



CODEN [USA]: IAJ PBB

ISSN : 2349-7750

## INDO AMERICAN JOURNAL OF PHARMACEUTICAL SCIENCES

SJIF Impact Factor: 7.187

<https://doi.org/10.5281/zenodo.6555634>
Available online at: <http://www.iajps.com>

Research Article

### DIABETES SELF-CARE IN CORRELATION WITH FASTING BLOOD GLUCOSE LEVELS AND DURATION OF DIABETES DIAGNOSIS

Dr. Abdullah Khalafallah Alnemari<sup>1</sup>, Dr. Abdulrahman Abdullah almalki<sup>2</sup>,  
Dr. Nawal Khalaf Alanazi<sup>3</sup>, Dr. Othman Abdullah Alnemari<sup>4</sup>,  
Dr. Meshari Mohammed Altowairqi<sup>5</sup>.

<sup>1</sup> Senior Registrar Family Medicine, MBBS, JBFM, MOH

<sup>2</sup> Consultant Family Medicine, MBBS, SBFM, ABFM, MOH

<sup>3</sup> Senior Registrar Family Medicine, MBBS, SBFM, MOH

<sup>4</sup> Senior Registrar Family Medicine, MBBS, SBFM, MOH

<sup>5</sup> Senior Registrar Family Medicine, MBBS, SBFM, MOH

Article Received: March 2022

Accepted: April 2022

Published: May 2022

**Abstract:**

**Background:** Self-care in diabetes mellitus (DM) is a key to management and less complications. **Aim:** We aimed to investigate the association between DM self-care and duration of diabetes diagnosis as well as fasting blood glucose (FBG) levels. **Methods:** This study adapts an analytical cross-sectional study design. We used the Arabic version of the Summary of Diabetes Self-Care Activities (SDSCA) validated tool to assess self-care for DM and correlate it FBG levels and duration of diabetes diagnosis. We used the Statistical Package for Social Sciences (SPSS) version 26 for data analysis. We performed descriptive analysis and we used Pearson's correlation for inferential statistics where a p-value that is equal to or less than 0.05 is deemed statistically significant. **Results:** Average SDSCA score among participants was  $3.2 \pm 1.6$ . Our study found that time since DM diagnosis was significantly correlated with exercise subdomain score ( $p=0.000$ ) as well as the FBG level ( $p=0.001$ ). FBG levels were negatively correlated with SDSCA score ( $p=0.000$ ) and all of its subdomains ( $p<0.01$ ). **Conclusion:** Our study concludes that there is a significant correlation between diabetes self-care and FBG levels. Our results showed that the higher the SDSCA score, the lower average FBG levels were.

**Corresponding author:****Dr. Abdullah Khalafallah Alnemari**

Senior Registrar Family Medicine, MBBS, JBFM, MOH

QR code



Please cite this article in press *Abdullah Khalafallah Alnemari et al, Diabetes Self-Care In Correlation With Fasting Blood Glucose Levels And Duration Of Diabetes Diagnosis., Indo Am. J. P. Sci, 2022; 09(5).*

**BACKGROUND:**

Diabetes mellitus (DM) is a significant burden on individuals, the national healthcare system, and the economy as a whole. Diabetes has reached pandemic proportions, according to the 9th edition of the IDF, which reported a prevalence of 9% (463 million people) in 2019. The increasing incidence of diabetes has been linked mostly to population ageing. However, lower diabetes mortality owing to improved medical treatment, as well as rises in diabetes incidence in certain countries due to rising prevalence of diabetes risk factors, particularly obesity, are key drivers of higher prevalence (Magliano *et al.*, 2019; Chan *et al.*, 2020).

