

## Diabetes Self Care Management Behaviors among Jordanian Type Two Diabetes Patients

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### Abstract

**Purpose:** The aim of this study was to assess the status of diabetes self care management behaviors among Jordanian patients with DM2 and its relationship with demographic variables. **Methods:** Descriptive correlational design, a convenience sample of 149 Jordanian patients with type two diabetes Mellitus who treated by the Specialized Diabetes Center in Amman-Jordan participated in this study. **Results:** The most frequently performed self care management behaviors was medication taking followed by foot care, dietary adherence, exercise, and the least performed behavior was blood glucose testing. Diabetes self care management behaviors were found to be associated with age, gender, level of education, and length of diagnosis. **Conclusion:** The findings from this study can guide the health providers to be trained to provide relevant self care management intervention that might improve the self care management behaviors for patients with diabetes.

**Keywords:** Self Care Management Behaviors, Type two Diabetes Mellitus

### 1. Introduction

Diabetes self care management is challenging and considered as new trend to have patients take an active role in regulating their treatment and self care their disease (Downer, 2001). It has been well known as an evolutionary process of development of knowledge or awareness by learning to survive with the complex nature of the Diabetes in a social context (Cooper, Booth, & Gill, 2003). Type one diabetes mellitus (DM1) and Type two diabetes mellitus (DM2) is managed by daily basis by patients, whereby self care management behaviors is the key stone to attain glycemic control through the following strategies: weight loss, eating a healthy diet, practicing regular physical activity, and DM self-monitoring of blood glucose. However, managing DM on daily basis is not always easy (McEwen, Baird, Pasvogel, & Gallegos, 2007).

The American Association of Diabetes Educators (AADE) and the American Diabetes Association (ADA) emphasize that DM self care management is the most important part of DM care (ADA, 2013). A sufficient self care management behaviors has been revealed to lower glycosylated hemoglobin levels (HbA1c), improve blood glucose levels, and improve dietary habits which considered as main step to decrease the occurrence of nephropathy and retinopathy (microvascular complications) and macrovascular ones, mainly cardiovascular diseases (CVD) (ADA, 2013).

The topics related to self care management behaviors including: blood glucose monitoring, nutrition, exercise, medication, and foot care were described below.

**Blood Glucose Monitoring.** Motivation for self care management of blood glucose (SMBG) is a familiar problem in DM care, since many patients with DM find regular testing difficult to be maintained in the long term, it requires motivation on the part of the patient; it also needs an understanding of the correct use of the glucose meter (Heisler, 2004).

However, patients must be taught the correct technique to self-monitor their blood glucose, because many studies have revealed that up to 50% of patient-generated SMBG results are inaccurate according to ADA (2010).

Moreover, Khattab, Khader, Al-Khawaldeh, and Ajlouni (2010) conducted a study to find out the factors related to poor blood glucose control among Jordanian patients with DM2. The sample size was 917 patients with DM2. Sociodemographic, clinical characteristics, barriers to DM care adherence, DM self care management behaviors, attitude towards DM and DM medication adherence questionnaires were used. Height, weight and waist circumferences of those patients were measured. All last readings of glycosylated hemoglobin (HbA1c), lipid profile and fasting blood glucose readings were taken from patients' files. Poor blood glucose control was defined as HbA1c  $\geq 7\%$ . They found that not adherent to DM self care management behaviors and longer duration of DM were related to poor glycaemic control.

Furthermore, Al-Khawaldeh, Al-Hassan, and Froelicher (2012) conducted study to evaluate the relationships between DM2 self care management behaviors, DM2 self-efficacy and blood glucose control who found that patient with high self efficacy and high DM2 self care management behaviors had better glycaemic control.

**Nutrition.** Diet control is essential of all therapy for patient with DM2, and it is also the most safe control mechanism, one-thirds of patients can control their blood glucose at a satisfactory level through diet control alone (Funnell, 2006). Effective nutrition intervention in DM2 care management results in improved self-monitoring of blood glucose, blood lipids, HbA1c, blood pressure, and weight management that can lead to reductions in medication, frequency of hypoglycemia, hospitalization, and cost of overall health care (Dunning, 2009). Thus, a nutrition intervention is worthy for every person with DM2.

