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Physical activity, self-care, and quality of life in Type 2 diabetic in the COVID-19 pandemic

Atividade física, autocuidado e qualidade de vida em diabéticos Tipo 2 na pandemia de COVID-19

Marinilda Santana Gomes de Freitas[1]*; Ingrid Marianne de Freitas Santos[2]; Sulyvan Ítalo Daher Chaves[1]; Silvia Regina Arruda de Moraes[1]; Anna Lima Jaguaribe de Lima [1,3]

[1] Postgraduate Program in Physical Therapy, Federal University of Pernambuco (UFPE), Recife (PE), Brazil
[2] Physiotherapy Department, Federal University of Pernambuco (UFPE), Recife (PE), Brazil
[3] Department of Animal Morphology and Physiology, Federal Rural University of Pernambuco (UFRPE), Recife (PE), Brazil

***Corresponding author:** Marinilda Santana Gomes de Freitas – *E-mail* - marinildasantana@gmail.com

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ABSTRACT
To evaluate factors associated with the level of physical activity during the COVID-19 pandemic in individuals with type 2 diabetes mellitus (DM2). Cross-sectional study, involving 211 people with DM2 aged ≥ 45 years, using Google Forms to collect information: personal data, International Physical Activity Questionnaire (IPAQ), Self-Care Inventory (SCI-R) and Brazilian version of the PAID Scale (B-PAID). There was a prevalence of DM2 diagnosis over 10 years (42.1%); in general, they were active (55.2%), with high emotional distress (52.6%) and low self-care (71.6%). There was an association between the level of physical activity and perceived health [95% CI OR = 2.421-1.264; p < 0.008) and the level of physical activity and insomnia (OR = 0.410-0.196; (p < 0.018). A higher level of physical activity was associated with positive self-perception of health and insomnia.

Keywords: Diabetes *mellitus.* Social isolation. Physical activity. COVID-19.

RESUMO
Avaliar fatores associados ao nível de atividade física durante a pandemia da COVID-19 em indivíduos com diabetes mellitus tipo 2 (DM2). Estudo transversal, envolvendo 211 pessoas com DM2 e idade ≥ 45 anos, utilizando o *Google Forms* para coletar informações: dados pessoais, Questionário Internacional de Atividade Física (IPAQ), Inventário de Autocuidado (SCI-R) e Versão Brasileira da Escala PAID (B-PAID). Houve prevalência do diagnóstico do DM2 acima de 10 anos (42,1%); no geral, eram ativos (55,2%), com alto sofrimento emocional (52,6%) e com baixo autocuidado (71,6%). Foi observada associação do nível de atividade física e a percepção de saúde [IC 95% OR = 2,421-1,264; p < 0,008) e o nível de atividade física e a insônia (OR = 0,410-0,196; (p < 0,018). O maior nível de atividade física foi associado à autopercepção de saúde positiva e à insônia.

Palavras-chave: Diabetes *mellitus.* Isolamento social. Atividade física. COVID-19.

INTRODUCTION

According to the International Diabetes Federation (IDF), diabetes mellitus is defined as a metabolic disorder that causes persistent hyperglycemia as a result of a deficit in insulin production or action [1]. It is also a public health problem associated with urbanization, the epidemiological and nutritional transition, sedentary lifestyle, overweight, population aging and

the survival of people with diabetes [1]. There are two main types of diabetes mellitus: type 1 diabetes mellitus (DM1), characterized by the inability to produce insulin, and type 2 diabetes mellitus (DM2), which is associated with insulin resistance [1,2]. DM2 accounts for most cases of diabetes (90-95%) and has no cure, only control, with obesity, physical inactivity and an unhealthy diet being the main contributing factors [1,2].

The Brazilian Society of Diabetes (SBD 2019-2020) states that the objective of DM2 treatment is to prevent or delay complications and preserve the quality of life (QoL) of patients [2]. QoL is an important component in treatment, as it reflects the individual's perception of their life in facing health problems, their consequences and associated treatments [3]. In this context, self-care is an essential part of the treatment, with practices and activities aimed at the health, well-being and life of people with diabetes. This includes maintaining a healthy diet, an active lifestyle, monitoring glucose, using medications correctly, solving problems and reducing risks[2].

In its guidelines on physical activity and sedentary behavior (2020), The World Health Organization (WHO) recommends that adults and older adults with chronic conditions, such as DM2, maintain regular physical activities of moderate to vigorous intensity, as this can reduce disease progression [4]. Physical activity plays a key role in promoting health, preventing and treating DM and its complications, contributing to maintaining a healthy weight and general well-being [4].

Many countries adopted social isolation as a preventive measure during the COVID-19 pandemic, especially for risk groups such as people with diabetes [5]. DM has been associated with the severe form of COVID-19 and has been one of the most common comorbidities in fatal cases of the disease [6,7]. Confinement and the remote performance of activities resulted in a reduction in physical activity levels, which had a significant impact on health in several aspects, including physical [5,8,9].