Self-care has long been seen as a multi-faceted term with several meanings. Orem's concept of self-care is the most consistent of the group. According to Orem (1995), self-care is a personal activity that involves taking care of one's own health and disease, as well as preventing disease-related complications. This may be accomplished by implementing and maintaining healthy lifestyle behaviours in the areas of physical exercise, diet, and medicine, among other things. In accordance with this, Orem defined it as a self-care agency, or the capacity to analyse, monitor, and make decisions on one's own behalf in one's own life circumstances. Self-care is a lifelong process of learning that is more closely related with the notion of self-care agency. This refers to a patient's goal-oriented (i.e., health and well-being) performance, upkeep, and self-control. According to the aforementioned definition, different scholars have defined self-care differently, with Schoenberg & Drungle (2001) defining it as an individual's task and a result of lay decisions about proper behaviour to benefit health, avoid future disease, limit illness, reestablish general wellbeing, and maintain independence based on rules of adherence and factors arising from an individual perspective. Other scholars characterised it as self-management of diabetes by self-administration of medicines, which is equivalent with symptom control and disease management (Mollem *et al.*, 1996; Schultz *et al.*, 2001). Cooper *et al.*, 2003; Paterson and Thorne (2000) defined self-care management as an evolutionary process of developing knowledge or awareness by learning to cope with the complex nature of diabetes in a sociocultural setting. Anderson *et al.*, (1995) and De Weerd, *et al.*, (1990) argued that self-care in diabetes is an essential factor in keeping the disease under control, with about 95% of disease care carried out by the affected individual or their family members.

A previous research by Nauck *et al.* showed that responsibility for one's own diabetes should be placed

on the person. This might include blood glucose monitoring, medication adherence, and healthy lifestyle adherence (Nauck *et al.*, 2009).

The key problem in diabetic self-management is not whether these individuals manage their everyday lives with their specific health difficulties, but how they do it (Henrich *et al.*, 2010). As a result, a valid and accurate measure to evaluate self-management behaviour in diabetic patients is required. In English-speaking nations, Toobert and colleagues' Summary of Diabetes Self-Care Activities measure (SDSCA) is one of the most popular and widely utilised instruments. The questionnaire is an 11-item self-reporting measure that assesses self-care levels in diabetic people. The SDSCA has been assessed in many research and found to have excellent psychometric qualities (Toobert *et al.*, 2000; Schmitt *et al.*, 2013).

**Study aim**

This study aims to correlate diabetes self-care behaviour with the duration of DM diagnosis and FBG level.

**METHODS:****Study design**

This study adapts an analytical cross-sectional study design.

**Study duration**

The study was conducted from the period of March 1, 2022 to April 15, 2022.

**Study sample**

The study sample comprised individuals with self-reported type-2 diabetes mellitus (T2DM) from Taif, Saudi Arabia.

**Data collection method and sampling procedure**

The data was collected using an online self-administered questionnaire. The questionnaire was published targeting social media clusters with diabetic individuals from Taif city. The sample size was calculated using the EpiTools epidemiology (Accessed at: <http://epitools.ausvet.com.au/content.php?page=1ProportionandProportion>), and a minimum of 350 participants were required. We further published the online form until at least 350 complete responses were obtained. The study included 419 participants who were eligible for participation as per the study eligibility criteria.

**Eligibility criteria**

**Inclusion criteria**

The study included adults residing in Taif, KSA who are diagnosed with T2DM and willing to participate in the study.

**Exclusion criteria**

The study excluded those who did not consent to participate, or who submitted an incomplete response.

**Data collection tools**

The study used the Arabic version of SDSCA to assess the self-management practice level. The SDSCA scale was originally developed by Toobert and colleagues (Toobert et al., 2000), and was translated into Arabic and assessed for validation by AlJohani and colleagues (AlJohani et al., 2016). Respondents were asked to reference the latest documented FBG measures and report them in the questionnaire in mg/dL (standard measure unit in PHC setting in Taif, Saudi Arabia).

**Data management plan**

We used the Statistical Package for Social Sciences (SPSS) version 26 for data management. We performed descriptive analysis in form of simple descriptive tables with frequencies and percentages for categorical variables, and means and standard deviations for continuous variables. We used the Pearson's correlation to correlation continuous variables where a p-value was regarded significant if it was equal to or less than 0.05.

**Ethical considerations**

The data collection tool included an explanatory section mentioning the purpose of the study and that participating is voluntarily. No names of personal identify data were collected. Data was handled only by study authors and the data analysis expert.

