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Physical Activity Correlates among Jordanian Diabetes Patients

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ABSTRACT

Introduction: An important keystone in preventing diabetes mellitus (DM) complications are performing Self-Care Behaviors (SCB) such as engaging in Physical Activity (PA). The objectives of the present research project are to identify PA levels among Jordanian patients with diabetes, explore the associations between PA and the socio-demographic characteristics of the participants, and recognize its predictors. **Method:** This study utilized quantitative descriptive cross-sectional design. The authors used purposive sampling method to recruit bout four hundred patients. Those patients were selected from the governmental sector of the Jordanian hospitals. **Results:** The inferential statistics illustrated that three factors were significant predictors to PA: complication presence (p=0.001), social norms (p= 0.01) in addition to perceived behavioral control (p= 0.001). The results indicated that about 65% of the participants had inadequate participation in the recommended physical activity. Similar findings were reported in the Arabic context, for example about 65 % of the Yemini patients had inadequate physical activity. Concerning the predictors the study results showed that those patients with diabetes complication have higher adherence to the prescribed physical activity. Dissimilar findings were evident in the literature For example, Shiriyedeve et al. found that there was association between adherence to PA and age (r = −0.085). However, this association was not statically significant. One of the most chronic illnesses in Jordan is diabetes mellitus. This could increase the responsibilities of the Jordanian health care providers especially the nurses. **Conclusion:** Being active participants in the physical activity is highly recommended measure to manage diabetes mellitus signs and symptoms appropriately.

Keywords: Correlates, Diabetes Mellitus, Jordan, Physical activity

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INTRODUCTION

DM is a major chronic health problem internationally(1). The world Health Organization (WHO) defined DM as a cluster of disorders in the metabolic system that can be recognized by the incidence of hyperglycemia, which coupled with the treatment lack. Several factors can be attributed for the etiology of diabetes, these factors can be summarized as the distortion in the metabolism of essential dietary molecules such as protein, fat and the carbohydrates in addition to disturbances in the insulin action or/and insulin secretion (2). Globally, the developed countries have witnessed increase percentages of these people who suffered from diabetes (3).The age-adjusted incidence of DM among mature individuals increased steadily during the period 1980 to 2014. They do have the following epidemiological results consecutively, 4.7% (108 million) to 8.5% (422 million). In addition to that, the developed countries have witnessed a significant increment (3). Regarding the international statistics, in 2019 it was estimated that prevalence of diabetes mellitus among those people from the age group 20–79 years equals to (9.3%) 463 million patients. Moreover, it is expected that by 2030 the prevalence of diabetes equals to (10.2%) 578 million patients (4).

Uncontrolled glucose levels were reported to cause about four million deaths annually (2). Furthermore, the International Diabetes Foundation (IDF) estimated that in 2019 the expenditure of global health care annually was USD 760 billion for those people with diabetes. Additionally, the expenditure will increase in 2030 to be about USD 825 billion (4). The statistics indicated that the international prevalence of diabetes is the highest in the Caribbean and North America while the prevalence of diabetes in the Middle East is considered as the second rank. More specifically, the statistics of the Middle East revealed that the diabetes prevalence in 2017 is approximated to be 39 million individual and this prevalence is expected to be increased in 2045 to reach 82 million individual (5).

In Jordan, the statistics shows that for Type 2 diabetes Mellitus (T2DM) the prevalence rate is high and it is increasing at a significant rate every day (6). The diabetes prevalence rate in the Jordanian population was reported to be 32.4% for males and 18.1% for females in 2017 (7). In Jordan, the number of annual diabetes-related

deaths was 400 males and 350 females for patients aged 30–69 years and 450 males and 490 females for patients aged over 70 years (3).

