Effect in self-care behavior and difficulties in coping with diabetes during the COVID-19 pandemic

Efecto en el comportamiento de autocuidado y dificultades para hacer frente a la diabetes durante la pandemia de COVID-19

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ABSTRACT

In this study, difficulties in coping with diabetes were evaluated during the coronavirus disease 2019 (COVID-19) lockdown. Similarly, the change in diabetes self-care activities was evaluated in patients with a recent assessment before COVID-19 lockdown in Mexico City. In 212 patients with type 2 diabetes (T2D) and regular primary care, a designed questionnaire was used to evaluate the presence/absence of difficulties in self-care related to diet, physical activity/exercise, glucose monitoring, treatment adherence, getting pharmacological treatment, and confinement adherence. The Summary of Diabetes Self-Care Activities tool was used to compare the frequency of self-care behaviors in the past 7 days. Self-reported difficulties in coping with T2D were documented and included difficulties in self-care behaviors related to diet (41.6%), physical activity/exercise (40.5%), glucose monitoring (23.7%), getting pharmacological treatment (22.9%),

RESUMEN

En el presente estudio se evaluaron las dificultades para hacer frente a la diabetes por los pacientes durante el confinamiento por COVID-19. Así mismo, se evaluó el cambio en las actividades de autocuidado de diabetes en pacientes con evaluación reciente antes del confinamiento por COVID-19 en la Ciudad de México. En 212 pacientes con diabetes tipo 2 (DT2), se utilizó un cuestionario diseñado para evaluar la presencia/ausencia de dificultades para el autocuidado. La herramienta *Summary of Diabetes Self-Care Activities* (SDCA) se utilizó para comparar las actividades de autocuidado, reportado en días a la semana. Las dificultades reportadas por los pacientes incluyeron las relacionadas con: alimentación (41.6%), actividad física/ejercicio (40.5%), monitoreo de glucosa (23.7%), acceso al tratamiento farmacológico (22.9%), adherencia al tratamiento farmacológico (19%) y adherencia al confinamiento (11.7%). En el grupo de pacientes con una

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pharmacological treatment adherence (19%), and home-confinement adherence (11.7%). In the group of patients with a recent previous-lockdown evaluation, global self-care behavior decreased from 5.15 ± 0.9 to 4.49 ± 1.02 days/week, $p < 0.001$. Diabetes self-care was a predictor for the presence of difficulties in coping with diabetes. Patients with T2D reported difficulties in coping with T2D and decreased diabetes self-care activities during the COVID-19 lockdown in Mexico City. Health-care policies must be designed and implemented to attenuate diabetes disease burden caused by this ongoing and future health-contingencies.

Key words: Diabetes self-care. Self-care behavior. Coronavirus disease 2019. Lockdown.

evaluación reciente previa al confinamiento, la actividad global de autocuidado disminuyó de 5.15 ± 0.9 a 4.49 ± 1.02 días/semana, *valor* $p < 0.001$. El autocuidado en diabetes fue predictor de la presencia de dificultades para hacer frente a la diabetes. Los pacientes informaron dificultades para afrontar la diabetes y disminuyeron las actividades de autocuidado durante el confinamiento por COVID-19. Políticas de atención médica deben diseñarse e implementarse para atenuar la carga de la enfermedad causado por esta y futuras contingencias en salud.

Palabras clave: Autocuidado diabetes. Autocuidado salud. COVID-19. Confinamiento.

INTRODUCTION

The coronavirus disease 2019 (COVID-19) outbreak caused by severe acute respiratory syndrome coronavirus 2 was first reported in Wuhan, China, and now has evolved into a global pandemic¹. Patients with pre-existing conditions such as type 2 diabetes (T2D) mellitus, obesity, and cardiovascular disease, among others, have a higher risk of developing more severe disease². According to the Centers for Disease Control and Prevention, patients with T2D and metabolic syndrome might have up to 10-times greater risk of death when they contract COVID-19³. Hyperglycemia leads to a suppressed immune state and predisposes patients to infections, making glycemic control an important variable to reduce the risk and severity of COVID-19⁴.

In Mexico, the Federal Government suggested quarantine to people susceptible for severe COVID-19, including older than 60 years and patients with T2D, among others. Globally, strategies established to reduce the virus spread include physical distancing and lockdown, which can be an additional burden for the patients, since they produce a notable emotional impact with symptoms of anxiety, stress, and depression⁵.