Thus, this study aimed to evaluate factors associated with the physical activity level during the COVID pandemic in individuals with DM2.

METHODOLOGY

This cross-sectional observational study involved volunteers aged 45 years or older, diagnosed with DM2 for at least six (6) months. The form used in the present study was available online on the *Google Forms platform* from January 25 to June 30, 2021

(epidemiological weeks 4 to 26 of 2021, of Epidemiological Bulletin number 148; a decrease period in the number of cases and the start of reopening). An electronic form for collecting personal data and self-administered questionnaires adopted in the study were available, and enabled the volunteers to participate at a low cost and without exposing them, or the researchers, to the risk of contamination. The form did not receive personal identification from the participants.

This study followed the ethical principles of respect for people's autonomy, indicated by the Resolution of the National Health Council (CNS), no. 466, of December 12, 2012, and was approved by the Research Ethics Committee of the Federal University of Pernambuco (Opinion number: 4,459,310). After reading the information about the study and the Informed Consent Form, the interested parties clicked on the option: "I declare that I understand the objectives, risks and benefits of my participation in the research and I agree to participate".

The individuals who participated in the study were people diagnosed with DM2 recruited from a database referring to previous studies and through disclosure in the UFPE newsletter and digital media (Facebook, Instagram and WhatsApp).

The evaluation form and questionnaires were made available in the following order:

1. The following information was collected on the evaluation form: personal identification data; patient's clinical history (hypertension and cardiac complications); social history (smoking, alcoholism and practice of physical activity); functional independence and limitations in activities of daily living (ADLs), medications in use; identification of patients who were infected by COVID-19 and manifested symptoms (cough, shortness of breath, fatigue, fever, sore throat, nasal congestion, headache, body pain, loss of taste and smell) and recovery time.

2. The International Physical Activity Questionnaire (IPAQ) was chosen for this study due to its efficiency, feasibility and validity to quantify the physical activity of the population at different levels involving leisure, commuting from one place to another, housework and occupational activities. It is an acceptable and validated self-reported questionnaire for Brazilian Portuguese. It was used in its short form which records activity at four levels of intensity: 1) vigorous intensity, such as aerobics, 2) moderate intensity, such as recreational cycling, 3) walking, and 4) sitting time. It is structured to provide separate scores for each type of activity [10,11]. Data processing and classification were carried out as suggested by the guidelines of the IPAQ Coordinating Center in Brazil (CELAFISCS) and the IPAQ GUIDELINE [12].

3. The Self-Care Questionnaire Inventory-Revised (SCI-R), translated and validated into Portuguese as the Self-Care Inventory, was selected for this study because it is a self-report questionnaire that assesses patients' perceptions of self-care behaviors, valid for type 2 diabetic patients. It provides brief and solid analysis of adherence to recommended self-care behaviors for adults with type 1 or type 2 diabetes [9]. The questionnaire consists of 15 questions involving glucose monitoring, physical exercise and dietary care, and uses a 5-point Likert scale to reflect how well patients followed diabetes treatment recommendations in the last 1-2 months (1 = "never" to 5 = "always"). Higher scores indicate better adherence [13].

4. The assessment of the impact of diabetes on quality of life was performed using the Brazilian version of the PAID Scale (B-PAID), validated for Brazilian Portuguese, consisting of 20 questions that indicate the individual's perception of the problems faced in everyday life with the disease, and focuses on aspects related to living with DM and its treatment. It presents four subdivisions: problems with food, social support, treatment and emotional problems. It uses a score from 0 to 100, in which the maximum score is configured as greater suffering. The total score is obtained by adding the answers to the 20 PAID items and multiplying by 1.25. Possible response options are divided into a five (5)-point Likert scale, ranging from: "Not a problem=0", "Small problem=1", "Moderate problem=2", "Almost serious problem= 3", "Serious problem=4". The cut-off point for analyzing the results is 40, with equal or higher values indicating a high degree of emotional distress [14].

STATISTICAL ANALYSIS

As data were being collected, they were automatically stored in an Excel XP 2010 Microsoft® database and all statistical analyzes were performed with Statical statistical *software* Package for Social Science (SPSS) version 20 for Windows. Statistical analyzes comprised descriptive and inferential statistics. Descriptive statistics were performed to describe demographic and clinical characteristics, variables related to care during the COVID-19 pandemic, and physical activity level. Therefore, absolute (n) and relative (%) frequencies were used for categorical variables.

We initially used bivariate analyzes (Pearson's Chi-Squared test or Fisher's Exact Test) to determine the factors associated with the of physical activity level. In this sense, all variables with a value of $p<0.05$ in the bivariate analyzes were tested in the multivariate analysis using Binary Logistic Regression. The variables with values of $P<0.05$ remained in the final model

(Wald test). The selection method adopted for choosing the variables was stepwise in the backward direction. When necessary, the models were compared through Omnibus Model Coefficients tests. The Hosmer-Lemeshow test was adopted to assess the goodness-of-fit. Odds ratios (OR) and 95% confidence intervals (95% CI) were obtained for each variable. The value of $p<0.05$ was adopted as statistically significant for all analyses.