**RESULTS:**

The study included 419 participants whose average age was  $52 \pm 14$ . Males constituted 69% of participants. The majority of respondents were Saudi (83.1%), working (42.7%), and having a secondary school degree (39.6%). Average time since DM diagnosis was  $10 \pm 8$  years. Hypertension diagnosis was self-reported by 54.7% of respondents, whereas 57.3% suffered dyslipidemia. Oral anti-diabetic drugs were used by 60.6% of respondents, where diet control was reported by 44.4%, and insulin therapy was reported by 11.7%. Average FBG of respondents was  $147 \pm 45$  (table 1).

Table 2 shows that the average SDSCA score among participants was  $3.2 \pm 1.6$ , where average score for diet domain was  $3.3 \pm 2.5$ , for exercise domain was  $3.9 \pm 2.3$ , for blood sugar test domain was  $3.1 \pm 2.4$ , and for foot care domain was  $2.7 \pm 2.4$ .

As shown in table 3, and figures 1 and 2, our study found that time since DM diagnosis was significantly correlated with exercise subdomain score ( $p=0.000$ ) as well as the FBG level ( $p=0.001$ ). FBG levels were negatively correlated with SDSCA score ( $p=0.000$ ) and all of its subdomains ( $p<0.01$ ).

**Table 1: Socio-demographic and diabetes health information among participants (n=419).**

Parameter		Frequency (%)
Age, y		$52 \pm 14$
Sex	Female	130 (31%)
	Male	289 (69%)
Nationality	Saudi	348 (83.1%)
	Other nationalities	71 (16.9%)
Occupation	Working	179 (42.7%)
	Retired	89 (21.2%)
	Student	24 (5.7%)
	Not working	127 (30.3%)
Highest educational degree	Primary education	90 (21.5%)
	University education	99 (23.6%)
	Illiterate	64 (15.3%)
	Secondary education	166 (39.6%)
Time since DM diagnosis, y		$10 \pm 8$
Diagnosed chronic conditions	Hypertension	229 (54.7%)
	Dyslipidemia	240 (57.3%)
	Others	50 (11.9%)

