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## Original Article

# Perception of persons with type 2 diabetes mellitus in Saudi Arabia



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## ARTICLE INFO

## Article history:

Received 10 October 2015

Received in revised form

21 November 2015

Accepted 2 February 2016

Available online 10 February 2016

## Keywords:

Health locus of control

Saudi Arabia

Self-care activities

Type 2 diabetes mellitus

## ABSTRACT

**Purpose:** To explore how perceptions of self-efficacy, health locus of control and outcome expectancy impact the adherence of adults with type 2 diabetes mellitus in Saudi Arabia to self-care activities.

**Methods:** A descriptive correlation design was used to analyse self-report questionnaires completed by a convenience sample of Arabic-speaking individuals ( $n = 30$ ) with type 2 diabetes mellitus from King Abdulaziz Medical City in Riyadh.

**Results:** More than half (53%) of participants reported high self-efficacy, and the majority (77%) valued health and believed that effective diabetes management was important. Although the vast majority (93%) of participants believed that their doctor influenced their diabetes management, 90% and 80% also acknowledged themselves and God, respectively, as the health locus of control. Participants who perceived that they or their doctors were in control of their health condition were more likely to adhere to self-care activities, such as follow a specific diet and perform foot care ( $p < 0.05$ ). Furthermore, female participants reported significantly greater adherence to medication than male participants ( $6.91 \pm 0.29$  vs  $5.14 \pm 2.44$ ;  $p = 0.02$ ), and unmarried participants reported greater adherence to exercise than married participants ( $4.15 \pm 2.22$  vs  $1.60 \pm 1.43$ ;  $p = 0.001$ ). Finally, self-efficacy had a significant, positive correlation with participants' adherence to exercise ( $r = 0.491$ ;  $p = 0.006$ ) and performing their foot care ( $r = 0.586$ ;  $p = 0.001$ ).

**Conclusion:** Patients' perceptions of their health should be considered by healthcare providers to maximize adherence to effective self-care management.

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Peer review under responsibility of Chinese Nursing Association.

<http://dx.doi.org/10.1016/j.ijnss.2016.02.007>

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## 1. Introduction

Type 2 diabetes mellitus (T2DM) is a chronic condition currently affecting approximately 387 million persons worldwide, and is expected to affect up to 592 million persons by 2035. [1] Saudi Arabia has the seventh highest prevalence of diabetes for adults 20–79 years old [2], and the 4th highest prevalence rate of T2DM compared to other Arabic-speaking countries [3]. T2DM can be managed by adhering to self-care activities, including diet, exercise, blood glucose monitoring, foot care and medication [4], as well as with regular follow-up with health care providers [5]. Secondary health problems due to ineffective self-management of T2DM, such as diabetic foot ulcers, can potentially further diminish a patient's quality of life [6].

Perceptions and beliefs of persons with T2DM, including self-efficacy, locus of control and outcome expectancy, influence adherence to self-care activities regardless of ethnicity or age [7–9]. Individuals with T2DM and high levels of self-efficacy in relation to their health have better self-care management for their condition than those reporting low self-efficacy [10,11]. Persons who perceive an internal health locus of control also have better adherence to diabetes treatment than those who believe their health is controlled by external factors [8]. Furthermore, persons who feel responsible for managing their diabetes and put more value on their health are typically more actively engaged in performing the recommended diabetes self-care activities [12].

Cultural perspectives influence self-efficacy, illness control perception and outcome expectancy, and can affect the way individuals with T2DM manage their disease [13–15]. Therefore, studying the impact of a persons' perceptions of their level of adherence to diabetes self-care activities is necessary, especially in a society with cultural perspectives such as Saudi Arabia. The aim of this pilot study was to explore the perceptions of self-efficacy, health locus of control and outcome expectancy in adults with T2DM in Saudi Arabia. A secondary aim was to study the effects of these variables on adherence to diabetes self-care activities.

## 2. Materials and methods

### 2.1. Theoretical framework

This study used the Modified Social Learning Theory as the theoretical framework [16]. According to this theory, a person's health behaviour can be predicted by the interactions between their perceptions, such as of health locus of control, self-efficacy and value of health, and the outcome.