According to the WHO (2), diabetes types can be described as follows. Diabetes Mellitus Type 1 (T1DM) is characterized by destruction of the β-cell inside the pancreas, which usually occurs as a result of autoimmune disease. This leads to insufficient production of insulin to meet the body's needs. This is common in infants and young people. Conversely, T2DM is caused by tissue receptor resistance to insulin due to dysfunction of the β-cell that could occur at different degrees. This is the most prevalent type of diabetes, and both obesity and overweight contribute to its incidence (8). Gestational DM occurs in the last trimester of pregnancy and can sometimes be clearly evident before the gestational period (9).

Several types of Self Care Behaviors)SCBs(, such as foot care, taking medication as prescribed, blood glucose management, cessation of smoking, PA, and following a healthy diet and lifestyle (10), are mentioned in the literature. The results of publications highlight the importance of performing (SCBs) such as disease management properly and achieving the treatment targets and goals (11). Moreover, (10) reported SCBs and good glycemic control is positively correlated. Complication reduction might improve the patient's quality of life (10).

In the current study, performing PA were studied. Adherence to PA was selected since performing PA on a regular basis could lead to several benefits for the patients' health status, for instance, controlling the blood glucose level, which is a result of most of the diabetes prevention programs, and reduction in patients' mortality (12). Moreover, participating in regular PA could contribute significantly to improving the cardiorespiratory fitness, reducing the lipid level, decreasing the blood pressure, and enhancing the glycemic control of patients.

Since 1980, researchers across the globe have reported important data concerning the prevalence pattern of DM(13) . Countries that are located in the low- and middle-income zone have witnessed a faster increase in DM rates than those that are located in the high-income zone (14).

Several factors, including population aging, better survival, the rise in DM incidence, the sedentary lifestyle, not participating in PA for a long time, and obesity, are expected to contribute to higher DM rates than ever before(13).

In Western countries such as America, the number of DM cases doubled from 1970 to 2000 (15). Similarly, in the Jordanian context, the statistics about DM revealed that the prevalence of DM increased from 1994 to 2004(16) . The Jordanian governmental agency through the prime minister has implemented essential measures to control and prevent DM in Jordan by 2020. The increase in the social cost and the high prevalence rate of DM in addition to the mortality and morbidity rates highlight the urgent need for conducting several projects that help in identifying contributing factors and designing appropriate therapeutic modalities (14, 16).

SCBs are essential to prevent long-term DM complications. For the affected patients to manage the symptoms of diabetes properly, the following activities should be carried out: taking medication properly, self-monitoring of blood glucose, weight management, cessation of smoking, exercise, healthy eating, and a healthy lifestyle(17). These activities are considered vital for achieving optimal health care outcomes. However, in the current is study, the researcher addressed only PA and MA. It has been reported in the literature that SCBs are positively correlated with quality of life improvement, complication reduction, and glycemic control (18).

Furthermore, it has been reported that multiple factors have an impact on SCBs. Those factors include the patient's economic status, the existence of morbidities and complications, social support, age, and sex (19-21). According to WHO, the factors that contribute to the medication non-adherence status of the patients can be classified into four categories: a) patient-related factors such as age and gender; b) provider–patient/health care system factors such as consultation sessions; c)social factors such as family support; and d) socioeconomic factors (22). The few studies carried out in Jordan did not pay adequate attention to the recommended SCBs and did not investigate the patients' SCBs comprehensively(23). Moreover, the cultural attributes of the Jordanian people could have been underestimated in the earlier studies(24). So, this study examined this clinical problem by exploring the cultural factors of Jordanian patients, attitude, social pressure, and facilitators of and barriers to performing SCBs (MA, PA) by using the TPB.

MATERIALS AND METHODS

Research Design

In order to fulfill the research questions and objectives, the researchers used correlational cross-sectional descriptive design.

There are several advantages of using a cross-sectional design, and they are available in nursing research textbooks (25, 26). First, cross-sectional designs usually require less time than other types of research methodology. Second, studies that employ this type of research design have readily available findings because of the huge amount of collected data. Third, minimal confounding data exist in relation to maturation (25). According to (14), the correlational design is a highly

useful design for research studies since many of these studies are beyond the researcher's ability to manipulate, control, and randomize. This is similar to the present study, in which the researcher intends to describe the factors that are associated with the PA.

