Physical Activity Level and its Barriers among Patients with Type 2 Diabetes Mellitus, Qassim Province, Saudi Arabia

Abstract

Background: Diabetes mellitus is the most common chronic disease that affects millions of people worldwide with rapidly growing prevalence. World health organization announced that physical inactivity is one of the top 10 global principle causes of morbidity and mortality worldwide. On the other hand, physical activity is well known to be cornerstone domain for managing diabetes mellitus. **Objectives:** To estimate the physical activity level among patients with type 2 diabetes mellitus in Qassim province and to explore its common barriers. **Methods:** We conducted a cross-sectional study among type 2 diabetic patients who attended chronic diseases clinics of 10 primary health care centers in Buraidah city during 2021. We used two validated self-administrated questionnaires which were the global physical activity questionnaire (WHO) and barriers to being active quiz (CDC). **Results**: We surveyed 357 type 2 diabetic patients. While majority of patients (90%) recognized the importance of physical activity for body health, only 29% of the participants met WHO recommendations for physical activity. Males and females had slight difference in their activity level, 72% and 69% respectively. Top reported barriers of physical activity were lack of willpower, lack of resources and lack of energy. The most common reported domain of physical activity was recreational activity. **Conclusion:** Type 2 diabetic patients in Qassim province have low physical activity level. We recommend more focus on physical activity by all diabetic care professionals. Further in-depth studies to further evaluate prevalence and other relevant factors are suggested.

Keywords: Physical activity, Type 2 Diabetes, PHCC, Qassim province.

Introduction and literature review:

Diabetes mellitus (DM) is the most common chronic disease affecting millions of people worldwide with rapidly growing prevalence over the last decade. The World Health Organization (WHO) has ranked Saudi Arabia as one of the top countries that have high prevalence level of diabetes mellitus, making DM a serious public health issue [1] .

There are many challenges in (DM) management that has to be tackled by different approaches including proper lifestyle changes. Regular physical exercise is an important factor of lifestyle changes. It is recommend by the American Diabetes Association (ADA) and the American Heart Association (AHA) to perform at least 150 minutes of moderate-intensive activity each week, or doing at least 90 minutes of vigorous exercise every week [2].

WHO announced that lack of physical activity leads to morbidity and mortality worldwide. Being the main cause for around 27% of diabetes cases and approximately 30% of coronary heart disease[3].

On the other hand, physical activity is well known to be a cornerstone of managing diabetes mellitus, but is often underutilized[4].The overall positive impacts of physical activity in type 2 diabetes mellitus are well recognized regarding the control of blood glucose and different cardiovascular risks. Optimal physical activity has great impacts on HbA1c level, insulin sensitivity improvement, and DM delay or even prevention[5]. Many researchers found that regular physical activity can help in reducing

cardiovascular risk by profound effects on blood pressure, lipid profile, and obesity[6-8]. Also, it can decrease the risk of ischemic heart disease in diabetic patients by 35%-55%and prevent metabolic syndrome [5]. Furthermore, exercise helps in the enhancement of cardio-respiratory fitness, strength of muscles and stamina[8].

Although patients with diabetes are advised to carry out regular physical activity, long-term adherence is the main issue with physical activity programs[9]. High failure rate is also reported in different nations. Several studies have revealed that most of T2DM patients do not meet the proper recommendations [10-14].

Keeping on active state has many influencing factors. These barriers need to be identified so concerned authorities could act accordingly[13]. Literature to date in Saudi Arabia showed a number of possible barriers to perform physical activity among DM 2 patients. The top barriers to physical activity in one Saudi study included lack of willpower, lack of energy, lack of skills, lack of social support, and fear of injury [14]. Similar study from Oman reported that also lack of willpower, lack of resources and lack of social support were the strongest reported barriers [15]. In the West, the USA in particular, very common barriers reported to PA among patients with T2DM were pain (41%), followed by lack of willpower (27%) and poor health (21%)[11]. Whereas, in Kuwait, the most frequently reported barriers to exercise were lack of time, coexisting diseases, hot weather conditions, abundance of housemaids, and tendency to use cars excessively [16].

To the best of our knowledge, there is no published similar study regarding physical activity level and its barriers among patients with Type 2 Diabetes Mellitus in

Qassim region. This research will give baseline data that could be used for developing approaches for authorities of local health as well as information for the health professionals to enhance their efforts in promoting patient health.

Objectives:

- To find out the level of Physical activity among Patients with Type 2 Diabetes Mellitus.
- To assess barriers of Physical activity among patients with Type 2 Diabetes Mellitus.
- To evaluate the sociodemographic and clinical variables associations with physical activity level.