A randomized Clinical Trial (RCT) have reported that low level glycaemic diets decrease hyperglycemia in patients with DM (Howard, Arnsten, & Gourevitch, 2004). Moreover, the contradiction in responses to the exact carbohydrate containing diet is a concern (Wylie-Rosett, Segal-Isaacson, & Segal-Isaacson, 2004). Nevertheless, a meta-analysis of a trials for low level glycaemic diet in patients with DM showed that such diets made a 0.4% decrease in HbA1c in comparison to high level glycaemic diets (Brand-Miller, Hayne, Petocz, & Colagiuri, 2003). However, it looks like that the majority of those patients who already eat a moderate level glycaemic diet. But that patients with DM who consuming, low level glycaemic diets can make a good benefit in managing postprandial hyperglycemia (Rizkalla et al., 2004).

In Jordan, Zindah, Belbeisi, Walke, and Mokdad (2008) found that poor diet, obesity and not practicing physical activity produce a key chronic disease burden including DM in Jordan that is possibly, can raise significantly in the next years. Their findings argue for developing of a more preventive measure in health care systems in Jordan.

**Exercise.** The importance of exercise is considered for both the psychological and physiological health. To increase patients' optimism and enhance patients with DM self-confidence there is need to increase activity, so it is the time to help patient with DM to discover and obtain the feeling that comes with exercising and convert that feeling into internal gain (Guthrie & Guthrie, 2002)

The justification for using exercise as one component of the DM self care management behaviors for patients with DM2; exercise may be practiced in addition to caloric reduction for weight decrease and to enhance insulin sensitivity in the overweight insulin-resistant patient with DM2 (Castaneda, 2002).

**Medication.** Taking medication on regular bases represents a challenge both to patients with DM2 and to their health care providers. Treatments with several medications or regular dosages have a negative result on DM2 care adherence (Bartels, 2004). Some older patients with DM2 who have other chronic diseases have to take many different kinds of medications. Additionally, many older patients with DM2 may have memory problems, so they may sometimes forget to take the medications, and there is also the potential possibility of taking wrong dosages. It is important for patients with DM2 to receive proper education in how to take medication correctly in order to prevent further progress of the disease and avoid complications (Funnell, 2006).

**Foot Care.** Diabetic foot is a heterogeneous disease entity defined as a group of symptoms that leads to tissue breakdown. Neuropathy and ischemia are considered as DM2 complications that increase the risk of infection for patient with DM2 (Apelqvist & Larsson, 2000). About 50-70 % of patients with DM have a lower limb amputation that begins with an ulcer. The prevalence of foot ulcers among patients with DM ranges from 2% to 12% (Boulton, 2004; Boulton, Vileikyte, Ragnarson-Tennvall, & Apelqvist, 2005). In addition, the lifetime risk of a diabetic person developing a foot ulcer could be as high as 25% (Singh, Armstrong, & Lipsky, 2005).

The amputation rate can be reduced by preventative care for foot, therefore foot care and its disease have an adverse effect on the well-being and the life of people with DM2 (Dunning, 2009).

Furthermore, data on the epidemiology of diabetic foot ulcers in the Middle East including Jordan is sparse; a Jordanian study conducted in 2001 that look at lower limb amputation in patient with DM showed foot ulcers prevalence of 4% (Jbour et al., 2003). A parallel percentage was reported in Iranian DM clinic based study (Alavi, Sanjari, Haghdoost, & Sibbald, 2009). And Bahranian nationwide primary care DM clinic based study among 1477 patients with DM found the foot ulcers prevalence to be 5.9%, associated with peripheral vascular disease (PVD) and neuropathy (Al-Mahroos & Al-Roomi, 2007).

In Jordan, a recent study was conducted by Bakri, Allan, Khader, Younes, and Ajlouni (2012) to assess the prevalence of diabetic foot ulcers and related risk factors among DM patients attending the National Center for Diabetes. The study sample were selected by systematic random sampling (n=1,000). Neurological, vascular, ulcer risk and musculoskeletal categories were all assessed. The diabetic foot ulcer prevalence was 4.6%, sensory neuropathy prevalence was 14.9%, lower limb ischemia prevalence was 7.5% and amputation prevalence was 1.7%. Foot ulcer was associated mainly with the gender (male), neuropathy, and increased length of DM.

