Original Research Article

Evaluating descriptive and clinical characteristics of type 2 diabetes mellitus patients with physical and environmental barriers to exercise

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ABSTRACT

Background: Exercise is critical in the treatment of Type 2 diabetes mellitus. It is critical to identify exercise barriers in non-exercising T2DM patients. The present study aimed to evaluate the physical and environmental barriers among non-exercising T2DM patients attending a tertiary care hospital in Karachi, Pakistan.
Methods: A cross-sectional study was conducted by recruiting patients from Family Medicine outpatient clinics at the Agha Khan University Hospital from October 2018 to April 2019. Patients between the ages of 18 and 65 who had T2DM for at least six months and exercised for fewer than 150 minutes per week or 30 minutes per day were enrolled. Barriers to exercise like physical (pain/discomfort, too overweight, co-existing illness) and environmental (too hot or cold weather, unavailability or no convenient place to exercise) were observed. The Chi-square test was used for inferential statistics.
Results: Of 275 patients, mean age of the patients was 46.58 ±10.96 years. There were 146 (53.1%) males and 129 (46.9%) females. Pain and physical discomfort 110 (40%) was the most common physical barrier. Moreover, hot or cold weather was reported in 48 (17.5%) patients, no convenient or nearby place to exercise in 53 (19.3%), unavailability of parks/gym in 48 (17.5%), and environmental barriers like traffic in 35 (12.7%).
Conclusions: A variety of physical and environmental barriers were discovered in this study; therefore, implementing suitable therapy to overcome these barriers will allow patients to engage in physical activities that will help them control their diabetes.

Keywords: Environmental barrier, Exercise, Physical barrier, Type 2 diabetes mellitus

INTRODUCTION

Diabetes mellitus is a severe health issue that increases morbidity and mortality owing to the development of different complications, the majority of which are connected to the cardiovascular system. Diabetes affected an estimated 415 million persons worldwide in 2015, and this figure is anticipated to rise to 642 million by 2040.[1]

Diabetes prevalence in the adult population has nearly doubled since 1980, growing to 8.5% from 4.7%, possibly indicating an increase in related risk factors such as being overweight or obese.[2] Diabetes prevalence has grown quicker in low- and middle-income nations than in high-income countries during the last decade.[2]

The aetiology of Type 2 diabetes mellitus (T2DM) is multifactorial, involving both genetic and metabolic components. The risk of developing diabetes is influenced by various factors such as ethnicity, previous gestational diabetes, family history of diabetes, advanced age, excessive weight, sedentary lifestyle, poor dietary habits, and tobacco use.[2] The global prevalence of diabetes is believed to be influenced to a significant extent by the presence of overweight and obesity, as well as a lack of

physical activity.[3] Physical activity constitutes a crucial component of maintaining a healthy way of life and is indispensable in managing individuals diagnosed with T2DM.[4]

Research has shown that engaging in physical activity can decrease the likelihood of developing cardiovascular risk factors, improve blood glucose regulation, facilitate weight loss, and promote general health and wellness. Exercise has been found to provide physical and psychological benefits for individuals diagnosed with T2DM.[5] According to research, engaging in consistent physical activity has the potential to delay or even prevent the onset of T2DM. A prior investigation has indicated a significant correlation between insufficient physical activity and an elevated likelihood of developing diabetes, as evidenced by a p value of 0.045.[6] A study conducted on individuals with chronic illness who have both T2DM and cardiovascular disease (CVD) revealed that a majority of the patients, specifically 60%, exhibited a lack of physical activity.[7]

Poor knowledge, behaviour, and attitudes toward the importance of blood glucose management in diabetic patients lead to noncompliance with physical activity programs.[8] It has been shown that there are certain barriers that can impact T2DM patients' levels of physical activity/exercise. In one research, reported barriers to exercise were sickness or injury (54%), work commitment (36%), weather conditions (32%), boredom (29%), family commitment (21%), lack of time (18%), and exhaustion (18%). 10 Physical pain (23.4 %), exercise is uninteresting (20.7 %), lack of time (20 %), exhaustion (15.9 %), and weather condition (11.7 %) were identified as frequent barriers to exercise in Irish research.[9] Beliefs, social support, and obstacles that develop are the three key variables that influence a person's success in physical exercise.[10] Most patients, however, are unaware of the kind, duration, frequency, and timing of physical exercise. They require assistance in implementing a physical activity plan.[11,12]