Methodology

Study design and Population:

A cross-sectional study was conducted in primary health care centers affiliated with the ministry of health in Buraidah city, Qassim province, central north of Saudi Arabia. The target population of this study was all type 2 diabetic patients attending chronic disease clinics in primary health care centers (PHCCs) in Buraidah city. The total number of registered type 2 diabetic patient at the time of the survey was 18,549 (personal communication).

Sampling:

Sample size was calculated using Open epi sample size calculator. The Confidence level is 95% and Marginal of error is 5%.Using listed below equation, sample size was calculated. The calculated sample was 357 patients.

$$n = [DEFF*Np\ (1-p)]/\ [(d^2/Z^2_{1-\alpha/2}*(N-1) + p*(1-p)]$$

Sampling technique:

In Buraidah, there are 41 primary health care centers that offer diabetes management. Ten PHCCs were chosen through a simple random sampling technique. All eligible participants attending selected PHCCs clinics during the study period were invited to participate in the study.

The study duration:

The study was conducted between November 2021 to March 2022. Data were collected during October and November 2021.

Inclusion criteria:

All 2 DM patients of any nationality, able to walk, have no documented cognitive deficit and age above 20 years.

Data collection tools:

This study was conducted using two validated self-administrated questionnaire which were the global physical activity questionnaire and barriers to being active quiz.

The first questionnaire assessed the level of physical activity among DM patients. It was developed by the World Health Organization. It collects information of three domains in relation to patient activity. These domains included activity at work, activity during transport, and recreational activities. Typical routine activity was evaluated for each patient as per WHO recommendations on physical activity per week should be at least:

- 150 minutes of moderate-intensity physical activity

- Or 75 minutes of vigorous-intensity physical activity
- Or an equivalent combination of moderate and vigorous intensity physical activity achieving at least 600 MET-minutes.

Vigorous-intensity activity represents activity that causes large increases in breathing or heart rate, while Moderate-intensity activity represent activity which causes minimal increases in breathing or heart rate.

The second questionnaire, developed by the Centers for Disease Control and Prevention (CDC) was used to evaluate barriers to physical activity. This questionnaire assessed the 7 major barriers to PA. Each barrier was evaluated by 3 questions. A scoring system (4 point Likert scale) indicate how likely a person would answer each statement about barriers (very likely = 3, somewhat likely = 2, somewhat unlikely = 1, and very unlikely = 0). Scores of three related questions were added together to identify a barrier of PA. The highest possible score of one barrier is 9. A score of 5 or above means significant barrier.

Four trained medical students from College of Medicine, Qassim University carried out data collection in PHCCs. They recruited participants while they were waiting for medical appointment. Patients who met eligibility criteria were invited to participate in the study. Explanation of the objectives of the study was given to each participant before filling the questionnaire.

Data entry and analysis:

Data were first transferred to google forms then transferred to an Excel sheet. Patients data were checked for completeness and cleanliness before being subjected to analysis. Data were analyzed using Epi Info, version 7.2. Descriptive analysis of the data was presented in tables and figures. Numerical data was described by measures of central tendency and dispersion (mean, range, and standard deviation). Categorical variables were presented as frequency and percentage. T-test was used to assess associations between continuous variables. Chi-square test was used to assess associations between different categorical variables. Statistical significance was set at p value <0.05.

Results:

Socio-demographic and clinical profile of participants

The total number of participants from the ten primary health care centers was 357 patients. From each center, the percentage of participants was the same. The average age was 54±12 years. Females were slightly more than males. Most of participants were Saudis (91%) married (87%) and literate (83%). Just about half of the study participants (49%) reported low household income of <5000. Approximately two thirds (64%) of the patients stated they were unemployed (Including retired ones). The mean duration of diabetes disease in this studied sample was 9 years.

Doctors were mentioned to be the best source of information regarding physical activity by most of participants (77%). On the other hand, health educators were rarely reported as the primary source for health advice.

Eighty eight per cent (317 patients) were using oral anti-hypoglycemic medications to control their diabetes, of which 24%(n=86) were additionally on insulin,

while only 12% of patients were taking insulin alone. Mean Glycated hemoglobin level was 8.6 ±1.5.Majority of patients (93%) had poor control of diabetes mellitus (HbA1c >7),[Table 1].

Physical activity level

While majority of participants (90%) recognized the importance of physical activity for body health, only 33% reported that their activity had increased after their diagnosis of the disease while 20% reported that their activity level was unchanged and even about half (47%) had thought that their physical activity had decreased after they knew that they are diabetic.