### 2.2. Participants

This research was conducted on a convenience sampling of individuals ( $n = 30$ ) from King Abdulaziz Medical City in Riyadh, Saudi Arabia. The inclusion criteria were adults  $\geq 18$  years of age living in Saudi Arabia that were diagnosed with T2DM and spoke Arabic. Adults that the nursing staff identified as having additional chronic conditions that were

complex or had significant complications with their T2DM were excluded. This study was approved by the ethics review board from the University and King Abdullah International Medical Research Center.

### 2.3. Study design

A descriptive correlational design was used for this pilot study, with data collected in 2014 from self-reported anonymous questionnaires. Health locus of control was assessed using form C of the Multidimensional Health Locus of Control Scale [17] and the God Locus of Health Control Scale [18]. The internal consistency for the Arabic version of the God Locus of Health Control Scale was adequate (Cronbach's  $\alpha = 0.855$ ). Additionally, the internal consistency of the Arabic version of form C of the Multidimensional Health Locus of Control Scale for this study was: internal = 0.674; chance = 0.774; doctors = 0.738; other people = 0.670.

Part III of the Multidimensional Diabetes Questionnaire [19] was used to measure self-efficacy and outcome expectancy. The reliability and validity of the Arabic version was not reported; however, in the present pilot study, the reliability of the Arabic version of self-efficacy scale was 0.866 and 0.941 for the outcome expectancy scale.

The Arabic version of the Revised and Expanded Summary of Diabetic Self-Care Activity Scale [20] was used to measure adherence to self-care activities. Participants responded to the adherence to self-care activities by identifying how many times per week they participated in the self-care activity. Scores were completed by taking the mean of the relevant items, with possible scores ranging from 0 to 7, with 0 indicating "not at all" and 7 representing "every day". The scale had a reported test–retest reliability of  $r = 0.912$  and internal consistency (Cronbach's  $\alpha = 0.76$ ). The subscales were also found to have internal consistency: diet,  $\alpha = 0.89$ ; exercise,  $\alpha = 0.83$ ; blood-glucose monitoring,  $\alpha = 0.92$ ; and foot care,  $\alpha = 0.77$  [20].

The Perception of Value of Health scale was developed by the authors (Albargawi and Sneathen) and pilot tested in this study to measure a person's perception of the value of health. Three content experts were used to determine a content validity index prior to using the survey, for a value of 1.00. However, when analysing the data, the reliability (Cronbach's  $\alpha = -0.395$ ) was lower than expected. The demographic variables included age, sex, marital status, education level, years of having diabetes, having diabetic foot problems, having an additional disease and belonging to a tribe.

### 2.4. Data analysis

Data were analysed using SPSS software, version 22 (IBM Corp., Armonk, NY, USA). Analyses of variance (ANOVAs) were performed to examine the relationship between demographic variables and the health locus of control, self-efficacy and outcome expectancy, as well as between levels of adherence to self-care activities. Hierarchical multiple regression analysis was conducted for each of the five dimensions of health locus of control. Demographic variables significantly associated with adherence to self-care activities ( $p < 0.05$ ) were entered in the first block. The second block for

each regression contained self-efficacy, outcome expectancy or one of the dimensions for health locus of control. Pearson correlations were used to examine the relationship between health locus of control, self-efficacy and outcome expectancy with adherence to diabetes self-care activities. Data are reported as a percentage or as mean  $\pm$  standard deviation. Statistical significance was set at  $p \leq 0.05$ , with higher scores indicating better adherence.

### 3. Results

#### 3.1. Health locus of control perception

The baseline and demographic characteristics of the T2DM study population are listed in Table 1.

##### 3.1.1. Internal health locus of control perception

The majority of participants (90%) reported having an internal health locus of control, indicating that they were responsible for adhering to their diabetes self-care activities, and 89% of participants also believed their health behaviours affected their diabetes. Furthermore, a majority of participants (80%) believed that they were at fault if their condition became worse, especially if they were not following their self-care management (73%). Conversely, the majority participants (77%) also indicated that they deserved the credit if their diabetes self-care management was effective.