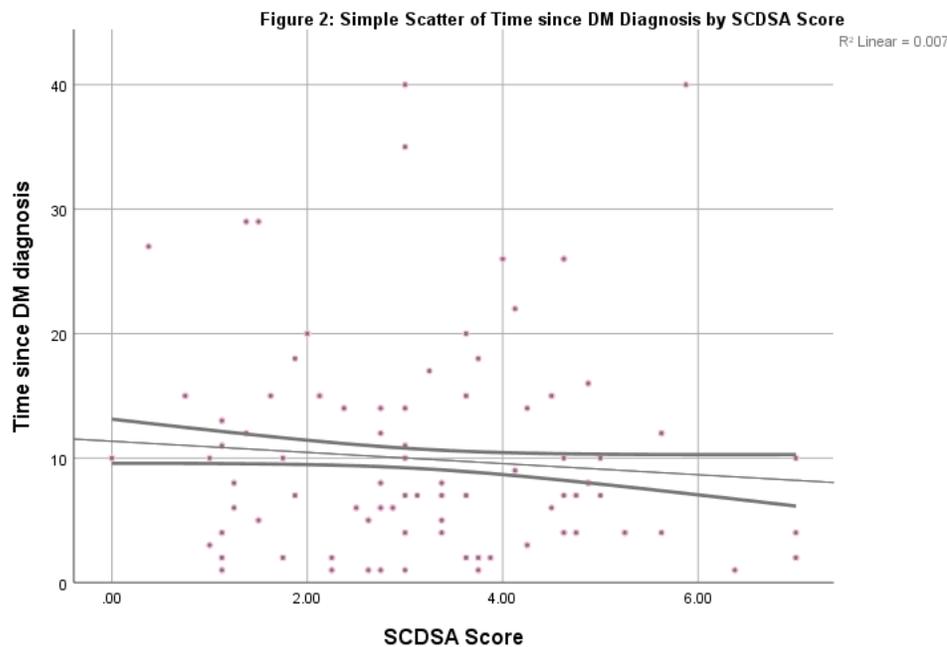
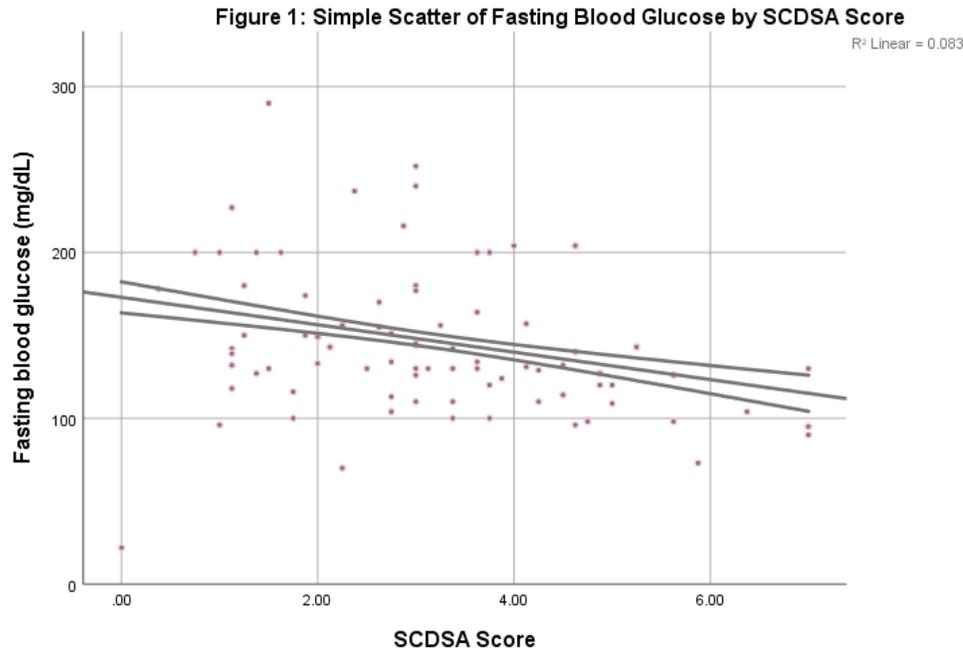
	<b>None</b>	72 (17.2%)
<b>Complications associated with DM</b>	<b>Peripheral neuropathy</b>	79 (18.9%)
	<b>Atherosclerosis</b>	76 (18.1%)
	<b>Retinopathy</b>	142 (33.9%)
	<b>Nephropathy</b>	53 (12.6%)
	<b>Others</b>	94 (22.4%)
<b>Treatment plan for DM</b>	<b>None</b>	177 (42.2%)
	<b>Insulin</b>	49 (11.7%)
	<b>Oral anti-diabetic drugs</b>	254 (60.6%)
	<b>Insulin and oral drugs</b>	115 (27.4%)
	<b>Diet</b>	186 (44.4%)
<b>FBG</b>		147±45

*Table 2: SDSCA and SDSCA domains average scores among participants (n=419).*

<b>SDSCA Domain</b>	<b>Mean±SD</b>
<b>Diet score</b>	3.3±2.5
<b>Exercise score</b>	3.9±2.3
<b>Blood sugar test score</b>	3.1±2.4
<b>Foot care score</b>	2.7±2.4
<b>SDSCA Score</b>	3.2±1.6

*Table 3: SDSCA and SDSCA domains scores correlated with FBG and time since DM diagnosis (n=419).*

<b>Parameter</b>	<b>Time since DM diagnosis</b>	<b>FBG</b>
<b>Time since DM diagnosis</b>	r=1, p=	r=0.163**, p=0.001
<b>FBG</b>	r=0.163**, p=0.001	r=1, p=
<b>SDSCA Score</b>	r=-0.086, p=0.079	r=-0.289**, p=0.000
<b>Diet score</b>	r=0.017, p=0.721	r=-0.343**, p=0.000
<b>Exercise score</b>	r=-0.310**, p=0.000	r=-0.136**, p=0.005
<b>Blood sugar test score</b>	r=0.01, p=0.840	r=-0.146**, p=0.003
<b>Foot care score</b>	r=0.039, p=0.427	r=-0.134**, p=0.006



### DISCUSSION:

At both the national and global levels, almost half of diabetic patients are said to have inadequate or poor glycemc control (Alsulaiman *et al.*, 2016; ADA, 2015). Diabetes that is uncontrolled is the leading cause of diabetes-related morbidity. Cardiovascular problems, in particular, increase the frequency of hospitalizations and the costs associated with them (Abdulwahid, 2016; Jain *et al.*, 2018; Liu *et al.*, 2020).