The measured physical activity level showed quite similar finding, as only 104 participants (29%) met WHO recommendations for physical activity. Active subjects were younger with a mean age of 52.7 ± 13.2 years, in comparison to the inactive participants who were 253, with a mean age was 55.1 ± 12.8 years. The mean difference in age between active and inactive participants was 2.4 years. However, this difference was not statistically insignificant (P = 0.06). Males and females had slight difference in their activity level, 72% and 69% respectively. The difference was also not statistically significant. Furthermore, there was no statistically significant association between physical activity level and age, marital status, nationality, employment status, income level, medication type, or HbA1c level. The only variable that had statistically significant association with physical activity was literacy level (p= 0.01), Table 2.

The most common reported domain of physical activity was recreational activities, as more than one third of patients reported that they do regular moderate intensity sport or fitness activity which may cause a slight elevation in heart or breathing

rate. The mean number days for this domain of activity was 4 days/week. The mean time duration of practicing leisure activity was 35 min/day, and the range was 10 min to 140 min/day.

On the other hand, transport activity was the second most common type of physical activity mentioned by participants. Around one quarter of patients (22%) reported that they walk or ride bicycle for transportation between places for at least 10 min continuously. The mean number of days in this domain of activity was 4 days/week. The mean time duration of travelling to and from places was 52 min/day, and the range was 5 min to180 min/day.

Considering the domain "activity at work", 14% of the patients engaged in moderate intensity activity. The mean days of involvement in this domain of activity was 3 days/week. The mean time duration of practicing this activity domain was 90 min/day, and the range was 6 min to 500 min/day.

The least reported types of physical activity were engaging in vigorous intensity activities at work or as a leisure activity which was about 8% of patients for both of them.

Barriers to physical activity

Figure 1 represent the top reported barriers to physical activity among diabetic patients. These barriers are listed in order of most common to least common ones.

The top reported barriers of physical activity among T2DM patients were lack of willpower (55%), followed by lack of resources (44%), lack of energy (39%) and lack of time (31%).

Table 3 demonstrates the association between the reported barriers and physical inactivity. Being physically active or inactive was not affected by any reported barriers as the association was not significant between them.

Table 1: PA Level and its Barriers among Type 2 DM patients, Qassim2021.
Patients characteristics:

Patients characteristics	No.	Percent
Gender		
Male	169	47
Female	188	53
Age(Years) Mean±SD	54±12	
Marital status		
Married	310	87%
Single	47	13%
Nationality:		
Saudi	323	91%
Non-Saudi	34	9%
Education level		
Bachelor	115	32%
High or secondary School	117	33%
Primary School	63	18%
illiterate	62	17%
Employment status:		
Employed	128	36%
Unemployed (including Retired)	229	64%
Monthly income		
<5000	174	49%
5000-10,000	104	29%
>10,000	79	22%
Medication		
oral hypoglycemic	231	65%
Insulin	40	11%
Both	86	24%
HbA1c Level		
Controlled <7	25	7%
Uncontrolled >7	332	93%
Best source of health advice regarding physical activity		
Doctor	276	77%
Health Educator	56	15%
Friends and relatives	18	5%
Internet	7	2%

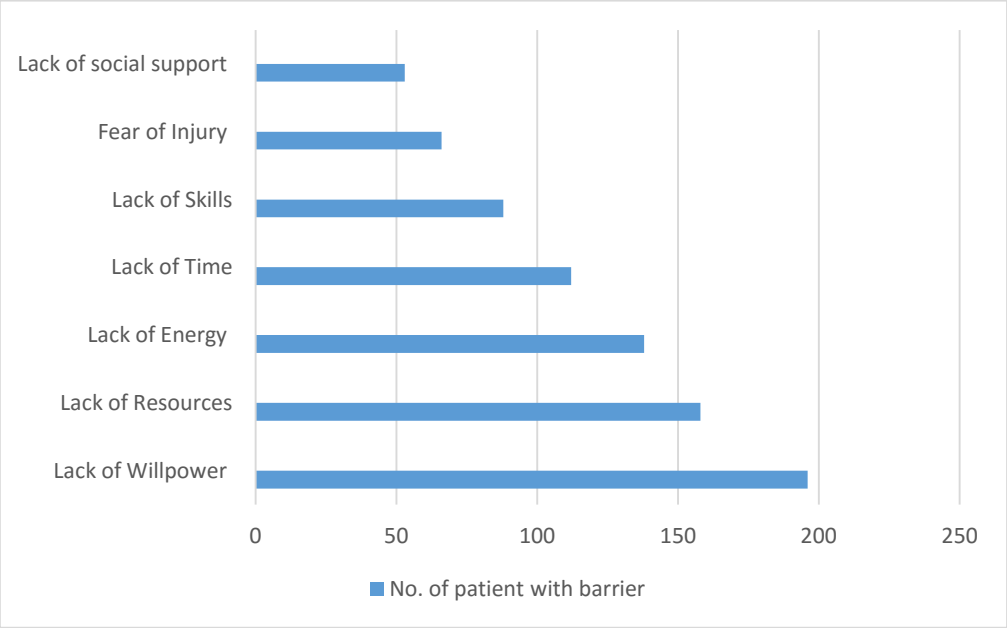
Table 2:PA Level and its Barriers among Type 2 DM patients, Qassim2021. Physical activity association with participants characteristics.

