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### RESEARCH ARTICLE

#### BARRIERS OF PHYSICAL ACTIVITY AMONG DIABETIC PATIENTS IN AL MADINAH AL MUNAWARAH 2021

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#### Abstract

**Aim:** To explore the barriers of individuals diagnosed with type 2 diabetes in relation to physical activity, and to compare between age, gender and level of educations .

**Background:** diabetic patients may have a lot of complications developed if not follow management plan that include physical activities. By knowing barriers of physical activities they will improve quality of life. Such research is vital in order to identify these barriers and try to eliminate.

**Methods:** Descriptive-analytical approach research conducted in diabetic center of King Fahad hospital in Al Madinah Al Munawarah. three hundred seventy seven diabetic type 2 patients filled questioners that includes barriers of physical activities .

**Results:** Lack of willpower shows significant barriers of physical activities among study members especially female (94.4% of them) rather than male (90.7% of them). The results also illustrated lack of energy was statistically significant among the study sample members of the female population (97.0% of them) while males (91.0% of them). Young members (15-29) shows all of them have Lack of time as barrier. primary certification (96.2% of them) suffered from lack of social support and (87.2% of them) suffered from lack of skills. The results illustrate there significant differences among the study sample members with university certification, where 99.0% of them suffered from lack of energy.

**Conclusions:** lack of willpower and energy shows significantly barriers among female while lack of social support and skills were barriers of low level educated patient. High level of education has lack of energy. lack of time was obvious with young patients.

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#### Introduction:-

Diabetes is a general term for disorders characterized by polyuria and it is usually referred to as diabetes mellitus. It is a common chronic disease that impaired carbohydrate, protein and fat metabolism with insulin insufficient or target tissue resistance (1). Complications of disease divided into macrovascular like cardiovascular complications and microvascular like retinopathy, nephropathy or neuropathy complications. These complications can impact the quality of life of diabetic patients. The disease have high prevalence among Saudi population which need more

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research. Management of diabetes comprise lifestyle modifications and can lead to pharmacological treatment according to patient and management plan that gave by physician. The lifestyle which includes diet and PA that both important to prevent complications of the disease.

Physical activity is all movement that leads to energy use. Physical exercise is an organized movement designed to increase fitness. Recommendations advise doing vigorous-intensity activity 150 min/ week (2).

Internationally in 2016, physical insufficient was 23% among males and 32 % among females above 18 years old. The prevalence over the past 15 years did not improve (3).

In Saudi Arabia according to WHO the physical inactivity about 58.5 % among adults in 2016 (4). National survey done shows 60 % of entire Saudi populations were inactive (5).

This study aimed to identify barriers of PA among diabetic patients in Al Madinah AlMunawarah during 2021.

**Rationale:**

A lot of diabetic patients suffer from complications because of uncontrolled disease and part of management that help a patient is physical activity. The researcher interest to determine barriers of physical activity among diabetic patient. If patients prevent these barriers they will become active and achieve targets.

**Objectives:-**

1. General Objectives:Knowing barriers of physical activity among diabetic patients inAl Madinah AlMunawarah 2021.
2. Specific Objectives:In this research concentrateTo determine barriers of physical activity among diabetic patients in Al Madinah almunawarah 2021 according to age ,gender and level of educations .

**Literature:-**

Diabetes mellitus is a worldwide chronic disease that have high prevalence and serious complications. Studies shows significant inactivity among diabetic patients and importance of physical activity as tool to prevent the most serious complications. A study was done in Jeddah about Physical activity level and its barriers among patients with type 2 diabetes mellitus attending primary healthcare centers in SA. The study is cross-sectional which carried out at 3 centers. Two questionnaires were used in this study one of the measure levels of physical activity and other identify barriers to physical activity. the prevalence was 38.4 % of inactive patients composed male 40 % and female 37 % (6).

The magnitude, determinants, and barriers for physical activities among diabetic patients in the Qassim area of Saudi Arabia study represent a low level of PA (81 %) were noted. Joint problems, languor and family time were the main barriers that lowered PA (7).