One the other hand, Abu-Qamar and Wilson (2011) conducted a qualitative research using face to face unstructured interviews to elaborate patient's diabetic feet care views within the healthcare system in Jordan. Seven participants were invited to participate from six hospitals. The results were referred to the barriers of efficient diabetic foot care. That the patients were not performing feet care preventive behaviors because of their beliefs about the construction and the culture of healthcare system in Jordan.

Particularly, the patients of this study believed that DM does not need regular assessment of the feet when no feet ulcers are present. As well, healthcare providers were not performing feet assessment regularly. The authors recommended more efforts be made to encourage self preventive care within the healthcare system in Jordan. As a result of doing that, the incidence and severity for diabetic foot ulcer and other complications may be decreased.

In conclusion, successful management of DM2 relies on the individual being able to perform self care management behaviors to control its symptoms and avoid its complications. Attention should be paid to manage DM2 to prevent many complications arising from including a prescribed medication schedule, strict diet or calorie control, performing exercise regularly, self blood glucose checking and foot caring (McDowell, Courtney, Edwards, & Shortridge-Baggett, 2005). Therefore, the aim of the current study is to assess the status of self care management behaviors among Jordanian patients with DM2.

## **2. Study Question**

1. What is the level of diabetes self care management behaviors reported by Jordanian patients with DM2?
2. What is the relationship between the level of diabetes self care management behaviors reported by Jordanian patients with DM2 and their demographic characteristics?

## **3. Methods**

### **3.1. Study Setting, Population, and Sample**

This cross-sectional descriptive study was conducted between June and December, 2014 in Diabetes Specialized Center in Amman-Jordan. A convenience sample of 168 Jordanian patients with DM2 who aged 20 years and older participated in the study. Patients who were diagnosed with DM2 for less than one month were excluded from the study to allow for the experience with self care management behaviors.

### **3.2. Recruitment and Data Collection Procedure**

Data was collected by the researcher from Diabetes Specialized Center in Amman-Jordan. Subjects who met the inclusion and exclusion criteria were then approached and invited to participate in the study on the day of their appointments.

### **3.3. Measurements**

Level of diabetes self care management behaviors were measured by the summary of diabetes self care management activities (SDSCA) (Toobert & Glasgow, 1994). Is a brief self-report questionnaire and consists of 12 items divided into five self care management activities: diet, practicing exercise, patient self-monitoring of blood glucose, foot care and taking DM medication.

The five questions related to diet measure adherence to the diet and levels of diet management in terms of degree of following dietary regimen and identifying the amount of specific diet content consumed per week. The two questions related to exercise assess the frequency of 30 minutes of exercise per week.

Two questions address glucose testing, assessing the number of glucose tests, two questions address foot care and asking about daily foot check. Diabetes medication consists of two questions that assess the number of pills taken or insulin injections done in the past week (Toobert & Glasgow, 1994). This questionnaire is scored by taking the raw score from each set of self care management tasks. Then these scores are averaged to form a combined score for each area or subscale (Toobert & Glasgow, 1994).

#### **4.4. Ethical Consideration**

Protection of human subjects Approval was obtained from the IRB of The University of Jordan and the IRB of The Diabetes Specialized Center Research Committee, which is considered also as administrative permission. The nature of the study was explained along with the participants' rights, the risks and the benefits, and their voluntary participation. Informed consent was obtained. Confidentiality of data was assured through separating the consent form from the returned study questionnaires and locking them in separate cabinets.

#### **4.5. Statistical Analysis**

The data were entered in the Statistical Package for the Social Sciences (SPSS) 21.0 for analysis. Descriptive statistics were used to describe the sample and the demographic variables of the study. Question number 1 was answered using descriptive statistics. Question number 2 was answered by conducting point biserial (rpb) correlation on dichotomous variables (gender, marital status, and employment variables), and by conducting separate one-way ANOVAs on each of the categorical variables (age, length of diabetes diagnosis, and level of education). Moreover to assess if groups differed significantly across levels of the categorical variables, a post hoc test using Fisher's LSD was conducted.