Item	Physical activity Level, n (%)			OR (95% CI)	P-value
	Active	Inactive	Total		
Gender					
Male	53(28)	135(72)	188	0.96 (0.61-1.52)	0.85
Female	51(31)	118(69)	169		
Age(Years)					
	104(29)	253(71)	357		0.06
	52.7 ± 13 years	55.1 ± 12 years			
Marital status					
Married	87(28)	223(72)	310	0.69 (0.36-1.33)	0.25
Single	17(36)	30(64)	47		
Nationality:					
Saudi	99(31)	224(69)	323	0.39 (0.13-0.98)	0.052
Non-Saudi	5(15)	29(85)	34		
Education level					
Literate	95(32)	200(68)	295	2.79 (1.36-6.23)	0.01*
Illiterate	9(14)	53(86)	62		
Employment status:					
Employed	38(30)	90(70)	128	1.04 (0.64-1.62)	0.86
Unemployed (including Retired)	66(29)	163(71)	229		
Monthly income					
<5000	50(29)	124(71)	174	0.96 (0.60-1.52)	0.87
>5000	54(30)	129(70)	183		
HbA1c Level					
Controlled <7	11(44)	14(56)	25	2.01 (0.86-4.64)	0.09
Uncontrolled >7	93(28)	239(72)	332		
Medication					
oral hypoglycemic alone	71(31)	160(69)	231	1.24 (0.77-2.04)	0.36
Management includes insulin	33(26)	93(74)	126		

Table 3:PA Level and its Barriers among Type 2 DM patients, Qassim 2021. Barriers to physical activity according to the level of physical inactivity.

Barriers	Physical activity Level, n (%)			OR (95% CI)	P-value
	Inactive	Active	Total		
Lack of willpower					
Yes	141(72)	55(28)	196	1.12 (0.70-1.77)	0.62
No	112(69)	49(31)	161		
Lack of resources					
Yes	118(75)	40(25)	158	0.71 (0.44-1.13)	0.15
No	135(68)	67(32)	202		
Lack of energy					
Yes	97(70)	41(30)	138	0.95 (0.59-1.53)	0.84
No	156(71)	63(29)	219		
Lack of time					
Yes	79(71)	33(29)	112	0.97 (0.59-1.60)	0.92
No	174(71)	71(29)	245		
Lack of skills					
Yes	61(69)	27(31)	88	0.90 (0.53-1.54)	0.71
No	192(71)	77(29)	269		
Fear of injury					
Yes	49(74)	17(26)	66	1.22 (0.67-2.30)	0.50
No	204(70)	87(30)	291		
Lack of social support					
Yes	40(75)	13(25)	53	1.31 (0.67-2.65)	0.42
No	213(70)	91(30)	304		

Figure 1: Barriers to Physical Activity among type 2 DM Patients,Qassim 2021.



Discussion

This research study aimed to assess the physical activity level among type 2 DM patients and to find out the most common barriers among T2DM patients in Buraidah. Generally, there was high failure rate in achieving WHO recommendations for physical activity by majority of the DM type 2 patients (71%). Although patients with diabetes are routinely advised to carry out regular physical activity, long-term adherence is a main issue with physical activity programs [9].

Our finding is consistent with other reported study was done among Saudi general population which showed that the prevalence of physical inactivity about 60 % of participants [13]. Also, several reported studies among diabetic patients in different nations showed high failure rate in meeting the proper recommendations of physical activity [10-14]. In the United States, about 66% of diabetic patients do not perform sufficient physical activities. Also, In the United Kingdom, approximately two third of type 2 diabetic patients were inactive [11]. In United Arab Emirates, a similar study to ours reported very low level of physical activity among diabetic patients, with only 3% of them were physically active [12].