Data availability

It was not possible to communicate with 78 of the 192 contacts in the database for various reasons such as: the number does not exist, the number belongs to someone else, or the contact would not answer the calls. It was possible to contact 114 patients, and three (3) of these refused to participate, claiming fear of scam or fraud; 10 were unable to participate because they were hospitalized, had low vision or difficulty using electronic means. Of those who agreed to participate, 37 responded to the form.

Adding the participants from the database and social media, we obtained 235 responses; of these, 24 had to be excluded: 16 for incomplete data; eight (8) for not meeting the inclusion criteria; five (5) did not have DM2; and three (3) had only been diagnosed four months ago (period less than six months). Thus, 211 valid responses remained. All answered the electronic form correctly, were aged 45 years or older and had been diagnosed with DM2 for at least six months, thus meeting the inclusion criteria of the study.

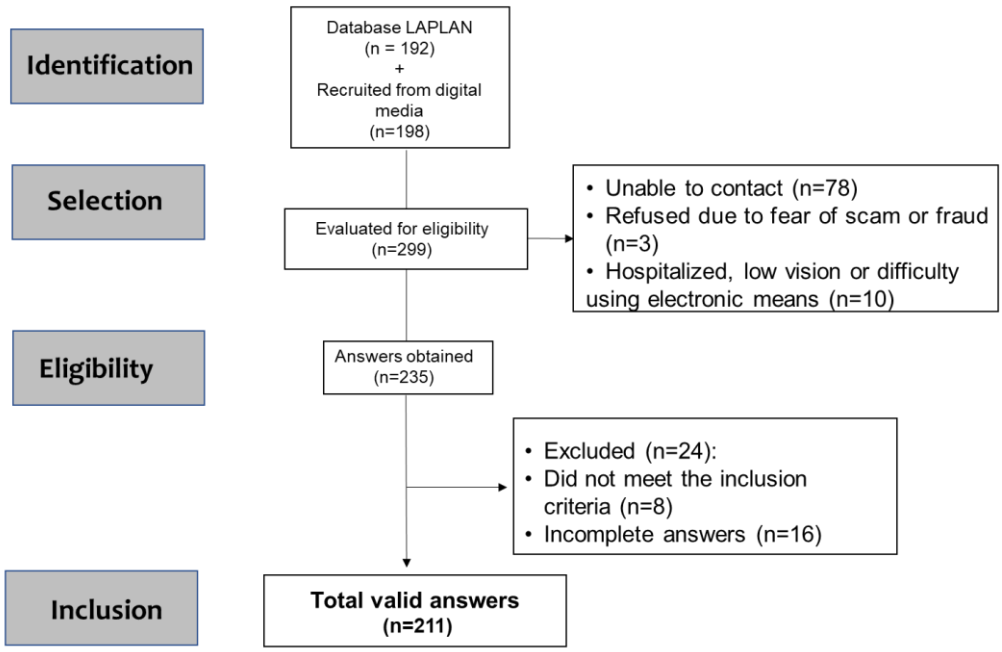

Figure 1. Flowchart for inclusion of participants in the study.

RESULTS

Table 1 presents the demographic and clinical characteristics of the present study sample. There were 211 people with DM2, of which 55.5% were between 45 and 59 years old, and 67.3% (142) were female. In the clinical data of this population, the majority (42.1%) had been diagnosed for more than 10 years, and 32.2% had two or more associated comorbidities.

Table 1. Sample characteristics

Variables	n (%)
Sex	
Masculine	69 (32.7)
Feminine	142 (67.3)
Age group	
Up to 59 years	117 (55.5)
60 to 69 years	67 (31.8)
Over 69 years old	27 (12.7)
Skin color	
White	124 (58.8)
not white	87 (41.2)
Family income	
Up to 3 minimum wages	106 (50.2)
Above 3 minimum wages	105 (49.8)
Education	
up to full elementary	44 (20.9)
Complete high school or higher	167 (79.1)
Marital status	
Lives with partner	112 (53.1)
Does not live with partner	99 (46.9)
Diagnosis of diabetes	
Less than 5 years	55 (26.1)
Between 5 and 10 years	67 (31.8)
Over 10 years	89 (42.1)
Number of associated comorbidities	
None	70 (33.2)
One	73 (34.6)
two or more	68 (32.2)
Diabetes complications	
Amputation	2 (0.9)
Vision problems	52 (24.6)
Diabetic foot	15 (7.1)
Other complications	27 (12.8)
Smoking	
former smoker	51 (54.2)
smoker	19 (9.0)
non-smoker	141 (66.8)
Alcoholism	
Yes	61 (28.9)
No	150 (71,)
Health perception	

positive	111 (52.6)
Negative	100 (47.4)

Values presented in absolute frequency (relative frequency).
Source: self-authored

Table 2 presents the variables related to care during the COVID-19 pandemic, in which 80.1% of the volunteers said they had carried out social isolation, while 67.8% were still isolated at the time of the study; 70.2% reported not having had a diagnosis for COVID-19, while 10.4% declared not knowing precisely if they had; however, 90.8% had symptoms. Of these symptoms, 64.6% were body pain and fatigue, followed by 52.3% headache and 50.8% cough. A loss of calmness (87.2%), loss of tranquility (78.2%), anxiety (66.8%), greater concern (65.9%), fear (51.7%) and sadness (51.7%) were reported regarding the feelings present during isolation.