### **3. Results**

#### **3.1. Characteristics of the Sample**

The target sample size for this study was 168 participants. A final number of the study sample was 149 participants who met the inclusion and the exclusion criteria were approached. The age of the participants ranged between 26-65 years with a mean of 51.40 (SD=6.80) years. The average duration since diagnosis with DM was 6.50 (SD =4.40) years. The sample consisted of (53.70%) females. Most participants were married (71.14%), the majority of participants had secondary education (81.20%), and 63.79% did not employed. (Table 1).

**Table1: Demographic Characteristics of the Sample (n = 149)**

Demographic characteristics	Frequency (n)
<b>Gender</b>	
Male	46.30%(69)
Female	53.69%(80)
<b>Marital status</b>	
Married	71.14%(106)
Single	8.72% (13)
Divorced	8.05% (12)
Widowed	12.08%(18)
<b>Employment status</b>	
Employed	36.20% (54)
Not employed or retired	63.79(95)
<b>Current therapy</b>	
Oral Hypoglycemia only	60.40% (90)
Oral Hypoglycemia and insulin	39.59%(59)
<b>The Level of Education</b>	
Intermediate	8.72%(13)
Secondary	81.20%(121)
Postgraduate	10.06%(15)
<b>Length of Diagnosis</b>	
1-5year	38.92%( 58)
6-10	51.00%(76)
11-20	6.70% (10)
>20	3.36% (5)
<b>Age (year)</b>	
20-29	6.71% (10)
30-39	28.18%(42)
40-49	35.60% (53)
50-59	22.81%(34)
>59	6.71% (10)

### 3.2. Level of Diabetes Self Care Management Behaviors

The findings indicated that most of the participants in this study reported lack of diabetes self-management behaviors. In parallel with the scoring guidelines of the original SDSCA, the following mean scores were obtained of each subscale by averaging the scores of diet ,exercise, blood glucose testing, foot care and medication adherence subscales (Toobert & Glasgow, 1994).

The first four questions related to diet, measured adherence to a healthy dietary regimen consumed in the past week such that zero means health dietary regimen was not followed in the past week and a score of seven means that health dietary regimen was consumed all seven days out the week. The mean score of the diet subscale for both groups was 1.80 days (SD= 1.21) in the past week ranging between 0 and 7days. It is also assessed dietary questions related to fruit and vegetables consumption and full fat dietary products consumed in the past week, whereby the responses on the latter item reflected inadequate adherence to a low-fat diabetes regimen.

While doing data entry, the full fat dietary products' consumption was reverse coded, then scored accordingly. The lowest mean score of the SDSCA was mean score of the blood glucose testing subscale was 0.38 days in the past week (SD=2.17) ranging between 0 and 7 days. The mean score of exercise subscale was 0.62 days in the past week (SD= 1.41) ranging between 0 and 7 days. The foot care subscale with a mean of 2.38 days in the past week (SD= 3.76) ranging between 0 and 7 days. On the other hand, the medication adherence subscale scored the highest with mean of 6.60 days in the past week (SD=0 .92) ranging between 0 and 7 days.

The medication two items (Item 11 and 12 which are: “On how many of the last seven days did you take your recommended insulin injections?” and” On how many of the last seven days did you take your recommended number of diabetes pills?”) were entered as one item by taking the average of two items, because according to inclusion and exclusion criteria of the sample, the participants should not take insulin alone but with oral hypoglycemic agent. The total average score of SDSCA for both control and intervention a group at baseline time was 1.89 days ranging between 0 and 7 days. This means low level of self care management behaviors at baseline time for both groups (Table 2).

