. Characteristics of the patients according to gender.

	Male (n = 51) Mean \pm SD	Female (n = 159) Mean \pm SD	Z	p
Age	59.7 \pm 11.3	55.3 \pm 10.0	-2.5	< 0.01
Years since diagnosis	9.7 \pm 8.0	9.2 \pm 6.1	0.4	0.70
BMI (kg/m ²)	25.8 \pm 3.8	28.0 \pm 4.7	3.04	< 0.002
Glucose mmol/L	9.5 \pm 2.8	8.9 \pm 2.4	1.1	0.30
HBA _{1c} (%)	11.5 \pm 2.7	11.9 \pm 2.8	1.1	0.25
Belief in conventional medicine (range 12-60)	47.2 \pm 6.9	45.8 \pm 8.3	0.7	0.49
Adherence to diet (range 7-35)	25.3 \pm 6.8	26.6 \pm 6.0	1.3	0.25
Adherence to medication (range 3-15)	13.3 \pm 2.6	12.4 \pm 2.9	-2.29	< 0.016
Social Support (range 4-20)	16.3 \pm 3.4	14.4 \pm 4.3	-2.8	< 0.004
Perception of economic cost (range 6-30)	14.7 \pm 6.2	14.5 \pm 7.2	-0.67	0.49
Coping styles of disease (range)				
Cognitive (13-65)	41.5 \pm 8.7	40.6 \pm 10.3	-0.71	0.48
Avoidant (9-45)	29.3 \pm 6.0	28.5 \pm 6.2	-0.69	0.49
Fatalistic (12-60)	39.4 \pm 8.8	37.5 \pm 8.8	-1.2	0.22
Supportant (9-45)	31.8 \pm 5.6	29.0 \pm 6.5	-2.56	< 0.009
Complications				
	n(%)	n(%)	χ^2	P
Nephropathy	6(11.76)	29(18.24)	1.16	0.28
Retinopathy	20(39.2)	50(44.0)	1.05	0.30
Neuropathy	25(49.0)	67(42.1)	0.74	0.39

support and we find a significant association ($r = 0.159$, $p < 0.021$).

Factors associated with adherence to treatment

Table 2 shows the factors associated with adherence to diet in the multiple regression procedure. Belief in conventional medicine was a significant regressor and fatalistic coping style was marginally associated after Bonferroni correction. It should be mentioned that social support and the perception of the burden of treatment cost on family finances were not included in the model ($p = 0.09$ and $p = 0.11$, respectively). In order to study the influence of years since diagnosis and social security coverage, we included each factor as dummy variable in hierarchical analysis. In this model, years since diagnosis was not significant ($F = 0.301$, $p = 0.58$). After testing, social security coverage showed marginal significance ($F = 4.89$, $p < 0.028$ and $p = 0.15$ after Bonferroni correction).

Adherence to medication was associated with the supportant and the avoidant coping styles. Perception of the burden of treatment cost on family finances initially showed significance, but it was not maintained after correction. In the test of years sin-

ce diagnosis or social security coverage as dummy variables, no significance was found (for years since diagnosis $F = 0.23$, $P = 0.63$, and for social security coverage $F = 0.015$, $p = 0.90$).

DISCUSSION

Our group of type 2 diabetic patients is representative of middle and low socioeconomic subjects from our population. They had low schooling, with high glycosylated hemoglobin levels, and low scores for adherence to treatment, especially to diet. Adherence to diet was associated with belief in conventional medicine and marginally with fatalistic coping style. Adherence to medication was associated with supportant coping styles and had a marginal association with avoidant coping styles.

Male patients had higher scores for social support and supportant coping style.³¹ Men also perceive greater family support. In traditional societies men have a predominant role as the family's main economic provider. On the other hand the housewife is the provider of emotional support especially in critical circumstances such as disease. Therefore, it is not surprising that men receive more support. In other diseases as myocardial infarction, women also perceive less social support.³²

Table 2. Multiple regression analysis of factors associated with adherence to diet and medication.