In the United Arab Emirates, study about Physical Activity and Reported Barriers to Activity Among Type 2 Diabetic Patients. the methods were a cross-sectional type. patients interviewed by questionnaire. Reported barriers were unavailability of parks, cost, safety and fear of metabolic disturbance (8).

Another study about Perceived barriers to leisure-time physical activity in adults with type 2 diabetes attending primary healthcare in Oman: a cross-sectional survey. patients more than 18 years old with type 2 diabetes are included in the study. Lack of willpower (44.4%), lack of resources (30.5%) and lack of social support (29.2%) were the most frequently reported barriers (9).

A study was done in Nepal about barriers and facilitates of physical activity among urban residents with diabetes. a cross-sectional design study used and 200 patients surveyed from two diabetic clinics. The result was a high prevalence of physical activity among urban Nepali diabetic patients. Family responsibility, busy schedule and family discouragement were barriers of active (10).

Barriers to physical activity in patients with diabetes study were done at Ninewells hospital, Dunde. The result was 34%, active diabetic patients. The main barriers were perceived difficulty taking part in exercise, feeling of tiredness and distracted by something good on TV (11)

**Methodology:-  
introduction**

It is the most important tools and methods used in the study that have been relied upon in the implementation of the field study, including the study population and sample, the study tools that used in data collection, and data analysis and the detailed process of each.

**Research design**

Given the nature of the topic, we can rely on the descriptive and analytical approach in a theoretical part, and the method in an applied part. As mentioned, the research is considered one of the modern topics that will prevail in knowing barriers of physical activity among diabetic patients in Al Madinah AlMunawarah 2021. This basis dictates the nature of the subject to aim of reaching an accurate knowledge of the elements of the problem, by showing the various theoretical aspects of the topic. As well as the purpose of accurate and detailed description of a phenomenon, then analysis and concluding to obtain scientific results in an objective way.

**Study Population**

Diabetic patient attending Diabetic Center of King Fahad Hospital in Al Madinah AlMunawarah – KSA 2021 according to the following criteria:

1. Adult both male and female.
2. Above 18 years old of age.
3. Saudis and non-Saudi patients.
4. Type 2 diabetic patients.

**Sampling Method and Size**

Since the method of the questionnaire (survey) is relied on in collecting information and data, the method by which the sample can be drawn and on which the questionnaire will be distributed and conducted, is dependent on the non-random (non-probability) method.

**Sample size**

The questionnaire (survey) targeted patients that visiting a diabetic center of King Fahad Hospital in Al Madinah AlMunawarah 2021. The sample size was calculated using Epi Info, with Population size = 20000, Confidence limits: 5%. As a result, the sample size: 377 patients .

**Research Instrument**

The instrument that is relied upon in this study is a survey that is used to gather data relating to knowing barriers of physical activity among diabetic patients in Al Madinah AlMunawarah 2021. The research tool is a valid, reliable, paper-based, self-administered questionnaire. English version taken from the centers for disease control and prevention. The Arabic version was valid and used after permission taken. The questionnaire divided into two parts. The first one about demographic information (age, gender, occupations) and consent. The second one includes 21 questions for barriers to PA. A scoring system was used to 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 category as a barrier to PA. The highest possible score of one category was 9. A score of 5/9 or above in any category would indicate a significant barrier.

**Data Collection Procedure**

In this research, the questionnaire distributed in form of papers and collected during clinic. The survey is designed to know barriers of physical activity among diabetic patients in Al Madinah AlMunawarah 2021. The first part: concerns the personal information of study sample, such as: age, gender, nationality, educational level. The second part: contains 21 phrases distributed on seven axes (Lack of time - Social influence - Lack of energy - Lack of willpower - Fear of injury - Lack of skill - Lack of resources) . In order to answer the phrases of the second part of the survey, a 4 point Likert scale is relied upon, and due to its use in many previous studies in this field, respondents are required to give a score of their agreement with each of the phrases on the 4 point Likert scale as well as follows:

(0= Very Unlikely, 1= Somewhat Unlikely, 2 = Somewhat Likely, 3= Very Likely ) . The researcher personally administered the research instruments to the respondents and the results were tallied and tabulated.