**Table 2.Means and Standard Deviations for 8 items of SDSCA\* (n=149)**

<b>Item</b>	<b>Mean</b>	<b>SD</b>
<b>DIET</b>	1.80	1.21
How many of the last SEVEN DAYS have you followed a healthful eating plan?	1.97	0.45
On average, over the past month, how many DAYS PER WEEK have you followed your eating plan	1.28	0.53
On how many of the last SEVEN DAYS did you eat five or more servings of fruits and vegetables?	0.45	0.54
On how many of the last SEVEN DAYS did you eat high fat foods such as red meat or full-fat dairy products?	3.56	0.93
<b>Exercise</b>	0.62	1.06
On how many of the last SEVEN DAYS did you participate in at least 30 minutes of physical activity?	1.14	0.94
On how many of the last SEVEN DAYS did you participate in a specific exercise session (such as swimming, walking, biking) other than what you do around the house or as part of your work?	0.09	0.31
<b>Blood Glucose Testing</b>	0.38	1.46
On how many of the last SEVEN DAYS did you test your blood glucose?	0.65	1.11
On how many of the last SEVEN DAYS did you test your blood glucose the number of times recommended by your health care provider?	0.11	0.56
<b>Foot Care</b>	2.38	3.76
On how many of the last SEVEN DAYS did you check your feet?	2.42	1.88
On how many of the SEVEN DAYS did you inspect the inside of your shoes?	2.40	1.88
<b>Medications</b>	6.60	0.92
On how many of the last SEVEN DAYS, did you take your recommended diabetes medication?	6.60	0.92
Total (Average mean score)	20.70(1.89)	4.65

\*SDSCA is consisted from 12 items rated on a seven-point likert type scal

### 3.4. Demographic Variables and Diabetes Self Care Management Behaviors

Table 3 describes the relationships between diabetes self care management behaviors and demographic variables. The findings indicated that male patients performed exercise more regularly than females patients, whereas, females were more regular on taking their medications than males. Also, employed patients performed exercise, blood glucose testing and foot care more regularly than the unemployed patients. Furthermore, the results indicated significant differences across the levels of education with respect to exercise [ $F(2, 146) = 12.42, p = 0.001, n_2 = 0.08$ ], Blood glucose testing [ $F(2, 146) = 4.66, p = 0.003, n_2 = 0.03$ ], and foot care [ $F(2, 146) = 6.7, p = 0.003, n_2 = 0.04$ ].

Participants with higher levels of education reported performing exercise, blood glucose testing and foot care, more regularly than patients with less education. The findings also indicated that there was significant differences across the age groups with regard to exercise [ $F(4, 146) = 7.0, p = 0.001, n_2 = 0.13$ ] and foot care [ $F(4, 146) = 4.0, p = 0.004, n_2 = 0.05$ ]. Younger patients reported performing exercise and foot care more regularly than older patients. Other demographic variables had no association with diabetes self care management behaviors.

**Table 3: Point Biserial Correlation between DSM and Demographic Variables**

Variables	Gender	Marital Status	Employment
Diet	0.045	0.060	0.027
Exercise	0.217**	0.049	0.258**
Blood Glucose Testing	0.035	0.025	0.162*
Foot Care	0.022	0.037	0.148*
Medication Taking	0.144*	0.013	0.046

\*\*p<.05(2-tailed).

\*p<.05(2-tailed).

#### 4. Discussion

The findings of this study suggest that Jordanian patients with DM2 who participated in this study have an inadequate level of diabetes self care management behaviors .Up to date no previous research has been conducted in Jordan on diabetes self care management that would allow for comparison to the findings of this study. Low level of self care management behaviors may be attributed to a number of potential barriers to self care management behaviors (social, cultural, financial, medical, and other), unmeasured in this study, that complicated the patients regimen, which may result in low adherence to self care management recommendations (Bell et al., 2005).

The most frequently performed self care management behavior was medication taking followed by foot care, dietary adherence, exercise, and the least performed behavior was blood glucose testing .This may indicate that individuals with DM2 were more likely to perform self care management behaviors that require the least effort and lifestyle changes. The study findings demonstrated that there is a substantial gap between participant's self care management behaviors and standards of optimal care of DM as recommended by the ADA, specifically in the domains of diet, exercise, blood glucose testing, and foot care self care management behaviors.