A cross-sectional observational study revealed that the most prevalent hurdles among men are a lack of time, a lack of motivation, and a lack of understanding regarding the value of regular physical activity in treating T2DM.[12] Females' most prevalent impediments include family commitment, a lack of time, and a lack of social support.[13] A systematic review of 13 studies found that barriers among adults with T2DM included a lack of time, family commitment, work commitment, weather conditions, pain, a lack of willpower, not knowing what type of exercise to do, a lack of company, and a lack of transportation and facilities.[14]

Numerous studies about the incidence and impact of T2DM are readily available at the local level. However, there is a dearth of research on the hindrances to physical activity among individuals with T2DM who do not engage in exercise. Through acknowledgement of these obstacles,

family physicians have the potential to support patients by formulating tailored interventions and counselling strategies aimed at promoting engagement in exercise and physical activities.

Such interventions may contribute to enhanced diabetes management. Therefore, the present study was conducted to evaluate physical and environmental barriers to exercise among non-exercising T2DM patients visiting a tertiary care hospital.

METHODS

A cross-sectional study was conducted to evaluate physical and environmental barriers to exercise among non-exercising T2DM patients visiting Family Medicine outpatient clinics at the Agha Khan University Hospital from October 2018 to April 2019.

The study comprised patients who met the inclusion criteria. The study subjects provided written informed consent. Standard precautions were taken to preserve the participants' confidentiality. Participants were given an information sheet on the relevance of exercise in T2DM patients owing to a lack of awareness, as well as how to overcome the obstacles to exercise in non-exercising T2DM patients, for ethical reasons. The participants were recruited through non-probability consecutive sampling. The sample size was calculated with WHO software based on the barrier to exercise among T2DM patients. The sample size came out to be 249, with a 95% confidence interval and bound on the error of 4%. The final sample size would be approximately 275 participants, after the addition of 10% of non-responders.

Inclusion and exclusion criteria

The inclusion criteria for this study were all type 2 diabetics patients >18 years of age and <65 years of age, diagnosis of T2DM for at least 6 months, and patients performing <150 minutes per week or 30 minutes per day (5 days in a week) exercise was included. Whereas, participants, who did not give consent, were terminally ill, and suffering from other co-morbid (psychological problems, stroke, disabling arthritis) were excluded. Patients were approached in the waiting area and were asked about their level of exercise and if non-exercising is stated in inclusion criteria, then a pilot-tested coded questionnaire was filled by them in 15-20 minutes. Principle investigator was present to answer any queries.

For those who were not educated or cannot write interviewer filled out the questionnaire. The questionnaire was developed based on published literature.[15] It comprised two parts; the first part contained demographics like age, gender, marital status, body mass index (BMI) (for estimating BMI height and weight was taken from their medical files), education level, income level, employment status, time since diagnosis of diabetes, current medications, co-existing illness.

The second part contains binary response questions regarding physical and environmental barriers. Except for those who are uneducated, the patients filled out the questionnaire themselves to eliminate the possibility of interviewer bias. Age, gender, educational status, marital status, work status, income level, time since diabetes diagnosis, and co-existing disease can all be impact modifiers in this study, and their effects were found after stratification.

Statistical analysis

SPSS version 19.0 was used to enter and evaluate data. Descriptive statistics were used to evaluate baseline data. Mean and standard deviation was recorded for quantitative factors such as height, weight, and time since diabetes diagnosis.

Frequencies and proportions were provided for qualitative characteristics such as age, gender, marital status, educational status, job status, income level, current medicines, co-existing disease, physical, and environmental obstacles to exercise.