Table 2. Clinical variables and symptoms in patients with DM2 during the isolation period due to the COVID-19 pandemic

Variables	n (%)
Diagnosis of COVID-19	
Yes	41 (19.4)
No	148 (70.2)
Do not know	22 (10.4)
Social isolation	
Yes	169 (80.1)
No	42 (19.9)
Current social isolation	
Yes	143 (67.8)
No	68 (32.2)
Symptoms of COVID 19 (n=65)	
Yes	59 (90.8)
No	6 (9.2)
Symptoms (n=65)	
Cough	33 (50.8)
Fatigue	42 (64.6)
Fever	26 (40.0)
Sore throat	22 (33.8)
Nasal congestion	23 (35.4)
Headache	34 (52.3)
Body ache	42 (64.6)
hypogeusia	30 (46.2)
Anosmia	29 (44.6)
Shortness of breathe	18 (27.7)
hospitalization	
Yes	5 (7.7)
No	60 (92.3)
COVID 19 precautions	
Wash hands when coughing/sneezing	157 (74.4)
Use of disposable when coughing/sneezing	83 (39.3)
wash hands in the bathroom	197 (93.4)
Wash hands before meals	184 (87.2)
Wash your hands when you get home	202 (95.7)
Feelings during social isolation	
loss of tranquility	165 (78.2)
Insomnia	67 (31.8)

loss of calm	184 (87.2)
Anxiety	141 (66.8)
Depression	46 (21.8)
Biggest concern	139 (65.9)
Panic	28 (13.3)
mood swings	74 (35.1)
bad thoughts	73 (34.6)
Fear	109 (51.7)
Stress	105 (49.8)
Sadness	109 (51.7)

Values presented in absolute frequency (relative frequency).
Source: self-authored

Table 3 describes the physical activity level, quality of life and degree of self-care of people with DM2 during the COVID 19 pandemic. There was a predominance of active people (55.2%), with poor quality of life with high level of suffering (52.6%) and with a low degree of self-care (71.6%), indicating low adherence to self-care.

Table 3 Level of physical activity, quality of life and self-care in patients with Type 2 Diabetes Mellitus during the period of isolation due to the COVID-19 pandemic

Variables	Values
Level of physical activity (n=163)	
Active	90 (55.2)
Not active	73 (44.8)
BPAID	
Low level of suffering	100 (47.4)
high level of suffering	111 (52.6)
Self care	
low self care	151 (71.6)
high self care	60 (28.4)

Values presented in absolute frequency (relative frequency). BPAID = Brazilian version of the PAID Scale
Source: self-authored

Table 4 shows that there was no association between sociodemographic factors and the physical activity level ($p>0.05$) in people with DM2 during the isolation period due to the pandemic.

Table 4 Association between sociodemographic factors and physical activity level in patients with Type 2 Diabetes Mellitus during the COVID 19 pandemic (n=163)

Variables	Active (n=90)	not active (n=73)	P
Sex			0.671
Masculine	28 (52.8)	25 (47.2)	
Feminine	62 (56.4)	48 (43.6)	
Age group			0.762
Up to 59 years	52 (56.5)	40 (43.5)	
60 to 69 years	29 (55.8)	23 (44.2)	
Over 69 years old	9 (47.4)	10 (52.6)	

Skin color			0.521
White	51 (53.1)	45 (46.9)	
not white	39 (58.2)	28 (41.8)	
Family income			0.931
Up to 3 minimum wages	45 (55.6)	36 (44.4)	
Above 3 minimum wages	45 (54.9)	36 (44.4)	
Education			0.901
up to full elementary	71 (55.5)	57 (44.5)	
Complete high school or higher	19 (54.3)	16 (45.7)	
Marital status			0.474
Lives with partner	53 (53.0)	47 (47.0)	
Does not live with partner	37 (58.7)	26 (41.3)	
Type of housing			0.549
isolated house	36 (49.3)	37 (50.7)	
House in isolated condominium	7 (53.8)	6 (46.2)	
Conjoined house	18 (60.0)	12 (40.0)	
Apartment	29 (61.7)	18 (38.3)	
Work			0.473
Yes	43 (52.4)	39 (47.6)	
No	47 (58.0)	34 (42.0)	

Values presented in absolute frequency (relative frequency)
Source: self-authored

Table 5 shows that there was an association between the physical activity level and the perception of health ($p < 0.015$). The results indicate that physically active patients report a more positive self-perception of health status and better quality of life, while physically inactive patients have a more negative perception and worse quality of life. There was no association for the other variables ($p>0.05$).