Other studies also reported that medication taking was the most frequently performed self care management behavior as the current study result (Heisler, Smith, Hayward, Krein, & Kerr, 2003; Wen, Shepherd, & Parchman, 2003) . Low levels of diet, exercise and blood glucose testing self care management behaviors among patients with DM2 were also reported in previous studies (Bell et al., 2005; Johnson, 2004; Nelson, McFarland, & Reiber, 2007; Wen et al., 2003; Zindah et al., 2008).

The second most frequent behavior in the current study was foot care and this may justified by that foot washing activity is more likely to be performed frequently by Muslim participants as a religious practice which enables the patients to check their foot. Similarly, Bell et al. (2005) found that the most frequently performed self care management behavior was foot care.

The least performed behavior was the blood glucose testing, because it is unclear whether adherence to blood glucose testing self care management behavior results in beneficial health care outcomes (Evans, et al., 1999). However, the reasons for low adherence to the blood glucose testing could be related to that the motivation for self care management of blood glucose (SMBG) is considered as a familiar problem in DM2 care, since many patients with DM2 find regular testing difficult to be maintained in the long term ,it requires motivation on the part of the patient; it also needs an understanding of the correct use of the glucose meter (Heisler, 2004).

However, patients must be taught the correct technique to self-monitor their blood glucose, because many studies have revealed that up to 50% of patient-generated (SMBG) results are inaccurate according to ADA (2010).Moreover, the costs of the equipment and materials needed for the blood glucose testing; also, it may have been difficult and costly to visit a health care facility on a daily basis for blood glucose testing.

In the current study the medication self care management behavior mean score was reported as the highest self care management .The justification of these results that the participants in both groups may perceive that medication taking is more important for DM self care management than other self care management behaviors. Also, it may be that barriers to diet, exercise, blood glucose testing, and foot care practices are greater than barriers to medication taking since these behaviors require changes in patients' lifestyles.

These study findings supported the recommendations of previous studies that emphasized the importance of assessing patients' self care management behaviors, so as to better understand obstacles the patients may face and to evaluate how educational or other self care management strategies and interventions may improve patients' self care management behaviors (Toobert, et al, 2000).

Adherence to DM medication, or rather, proper medication taking, is vital for effective DM self care management. However, there are several possible explanations for the current study result. Either, patients were over estimating their adherence to medication or the method used to assess medication adherence might be subjected to the influence of a "socially desirable answer" leading to unreliable results. Cook, et al., (2005) have noted that some instrument may not accurately measure for medication adherence, which might be the case of the current study findings.

The results of this study also found that male patient perform exercise more regularly than female patients that was consistent with previous research (Albright, Parchman, & Burge, 2001). This could be explained by the cultural gender role expectations within the Jordanian culture.

Culturally, it is more acceptable for males to exercise outside the home than females. There are many gym reserved for women but many women can't pay for the gym. Furthermore, the study results also was consistent with previous research (Xu, Pan, & Liu, 2010; Yamashita, Kart, & Noe, 2012). In the current study, older participants reported performing exercise and foot care less frequently than younger participants, which was opposite with other research of Xu et al. (2010) and Yamashita et al. (2012). The justification of this could be related to that older participants have other chronic diseases and DM complications that make it difficult for them to perform diabetes self care management behaviors such as physical exercise. Similar with previous research patients with higher levels of education and who are employed reported performing exercises, blood glucose testing and foot care more regularly than patients with less education. That was inconsistent with (Tan & Magarey, 2008) who found that employed patients have constraint to diabetes self care management behaviors. But this result is also consistent with Yamashita et al. (2012) who found that unemployed participants performing diabetes self care management behaviors less frequently compared to the employed.

Finally, Participants with longer length of diabetes diagnosis may have adapted to self- care manage their diabetes compared to those with shorter length of diabetes diagnosis which is consistent with previous research (McCleary-Jones, 2010; Xu et al., 2010).

## **5. Conclusion**

This study findings indicated alarming status of diabetes self care management behaviors among Jordanian patients with DM2. Addressing self care management issues for patient with DM2 is an important challenge for health-care providers and the health care system including all aspects of self care management including: blood glucose monitoring, nutrition, exercise, medication and foot care.

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