The outcome variables were exercise obstacles. The frequency and percentages of all questions on exercise obstacles among T2DM patients were determined. The Chi-square test was used to examine the relationship between various sociodemographic characteristics and obstacles. A p value of <0.05 was considered to be statistically significant.

RESULTS

The mean age of the patients was 46.58±10.96 years, with the majority of the patients 128 (46.5%) aged >50 years. Table 1 shows the mean height, weight and duration of the patients were 163.82±8.19 cm, 76.38±13.74 kg, and 6.15±4.35 years, respectively. There were 129 (46.9%) females and 146 (53.1%) males. BMI distribution showed 94 (34.2%) obese, 113 (41.1%) overweight, and 7 (2.5%) underweight. Most of the patients 259 (94.2%) were married.

The majority of the patients had secondary or higher educational status, i.e., 209 (76%) whereas 169 (61.45%) had jobs or businesses (Table 1). Medication status showed that the majority of 241 (87.6%) patients were on drugs only, 19 (6.9%) were on insulin, 9 (3.3%) were on both medications and insulin, and 6 (2.2%) were on no medication.

Table 1 shows that 105 (38.2%) patients were hypertensive and 32 (11.6%) had dyslipidemia.

Table 2 shows that pain and physical discomfort as a barrier to exercise was observed in 110 (40%) patients, too overweight to exercise in 70 (25.5%), and coexisting illness (blood pressure, cardiac disorders) in 47 (17.1%) patients. Table 3 reported the environmental barrier; such

that too hot or cold weather was reported in 48 (17.5%) patients, no convenient or nearby place to exercise in 53 (19.3%), unavailability of parks/gym in 48 (17.5%), and environmental barriers like traffic in 35 (12.7%) (Table 4).

Table 1: Descriptive characteristics of the patients.

Parameters	Mean±SD	
Age (years)	46.58±10.96	
Height (cm)	163.82±8.19	
Weight (kg)	76.38±13.74	
Duration of diabetes (years)	6.15±4.35	
Parameters	N	%
Age (years)		
18-29	9	3.3
30-40	53	19.3
41-50	85	30.9
>50	128	46.5
Gender		
Male	146	53.1
Female	129	46.9
BMI		
Underweight	7	2.5
Normal	61	22.2
Overweight	113	41.1
Obese	94	34.2
Marital status		
Married	259	94.2
Unmarried	13	4.7
Widow	3	1.1
Educational status		
Not educated	32	11.6
Primary	34	12.4
Secondary	84	30.5
Intermediate	41	14.9
Higher	84	30.5
Employment status		
Stay at home	106	38.5
Full-time job	58	21.1
Part-time job	17	6.2
Own business	94	34.2
Monthly income (Rupees)		
<20,000 PKR	20	7.3
20,000-50,000 PKR	77	28
>50,000 PKR	178	64.7
Clinical characteristics		
Medication		
Drugs only	241	87.6
Insulin only	19	6.9
Both	9	3.3
No medication	6	2.2
HTN		
Yes	105	38.2
No	170	61.8
Dyslipidemia		
Yes	32	11.6
No	243	88.4

Table 2: Physical barriers to exercise among non-exercising T2DM.

Parameters	Yes, N (%)	No, N (%)
You feel pain/physical discomfort while doing exercise	110 (40)	165 (60)
You are too overweight to exercise	70 (25.5)	205 (74.5)
You have coexisting illnesses like heart disease, blood pressure etc.	47 (17.1)	228 (82.9)

Table 3: Environmental barriers to exercise among non-exercising T2DM.