### Data Analysis Method

In order to analyze the data collected through the survey lists, the process of unpacking the data is carried out in Excel and using the SPSS program, whereby a set of statistical methods are relied upon as follows: Use frequencies and percentages to describe the demographics of the study sample , Use of arithmetic means , Use standard deviations , Coefficient of stability and Cronbach's Alpha criterion.

### Instrument Validity

A number of tests are performed on the questionnaire to ensure its validity and stability. The validity of the questionnaire has been checked by two means:

### The validity of Internal Consistency

The internal validity of the questionnaire is the first statistical test that used to test the validity of the questionnaire. Internal validity measured through the correlation coefficients between each item in the construct and its total.

**Table 1:-** Correlation coefficient of each paragraph of each axis and the total of this axis.

	No.	Paragraph	Correlation Coefficient	Sig.
Lack of time	1.	My day is so busy now, I just don't think I can make the time to include physical activity in my regular schedule.	0.641**	0.000
	2.	Physical activity takes too much time away from other commitments—time, work, family, etc.	0.730**	0.000
	3.	My free times during the day are too short to include exercise.	0.698**	0.000
Social influence	4.	None of my family members or friends like to do anything active, so I don't have a chance to exercise.	0.683**	0.000
	5.	I'm embarrassed about how I will look when I exercise with others.	0.577**	0.000
	6.	My usual social activities with family or friends do not include physical activity.	0.712**	0.000
Lack of energy	7.	I'm just too tired after work to get any exercise.	0.710**	0.000
	8.	I don't get enough sleep as it is. I just couldn't get up early or stay up late to get some exercise.	0.745**	0.000
	9.	I'm too tired during the week and I need the weekend to catch up on my rest.	0.734**	0.000
Lack of willpower	10.	I've been thinking about getting more exercise, but I just can't seem to get started	0.685**	0.000
	11.	It's easier for me to find excuses not to exercise than to go out to do something.	0.644**	0.000
	12.	I want to get more exercise, but I just can't seem to make myself stick to anything.	0.715**	0.000
Fear of injury	13.	I'm getting older so exercise can be risky.	0.817**	0.000
	14.	I know of too many people who have hurt themselves by overdoing it with exercise.	0.690**	0.000
	15.	I'm afraid I might injure myself or have a heart attack.	0.775**	0.000
Lack of	16.	I don't get enough exercise because I have never learned the skills for any sport.	0.746**	0.000
	17.	I really can't see learning a new sport at my age.	0.784**	0.000

	18.	I'm not good enough at any physical activity to make it fun.	0.780 <sup>**</sup>	0.000
Lack of resources	19.	I don't have access to jogging trails, swimming pools, bike paths, etc.	0.671 <sup>**</sup>	0.000
	20.	It's just too expensive. You have to take a class or join a club or buy the right equipment.	0.605 <sup>**</sup>	0.000
	21.	If we had exercise facilities and showers at work, then I would be more likely to exercise.	0.653 <sup>**</sup>	0.000

<sup>\*\*</sup>Correlation is significant at the 0.01 level (2-tailed).

The previous table clarifies the correlation coefficient for each paragraph in the each axis and the total of the axis. The p-values (Sig.) are less than 0.05, so the correlation coefficients of all paragraphs are significant at ( $\alpha \leq 0.05$ ), so it can be said that the sevenaxes are valid to be measured what it was set for to achieve the main aim of the study.

### Construct validity

Construct validity evaluates whether a measurement tool really represents the thing we are interested in measuring. It's central to establishing the overall validity of a method.

**Table2:-** Correlation coefficient of each axis and the total of the questionnaire.

No.	Axis	Correlation Coefficient	Sig.
1.	Lack of time	0.687 <sup>**</sup>	0.000
2.	Social influence	0.749 <sup>**</sup>	0.000
3.	Lack of energy	0.727 <sup>**</sup>	0.000
4.	Lack of willpower	0.744 <sup>**</sup>	0.000
5.	Fear of injury	0.693 <sup>**</sup>	0.000
6.	Lack of skill	0.831 <sup>**</sup>	0.000
7.	Lack of resources	0.631 <sup>**</sup>	0.000

<sup>\*\*</sup>Correlation is significant at the 0.01 level (2-tailed).