Study Site

The researchers choose to conduct the present research project in the Jordanian health care institutions from the governmental sector and located in three different areas (i.e., the northern, central and southern areas of Jordan). The patients were selected from both inpatient wards and outpatient clinics (medical & surgical). The selected hospitals were Al-Karak Hospital, Jameel Al-Totangi Hospital, Al-Bashir Hospital, and Princess Basma Teaching Hospital. The researcher chose these hospitals as the patients who attend these hospitals represent diverse socioeconomic backgrounds. The rationale for choosing patients from public hospitals because these hospitals used similar policies and regulations and this facilitate data collection procedures. Furthermore, the researcher selected two hospitals from the central region of Jordan since the total population of this region of Jordan constitutes 63.5% of the population of the country. The following information will be presented according to the (Ministry of Health [MOH], 2020).

Population and Study Sample

All the participants in the current study were DM patients attending the hospitals described above. The inclusion criteria for participation in the study are: a) the age of the patient must be at least 18 years (adult patients not pediatric patients); b) participants with a confirmed diagnosis of DM for at least six months; c) patients who attended one of the above-mentioned hospitals. The researchers used the informed consent to reflect the agreeing of those individuals. On the other hand, the exclusion criteria for participation are: a) patients who require intensive care (such as patients with myocardial infarction or respiratory distress) and cannot respond; and b) patients who have any mental or sensory impairment that prevents them from participating in the data collection phase of the study.

Sample Procedures

Getting the study sample can be described as the process of representing the whole population through choosing a subset or portion of individual from the previously pre-determined targeted population (26). The sample was selected using purposive sampling method.

The Size of the Recruited Sample

Adequate size of the sample can be defined as the minimum frequency of the individuals who are required for the attainment of a trustworthy conclusion from the statistical point view (25). For the purpose of calculating the required size of the sample in the present research project, the researcher used G*power software analysis. The subsequent features were utilized: alpha 0.05, power of 80%, moderate effect size, 2-tailed measure. The chosen statistical test was Pearson correlation. The resulting size of the sample equals to 356 participants. Nevertheless, to combat the challengers of having incomplete questionnaires as well as incorrectly given data, the total sample size was 400 (adding a 10% attrition rate for recording error or non-response).

Data Collection

For Data collection purpose the researcher used self-reported questionnaire as illustrated in the next section.

Study Questionnaire

The MAPADM structured self-report questionnaire was adapted by the researcher based on those used in previous studies (27-29). These studies incorporated the following original tools: Proportion of Adherence and Global Assessment of Adherence). In the current study, the questionnaire was used, which consisted of the following sections: A) patients' demographics; B) physical activity for patients with DM.

Patients' Demographics Section

This section consists of two subscales; the first one is patients' demographic information, while the second one is the current diabetes status. The first subscale for demographic information includes seven variables: gender, marital status, age, current living situation, employment status, monthly income (Jordanian Dinar), and educational level. These variables can be divided in terms of measurement level into two main categories, namely dichotomous (gender) and categorical (marital status, current living situation, employment status, and educational level) variables, in addition to continuous variables (age and monthly income).

The second part of the patients' demographics section is called the Current Diabetes Status subscale, which measure diabetes-associated information such as DM diagnosis date, type of diabetes, HbA1c level, treatment method of diabetes, and DM complications. These variables can be divided in terms of measurement level into two main categories, continuous variables (diabetes diagnosis date), interval (HbA1c level), categorical (the type of DM, treatment method of diabetes), and dichotomous (DM complications).

Physical Activity Questionnaire Adherence

Attitudes toward Physical Activity (APA): This section includes a Likert scale that ranged from 1 to 5 points. The scores for the whole subscale ranged from 7 to 35 points. The median score was used to distinguish the levels of attitude. The scores from 26 to 35 indicate a favorable attitude, while the scores from 7 to 25 indicate an unfavorable attitude.