Parameters	Yes, N (%)	No, N (%)
Too hot or cold weather is the reason for not doing exercise	48 (17.5)	227 (82.5)
There is no convenient or nearby place to exercise	53 (19.3)	222 (80.7)
There is an unavailability of parks/gym	48 (17.5)	227 (82.5)
There are environmental barriers such as traffic	35 (12.7)	240 (87.3)

Table 5-10 show comparison was done to see the effect of physical and environmental factors with general characteristics. A significant association of age was found with no convenient or nearby place to exercise (p value 0.002), unavailability of parks/gym (p value <0.001), hot or cold weather reason (p value 0.030), too overweight to exercise (p value 0.030), and feel pain/physical discomfort (p value <0.001). A significant association of BMI was observed with hot or cold weather reasons (p value 0.004), being too overweight to exercise (p value<0.001) and feeling pain/physical discomfort (p value <0.001). A significant association of educational status was observed with no convenient or nearby place to exercise (p value <0.001), unavailability of parks/gym (p value <0.001), hot or cold weather reason (p value <0.001), and feeling pain/physical discomfort (p value <0.001). A significant association of marital status was observed with being too overweight to exercise (p value=0.002). A significant association between employment status was observed with no convenient or nearby place to exercise (p value 0.003) and unavailability of parks/gym (p value 0.035). A significant association of monthly household income was observed with no convenient or nearby place to exercise (p value<0.001), unavailability of parks/gym (p value <0.001), and feeling pain/physical discomfort (p value 0.026). A significant association of medications was observed with no convenient or nearby place to exercise (p value 0.002), hot or cold weather reasons (p value 0.003), and feeling pain/physical discomfort (p value 0.033).

Table 4: Comparison of feeling pain/physical discomfort with general characteristics.

Parameters	Feel pain/physical discomfort		
	Yes, N (%)	No, N (%)	P value
Age (years)			
18-29	0 (0)	9 (100)	
30-40	11 (20.8)	42 (79.2)	<0.001
41-50	31 (36.5)	54 (63.5)	
>50	68 (53.1)	60 (46.9)	
Gender			
Male	59 (40.4)	87 (59.6)	0.882
Female	51 (39.5)	78 (60.5)	
BMI			
Underweight	0 (0)	7 (100)	
Normal	23 (37.7)	38 (62.3)	<0.001
Overweight	34 (30.1)	79 (69.9)	
Obese	53 (56.4)	41 (43.6)	
Marital status			
Married	105 (40.5)	154 (59.5)	
Unmarried	5 (38.5)	8 (61.5)	0.360
Widow	0 (0)	3 (100)	
Educational status			
Not educated	18 (56.3)	14 (43.8)	
Primary	20 (58.8)	14 (41.2)	
Secondary	41 (48.8)	43 (51.2)	<0.001
Intermediate	10 (24.4)	31 (75.6)	
Higher	21 (25)	63 (75)	
Employment status			
Stay at home	47 (44.3)	59 (55.7)	0.547

Continued.

Parameters	Feel pain/physical discomfort		
	Yes, N (%)	No, N (%)	P value
Full-time job	19 (32.8)	39 (67.2)	
Part-time job	7 (41.2)	10 (58.8)	
Own Business	37 (39.4)	57 (60.6)	
Monthly income (Rupees)			
<20,000 PKR	13 (65)	7 (35)	
20,000-50,000 PKR	34 (44.2)	43 (55.8)	0.026
>50,000 PKR	63 (35.4)	115 (64.6)	
Medications			
Drugs only	90 (37.3)	151 (62.7)	
Insulin only	11 (57.9)	8 (42.1)	
Both	7 (77.8)	2 (22.2)	0.033
No Medication	2 (33.3)	4 (66.7)	
Hypertension			
Yes	45 (42.9)	60 (57.1)	
No	65 (38.2)	105 (61.8)	0.447
Dyslipidemia			
Yes	15 (46.9)	17 (53.1)	
No	95 (39.1)	148 (60.9)	0.398

Table 5: Comparison of too overweight to exercise with general characteristics.

