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

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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±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.*

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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 Weerdt, 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 (Henirich 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±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±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±45 (table 1).

Table 2 shows that the average SDSCA score among participants was 3.2±1.6, where average score for diet domain was 3.3±2.5, for exercise domain was 3.9±2.3, for blood sugar test domain was 3.1±2.4, and for foot care domain was 2.7±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±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±8
Diagnosed chronic conditions	**Hypertension**	229 (54.7%)
	Dyslipidemia	240 (57.3%)
	Others	50 (11.9%)

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

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

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

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

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

Figure 1: Simple Scatter of Fasting Blood Glucose by SCDSA Score

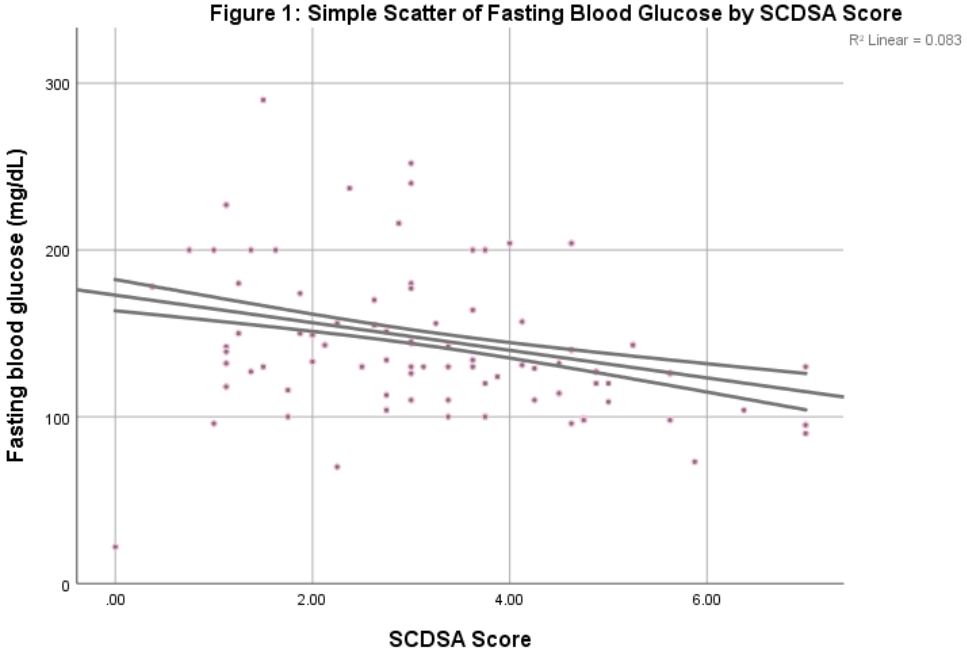
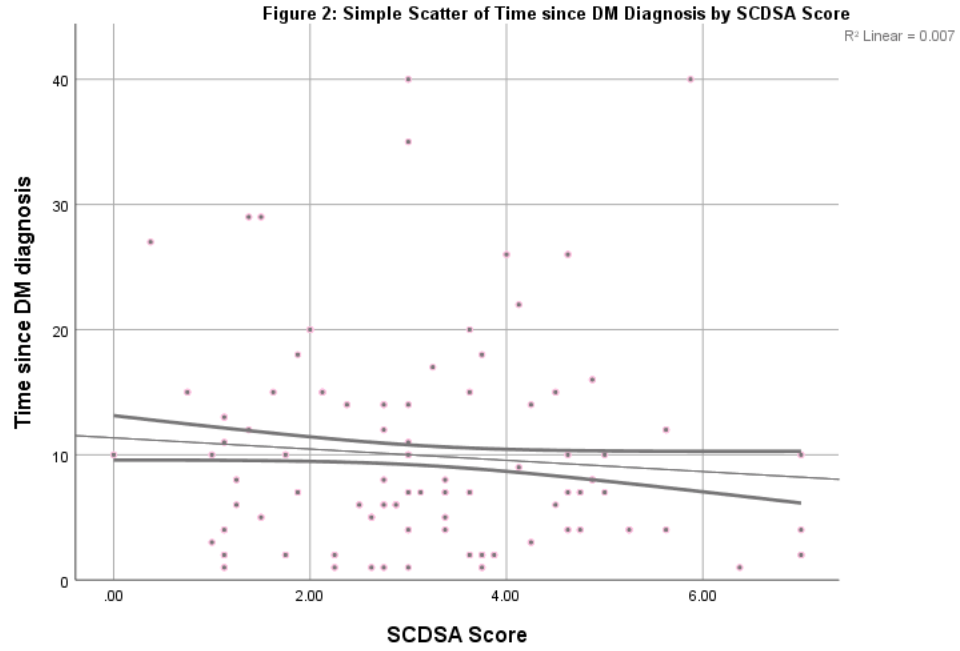


Figure 2: Simple Scatter of Time since DM Diagnosis by SCDSA Score



DISCUSSION:

At both the national and global levels, almost half of diabetic patients are said to have inadequate or poor glycemic 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±1.6, with average scores of 3.3±2.5 in the nutrition domain, 3.9±2.3 in the

exercise domain, 3.1±2.4 in the blood sugar test domain, and 2.7±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; Chrvala 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.

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