We conducted this cross-sectional study to assess the correlation between self-care behaviour in diabetic patients and levels of FBG and duration since DM diagnosis.

The SDSCA scale was utilised by Al Johani *et al.*, who found a similar pattern in sub-scale scores. In this study, the average SDSCA score across participants was  $3.2 \pm 1.6$ , with average scores of  $3.3 \pm 2.5$  in the nutrition domain,  $3.9 \pm 2.3$  in the

exercise domain,  $3.1 \pm 2.4$  in the blood sugar test domain, and  $2.7 \pm 2.4$  in the foot care area. The overall SDSCA score reported by AlJohani et al. was higher than in our study (3.72) (AlJohani et al., 2016). Another study in Al Hada City, Makkah Province, used the SDSCA to convert raw scores into 0-100 scaled scores and found similar trends, with medication adherence having the highest index of self-care (94.7%), followed by footcare (53.4%), exercise and diet (approximately 41-42%), and blood glucose monitoring having the lowest (22.4%) (Sabbah and Al-Shehri, 2014).

We found significant correlation between FBG and global SDSCA score ( $r = -0.289^{**}$ ,  $p = 0.000$ ). Self-management, in conjunction with pharmaceutical therapy, has been an important aspect of diabetes care in the past two decades. It entails enabling patients to carry out a set of actions in order to meet specific lifestyle and behavioural goals in areas such as nutrition, exercise, and blood glucose monitoring (Chatterjee et al., 2018; Powers et al., 2017; Chrvla et al., 2016). This method has shown to be effective in improving diabetes management and is becoming more widely suggested as a standard of treatment for diabetics (ADA, 2015; Sukkarieh-Haraty et al., 2018; Powers et al., 2017).

Herschbach et al. (1997) reported that self-care entails not only executing drug intake activities but also taking into account the interrelationships between them and making suitable modifications in one's normal life cycle. Self-care needs physical abilities, cognitive abilities, and understanding of how mental health influences self-care. Cognitive talents are beneficial in situations when an individual's issue resolution is done via thinking rather than action (Rubin et al., 1993; Bandura, 1977). According to the aforementioned scholars (Rubin and Bandura), self-care is a continuous learning process in which the patient attempts to learn various self-care methods in order to establish what is necessary for an adequate lifestyle and living situation (Hernandez et al., 1999; Peterson and Thorne, 2000). While self-care adherence or compliance does not necessarily equate to good metabolic control, poor self-care is more likely to result in poor glycaemic control (Toljamo and Hentinen, 2001).

As a result, diabetes self-management is receiving more attention, with multiple studies conducted locally revealing insufficient levels of practise in different aspects of self-care (Ansari et al., 2014; Sabbah and Al-Shehri, 2014; AlJohani et al., 2016). Such observations prompted physicians and researchers to facilitate patient education for self-care

(Al Hayek et al., 2013; Khan et al., 2011) and to introduce technology-based solutions, such as the use of smartphone apps and gamification of self-care behaviour, to overcome additional barriers and yield promising results in Saudi Arabia (Alotaibi et al., 2016; Alanzi, 2018).

### CONCLUSION:

According to our findings, there is a significant correlation between diabetic self-care and FBG levels. Our findings revealed that the lower the average FBG levels were, the higher the SDSCA score. More emphases on patient education are recommended as self-care has been suggested to be associated with lower morbidity and mortality among diabetic patients.