Parameters	Too overweight to exercise		
	Yes, N (%)	No, N (%)	P value
Age (years)			
18-29	0 (0)	9 (100)	
30-40	12 (22.6)	41 (77.4)	
41-50	16 (18.8)	69 (81.2)	0.030
>50	42 (32.8)	86 (67.2)	
Gender			
Male	40 (27.4)	106 (72.6)	
Female	30 (23.3)	99 (76.7)	0.431
BMI			
Underweight	0 (0)	7 (100)	
Normal	6 (9.8)	55 (90.2)	
Overweight	16 (14.2)	97 (85.8)	<0.001
Obese	48 (51.1)	46 (48.9)	
Marital status			
Married	67 (25.9)	192 (74.1)	
Unmarried	0 (0)	13 (100)	0.002
Widow	3 (100)	0 (0)	
Educational status			
Not educated	6 (18.8)	26 (81.3)	
Primary	12 (35.3)	22 (64.7)	
Secondary	21 (25)	63 (75)	0.616
Intermediate	11 (26.8)	30 (73.2)	
Higher	20 (23.8)	64 (76.2)	
Employment status			
Stay at home	29 (27.4)	77 (72.6)	
Full-time job	11 (19)	47 (81)	
Part-time job	2 (11.8)	15 (88.2)	0.251
Own business	28 (29.8)	66 (70.2)	
Monthly income (Rupees)			
<20,000 PKR	6 (30)	14 (70)	
20,000-50,000 PKR	16 (20.8)	61 (79.2)	0.517
>50,000 PKR	48 (27)	130 (73)	
Medications			

Continued.

Parameters	Too overweight to exercise		P value
	Yes, N (%)	No, N (%)	
Drugs only	64 (26.6)	177 (73.4)	
Insulin only	2 (10.5)	17 (89.5)	0.452
Both	2 (22.2)	7 (77.8)	
No medication	2 (33.3)	4 (66.7)	
Hypertension			
Yes	33 (31.4)	72 (68.6)	0.074
No	37 (21.8)	133 (78.2)	
Dyslipidemia			
Yes	10 (31.3)	22 (68.8)	0.423
No	60 (24.7)	183 (75.3)	

Table 6: Comparison of co-existing illnesses with general characteristics.

Parameters	Co-existing illness as a barrier		P value
	Yes, N (%)	No, N (%)	
Age (years)			
18-29	0 (0)	9 (100)	
30-40	3 (5.7)	50 (94.3)	0.002
41-50	11 (12.9)	74 (87.1)	
>50	33 (25.8)	95 (74.2)	
Gender			
Male	28 (19.2)	118 (80.8)	0.328
Female	19 (14.7)	110 (85.3)	
BMI			
Underweight	0 (0)	7 (100)	
Normal	10 (16.4)	51 (83.6)	0.103
Overweight	26 (23)	87 (77)	
Obese	11 (11.7)	83 (88.3)	
Marital Status			
Married	47 (18.1)	212 (81.9)	
Unmarried	0 (0)	13 (100)	0.174
Widow	0 (0)	3 (100)	
Educational Status			
Not Educated	4 (12.5)	28 (87.5)	
Primary	7 (20.6)	27 (79.4)	
Secondary	5 (6)	79 (94)	0.003
Intermediate	7 (17.1)	34 (82.9)	
Higher	24 (28.6)	60 (71.4)	
Employment Status			
Stay at home	13 (12.3)	93 (87.7)	
Full-Time Job	8 (13.8)	50 (86.2)	0.149
Part-Time Job	4 (23.5)	13 (76.5)	
Own Business	22 (23.4)	72 (76.6)	
Monthly Income (Rupees)			
<20,000 PKR	4 (20)	16 (80)	
20,000-50,000 PKR	10 (13)	67 (87)	0.523
>50,000 PKR	33 (18.5)	145 (81.5)	
Medications			
Drugs Only	38 (15.8)	203 (84.2)	
Insulin Only	2 (10.5)	17 (89.5)	0.005
Both	3 (33.3)	6 (66.7)	
No Medication	4 (66.7)	2 (33.3)	
Hypertension			
Yes	33 (31.4)	72 (68.6)	<0.001
No	14 (8.2)	156 (91.8)	
Dyslipidemia			

Parameters	Co-existing illness as a barrier		P value
	Yes, N (%)	No, N (%)	
Yes	6 (18.8)	26 (81.3)	0.791
No	41 (16.9)	202 (83.1)	

Table 7: Comparison of hot or cold weather reasons with general characteristics.