In contrast to these studies which consistently reported high level of inactivity, a study from Jeddah among diabetic patients reported that only 38% of patients were physically inactive [14]. We could not find a clear reason for this difference. A possible reason is the difference in the study population as the national health care serve mainly their military personal and their family who are different from the general population.

Recreational activity was the most common reported domain of physical activity by majority of patients (35%). This result is similar to several other studies [12,14,17,18].

Active subjects were younger than the inactive participants, with mean difference in age between active and inactive participants was 2.4 years. However, this difference was found to be statistically insignificant (p = 0.06), and this finding was also described in other studies [12,15].

The top reported barriers of physical activity which were lack of willpower, resources, energy and time are consistent with similar studies done in Saudi Arabia and a neighbouring country [14,15]. Keeping on active state has many other influencing factors which may include cultural and environmental barriers that were not addressed in our study.

In the current study, factors which may influence participant decision-making regarding physical activity, such as level of income and marital status, did not show any statically significant relationship with physical activity level nor with its barriers. This finding was also reported before [14, 15].

On the other hand, there was statistically significant association between literacy and physical activity (P = 0.01). The effect of literacy was shown only for those who are under 55 (p=0.002). In the literature, there are limited data that literacy levels are linked to physical activity. However, one possible explanation is that literate people might have better understanding of impacts of physical activity in health which in turn would promote them to keep up in regular activity.

Medical doctors were the primary source of knowledge regarding physical activity, while family and friends were rarely involved. Getting the support of close relatives or friends is a significant way to promote adherence to physical activity. There are several studies which revealed a positive relationship between family involvement in

patient management and adherence to prescribed diet, exercise regime, and medicines in patients with diabetes [17, 19-24]. Long term adherence to physical activity requires partner support. While most of our participants live with their families, only 5 per cent of sample reported that their family members engaged in their health education, this indicates that there is still an opportunity for improvement in this regard.

While the most advanced diagnostics, treatment modalities and highly qualified staff are free of charge and readily available for all nationals, the recommended physical activity levels were not met.

Although we could not find strong relationships between most of the independent factors and physical activity level, patient physical activity preferences, social support, educational level, and time limits should be considered when prescribing physical activity regimen. Generally, patients who get standardized routine counselling are unable to self-manage their conditions; as a result, physical activity therapy must be individualized. Patients are believed to be less willing to follow health care advices if they differ from their preferences [25].

Multidisciplinary approach by health care team includes doctors, nurses, health educators, and other allied professionals to improve physical activity level. Together, they can increase their patients knowledge, promote their positive attitude, hence enhance their physical activity level.

Strengths and Limitations

Our study is the first survey that estimated physical activity level and its barriers among type 2 patients in Qassim province. It contributes to the available literature on this important aspect. It is hoped that it enhances health care consciousness about this less addressed aspect of diabetes care. It does, however, have few limitations. Despite that we used reliable measuring scales for activity level and its barrier, self-administered questionnaire probably biased the result in several ways such as intention to participate, ability to understand questions and correctly responding to them. Furthermore, patients may underrate or overrate their activity for various reasons. This might influence the study findings towards either sides. As our study was confined to Buraidah city, our results might not be fully generalized to other provinces of Saudi Arabia.

Conclusion

Our study revealed low physical activity level among diabetic patients in Qassim region. Top reported barriers of physical activity were lack of willpower, lack of resources, and lack of energy. This research will give baseline data that could be used for developing approaches for authorities of local health as well as information for the health professionals to enhance their efforts in promoting patient health.

Recommendations

Further studies are recommended to better estimate the physical activity level and its barrier among diabetic patients. Furthermore, interviewer-based approach is more likely to better reflect the actual situation. An alternative way to assess physical activity level is by daily recording and measuring maximal oxygen consumption for physical fitness.

We recommend interventional studies to find the best approach for improving physical activity level. As we could not identify significant association between studied factors and physical activity level, a more in-depth studies are recommended to identify such factors, henceforth best approaches for improving physical activity level are suggested.

Consent:

As per the Ethical committee instructions and standard protocols, informed consent was taken and preserved by the authors.

Ethical considerations

Permission was obtained from public health authority to conduct this study. Verbal consent was obtained from each participant. In addition, ethical approval was taken from ethical committee in Qassim region (Ethical approval number: 1441-1065135). Privacy and confidentiality were protected, no identifiers or personal information was collected.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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