### REFERENCES:

1. Abdulwahid NA. Registry study for type 2 diabetes mellitus in a diabetic center in Saudi Arabia with comparative analysis for controlled versus uncontrolled cases. *J Endocrinol Diab.* 2016;3(5):1-6.
2. Al Hayek AA, Robert AA, Al Dawish MA, Zamzami MM, Sam AE, Alzaid AA. Impact of an education program on patient anxiety, depression, glycemic control, and adherence to self-care and medication in Type 2 diabetes. *Journal of family & community medicine.* 2013 May;20(2):77.
3. Alanzi T. mHealth for diabetes self-management in the Kingdom of Saudi Arabia: barriers and solutions. *Journal of Multidisciplinary Healthcare.* 2018;11:535.
4. AlJohani KA, Kendall GE, Snider PD. Psychometric Evaluation of the Summary of Diabetes Self-Care Activities-Arabic (SDSCA-Arabic): Translation and Analysis Process. *J Transcult Nurs.* 2016 Jan;27(1):65-72.
5. Alotaibi MM, Istepanian R, Philip N. A mobile diabetes management and educational system for type-2 diabetics in Saudi Arabia (SAED). *Mhealth.* 2016;2.
6. Alsulaiman TA, Al-Ajmi HA, Al-Qahtani SM, Fadlallah IM, Nawar NE, Shukerallah RE, Nadeem SR, Al-Weheedy NM, Al-Sulaiman KA, Hassan AA, Shahin AA. Control of type 2 diabetes in King Abdulaziz Housing City (Iskan) population, Saudi Arabia. *Journal of family & community medicine.* 2016 Jan;23(1):1.
7. American Diabetes Association. 4. Foundations of care: education, nutrition, physical activity, smoking cessation, psychosocial care, and immunization. *Diabetes care.* 2015 Jan 1;38(Supplement\_1):S20-30.