Parameters	Hot or cold weather reason		P value
	Yes, N (%)	No, N (%)	
Age (years)			
18-29	0 (0)	9 (100)	
30-40	8 (15.1)	45 (84.9)	0.030
41-50	9 (10.6)	76 (89.4)	
>50	31 (24.2)	97 (75.8)	
Gender			
Male	21 (14.4)	125 (85.6)	0.153
Female	27 (20.9)	102 (79.1)	
BMI			
Underweight	0 (0)	7 (100)	
Normal	10 (16.4)	51 (83.6)	0.004
Overweight	30 (26.5)	83 (73.5)	
Obese	8 (8.5)	86 (91.5)	
Marital status			
Married	48 (18.5)	211 (81.5)	
Unmarried	0 (0)	13 (100)	0.166
Widow	0 (0)	3 (100)	
Educational status			
Not educated	14 (43.8)	18 (56.3)	
Primary	5 (14.7)	29 (85.3)	
Secondary	8 (9.5)	76 (90.5)	<0.001
Intermediate	5 (12.2)	36 (87.8)	
Higher	16 (19)	68 (81)	
Employment status			
Stay at home	24 (22.6)	82 (77.4)	
Full-time job	6 (10.3)	52 (89.7)	0.087
Part-time job	5 (29.4)	12 (70.6)	
Own business	13 (13.8)	81 (86.2)	
Monthly income (Rupees)			
<20,000 PKR	10 (50)	10 (50)	
20,000-50,000 PKR	19 (24.7)	58 (75.3)	<0.001
>50,000 PKR	19 (10.7)	159 (89.3)	
Medications			
Drugs only	36 (14.9)	205 (85.1)	
Insulin only	5 (26.3)	14 (73.7)	0.003
Both	3 (33.3)	6 (66.7)	
No medication	4 (66.7)	2 (33.3)	
Hypertension			
Yes	22 (21)	83 (79)	0.230
No	26 (15.3)	144 (84.7)	
Dyslipidemia			
Yes	5 (15.6)	27 (84.4)	0.772
No	43 (17.7)	200 (82.3)	

Table 8: Comparison of no convenient or nearby place to exercise with general characteristics.

Parameters	No convenient or nearby place to exercise		P value
	Yes, N (%)	No, N (%)	
Age (years)			

Continued.

Parameters	No convenient or nearby place to exercise		
	Yes, N (%)	No, N (%)	P value
18-29	0 (0)	9 (100)	
30-40	10 (18.9)	43 (81.1)	0.002
41-50	7 (8.2)	78 (91.8)	
>50	36 (28.1)	92 (71.9)	
Gender			
Male	33 (22.6)	113 (77.4)	0.136
Female	20 (15.5)	109 (84.5)	
BMI			
Underweight	0 (0)	7 (100)	
Normal	11 (18)	50 (82)	0.267
Overweight	27 (23.9)	86 (76.1)	
Obese	15 (16)	79 (84)	
Marital Status			
Married	50 (19.3)	209 (80.7)	
Unmarried	3 (23.1)	10 (76.9)	0.658
Widow	0 (0)	3 (100)	
Educational Status			
Not Educated	7 (21.9)	25 (78.1)	
Primary	4 (11.8)	30 (88.2)	
Secondary	5 (6)	79 (94)	<0.001
Intermediate	6 (14.6)	35 (85.4)	
Higher	31 (36.9)	53 (63.1)	
Employment Status			
Stay at home	19 (17.9)	87 (82.1)	
Full-Time Job	17 (29.3)	41 (70.7)	0.003
Part-Time Job	7 (41.2)	10 (58.8)	
Own Business	10 (10.6)	84 (89.4)	
Monthly Income (Rupees)			
<20,000 PKR	10 (50)	10 (50)	
20,000-50,000 PKR	18 (23.4)	59 (76.6)	<0.001
>50,000 PKR	25 (14)	153 (86)	
Medications			
Drugs Only	41 (17)	200 (83)	
Insulin Only	3 (15.8)	16 (84.2)	0.002
Both	5 (55.6)	4 (44.4)	
No Medication	4 (66.7)	2 (33.3)	
Hypertension			
Yes	16 (15.2)	89 (84.8)	0.183
No	37 (21.8)	133 (78.2)	
Dyslipidemia			
Yes	8 (25)	24 (75)	0.382
No	45 (18.5)	198 (81.5)	

Table 9: Comparison of unavailability of parks/gym with general characteristics.