Table 5 Association between activity level and clinical characteristics in patients with Type 2 Diabetes Mellitus during pandemic isolation

Variables	Active (n=90)	not active (n=73)	P
Diagnosis of diabetes			0.092
Less than 5 years	28 (70.0)	12 (30.0)	
Between 5 and 10 years	29 (51.8)	27 (48.2)	
Over 10 years	33 (49.3)	34 (50.7)	
Number of associated comorbidities			0.233
None	32 (65.3)	17 (34.7)	
One	31 (51.7)	29 (48.3)	
two or more	27 (50.0)	27 (50.0)	
Diabetes complications			
Amputation	2 (100.0)	-	0.502
Vision problems	23 (59.0)	16 (41.0)	0.588
Diabetic foot	6 (46.2)	7 (53.8)	0.493

Other complications	14 (63.6)	8 (36.4)	0.393
Smoking			0.466
former smoker	23 (63.9)	13 (36.1)	
smoker	8 (57.1)	6 (42.9)	
non-smoker	59 (52.2)	54 (47.8)	
Alcoholism			0.316
Yes	22 (48.9)	23 (51.1)	
No	68 (57.6)	50 (42.4)	
Health perception			0.015
positive	53 (64.6)	29 (35.4)	
Negative	37 (45.7)	44 (54.3)	

Values presented in absolute frequency (relative frequency)
Source: self-authored

Table 6 shows the associations between physical activity level and variables related to care during the pandemic in people with DM2. It can be observed that the physical activity level was associated with insomnia (p=0.035) and with the possibility of hospitalization (p=0.011).

Table 6 Correlation between activity level and variables related to care during the pandemic in patients with DM2

Variables	Active (n=90)	Not active (n=73)	P
Diagnosis of COVID-19			0.891
Yes	16 (51.6)	15 (48.4)	
No	63 (55.8)	50 (44.2)	
Do not know	11 (57.9)	8 (42.1)	
Social isolation			0.819
Yes	74 (55.6)	59 (44.4)	
No	16 (53.3)	14 (46.7)	
Symptoms of COVID-19 (n=65)			0.571
Yes	28 (58.3)	20 (41.7)	
No	1 (33.3)	2 (66.7)	
Symptoms (n=65)			
Cough	14 (56.0)	11 (44.0)	0.903
Fatigue	20 (58.8)	14 (41.2)	0.689
Fever	8 (40.0)	12 (60.0)	0.051
Sore throat	9 (56.3)	7 (43.8)	0.952
Nasal congestion	12 (63.2)	7 (36.8)	0.484
Headache	16 (61.5)	10 (38.5)	0.492
Body ache	18 (52.9)	16 (47.1)	0.424
hypogeusia	14 (60.9)	9 (39.1)	0.601
Anosmia	13 (56.5)	10 (43.5)	0.964
Shortness of breathe	9 (56.3)	7 (43.8)	0.952
hospital need			0.374
Yes	13 (50.0)	13 (50.0)	
No	15 (62.5)	9 (37.5)	

hospitalization			0.011
Yes	-	5 (10.00)	
No	29 (63.0)	17 (37.0)	
Feelings during social isolation			
loss of tranquility	74 (59.7)	50 (40.3)	0.041
Insomnia	32 (68.1)	15 (31.9)	0.035
loss of calm	78 (55.7)	62 (44.3)	0.752
Anxiety	63 (59.4)	43 (40.6)	0.140
Depression	18 (48.6)	19 (51.4)	0.361
Biggest concern	56 (54.4)	47 (45.6)	0.776
Panic	12 (63.2)	7 (36.8)	0.459
mood swings	32 (59.3)	22 (40.7)	0.465
bad thoughts	32 (60.4)	21 (39.6)	0.358
Fear	48 (60.0)	32 (40.0)	0.228
Stress	50 (61.7)	31 (38.3)	0.096
Sadness	44 (55.0)	36 (45.0)	0.957

Values presented in absolute frequency (relative frequency).
Source: self-authored

The analysis of the results found in the adjusted logistic model (not shown in tables) demonstrates that the positive perception of health is positively associated with the physical activity level. The ß coefficient is 0.884, indicating that active individuals are more likely (OR = 2.421) to demonstrate a positive perception of health during the pandemic compared to non-active individuals. In addition, the presence of insomnia during isolation is negatively associated with the physical activity level. The ß coefficient is -0.891, which suggests that active individuals are less likely (OR = 0.410) to develop insomnia compared to non-active individuals.

DISCUSSION

The objective of this study was to evaluate the factors associated with the physical activity level during the social isolation period in the COVID- 19 pandemic in individuals with T2DM. The findings demonstrate that the physical activity level is associated with the perception of health, quality of life and insomnia.

The largest proportion of participants in the present study were non-hospitalized and women, corroborating the findings of a comparative study in China. In this latter study, the most severe and lethal cases were significantly higher in men [15]. In a study in Spain, women showed greater concern with the pandemic, which was reflected in greater compliance with safety measures when compared to men [16].