Social Norms toward Physical Activity (SNPA): A Likert scale that ranged from strongly disagree = 1 point to strongly agree = 5 points was used in this section.

The total score for the whole subscale is from 4 to 20 points; the scores from 4 to 16 indicate that they received discouragement from significant people while the scores from 17 to 20 indicate that patients received encouragement from significant people.

Perceived Behavioral Control for Physical Activity (PBCPA): A Likert scale that ranged from strongly disagree = 1 point to strongly agree = 5 points was used in this section. The total score for the whole subscale ranged from 5 to 35 points. In this study, two items were deleted for the purpose of reliability (for more details, see the Pilot Study section). Therefore, the total score for the whole subscale ranged from 3 to 15 points. The scores from 10 to 15 indicate it is easy to control adherence to PA, while the scores from 3 to 9 indicate it is difficult to control adherence to PA.

Behavior (Adherence) for Physical Activity (BPA): A Likert scale that ranged from very unlikely = 1 point to very unlikely = 5 points was used in this section. The total score for the whole subscale is5 to 25 points, where the scores from 16 to 25 indicate adequate adherence to PA, while the scores that from 5 to 15 indicate inadequateadherence to PA.

Reliability of the Physical Activity Questionnaire

Reliability analysis allows the properties of the tool and its items to be studied. Cronbach's alpha was utilized to assess the internal consistency of the tool that evaluates the consistency of subjects across the items on the whole tool (Polit& Beck, 2017). Polit and Beck (2018) stated that the acceptable reliability of the intended tool could be expressed by a Cronbach's alpha of 0.70 and above. The total Physical Activity Questionnaire alpha coefficient was 0.83, indicating acceptable internal consistency. The Cronbach's alpha for the eight subscales ranged from 0.71 to 0.99 during the data collection period.

Ethical Clearance

This study was approved by Research Ethics Committee, ethical approval number is 5944 from the Jordanian Ministry of Health

RESULTS

Description of the study sample

This study included about 400 Jordanian diabetes patients which represent the study sample. The researcher used Table I to illustrate the study sample demographics. In relation to the study age, the study illustrate that the sample younger age was 20 years and the maximum age was 86 years (M = 60.18; SD =12.21). Patients' monthly income ranged from 30 to 1000 JD (M = 312.10, SD = 169.47). The diabetes duration of the study patients ranged from 1 to 35 years (M = 12.02, SD = 8.57). The majority of the patients were female (n = 244, 61.0%), married (n = 381, 95.3%), live with family (n = 358, 89.5%), unemployed due to their health condition(s) (n = 136, 34.0%), have high school education (n = 232, 58.0 %), have T2DM (n = 344, 86.0%), have HbA1c with a laboratory result over 8.0 (n = 112, 28.0%), and use more than one treatment method (e.g., insulin & oral treatments) (n = 167,41.8%). In addition, more than two

Table I: Characteristics/Demographics of the Study Sample (n=400)

Variable	Mean (SD)	Median	Minimum	Maximum
Age	60.18 (12.21)	60	20	86
Monthly income	312.10 (169.47)	250	30	1000
Diabetes Duration	12.02 (8.57)	10	1	35