Social restrictions and emotional distress may have a negative impact on the comprehensive management of T2D, including metabolic control, self-care behaviors, and self-care management⁶. Diabetes self-care activities are behaviors undertaken by T2D patients and contribute to successful self-management^{7,8}.

These self-care behaviors positively correlate with good glycemic control, reduction of complications, and improvement in the quality of life^{7,9}.

Lockdown may impose difficulties for executing self-care activities since some of them are dependent on leaving home to be able to execute them. Moreover, information is lacking regarding the impact and health needs among patients living with T2D during and after the COVID-19 outbreak, but also about consequences related to the lockdown and social distancing on diabetes care goals, including diabetes self-care. Therefore, the aim of this study was to evaluate the effect of the COVID-19 pandemic on diabetes self-care behavior and to know the difficulties in coping with diabetes during the lockdown in persons living with T2D.

MATERIALS AND METHODS

Subjects

An observational cross-sectional survey was conducted among 212 patients with T2D who registered a visit for dispensing medications in the pharmacy of Clínica Especializada en el Manejo de la Diabetes from the Mexico City government during the COVID-19 health contingency between April 20, 2020, and May 29, 2020. Patients were participants of the Diabetes EMpowerment and Improvement of Care (DIABEMPIC) program, whether they had finished the program recently (previous 2 months) or

were ongoing. The DIABEMPIC program is a quality improvement-of-care initiative in the public primary health-care system, designed to improve clinical outcomes for patients with T2D through multicomponent intervention, including interdisciplinary care and self-management education scheme^{7,10-12}. These patients were referred from primary outpatient centers located in urban areas of Mexico City, they were beneficiaries of the INSABI (public health insurance), and some of them continue to receive medication at the Clinic when they finished the program. The study protocol was approved by the ethics and investigation in humans' committee Institutional Review Board (101-010-019-20). The DIABEMPIC study was registered in ClinicalTrials.gov (Identifier: NCT04245267). The participation criteria were as follows: (a) T2D patients older than 18 years and (b) acceptance to participate after explaining the survey and the questionnaire. The data related to demographic characteristics, time since diagnosis, and comorbidities were collected from medical records and confirmed during the interviews.

Self-reported difficulties and self-care assessment

A questionnaire was used to identify the presence/absence of difficulties for coping with T2D during the COVID-19 lockdown. The questionnaire included components related to difficulties for self-care related to diet, physical activity/exercise, glucose monitoring, treatment adherence, getting pharmacological treatment, and difficulties for confinement adherence for working purposes. For example, for self-care difficulty related to diet, the question was as follows: During this COVID-19 lockdown, do you have difficulties related to the lockdown in following recommendations for diet self-care? The 11-item version of the Summary of Diabetes Self-Care Activities¹³ was used to measure the frequency of self-care behavior in the past 7 days. In this study, we report a global self-care behavior score (average of diet, physical activity/exercise, glucose monitoring, and foot-care behaviors) reported in days a week patient executes self-care activities. Global self-care score was also previously measured in patients who completed the DIABEMPIC program between

February 2020 and March 2020, so a comparative analysis with this group of patients was possible. After getting their reply, an appointment for telephone consulting was scheduled for advice about any inquiries related to their T2D management.

Statistical analysis

The normality of the variables was explored through the Shapiro-Wilk test. Categorical variables were presented as frequency and percentage, and continuous variables as mean and standard deviation (SD). To compare global self-care activities, previous-lockdown global self-care score versus during-lockdown global self-care score, a paired-sample t-test was performed. To predict the presence of self-reported difficulties, a generalized linear model with a quasibinomial link function was used. This link function addresses the over-dispersion of the data, making stricter the omnibus test. Multiple correspondence analyses were used to generate a map to show the spatial relationship between questionnaire variables. It was considered a two-tail study and a $p < 0.05$ was considered statistically significant. Missing values were managed by complete case analysis. The sample size was computed by convenience since it included all subjects that completed the DIABEMPIC program that accepted to participate answering the questionnaire. The statistical programs used as SPSS version 21 (IBM, Armonk, NY, USA).

RESULTS

A total of 212 patients with T2D were included in the study. Most patients were female (61.3%), 50.4% had hypertension, and according to the body mass index criteria, 41.9% had obesity. The mean age was 54.3 ± 10.9 years, and mean disease duration was 11.4 ± 7.7 years.