**Table 1 – Demographic variables of study participants (n = 30)**

Variable	Percentages (%)
Age (yr)	
≤49	52
≥50	48
Sex	
Male	60
Female	40
Marital status	
Married	67
Not married	33
Level of education	
No school	13
Primary school	20
Secondary school	7
High school	23
College	37
Belong to a tribe	
Yes	77
No	23
Years since diabetes diagnosis	
<1	13
>1	87
Foot problems secondary to diabetes	
Yes	40
No	60
Additional health problems	
Yes	67
No	33

##### 3.1.2. External health locus of control perception

All of the participants (100%) indicated that they believed that complications with their diabetes were due to God's will. Additionally, participants held the belief that most things that affect their condition were because of God's will (80%), and only God could improve their condition if their diabetes worsened (73%). In addition, more than half (62%) of these respondents in this study believed that fate was the reason for their diabetes becoming worse, and 60% did not believe that getting help from others would positively influence their diabetes. However, an overwhelming proportion (93%) of the participants believed in the need to see their doctor regularly, with 90% reporting that they needed to seek help from a doctor when their diabetes become worse; 87% believed seeking help from a doctor would help prevent the development of complications related to their diabetes.

#### 3.2. Perceived self-efficacy and outcome expectancy

Most participants (90%) believed that adhering to their diabetes self-care activities, including taking medication and monitoring blood sugar as recommended, was important to manage their diabetes, and 83% indicated that adherence helped to prevent the development of complications. Roughly half (53%) of the participants felt that they had the ability to follow their diabetic treatment regimen and self-monitor and maintain their blood sugar levels as instructed by their healthcare provider. Although participants indicated that they were aware of the importance of following their diet (83%) and exercising (87%), most (73%) did not believe that they could exercise regularly or maintain a healthy weight (53%). Although a majority (67%) of the participants reported that they could follow their diet, 60% did not believe they would be able to resist food temptations.

#### 3.3. Health perceptions

The value of health was perceived as very high by a majority (87%) of participants to avoid secondary problems due to T2DM. Almost all (97%) of the participants acknowledged that they need to manage their T2DM, and 70% viewed diabetes as the worst thing that had ever happened to them. Additionally, a large number (64%) of respondents reported that managing their diabetes was more important than enjoying their life.

Participants' perceptions of their T2DM was not significantly different based on their demographic characteristics, except for level of education; participants who did not have a college degree were more likely to report that their diabetes will get better or worse due to chance ( $3.49 \pm 1.20$ ;  $p = 0.048$ ), and that other people in their lives, such as family members or friends, influenced their diabetes management ( $3.78 \pm 1.21$ ;  $p = 0.034$ ). Conversely, participants with college degrees did not believe that chance caused their T2DM to improve or worsen ( $2.62 \pm 0.93$ ;  $p = 0.048$ ), and were less likely to report that family and friends influenced their diabetes management ( $2.78 \pm 1.13$ ;  $p = 0.034$ ).

### 3.4. Adherence to diabetes self-care activities

Treatment with medication had the highest reported level of adherence to diabetes self-care activities (7 d/wk), and exercise had the lowest level (1–2 d/wk) (Table 2).

#### 3.4.1. Influence of demographic variables on adherence

A one-way ANOVA was performed to explore the level of adherence to diabetes self-care activities by participant demographic characteristics. Female participants reported greater adherence to diet, exercise, blood-glucose testing and foot care than was reported by male participants, though this difference was not significant. However, female participants reported significantly greater adherence to medication than male participants ( $6.91 \pm 0.29$  vs  $5.14 \pm 2.44$ ;  $p = 0.02$ ).

Unmarried participants reported a significantly greater adherence to exercise than married participants ( $4.15 \pm 2.22$  vs  $1.60 \pm 1.43$ ;  $p = 0.001$ ). However, married participants reported greater adherence to foot care ( $4.53 \pm 1.48$ ), though it was not statistically different from responses from unmarried participants. Similarly, adherence to dietary intake, medication and blood-glucose testing did not significantly differ between married and unmarried participants.