The previous table clarifies the correlation coefficient for axes and the total of the questionnaire. The p-values (Sig.) are less than 0.05, so the correlation coefficients of all fields are significant at ( $\alpha \leq 0.05$ ).

### Instrument Reliability

The reliability of an instrument is the degree of consistency which measures the attribute; it is supposed to be measuring. The less variation an instrument produces in repeated measurements of an attribute, the higher its reliability. Reliability can be equated with the stability, consistency, or dependability of a measuring tool.

The test is repeated to the same sample of people on two occasions and then compares the scores obtained by computing a reliability coefficient.

To insure the reliability of the questionnaire, Cronbach's Coefficient Alpha should be applied.

**Table3:-** Cronbach's Alpha for total fields of the questionnaire.

Questionnaire	No. of Paragraphs	Cronbach's Alpha
Number of Paragraphs	21	0.872

The previous table shows the values of Cronbach's Alpha equals 0.872 for the entire questionnaire which indicates an excellent reliability of the entire questionnaire. Thereby, it can be said that the researcher proved that the questionnaire was valid, reliable, and ready for distribution for the population sample.

### Data Analysis and Results:-

This part includes analysis of the most important statistical results and those have been reached about the problem of the study. In addition, this chapter features the results of answering the study questions and commenting on each one of them in light of the study problem.

### Descriptive Statistics

#### Distribution of respondents by Gender

According to the following table, analysis of the sample profile shows that 57.3% of respondents are males, while 42.7% of them are females.

**Table 4:-** Distribution of respondents by their gender.

Gender	Frequency	Percent
Male	216	57.3%
Female	161	42.7%
Total	377	100.0%

#### Distribution of respondents by Age

According to the following table, analysis of the sample profile shows that 72.5% of respondents their ages are 45 years or more, 25.9% of them their age is between (30-44) years, while 1.6% of them their age is between (15-29) years.

**Table 5:-** Ddistribution of respondents by their age.

Age	Frequency	Percent
15-29	6	1.6%
30-44	98	25.9%
45 and more	273	72.5%
Total	377	100.0%

#### Distribution of respondents by Educational level

According to the following table, analysis of the sample profile shows that 33.7% of respondents have finished their university, 29.1% of them have finished their secondary school, 20.7% of them have finished their primary school, while 16.5% of them have finished their preparatory school.

**Table 6:-** Distribution of respondents by their educational level.

Educational level	Frequency	Percent
Primary	78	20.7%
Preparatory	62	16.5%
Secondary	110	29.1%
University	127	33.7%
Total	377	100.0%

#### Distribution of respondents by Nationality

According to the following table, analysis of the sample profile shows that 95.1% of respondents are Saudi, while 4.9% of them are non-Saudi.

**Table 7:-** Distribution of respondents by their experience.

Experience	Frequency	Percent
Saudi	359	95.1%
Non-Saudi	18	4.9%
Total	309	100.0%

### Results and Discussion:-

In order to determine barriers of physical activity among diabetic patients in Al Madinah almunawarah2021,the researcher calculated the arithmetic mean averages and percentage according to their Sociodemographic characteristics by barriers to physical activity The following table illustrates these result .