Most of the volunteers in the present study were generally active. This finding can be justified by the fact that this group is considered at risk for COVID-19, increasing concern about contamination. Some studies point out that maintaining a physically active life would be an important factor for health promotion, and may be a recommended prophylactic strategy in the context of the pandemic [17,18].

At the same time, the quality of life proved to be poor with a high level of emotional suffering reflected in a lower QoL and with a low degree of self-care. Low adherence to self-care can be explained by restrictions during the pandemic period, thus causing changes in sleep patterns, eating disorders and a decrease in healthy habits. Self-care aims to reduce the comorbidities caused by DM and makes it necessary for the patient to actively participate [19]. Changes in self-care in this period occurred due to staying at home or canceling social activities for fear of meeting people during the pandemic, while others were more physically active as a precaution related to COVID-19 [20, 21].

Contrary to expectations, there was no association in the results between sociodemographic factors and the physical activity level. This sample possibly limits conclusions about the relationship between the variables, making a deeper and more detailed comparison difficult.

Although the majority reported not having been diagnosed with COVID-19, a large number reported having had possible symptoms, which may suggest underreporting. The diagnosis of COVID-19 was a challenge worldwide and the great inequality in underreporting rates in countries that did not carry out enough tests presents an unreliable scenario of the infection incidence rates [22].

Most of the volunteers who had a positive perception of health proved to be active at the same time, showing an association between the physical activity level, the perception of health and quality of life. On the other hand, non-active patients showed a high level of emotional distress referring to a low quality of life, which is probably a reflection of the difficulty in maintaining focus and discipline in the necessary care already mentioned. Several studies show that patients with better metabolic control have better quality of life [23,24].

In a 2022 review during the COVID-19 pandemic, patients with DM showed a considerable increase in levels of stress, anxiety, depression, changes in sleep patterns and eating disorders, associated with social isolation measures, a decrease in healthy habits and concern for family members and the economic crisis [25]. These changes in eating habits, added

to boredom and stress, caused changes in meal times, increasing the consumption of carbohydrates and snacks, and creating obstacles to good glycemic control [20,26].

Meeting physical activity recommendations was specifically associated with reduced insomnia during isolation. The most active individuals in the present study showed a lower degree of insomnia, which may be related to the fact that these patients used physical activity as a strategy to try to reduce their level of stress. Some studies cite that blocking measures caused an increase in levels of stress, anguish, anxiety and depression, as well as changes in daily structures and behavior, which directly influence the self-management of diabetes compared to periods of normality [27].

According to a study from Brazil, non-active participants also demonstrated to have a more negative perception and a worse quality of life, and the perception of negative health level is associated with the adoption of risk behaviors [28] . Therefore, those who consider their current health to be fair or poor tend to have worse clinical conditions and higher morbidity and mortality indicators. The group was composed of volunteers with longer diagnosis time, ranging from five to 10 years, and over 10 years. Another study found a relationship between the chronic hyperglycemic state, long-term DM and complications, which tend to affect patients around 10 years after the disease is diagnosed, negatively reflecting on quality of life [29].

This study has some limitations, such as: the exclusive inclusion of individuals with an electronic internet connection, as well as impediments to some with little familiarity in using the computer, cell phone and the internet; the self-reported nature of the questionnaire leads to bias, as some questions on the form referred to past experiences which could be a source of recall bias in the study; when contacting patients, many did not feel safe answering calls from unknown numbers, as well as accessing links sent by third parties due to the wave of virtual scams applied in Brazil through calls and links to capture data and use them for fraud.

The strengths of the study are the recruitment of a characteristic age group for DM2 and its remote performance due to the pandemic scenario. This format avoided possible researcher influence, which could exist if the survey was conducted over the telephone. At the same time, it made this study viable and safe for both researchers and volunteers in a period of high COVID-19 cases and travel restrictions. Furthermore, it enabled cheap access to people and with a greater scope. Encouraging the adoption of remote surveys is not only a valid alternative, but can also optimize data collection dynamics. Research in digital environments presents a diverse range of opportunities to investigate social behavior in everyday life, developing identities and building narratives and performances [30].

The need for careful monitoring and specific treatment for patients with diabetes mellitus, including self-care and physical activity, should have been even more pronounced during the COVID-19 pandemic. Physical activity plays a vital role in managing type 2 diabetes and improving overall health. Interventions can lead to significant benefits in glycemic control, physical and mental well-being, prevention of complications and quality of life.

CONCLUSION

From the results, it is concluded that the positive perception of health, quality of life, the presence of insomnia and the number of hospitalizations were factors associated with the physical activity level in individuals with type 2 diabetes during the pandemic. Active individuals were more likely to have a positive perception of health and less chance of insomnia, while those who were less active were more likely to have a negative perception of health, worse quality of life and a greater likelihood of hospitalization.

This demonstrates the need to encourage a positive perception of health as a factor that influences engagement in physical activities in this population. Improving aspects related to health promotion, such as awareness of the importance of physical activity and the adoption of healthy habits can be beneficial to encourage the regular practice of physical exercises in individuals with type 2 diabetes.