8. Anderson, RM; Funnell, M; Butler, P; Arnold, M; Fitzgerald, J. & Feste, C. (1995). Patient empowerment. Results of a randomized controlled trial. *Diabetes Care*, 18, 943–949.
9. Ansari RM, Dixon JB, Browning CJ. Self-management of type 2 diabetes in middle-aged population of Pakistan and Saudi Arabia. *Open Journal of Preventive Medicine*. 2014 Jun 11;2014.
10. Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. *Psychological Review*, 84, 191–215.
11. Chan JC, Lim LL, Wareham NJ, Shaw JE, Orchard TJ, Zhang P, Lau ES, Eliasson B, Kong AP, Ezzati M, Aguilar-Salinas CA. The Lancet Commission on diabetes: using data to transform diabetes care and patient lives. *The Lancet*. 2020 Dec 19;396(10267):2019-82.
12. Chatterjee S, Davies MJ, Heller S, Speight J, Snoek FJ, Khunti K. Diabetes structured self-management education programmes: a narrative review and current innovations. *The Lancet Diabetes & Endocrinology*. 2018 Feb 1;6(2):130-42.
13. Chvala CA, Sherr D, Lipman RD. Diabetes self-management education for adults with type 2 diabetes mellitus: a systematic review of the effect on glycemic control. *Patient education and counseling*. 2016 Jun 1;99(6):926-43.
14. Cooper, H; Booth, K. & Gill, G. (2003). Patients' perspectives on diabetes health care education. *Health Education Research*, 18, 191–206.
15. De Weerd, I; Visser, A; Kok; G. & van DerVeen, E. (1990). Determinants of active self-care behaviour of insulin treated patients with diabetes: implications for diabetes education. *Social Science and Medicine*. 30, 605–615.
16. Heinrich E, Schaper NC, de Vries Nanne K: Self-management interventions for type 2 diabetes: a systematic review. *Eur Diab Nursing* 2010, 7: 71–76. 10.1002/edn.160
17. Hernandez, C; Bradish, G; Rodger, N. & Rybansky, SI. (1999). Self-awareness in diabetes: using body cues, circumstances, and strategies. *The Diabetes Educator*. 25, 576–584.
18. Herschbach, P; Duran, G; Waadt, S; Zettler, A. & Amch, C. (1997). Psychometric properties of the questionnaire on stress in patients with diabetes-revised (QSD-R). *Health Psychology*. 16, 171–174.
19. Jain N, Agarwal M, Kadaria D, Steinberg HO, Dagogo-Jack S. National trends and outcomes in patients with uncontrolled diabetes and related complications. *Diabetes*. 2018 Jul 1;67(Supplement\_1).
20. Khan AT, Lateef NA, Khamseen MA, Alithan MA, Khan SA, Ibrahim I. Knowledge, attitude and practice of ministry of health primary health care physicians in the management of type 2 diabetes mellitus: A cross sectional study in the Al Hasa District of Saudi Arabia, 2010. *Nigerian journal of clinical practice*. 2011;14(1).
21. Liu L, Wang F, Gracely EJ, Moore K, Melly S, Zhang F, Sato PY, Eisen HJ. Burden of uncontrolled hyperglycemia and its association with patients characteristics and socioeconomic status in Philadelphia, USA. *Health equity*. 2020 Dec 1;4(1):525-32.
22. Magliano DJ, Islam RM, Barr EL, Gregg EW, Pavkov ME, Harding JL, Tabesh M, Koye DN, Shaw JE. Trends in incidence of total or type 2 diabetes: systematic review. *Bmj*. 2019 Sep 11;366.
23. Mollem, E; Snoek, F; & Heine, R. (1996). Assessment of Education perceived barriers in selfcare of insulin-requiring diabetic patients. *Patient and Counseling*, 29, 277–281.
24. Nauck, M; El-Ouaghlidi, A; Vardarli, I. (2009). Self-Monitoring of blood glucose in diabetes. *DeutschesÄrzteblatt International*, 106(37),587-97.
25. Orem, DE. (1995). *Nursing Concepts of practice*. (5th edition). St Louis: Mosby Year Book Inc.
26. Paterson, B. & Thorne, S. (2000). Developmental evolution of expertise in diabetes selfmanagement. *Clinical Nursing Research*, 9, 402-419.
27. Powers MA, Bardsley J, Cypress M, Duker P, Funnell MM, Hess Fischl A, Maryniuk MD, Siminerio L, Vivian E. Diabetes self-management education and support in type 2 diabetes: a joint position statement of the American Diabetes Association, the American Association of Diabetes Educators, and the Academy of Nutrition and Dietetics. *Diabetes care*. 2015 Jul 1;38(7):1372-82.
28. Rubin, R; Peyrot, M. & Saudek. C. (1993). The effect of a diabetes education program incorporating coping skills training on emotional well-being and diabetes self-efficacy. *The Diabetes Educator*, 19, 210–214.
29. Sabbah KOA, Al-Shehri AA. Practice and perception of self-management among diabetics in Taif, KSA: Impact of demographic factors. *Int J Med Sci Public Health*. 2014;3:277–285.
30. Schmitt A, Gahr A, Hermanns N, Kulzer B, Huber J, Haak T: The Diabetes Self-Management Questionnaire (DSMQ): development and evaluation of an instrument to assess diabetes self-care activities associated with glycaemic control. *Health Qual Life*

- Outcomes 2013, 11: 138. 10.1186/1477-7525-11-138
31. Schoenberg, N. & Drungle, S. (2001). Barriers to non-insulin dependent diabetes mellitus (NIDDM) self-care practices among older women. *Journal of Aging and Health*, 13, 443–466.
  32. Shultz, J; Sprague, M; Branen, L. & Lambeth, S. (2001). A comparison of views of individuals with type 2 diabetes mellitus and diabetes educators about barriers to diet and exercise. *Journal of Health Communication*, 6, 99–115.
  33. Sukkariéh-Haraty O, Bassil M, Egede LE. Results of a culturally tailored multidisciplinary intervention on diabetes self-care and glyceimic outcome in Lebanese patients with type 2 diabetes. *Diabetes*. 2018 Jul 1;67(Supplement\_1).
  34. Toljamo, M. & Hentinen, M. (2001). Adherence to self-care and glycaemic control among people with insulin-dependent diabetes mellitus. *Journal of Advanced Nursing* 34, 780-786.
  35. Toobert DJ, Hampson SE, Glasgow RE: The summary of diabetes self-care activities measure: results from 7 studies and a revised scale. *Diabetes Care* 2000, 23: 943–950. 10.2337/diacare.23.7.943