Variable included	β	t	P	Pc*
Adherence to diet Adjusted R ² = 0.064; p = 0.0004				
Constant	15.03	5.25	< 0.0001	
Belief in conventional medicine	0.143	2.71	< 0.007	< 0.035
Fatalistic coping style	0.123	2.62	< 0.010	< 0.05
Including social security coverage as dummy variable Adjusted R ² = 0.081; p = 0.0003				
Constant	14.88	5.25	< 0.0001	
Belief in conventional medicine	0.155	2.95	< 0.004	< 0.02
Fatalistic coping style	0.11	2.39	< 0.018	< 0.09
Social Security (with or without)		F = 4.893	< 0.028	0.15
Adherence to medication Adjusted R ² = 0.065; p = 0.0008				
Constant	11.45	10.87	< 0.0001	
Supportant coping style	0.225	2.85	< 0.0048	< 0.02
Avoidant coping style	-0.200	-2.62	< 0.0094	< 0.05
Perception of the burden of treatment cost on family finances	0.147	2.02	< 0.045	0.2

* Pc: P value after the Bonferroni correction.

The group with > 5 years since diagnosis had higher levels of glycated hemoglobin, a finding explained by the decreased metabolic control usually found in advanced stages of disease.³³ The group with social security had higher scores for adherence to diet, for cognitive and supportant coping styles and lower perception of the burden of treatment on family finances. These findings are in keeping with a higher socioeconomic level in these patients, considering that in families without social security, none of the members have a permanent job.

In the study of factors associated with adherence to diet, belief in conventional medicine had a strong correlation. This finding agrees with our previous report,⁹ and underlines the importance of cultural factors that give preference to parallel medicine, and distrust the alien modalities of conventional medicine. This subject merits a profound review for the strategies of providers of medical services in different parts of the world.

In regard to coping styles, the avoidant strategy was marginally associated with adherence to medication. This finding is explained because denial may induce avoidant coping styles. Denial has been found to hinder adherence to treatment, mainly at early years of disease.²⁴ The use of avoidance strategies has been found in other studies.^{16,34} Previous reports have noted that patients who favor avoidance coping may do better in treatment that play down personal control and responsibility.³⁵

The supportant coping style was associated, in a positive manner, with adherence to medication. This indicates that patients, who look for support, better comply with treatment. It is important to identify patients who do not look for support in response to the stressful situation of disease. They might require special strategies to induce the compromise of other relatives in the attention of disease. It is feasible that the supportant coping style may be more prone to perceive the social support they receive, and in fact a significant association was found between those factors. Other works have shown a significant relationship of adherence to diet with perceived social support.³⁶ Also has been showed that better levels of social support are associated with lower fasting glucose.³⁷

It is of interest that social support was not associated with adherence to treatment in the model of multiple regression analysis. This is at variance with our previous finding.⁷ In this study, however, this factor was marginally excluded from the

model after the inclusion of supportant coping style.

The fatalistic coping style, showed a marginal positive association with adherence to diet. This strategy, as proposed by Jalowiec, implies a pessimistic, regressive, nugatory attitude with a sense of powerlessness.²⁹ This association may indicate that the emotional reaction in spite of its negative nature might induce an adaptive component of behavior.³⁸ We must consider that coping style is much more specific to stressful environments and to the changes noted in one's behavior and cognitions during times of stress.¹⁴ Thus, it is possible that a fatalistic style might impair avoidance and denial, and thus facilitate a better adherence to diet.

The influence of the availability of social security means access to free treatment for diabetes. It was surprising that it had only marginal influence on adherence to diet, and no influence on adherence to medication. The latter aspect may be explained because the factor "adherence to medication" may not be determined by the type and cost of prescribed medication. The marginal influence on adherence to diet may be related to the higher socioeconomic level of subjects in the group with social security coverage. It was also unexpected that the perception of the economic cost of treatment was also unrelated to social security coverage. These findings were interpreted to mean that attitudes are a stronger determinant of adherence than the perception of the cost of treatment.

In this work we did not consider relevant to analyze the association of adherence to treatment with metabolic control, as assessed by HbA_{1c}. Our group of study was obtained from diverse health care units, with varied resources and quality of medical attention, both important factors for the treatment outcome. Adherence to treatment with a substandard medical care or with insufficient resources for monitoring and treatment might correlate poorly with effectiveness of metabolic control. Yet, adherence to treatment is a cornerstone for the control of chronic metabolic diseases, considering that the quality of medical services is interrelated with adherence to treatment. Patients with better adherence are in a position to demand better services.

Our results support the concept that the best adherence can only be obtained if the psychosocial conditions of the patients, are carefully considered.³⁹ Furthermore, effective coping can protect individuals from the deleterious effects of stress.³⁷ Treatment to diabetic patients requires a profound change from traditional, bio-medical approach to a comprehensive bio-psycho-social approach.

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