**Sociodemographic characteristics by barriers to physical activity.**

Sociodemographic characteristic	Lack of resources		Lack of willpower		Lack of social support		Lack of energy		Lack of skills		Lack of time		Fear of injury	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Gender	359/377	95.20%	348/377	92.30%	342/377	90.70%	353/377	93.60%	284/377	75.30%	364/377	96.60%	345/377	91.50%
Male	205/216	94.90%	196/216	90.70%	194/216	89.80%	196/216	90.70%	157/216	72.70%	182/216	84.30%	194/216	89.80%
Female	154/161	95.50%	152/161	94.41%	148/161	91.90%	156/161	97.00%	127/161	78.90%	148/161	91.90%	151/161	93.80%
	<b>X<sup>2</sup>=1.091</b>	<b>P=0.282</b>	<b>X<sup>2</sup>=1.796</b>	<b>P=0.036</b>	<b>X<sup>2</sup>=8.715</b>	<b>P=0.464</b>	<b>X<sup>2</sup>=1.700</b>	<b>P=0.043</b>	<b>X<sup>2</sup>=1.350</b>	<b>P=0.141</b>	<b>X<sup>2</sup>=1.132</b>	<b>P=0.254</b>	<b>X<sup>2</sup>=6.546</b>	<b>P=0.684</b>
Age	359/377	95.20%	348/377	92.30%	342/377	90.70%	353/377	93.60%	284/377	75.30%	329/377	87.30%	345/377	91.50%
15-29 years	6/6	100.00%	6/6	100.00%	6/6	100.00%	6/6	100.00%	4/6	66.70%	6/6	100.00%	6/6	100.00%
30-44 years	90/98	91.80%	92/98	93.80%	85/98	86.70%	93/98	94.90%	60/98	61.20%	89/98	90.80%	90/98	91.80%
45 years and more	263/274	95.90%	250/273	91.60%	251/273	91.90%	254/274	92.70%	220/273	80.60%	234/273	85.70%	249/273	91.20%
	<b>X<sup>2</sup>=1.550</b>	<b>P=0.627</b>	<b>X<sup>2</sup>=1.981</b>	<b>P=0.344</b>	<b>X<sup>2</sup>=9.906</b>	<b>P=0.935</b>	<b>X<sup>2</sup>=2.244</b>	<b>P=0.213</b>	<b>X<sup>2</sup>=2.780</b>	<b>P=0.065</b>	<b>X<sup>2</sup>=3.213</b>	<b>P=0.021</b>	<b>X<sup>2</sup>=2.165</b>	<b>P=0.248</b>
Educational Level	359/377	95.20%	348/377	92.30%	342/377	90.70%	353/377	93.60%	284/377	75.30%	329/377	87.30%	345/377	91.50%
Primary	74/78	94.90%	72/78	92.30%	75/78	96.20%	74/78	94.90%	68/78	87.20%	71/78	90.00%	72/78	92.30%
Preparatory	59/62	95.20%	56/62	90.30%	59/62	95.20%	54/62	87.10%	50/62	80.60%	54/62	87.10%	54/62	87.10%
Secondary	104/110	94.50%	99/110	90.00%	91/110	82.70%	99/110	90.00%	74/110	67.30%	89/110	80.90%	99/110	90.00%
University	122/127	96.10%	121/127	95.30%	117/127	92.10%	126/127	99.00%	92/127	72.40%	116/127	91.30%	120/127	94.50%
	<b>X<sup>2</sup>=3.052</b>	<b>P=0.291</b>	<b>X<sup>2</sup>=3.925</b>	<b>P=0.060</b>	<b>X<sup>2</sup>=4.638</b>	<b>P=0.012</b>	<b>X<sup>2</sup>=5.479</b>	<b>P=0.001</b>	<b>X<sup>2</sup>=4.755</b>	<b>P=0.009</b>	<b>X<sup>2</sup>=3.478</b>	<b>P=0.144</b>	<b>X<sup>2</sup>=2.829</b>	<b>P=0.396</b>

**Bolding indicates statistically significant difference.**

The previous table shows the suffering of the study sample members from lack of willpower. The results illustrated that there was statistically significant differences at level ( $\alpha \leq 0.05$ ) among the study sample members of the female population, where 94.4% of them suffered from a lack of willpower to engage in various physical activities, while males (90.7% of them) also find it difficult to have a good willpower to practice different physical activities.

The researcher explains these results by the nature of the female life and the nature of the society in which they live, and her daily officials take care of home, children and work, which may eliminate any desire they have to engage in any physical activities.

The results also illustrated that there was statistically significant differences at level ( $\alpha \leq 0.05$ ) among the study sample members of the female population, where (97.0%) of females are suffering from lack of energy, while males (91.0% of them) also find it difficult to have enough energy to practice different physical activities. The reason for these results may be due to – as mentioned before- the daily activities that females do every single day.

The researcher find that these activities consume the females daily energy, which makes them feel that they have no ability to engage in physical activities, not to mention that they suffer from diabetes, which causes them to feel lethargic.