Parameters	Unavailability of parks/gym		
	Yes, N (%)	No, N (%)	P value
Age (years)			
18-29	0 (0)	9 (100)	
30-40	5 (9.4)	48 (90.6)	<0.001
41-50	7 (8.2)	78 (91.8)	
>50	36 (28.1)	92 (71.9)	
Gender			
Male	31 (21.2)	115 (78.8)	0.079
Female	17 (13.2)	112 (86.8)	
BMI			

Continued.

Parameters	Unavailability of parks/gym		
	Yes, N (%)	No, N (%)	P value
Underweight	0 (0)	7 (100)	
Normal	11 (18)	50 (82)	0.461
Overweight	23 (20.4)	90 (79.6)	
Obese	14 (14.9)	80 (85.1)	
Marital status			
Married	48 (18.5)	211 (81.5)	
Unmarried	0 (0)	13 (100)	0.166
Widow	0 (0)	3 (100)	
Educational status			
Not educated	9 (28.1)	23 (71.9)	
Primary	0 (0)	34 (100)	
Secondary	7 (8.3)	77 (91.7)	<0.001
Intermediate	8 (19.5)	33 (80.5)	
Higher	24 (28.6)	60 (71.4)	
Employment status			
Stay at home	19 (17.9)	87 (82.1)	
Full-time job	15 (25.9)	43 (74.1)	0.035
Part-time job	5 (29.4)	12 (70.6)	
Own business	9 (9.6)	85 (90.4)	
Monthly income (Rupees)			
<20,000 PKR	7 (35)	13 (65)	
20,000-50,000 PKR	22 (28.6)	55 (71.4)	<0.001
>50,000 PKR	19 (10.7)	159 (89.3)	
Medications			
Drugs only	40 (16.6)	201 (83.4)	
Insulin only	5 (26.3)	14 (73.7)	0.261
Both	3 (33.3)	6 (66.7)	
No medication	0 (0)	6 (100)	
Hypertension			
Yes	20 (19)	85 (81)	0.584
No	28 (16.5)	142 (83.5)	
Dyslipidemia			
Yes	7 (21.9)	25 (78.1)	0.483
No	41 (16.9)	202 (83.1)	

Table 10: Comparison of environmental barriers such as traffic with general characteristics.

Parameters	Environmental Barrier such as traffic		
	Yes, N (%)	No, N (%)	P value
Age (years)			
18-29	3 (33.3)	6 (66.7)	
30-40	3 (5.7)	50 (94.3)	0.093
41-50	10 (11.8)	75 (88.2)	
>50	19 (14.8)	109 (85.2)	
Gender			
Male	21 (14.4)	125 (85.6)	0.381
Female	14 (10.9)	115 (89.1)	
BMI			
Underweight	2 (28.6)	5 (71.4)	
Normal	8 (13.1)	53 (86.9)	0.303
Overweight	17 (15)	96 (85)	
Obese	8 (8.5)	86 (91.5)	
Marital status			
Married	32 (12.4)	227 (87.6)	
Unmarried	3 (23.1)	10 (76.9)	0.422
Widow	0 (0)	3 (100)	

Continued.