However, it is important to emphasize that these results are based on the data analyzed in this specific study. Other factors, such as socioeconomic causes, access to resources and social support, are also relevant to engagement.

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REFERENCES

1. International Diabetes Federation. IDF Diabetes Atlas, 10th edn. Brussels, Belgium: 2021. Available at: https://www.diabetesatlas.org

2. Rodacki M, Teles M, Gabbay M, Montenegro R, Bertoluci M. Classificação do diabetes. Diretriz Oficial da Sociedade Brasileira de Diabetes. (2022). DOI: 10.29327/557753.2022-1.

3. Umardi A, Widayati N, Rondhianto R. Physical activity and quality of life of type 2 diabetes mellitus patients: a cross-sectional study during the covid-19 pandemic. J Kesehat Komunitas Indones. 2022;2(1):92-102. DOI: 10.58545/jkki.v2i1.22

4. OMS. Organização Mundial da Saúde. Diretrizes da OMS para atividade física e comportamento sedentário: num piscar de olhos. Genebra: OMS [2020]. Disponível em https://apps.who.int/iris/bitstream/handle/10665/337001/9789240014886por.pdf

5. Aquino EM, Silveira IH, Pescarini JM, Aquino R, Souza-Filho JA, Rocha AD, et al. Medidas de distanciamento social no controle da pandemia de COVID-19: potenciais impactos e desafios no Brasil. Cienc Amp Saude Coletiva. 2020;25(suppl 1):2423-46. DOI: 10.1590/1413-81232020256.1.10502020.

6. Ministério da Saúde do Brasil SD. Coordenação-Geral de Promoção da Atividade Física e Ações Intersetoriais: gestão da atividade física no Ministério da Saúde do Brasil. Rev Bras Atividade Fis Amp Saude. 2022; 27:1-4. DOI: 10.12820/rbafs.27e0248.

7. Guan WJ, Liang WH, Zhao Y, Liang HR, Chen ZS, Li YM, et al. Comorbidity and its impact on 1590 patients with COVID-19 in China: a nationwide analysis. Eur Respir J [Internet]. 2020;55(5):2000547. Disponível em: https://doi.org/10.1183/13993003.00547-2020.

8. Coelho FC, Lana RM, Cruz OG, Villela D, Bastos LS, Pastore y Piontti A, et al. Assessing the potential impact of COVID-19 in brazil: mobility, morbidity and the burden on the health care system. SSRN Electron J [Internet]. 2020. Disponível em: https://doi.org/10.2139/ssrn.3559609.

9. Cavalcante MV, Siqueira RC, Costa RC, Lima TF, Costa TM, Costa CL. Associações entre prática de atividade física e qualidade do sono no contexto pandêmico de distanciamento social. Res Soc Dev [Internet]. 2021;10(1):e8610111471. Disponível em: https://doi.org/10.33448/rsd-v10i1.11471.

10. Matsudo S, Araújo T, Matsudo V, Andrade D, Andrade E, Oliveira LC, et al. Questionário internacional de atividade física (ipaq): estudo de validade e reprodutibilidade no Brasil. Rev. Bras. Ativ. Fís. Saúde [Internet]. 2012;6(2):5-18.

11. Lee PH, Macfarlane DJ, Lam T, Stewart SM. Validity of the international physical activity questionnaire short form (IPAQ-SF): a systematic review. Int J Behav Nutr Phys Act [Internet]. 2011;8(1):115. Disponível em: https://doi.org/10.1186/1479-5868-8-115.

12. International Physical Activity Questionnaire (IPAQ). Guidelines for data processing and analysis of the International Physical Activity Questionnaire (IPAQ) – short and long forms. Disponível em: https://www.physio-pedia.com/images/c/c7/Quidelines_for_interpreting_the_IPAQ.pdf Acesso em: 7 jun. 2020.

13. Teló GH, Iorra FD, Velho BS, Sparrenberger K, Schaan BD. Validation to Brazilian Portuguese of the Self-Care Inventory-revised for adults with type 2 diabetes. Arch Endocrinol Metab [Internet]. 2020. Disponível em: https://doi.org/10.20945/2359-3997000000213.

14. Gross CC. Versão brasileira da escala PAID (Problem areas in diabetes): avaliação do impacto do diabetes na qualidade de vida [Internet]. Fev 2004. Localizado em: https://www.lume.ufrgs.br/bitstream/handle/10183/10808/000602030.pdf, Porto Alegre. Disponível em: https://www.lume.ufrgs.br/bitstream/handle/10183/10808/000602030.pdf.

15. Qian J, Zhao L, Ye RZ, Li XJ, Liu YL. Age-dependent gender differences in COVID-19 in mainland china: comparative study. Clin Infect Dis [Internet]. 30 maio 2020. Disponível em: https://doi.org/10.1093/cid/ciaa683.

16. De la Vega R, Ruíz-Barquín R, Boros S, Szabo A. Could attitudes toward COVID-19 in Spain render men more vulnerable than women? Glob Public Health [Internet].2020;15(9):1278-91.Disponível em: https://doi.org/10.1080/17441692.2020.1791212.