In table 1, the clinical characteristics of the study population and self-reported difficulties for self-care performance are presented. The variables with higher self-reported difficulties were diet (41.6%), physical activity/exercise (40.5%), and glucose monitoring

Table 1. Clinical characteristics of the study population (n = 212)

Characteristics	n = 212
Female, %	130 (61.3)
Age, years	54.3 ± 10.9
Primary school or less education	89 (41.9)
Diabetes duration, years	11.4 ± 7.7
Age at diagnosis, years	43.5 ± 10.3
Hypertension, %	107 (50.4)
Obesity (body mass index), %	89 (41.9)
Self-reported difficulties for self-care performance	
– Diet	88 (41.5)
– Physical activity/exercise	85 (40)
– Monitoring glucose	50 (23.5)
– Treatment adherence previous weeks	40 (18.8)
– Getting pharmacological treatment	48 (22.6)
– Confinement adherence	25 (11.7)

Data are presented as number (percentage) or mean ± standard deviation as indicated.

Table 2. Quasibinomial regression models for pre-pandemic and pandemic global self-care behavior scores and the presence of difficulties

Variable	Estimate	exp(β)	95% CI	p - value
Diet model				
Pre-pandemic global self-care	−0.53	0.58	0.37-0.9	0.015
During pandemic global self-care	−0.84	0.42	0.26-0.69	<0.001
Exercise model				
Pre-pandemic global self-care	−0.47	0.62	0.4-0.95	0.031
During pandemic global self-care	−0.67	0.51	0.32-0.79	0.003
Medication model				
During pandemic global self-care	−0.5779	0.56	0.32-0.97	0.038

Exp (β) refers to odds ratio.

(23.7%). In the group of patients with a recent pre-previous-lockdown evaluation (n = 106), the global self-care activities score decreased from 5.15 ± 0.9 to 4.49 ± 1.02 days/week, $p < 0.001$ (Fig. 1).

Pre-pandemic and pandemic global self-care behavior scores were significant predictors in the quasibinomial regression models (Table 2). A pre-pandemic high score in the self-care behavior scale was related to fewer difficulties in diet and exercise ($p < 0.05$). A high global self-care behavior score during pandemic had also an inverse relation with difficulties in diet, exercise, and medication ($p < 0.05$).

Multiple correspondence analyses reduced the questionnaire in two dimensions, and it explained 62.8% of the variance. Figure 2 shows the spatial relationship between variables; variables answered as "no difficulties" were colored black and "with difficulties" were colored gray. Dimension one did not split the variables, but dimension two splitted the data in two groups: one by no difficulties in the medication attachment and other with the rest of the answers. This clustering expressed the inverse relationship between no difficulties in medication attachment and the rest of difficulties explored by the questionnaire.

Figure 1. Previous and during coronavirus disease 2019 lockdown global self-care activities score (days a week) in Mexico City ($n = 106$). Data are expressed as mean of global self-care score (diet, physical activity/exercise, glucose monitoring, and foot care) in days a week.

DISCUSSION

This study aimed to analyze the effect in self-care behavior and the presence of difficulties in coping with diabetes treatment during the COVID-19 lockdown in patients with regular primary care in Mexico City. Remarkably, patients with T2D reported a high frequency of difficulties for self-care behavior performance, particularly for coping with a diet plan and exercise recommendations. In addition, patients decreased global self-care behavior during the COVID-19 outbreak, but patients with better self-care behavior performance reported less difficulty in coping with diabetes. To the best of our knowledge, this is one of the first studies demonstrating the effect of the COVID-19 lockdown in diabetes self-care behavior and the presence of difficulties in coping with diabetes in patients living with T2D.

The evidence about the barriers and difficulties for the management of disease in patients with T2D imposed by COVID-19 is scant. Nachimuthu S. reported regular adherence to exercise and diet in India, but only 28% of patients surveyed were

Figure 2. Spatial relationship between variables of the difficulties related to self-care questionnaire. SMBG: self-monitoring blood glucose. This map is constructed with the first two dimensions acquired by multiple correspondence analysis. The variances represented by the first two dimensions were 38.7% and 24.1%, respectively.

checking their blood glucose levels during COVID-19 lockdown¹⁴. In this work, we report not only the presence of difficulties in coping with diabetes but also a comparison between the current-lockdown diabetes self-care with that before the lockdown.