Parameters	Environmental Barrier such as traffic		
	Yes, N (%)	No, N (%)	P value
Educational status			
Not educated	5 (15.6)	27 (84.4)	
Primary	3 (8.8)	31 (91.2)	
Secondary	10 (11.9)	74 (88.1)	0.285
Intermediate	2 (4.9)	39 (95.1)	
Higher	15 (17.9)	69 (82.1)	
Employment status			
Stay at home	8 (7.5)	98 (92.5)	
Full-time job	5 (10.3)	52 (89.7)	
Part-time job	8 (47.1)	9 (52.9)	<0.001
Own business	13 (13.8)	81 (86.2)	
Monthly income (Rupees)			
<20,000 PKR	5 (25)	15 (75)	
20,000-50,000 PKR	12 (15.6)	65 (84.4)	0.112
>50,000 PKR	19 (10.7)	159 (89.3)	
Medications			
Drugs only	30 (12.4)	211 (87.6)	
Insulin only	5 (26.3)	14 (73.7)	
Both	0 (0)	9 (100)	0.147
No medication	0 (0)	6 (100)	
Hypertension			
Yes	14 (13.3)	91 (86.7)	
No	21 (12.4)	149 (87.6)	0.813
Dyslipidemia			
Yes	0 (0)	32 (100)	
No	35 (14.4)	208 (85.6)	0.022

DISCUSSION

This cross-sectional study describes the physical and environmental obstacles that impede physical activity among individuals with T2DM who have refrained from exercising and have been diagnosed with the condition for a minimum of six months. The analysis of physical barriers indicated that the majority of patients (40%) reported pain and physical discomfort as a barrier to performing exercise. Several studies have shown exhaustion and fatigue as a barrier to exercise in diabetes individuals who were not exercising.[16,17] This might be related to diabetes individuals' inadequate physical activity over a lengthy period. There is no need for strenuous physical activity, and even a little daily exercise can help relieve pain and suffering.[18,19] Furthermore, in our study, being overweight (25.5 %) and having a comorbid ailment such as heart disease or high blood pressure (17.1%) were indicated as physical impediments to exercise. Effective exercise for multimorbidity patients is being focused on in a few of the previous studies.[20-22] It is recommended that individuals who have many co-existing illnesses should be treated with caution. According to a recent study, exercise principles in people with comorbidity or multimorbidity must include a rigorous assessment of health status, adaptation of exercise to comorbidity or multimorbidity, application and integration of behavior change techniques into exercise plan, and clinical reasoning to support exercise application by health professionals.[23] Aerobic and resistance exercise 2-3 times per week, according to a comprehensive study, is good for those with chronic conditions.

They also revealed a multi-system approach to exercise prescription, which proposes assessing important physiological indicators from many bodily systems to properly prescribe exercise to people with numerous chronic conditions.[24] A lifestyle change is also particularly essential in patients who felt that their surroundings was a barrier to exercising.

In the pre, 19.3% of diabetes patients reported no convenient or local area to exercise, 17.5% noted a lack of parks/gyms, and 12.7% mentioned traffic as a barrier. All of these variables are connected with poor diabetes management.

All of these hurdles, however, are manageable and can be alleviated by lifestyle adjustments or other external interventions.

In the present study, 17.5% reported hot or cold weather as a hindrance. Indoor physical activities can help overcome the obstacle of bad weather to exercise. Patients must be counselled to investigate different forms of physical exercise.

Diabetic patients should be motivated to maintain a particular level of physical activity in addition to the recommended drugs to control their diabetes.

Limitations

There are certain limitations of this study. For instance, being a cross-sectional study, the temporal association of the variables could not be ascertained. Second, this is single-centre research that represents only a subset of our community that belongs to a higher socioeconomic level. As a result, the study's findings cannot be extrapolated to a broader population. Finally, the conclusions of this study might be influenced by reporting bias.

CONCLUSION

This study addressed an issue that is often ignored in T2DM patients. As previously documented by the majority of local research on the prevalence and variables leading to T2DM. This study uncovered a previously unknown topic in T2DM patients. Identifying barriers to exercise in T2DM patients, Family Physicians may assist patients by applying individualized treatments and therapy techniques to encourage them to exercise, which would also help to improve diabetes management. Several physical and environmental obstacles were identified in the course of this investigation. The research findings suggest that the provision of appropriate therapeutic interventions can facilitate the participation of patients in physical activities, thereby enabling them to effectively manage their diabetes.

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