No significant differences in adherence to diabetes self-care activities were found between participants with and without diabetic foot ulcers. However, participants who had diabetic foot ulcers, compared to those without, reported non significantly higher adherences to a specific diet ( $3.5 \pm 1.43$  vs  $3.19 \pm 1.69$ ;  $p = 0.623$ ), foot care ( $4.56 \pm 1.46$  vs  $4.23 \pm 1.51$ ;  $p = 0.569$ ), and medication ( $5.95 \pm 2.32$  vs  $5.83 \pm 1.94$ ;  $p = 0.881$ ).

#### 3.4.2. Influence of perceptions on adherence

Participants who perceived that they were in control of their health condition were more likely to adhere to a general diet ( $r = 0.472$ ;  $p = 0.008$ ), follow a specific diet ( $r = 0.402$ ;  $p = 0.002$ ) and perform their foot care ( $r = 0.384$ ;  $p = 0.036$ ). Participants who believed that the doctor could help them manage their diabetes were more likely to adhere to a general diet ( $r = 0.402$ ;  $p = 0.005$ ), whereas those who believed that God was in control of their health condition were less likely to adhere to a specific diet ( $r = -0.394$ ;  $p = 0.031$ ). Self-efficacy had a significant, positive correlation with participants' adherence to exercise ( $r = 0.491$ ;  $p = 0.006$ ) and performing their foot care ( $r = 0.586$ ;  $p = 0.001$ ). However, participants who expected a positive outcome from performing diabetes self-care activities were less likely to adhere to foot care ( $r = -0.367$ ;  $p = 0.046$ ).

These correlations were further assessed after controlling for the effects of sex and marital status. Participants who reported having greater self-efficacy still had higher reported

rates of adherence to exercising ( $\beta = 0.499$ ;  $p = 0.001$ ) and performing their foot care ( $\beta = 0.530$ ;  $p = 0.001$ ). In addition, those who expected higher outcomes after adhering to their diabetes self-care activities also remained less likely to adhere to performing their foot care ( $\beta = -0.370$ ;  $p = 0.016$ ). Finally, participants who believed that God controlled their diabetes were likely to adhere less to specific ( $\beta = -0.422$ ;  $p = 0.018$ ) and general ( $\beta = -0.371$ ;  $p = 0.05$ ) diets.

## 4. Discussion

Managing T2DM requires that persons adhere to self-care activities to prevent negative health outcomes [39]. The findings from this study indicate that participants' perceptions influence their adherence to these self-care activities. Overall, adherence to pharmacologic therapy was higher than to exercise, which is similar to a previous report showing that many Saudis have a sedentary lifestyle and do not practice daily physical activity [22]. The findings in this study are also consistent with a recent study by Johani et al. [23] showing that the majority of adults in Saudi Arabia with T2DM took their medications as required, but were less likely to adhere to other diabetes self-care activities. In their study, less than half (47%) exercised and the vast majority (85%) did not monitor blood glucose.

The participants in the current study acknowledged the importance of seeing their doctors regularly and following their recommendations in order to control their diabetes, consistent with the report by Wu et al. [29]. However, these participants also believed that God was directly responsible for whether their diabetes got better or worse. Indeed, Saudi culture is based on the Islamic beliefs that, although persons have some control over their lives and health, God controls all life circumstances [27,28]. Furthermore, Muslim persons believe in predestination, that everything in their lives happens for a reason [27]. The participants in the present study reflected those beliefs, reporting that fate or chance does not impact their diabetic condition. Nevertheless, a study by Morowatisharifabad et al [8] reported that adherence to T2DM self-care activities was negatively correlated with a chance locus of control in Iranian individuals.

The Islamic faith also encourages followers to take care of themselves and value their health [30], consistent with an internal health locus of control. Previous studies have reported that health-promoting behaviours are associated with an individual's value of health [29,38]. Additionally, Wu and his colleagues [29] indicated that, by itself, the perception of the value of health had a greater influence on healthy

**Table 2 – Level of adherence to diabetes self-care activities**

Self-care activity	Median	Mean	SD	Minimum	Maximum	Alpha
Medication	7.00	5.88	2.06	1.00	7.00	0.848
Foot care	4.40	4.29	1.50	1.60	6.80	0.552
Blood-glucose monitoring	4.00	3.85	2.27	0.50	7.00	0.872
General diet	3.50	3.75	1.79	0.00	7.00	0.865
Specific diet	3.00	3.32	1.56	0.50	6.50	0.555
Exercise	1.50	2.40	2.12	0.00	7.00	0.895



behaviours than when considering its interactions with health locus of control and self-efficacy. A similar comparison was not possible in the present study due to the value of health scale that was utilized. However, the majority of the participants in the current study perceived that their health was important and their diabetes should be managed to maintain their well-being.