Variable	Frequency (%)
Gender	
Female	244 (61.0 %)
Male	156 (39.0 %)
Marital status	
Single	11 (2.8 %)
Married	381 (95.3 %)
Separated/Divorced	4 (1.0 %)
Widow	4 (1.0 %)
Living Situation	
Live Alone	1 (0.3%)
Live with Family	358 (89.5 %)
Live with Relative	41 (10.3 %)
Live in Elderly house (nursing home)	0 (0 %)
Employment Status	
Employed Full Time	36 (9.0 %)
Employed part Time	69 (17.3 %)
Unemployed, looking for a job	73 (18.3 %)
Unemployed due to my Health Condition(s)	136 (34.0 %)
Retired	86 (21.5 %)
Education	
Less than High School	106 (26.5 %)
High School	232 (58.0 %)
College Diploma	16 (4.0 %)
Bachelor's Degree	36 (9.0 %)
Master's Degree	6 (1.5 %)
Doctoral Degree	4 (1.0 %)
Type of Diabetes	
Type 1	53 (13.3 %)
Type 2	344 (86.0%)
Other	3 (0.8%)
HBA1c	
< 6.0	23 (5.8 %)
6.1 – 6.5	36 (9.0 %)
6.6 – 7.0	53 (13.3 %)
7.1 – 7.5	101 (25.3 %)
7.6 – 8.0	75 (18.8 %)
> 8.0	112 (28.0 %)
Treatment Method	
Oral Medication	158 (39.5 %)
Insulin	75 (18.8 %)
Using More than One Treatment Method (e.g., insulin and oral medication)	167 (41.8%)
Complication presence	
Yes	325 (81.3 %)
No	75 (18.8%)
Type of Complication	
Not Available (N/A)	74 (18.5 %)
Atherosclerosis	29 (7.2 %)
Eye Disease	46 (11.5 %)
Foot Problems	19 (4.8 %)
Kidney Disease	5 (1.3 %)
Nerve Damage	5 (1.3 %)
Problems Related to sexuality	1 (0.3 %)
Having more than One type of Complications	221 (55.3%)

thirds of the study sample have a diabetes complication (n = 325, 81.3%), while around half of the study sample have more than one type of diabetes complication (n = 221, 55.3%).

Physical Activity Correlates

Moreover, the correlation measures presented in Table II revealed that independent variables are age, living situation, monthly income, educational level, complication presence, complication type, behavioral attitude, SN, and PBC are correlated with PA, independent variable.

Table II: Correlates of the Physical Activity Adherence (n= 400)

Variables	Correlation coefficient	Significance
Gender	- 0.07	0.16
Marital Status	- 0.03	0.61
Age	- 0.26	0.001**
Living Situation	- 0.14	0.006**
Employment Status	- 0.02	0.68
Monthly Income	0.12	0.02*
Education	0.13	0.01*
Diabetes Duration	- 0.09	0.08
Diabetes Type	0.01	0.91
HBA 1c	0.04	0.38
Treatment Method	- 0.01	0.97
Complication presence	0.33	0.001**
Complication Type	- 0.29	0.001**
Attitude	0.27	0.001**
Social Norms	0.31	0.001**
Perceived behavior Control	0.59	0.001**

Note: *Significant < 0.05; ** Significant < 0.01

The findings revealed a significant low negative correlation between adherence to PA and age (r = –0.26; p = 0.001) and a significant low negative correlation between adherence to PA and living situation (r = –0.14; p = 0.006*). Conversely, a significant low positive relationship was revealed between monthly income and adherence to PA (r = 0.12; p = 0.02*). Furthermore, a significant low positive correlation was revealed between adherence to PA and educational level (r =0.13; p = 0.01). The results also indicated that complication presence has a low positive relationship with adherence to PA (r =0.33; p = 0.001). Likewise, the study results revealed a significant low negative correlation between adherence to PA and complication type (r = –0.29; p = 0.001). Moreover, a significant low positive correlation was detected between adherence to PA and behavioral attitude (r =0.27; p = 0.001). Similarly, a significant low positive relationship was identified between SN and adherence to PA (r = 0.31; p = 0.02*). Finally, the findings revealed a moderate positive correlation between adherence to PA and PBC (r =0.59; p = 0.001).Conversely, the findings identified no significant correlation between PA and the rest of the variables.