17. Zbinden-Foncea H, Francaux M, Deldicque L, Hawley JA. Does high cardiorespiratory fitness confer some protection against proinflammatory responses after infection by sars-cov-2? Obesity [Internet]. 2020;28(8):1378-81. Disponível em: https://doi.org/10.1002/oby.22849.

18. Ramos AB, Gomide EB, Alves TC, Miguel ND, Trapé ÁA, Sebastião E, et al. Physical activity and sitting time in adults after positive diagnosis for COVID-19: a cross-sectional study. Rev Bras Atividade Fis Amp Saude [Internet]. 2022; 27:1-10. Disponível em: https://doi.org/10.12820/rbafs.27e0268.

19. Sallis R, Young DR, Tartof SY, Sallis JF, Sall J, Li Q, et al. inactivity is associated with a higher risk for severe COVID-19 outcomes: a study in 48 440 adult patients. Br J Sports Med [Internet]. 2021;55(19):1099-105. Disponível em: https://doi.org/10.1136/bjsports-2021-104080.

20. Gomides DD, Villas-Boas LC, Coelho AC, Pace AE. Autocuidado das pessoas com diabetes mellitus que possuem complicações em membros inferiores. Acta Paul Enferm [Internet]. 2013;26(3):289-93. Disponível em: https://doi.org/10.1590/s0103-21002013000300014.

21. Pettersson S, Jaarsma T, Hedgärd K, Klompstra L. Self-care in migrants with type 2 diabetes, during the COVID -19 pandemic. J Nurs Scholarsh [Internet]. 2022. Disponível em: https://doi.org/10.1111/jnu.12842.

22. Magno L, Rossi TA, Mendonça-Lima FW, Santos CC, Campos GB, Marques LM, Pereira M, Prado NM, Dourado I. Desafios e propostas para ampliação da testagem e diagnóstico para COVID-19 no Brasil. Cienc Amp Saude Coletiva [Internet]. 2020;25(9):3355-64. Disponível em: https://doi.org/10.1590/1413-81232020259.17812020.

23. Ruissen MM, Regeer H, Landstra CP, Schroijen M, Jazet I, Nijhoff MF, et al. Increased stress, weight gain and less exercise in relation to glycemic control in people with type 1 and type 2 diabetes during the COVID-19 pandemic. BMJ Open Diabetes Res Amp Care [Internet]. 2021;9(1):e002035. Disponível em: https://doi.org/10.1136/bmjdrc-2020-002035.

24. Alshayban D, Joseph R. Health-related quality of life among patients with type 2 diabetes mellitus in Eastern Province, Saudi Arabia: a cross-sectional study. Plos One [Internet]. 2020;15(1):e0227573. Disponível em: https://doi.org/10.1371/journal.pone.0227573.

25. Gonçalves Souza L, Randow R, Cristina Lima Siviero P. Reflexões em tempos de COVID-19: diferenciais por sexo e idade. Com. Ciências Saúde [Internet]. 2020;31(Suppl1):75-83. Disponível em: https://revistaccs.escs.edu.br/index.php/comunicacaoemcienciasdasaude/article/view/672.

26. Ruiz-Roso MB, Knott-Torcal C, Matilla-Escalante DC, Garcimartín A, Sampedro-Nuñez MA, Dávalos A, et al. COVID-19 Lockdown and Changes of the Dietary Pattern and Physical Activity Habits in a Cohort of Patients with Type 2 Diabetes Mellitus. Nutrients [Internet]. 2020;12(8):2327. Disponível em: https://doi.org/10.3390/nu12082327.

27. Ruissen MM, Regeer H, Landstra CP, Schroijen M, Jazet I, Nijhoff MF, et al. Increased stress, weight gain and less exercise in relation to glycemic control in people with type 1 and type 2 diabetes during the COVID-19 pandemic. BMJ Open Diabetes Res Amp Care [Internet]. 2021;9(1):e002035. Disponível em: https://doi.org/10.1136/bmjdrc-2020-002035.

28. Bode B, Garrett V, Messler J, McFarland R, Crowe J, Booth R, et al. Glycemic Characteristics and Clinical Outcomes of COVID-19 Patients Hospitalized in the United States. J Diabetes Sci Technol [Internet]. 2020;14(4):813-21. Disponível em: https://doi.org/10.1177/1932296820924469.

29. Lima LR, Funghetto SS, Volpe CR, Santos WS, Funez MI, Stival MM. Quality of life and time since diagnosis of Diabetes Mellitus among the elderly. Rev Bras Geriatr Gerontol [Internet]. 2018;21(2):176-85. Disponível em: https://doi.org/10.1590/1981-22562018021.170187.

30. Deslandes S, Coutinho T. Pesquisa Social Em Ambientes Digitais Em Tempos De Covid-19: Notas Teórico-metodológicas. Cad. Saúde Pública 2020;36(11). https://doi.org/10.1590/0102-311x00223120