Regarding the age variable, the result show that there was statistically significant differences at level ( $\alpha \leq 0.05$ ) among the study sample members there age ranged between (15-29) years old, where 100% of them suffered from a lack of time to engage in various physical activities in their daily time. The researcher explain these results that young people at this age are preoccupied with many things, such as educational attainment at the school and university on the one hand, and searching for suitable work after completing university studies on the other hand, which takes up most of their time, making them not find enough time to do any physical activity.

The previous results also shows that there was statistically significant differences at level ( $\alpha \leq 0.05$ ) among the study sample members with primary certification, where 96.2% of them suffered from lack of social support and 87.2% of them suffered from lack of skills, which illustrates the lack of adequate psychological, and social support for the members of the study sample who hold the primary certificate, the reason for this may be due to the inability of this group to engage with the different layers of society as a result of the different educational level. The results also illustrate there significant differences among the study sample members with university certification, where 99.0% of them suffered from lake of energy.

**Recommendation:-**

Based on the previous results, the researcher recommends a set of recommendations that can be used to enhance the practice of physical activities in patients with type 2 diabetes:

1. Educating family members about the importance of practicing group sports activities, especially for people with type 2 diabetes.
2. Spreading the culture of exercise in different groups of society and how to integrate with others and ignoring any negative thoughts about how they will look when they exercise with others.
3. Educating diabetic patients on how to balance the effort spent at work and the effort to be exerted in practicing different physical activities.
4. Educating diabetics about the importance of getting enough sleep, the importance of waking up early and the harms of staying up late.
5. Working to provide awareness brochures on how to start practicing physical and sports activities for diabetic patients in line with their health condition.
6. Providing health awareness brochures on how to treat minor sports injuries that diabetics may be exposed to during their various sports activities.

**Ethical approval:**

The proposal presented to the board committee and ethically approved.

**Ethical consideration:**

1. Permission from Al-madina joint program of family medicine obtained.
2. Diabetic center permission already taken.

3. Consent obtained from every patient in beginning of the questionnaire.

**Pilot study:**

This study to test applicability, feasibility and to take feedback from patients regarding the questionnaire. The data collected from this pilot and not included in the research result.

**Budget:**

It is self-funded research

**References:-**

- (1) bmj best practice.
- (2) Standards of medical care of diabetes 2020.
- (3) Prevalence of insufficient physical activity, ([https://www.who.int/gho/ncd/risk\\_factors/physical\\_activity\\_text/n/](https://www.who.int/gho/ncd/risk_factors/physical_activity_text/n/))
- (4) World Health Organization. Saudi Arabia Diabetes country profiles 2016. Geneva, Switzerland: World Health Organization; 2016.
- (5) Ministry of Health. Survey of Health Information in Kingdom of Saudi Arabia 2013.
- (6) Alzahrani AM, Albakri SB, Alqutub TT, Alghamdi AA, Rio AA. Physical activity level and its barriers among patients with type 2 diabetes mellitus attending primary healthcare centers in Saudi Arabia. *Journal of family medicine and primary care*. 2019 Aug;8(8):2671.
- (7) Aldukhayel A. The magnitude, determinants and barriers for physical activities among diabetic patients in Qassim area of Saudi Arabia. *International Journal of Advances in Medicine*. 2018 May;5(3):482.
- (8) Al-Kaabi J, Al-Maskari F, Afandi B, Parkar H, Nagelkerke N. Physical activity and reported barriers to activity among type 2 diabetic patients in the United Arab Emirates. *The review of diabetic studies: RDS*. 2009;6(4):271.
- (9) Alghafri T, Alharthi SM, Al Farsi YM, Bannerman E, Craigie AM, Anderson AS. Perceived barriers to leisure time physical activity in adults with type 2 diabetes attending primary healthcare in Oman: a cross-sectional survey. *BMJ open*. 2017 Nov 1;7(11): e016946.
- (10) Kadariya S, Aro AR. Barriers and facilitators to physical activity among urban residents with diabetes in Nepal. *PloS one*. 2018;13(6).
- (11) Thomas N, Alder E, Leese GP. Barriers to physical activity in patients with diabetes. *Postgraduate medical journal*. 2004 May 1;80(943):287-91.