Diabetes requires lifelong behavioral modifications for effective treatment, such as regular exercise, dietary changes, frequent blood glucose testing, and medication adherence¹⁵. Previously, we reported worst outcomes related to deficits in self-care and disease knowledge in patients with T2D in the primary care setting, which improved with a multicomponent intervention focused on diabetes therapeutic education and self-care behaviors changes^{7,11,12}.

The COVID-19 lockdown imposed different barriers to continue with disease self-care by patients with T2D. The restriction to stay at home difficult to make decisions about the food consumed, to exercise at

open spaces or sports centers, and to obtain medications¹⁴. In this study, a significant proportion of patients reported that these confinement-induced difficulties to continue their care related to diet, physical activity and exercise, and glucose monitoring. Similarly, patients had difficulties in accessing their pharmacological treatment and attending the recommendation of confinement due to the need to continue working.

Furthermore, many patients stopped attending their routine medical appointments in health centers during this lockdown, because of either the risk of contagion or the lack of capacity of the overwhelmed health-care system by COVID-19 patients. Multiple actions can be implemented to handle these problems, such as telemedical care, improvements in the dispensing of medications, psychological support, and counseling to continue their diabetes self-care^{6,16,17}.

In our study, better pre-pandemic self-care behavior was related to less difficulty in diet and exercise. A high self-care behavior score reported during pandemic had also an inverse relation with difficulties in diet, exercise, and medication. This could reflect that when a patient has better self-care activities performance, it is more likely to have better diabetes management in health contingencies scenarios, and patients are less dependent on the health-care system to continue managing their disease. Therefore, effective strategies focused on improving self-care and provide self-efficacy in regular care should be considered to decrease diabetes disease burden in these scenarios^{7,18,19}.

Although these results are novel and potentially useful in COVID-19 lockdown in patients with T2D and regular primary care, our study has several limitations. First, this is a cross-sectional exploratory study, so we are not able to conclude causality; even though a longitudinal analysis of self-care was done, it is not possible to conclude that the decrease in self-care was not influenced for other variables that were not included in this study. However, as any other epidemiological study, it is a hypothesis generator, and it examines the impact of the COVID19 lockdown in an important determinant of health in diabetes, just like self-care and medication

adherence. Second, the studied population belongs to a group of patients with a recent finished diabetes multicomponent intervention, so this decrease in self-care was observed in patients with a previous high self-care performance. Nevertheless, people with the absence of this kind of quality of care interventions may have lower skills in coping with diabetes, then the negative impact of COVID-19 lockdown could be even greater in these populations. Third, we report only the presence of difficulties for diabetes self-care, but the causes that explain each difficulty is not evaluated, so a wider causal research study are recommended. In this work, the presence of difficulties related to self-care habits such as glucose monitoring, physical activity/exercise, and diet were clustered with each other, but not with medication adherence (Fig. 2), suggesting associations between barrier mechanisms. The effect of the economic impact caused by this quarantine, which conditioned the loss of economic incomes in many households, is an aspect that must be investigated as a barrier to carrying out self-care and adherence actions, particularly in populations with social backwardness. Finally, this study was performed in a single center; thus, a center-specific bias cannot be excluded from the study. However, it is a reference center for other health-care units within the first level of care in the public health system, so it may be a representative sample of patients with diabetes in Mexico City. Moreover, the study highlights the need to consider difficulties in coping with diabetes across populations that surely share similarities with our sample.

CONCLUSIONS

The COVID-19 lockdown affects diabetes self-care performance and imposes difficulties in coping with diabetes in patients with T2D. Diabetes self-care was a predictor for the presence of difficulties in coping with diabetes. Futures studies about the impact on diabetes care goals are guaranteed. Health-care policies must be designed and implemented to attenuate diabetes disease burden caused by this ongoing and future health-contingencies.

Approval was obtained by the institutional Bioethics and Research Health Ministry Board (101-010-019-20).

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

FUNDING

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ETHICAL DISCLOSURES

Protection of human and animal subjects. The authors declare that no experiments were performed on humans or animals for this study.

Confidentiality of data. The authors declare that they have followed the protocols of their work center on the publication of patient data.

Right to privacy and informed consent. The authors declare that no patient data appear in this article.

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