Predictors of Physical Activity

In relation to PA, Table III shows that the multiple regression analysis revealed that the model statistically significantly predicted PA (F = 32.37, p = 0.001). The R2 for the model was 0. 42.8% (R=-0.428), and the adjusted R2 was 0.414. Regarding the dependent variable (PA), the outcome showed a predictive model of nine factors, three of which were significantly related to PA: Complication presence, SN, and PBC. Complication presence had relatively higher prediction effects (B = 2.68, p <0.001) compared with the rest of the predictors. The findings showed that complication presence (t = 3.39, p = 0.001), SN (t = 2.61, p = 0.01), and PBC (t =11.46; p = 0.001) were the significant predictors of adherence to PA among Jordanian patients with diabetes. The beta coefficient for complication presence was 2.68, representing that a 1 point increase in complication presence is correlated with a 2.68 point increase in adherence to PA. Moreover, the beta coefficient for SN was 0.23, representing that a 1 point increase in SN is correlated with a 0.23 point increase in adherence to PA. The beta coefficient for PBC is 1.00, representing that a 1 point increase in PBC is associated with a 1.00 point increase in adherence to PA.

Levels of Self Care Behaviors

Table IV reported the number and percentage for each level of adherence to PA. The total score for each section of PA (behavior) was divided into two levels (i.e., inadequate & adequate). Furthermore, the study results showed that about one third of study participants reported having an in adequate level of adherence to the recommended PA (n= 260, 65 %).

DISCUSSION

In this study, data were collected from 400 Jordanian

Table III: Predictors of Physical Activity (n= 400)

Variables	B	SE b	b†	T	P value	95% CI	
						Lower	Upper
Age	- 0.04	0.02	- 0.08	- 1.93	0.06	- 0.08	0.001
Living Situation	- 0.36	0.74	- 0.02	- 0.49	0.62	- 1.83	1.09
Monthly Income	0.001	.001	0.02	0.55	0.58	- 0.002	0.004
Education	- 0.18	0.26	- 0.03	- 0.68	0.50	- 0.69	0.34
Complication presence	2.68	0.79	0.18	3.39	0.001*	1.13	4.24
Complication Type	- 0.06	0.09	- 0.04	- 0.71	0.48	- 0.24	0.11
Attitude	0.09	0.09	0.04	0.94	0.35	- 0.09	0.27
Social Norms	0.23	0.09	0.11	2.61	0.01*	0.06	0.41
Perceived behavior Control	1.00	0.09	0.49	11.46	0.001*	0.83	1.17

b: Unstandardized beta; B: Standardized beta; CI: Confidence Interval, standard error (SE b)
* Significant at the 0.05 level.
†R^2 = 0.428; adjusted R^2 = 0.414; F = 32.37, p =0.001.

Table IV: Diabetic physical activity levels (i.e., adequate and inadequate) among diabetic Jordanian patients (n= 400)

Levels of Physical Activity Adherence	Score	N	%
Inadequate adherence	5-14	260	65.0%
Adequate adherence	15-25	140	35.0%

patients with diabetes. The demographic results indicated that the majority of the participants had T2DM (86.0%). A higher percentage was reported in study that conducted Nepal (30). The author found that 131 patients (98%) had T2DM. In contrast, (31) found that 242 patients in Ethiopia (58.2%) had T2DM, which is lower than the reported results in the present study. This variation could be attributed to the variation in context. Likewise, (32) reported lower percentages in the Jordanian context, finding that about half of the participants (n = 169, 51.6%) had T2DM. The higher percentage of T2DM in the present study could be due to the fact that T2DM is widely spread in Jordan (1).

This study indicated that about 65% (n = 260) of the participants had inadequate adherence to PA. Conversely, the results illustrated that 35% (n = 140) had adequate adherence to the recommended PA. Likewise, (33) found that about 36% of participants reported that they engaged in physical exercise on at least five days per week. Conversly, (34) reported that 132 (63.8%) Yemeni participants had low adherence to recommended PA.