Although an earlier report indicated that family support is a positive influence with regard to the ability of individuals to manage their disease [31], participants in the present study did not feel that other people in their lives influenced their ability to manage diabetes. However, participants' perceptions of their health locus of control differed based on their level of education. Participants with out a college education were more likely to acknowledge that other people in their lives or chance influences their T2DM. Participants with similar beliefs and education were shown to have poor glycemic control in a study by Reach et al. [26]

The current study also shows that sex and marital status significantly influence participants' adherence to some diabetes self-care activities. Unmarried persons were more likely to adhere to their diabetes self-care activities than participants who were married. In contrast, a study by August and Sorkin [24] found that married persons with a chronic condition followed a better dietary pattern than unmarried counterparts. In the current study, female participants were significantly more likely to adhere to their medication regimen than male patients, in contrast to the findings from a recent systematic review by Davies et al. [25] In addition, participants who believed that God controlled their diabetes were also less likely to adhere to recommended diets.

After controlling for the effect of sex and marital status, self-efficacy was one of the main perceptions that had a positive and significant relationship with adherence to self-care activities, especially foot care and exercise. Indeed, self-efficacy has been previously reported to have a significant impact in influencing a person's health behaviours [32–34]. Similarly, a study by Chin et al. [35] found that self-efficacy was a significant factor influencing daily foot care in patients with diabetes and peripheral neuropathy. Furthermore, individuals with T2DM who report higher perceived levels of self-efficacy had better diabetes management, especially for diet, exercise, medication, and blood-glucose monitoring [32]. Although the participants in this study with high perceptions of self-efficacy reported greater adherence to diabetes self-care behaviours, they also reported low self-efficacy with regard to maintaining their weight and resisting food temptations. Interestingly, those who expected higher outcomes after adhering to their diabetes self-care activities also remained less likely to adhere to performing their foot care, which conflicts with Modified Social Learning Theory [16]. Importantly, individuals with diabetic foot problems typically have poor adherence to foot care [36]. Conversely, it has been reported that Saudis with diabetes who do not have foot ulcers are not as likely to adhere to their foot care regimen [23,37]. In the present study, there was no difference in the adherence to the performance of foot care between those with or without a diabetic foot ulcers.

A limitation of this study is that a convenience sampling technique was used to recruit a small of participants.

However, the sample size was sufficient for the intended purpose of a pilot study. Another limitation of the study is that the scale for measuring the value of health was not internally consistent among the study participants. Therefore, we were not able to examine all assumptions of the Modified Social Learning Theory. Finally, we cannot discern if all questionnaire items were fully understood by all of the participants.

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## 5. Conclusion

The findings from this study suggest that the perceptions and beliefs of individuals with T2DM influence their level of adherence to diabetes self-care activities. As a result, health-care providers in Saudi Arabia should assess these perceptions and incorporate them in a plan of care that is consistent with the patients' expectations for treatment and their ability to sustain healthy behaviours. Future studies with a larger sample of participants are needed to further explore the role of persons' perceptions about effective diabetes management, and their adherence to diabetes self-care activities. In addition, further work should be conducted to establish a valid and reliable scale for measuring the value of health perception in persons with T2DM.

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## Conflict of interest

The authors declare that there are no conflicts of interest with regard to the present work. This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

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## Acknowledgements

Special thanks to the Nursing Services at King Abdulaziz Medical City in Riyadh-National Guard, Saudi Arabia, for their collaboration and assistance during the data-collection period. Additional thanks to the King Saud bin Abdulaziz University for Health Sciences-Riyadh, which made this study possible through their educational support.

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