The present study found that nine demographics factors were significantly associated with patients' adherence to PA. In relation to age, the present study's findings are consistent with those (35). Conversely, inconsistent findings were reported by (36), who found that there was a negative correlation between adherence to PA and age (r = −0.085).
Concerning the association between living situation and PA, the findings of the present study are not consistent with those (37) , who reported different results in the Indian context. It was reported that lower participation in PA is evident in patients who live with a joint family (n = 204,M =70.5) (p = <0.05). In contrast, there was higher participation in PA among patients who live alone or with a nuclear family (n = 49, M =57).Similar findings were reported by (30) , who showed a significant correlation (p = 0.041) between the patients' family type (nuclear versus joint) and the level of PA.

Regarding the monthly income impact on PA, the present study found that there was a significant association between monthly income and PA. Likewise, (38) found that doing exercise is associated with the socioeconomic status of South African patients with patients with diabetes. Furthermore, (39) found that the correlation between the Pakistani patients' participation in the recommended exercise program (i.e., exercising at least 20 to 30 minutes per day on at least five days per week) and the participants' monthly household income was significant (n= 65,61.3%) (p = 0.001**).
In relation to the educational level variable, the present study found a significant positive association between the educational level of the patients and PA. Another study found that there was significant correlation between educational level and PA Iranian study (p <0.005) (40). Conversely, in the Indian context, it was reported that there was no correlation between the patients' educational level and their adherence to PA (41).

The present research project also showed that complication type and PA was significantly correlated with each other. Similarly, (42) revealed that PA can enable the Saudi Arabian patients to postpone, or even control, the presence of the complication (p=0.006), which is statistically significant. Likewise, it has been reported that that diabetes complications (such as nephropathy, retinopathy, and hypertension) is associated with physical activity (p < 0.001) among Bangladeshi patints with diabetes (35)Complications of diabetes were found more often among the patients who were not performing exercises regularly than among the patients who were performing exercise regularly (42).

Concerning the association between patients' behavioral attitude and participation in PA, it was significant according to the results of the study. The present research projects result aligns with those of previous similar studies in the literature (12). The results showed that PA and behavioral attitude is significantly associated with each other among Brazilian patients (OR=10.1; 95% CI: 6.34–20.1) (12). Similarly, (43) reported that the highest predictor of self-care (sport type of self-care) is the patients' behavioral attitude (p < 0.001) among selected patients from Iran.

The identified results in the current study revealed that patients' PA can be predicted by the following factors: complication presence, SN, and PBC. The findings of a number of previous studies (44, 45) were comparable to the current study's results regarding the association between SN and PA but in a different context. Furthermore, the association between PBC and PA has been validated by (46) , (47-49). Conversely, although the association between diabetes complications and PA has been reported in the previous studies (42, 50), these studies measured the type of complication and not the complication presence.

It seems that patients who developed a diabetes complication recently usually tried to delay the progress of the complications by performing PA. Another possible explanation for this correlation is that the patients in the present study have higher awareness of the benefits of PA. Moreover, most of the media platforms (such as TV and National Radio) in Jordan play a significant role in enhancing such awareness as they have countless

ongoing programs that emphasize the importance of PA. Similarly, SN positively predicted the patients' participation in PA. Families are connected in Jordan and they do encourage their relatives with DM to adhere to the prescribed PA program as they are concerned about the well-being of their loved ones. Finally, the study found that patients with a higher level of PBC have higher adherence to participating in PA than other patients. This could be attributed to the significant in motivating the patients to perform the recommended PA.

CONCLUSION

There are several chronic illnesses in Jordan nowadays; however, diabetes could be the most prevalent. This maight lead to a higher burden on both the health care personnel (such as the physicians and the nurses) and the patients themselves. The results of the present study indicated that three factors were significant predictors to PA, these factors are complication presence, social norms as well as perceived behavioral control. Additionally, the study results showed that about one third of study participants reported having an in adequate level of adherence to the recommended PA. The health care providers should build their practices on the latest knowledge available in the diabetes field. Furthermore, the patients should adhere to the prescribed therapeutic regimen including the recommended exercise or PA.

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