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Original Research Article

The relationship between self-efficacy and self-management behavior among diabetic pregnant women

Howaida Amin Hassan Fahmy Elsaba[1*], Amal Samir Abd El-Maksoud[2,3] and Mohamed Saeed Aljohani[3]

[1]Maternity, Obstetric and Gynecological Nursing Department, Faculty of Nursing, Port Said University, Egypt.

[2]Medical Surgical Nursing Department, Faculty of Nursing, Alexandria University, Egypt.

[3]Medical Surgical Nursing Department, College of Nursing, Taibah University, KSA.

***Corresponding Author's E-mail: Dr_howaidaamin@yahoo.com**

Abstract

Evidence indicated the wide-range consequences of diabetes mellitus throughout gestation for each of the mother and the newborn. Because diabetes self-management incorporates behavioral, personal, and environmental factors into the daily performance of suggested activities, the concept of self-efficacy has relevance for promoting self-management. The aim of the study was to investigate the relationship between self-efficacy and self-management among diabetic pregnant women. A descriptive correlational study was conducted. Convenience samples of 125 diabetic pregnant women were recruited during their visit to an antenatal clinic at Maternity University Hospital in Alexandria- Egypt. Three tools were used to collect data: *Tool I:* Biological and socio-demographic; *Tool II:* The Diabetes Management Self-efficacy scale (DMSES); and *Tool III:* Diabetic Self-Management Questionnaire (DSMQ). The findings revealed a highly positive correlation between self-efficacy and self-management among diabetic pregnant women. Moreover, high self-efficacy was related to take prescribed medications and adjust medication with illness. While low self-efficacy related to keeping body weight under control and the ability to follow a healthy diet. Regarding, diabetic self-management of women, a high self-management was related to taking diabetic medication and keeping recommended doctor appointment, while low diabetic self-management related to practice physical activity and recording blood sugar level regularly. Also, a significant positive relationship was found between bio-sociodemographic factors of study participant and their diabetic self-efficacy and self-management. This study has highlighted the importance of self-management intervention to improve healthy behaviors and diabetic control among diabetic pregnant women.

Keywords: Diabetic pregnant women, Self-efficacy, Self-management

INTRODUCTION

Diabetes mellitus (DM) is one of the most common complications of pregnancy in developed and developing countries. Globally, 20.9 million pregnancies are associated with hyperglycemia. Among these, gestational diabetes mellitus (GDM) affects 17.8 million pregnancies (International Diabetes Fedration, 2017; Kuo et al., 2017). Gestational diabetes is described as intolerance of glucose, which begins for the first time during pregnancy and usually ends during the postpartum (Qazi et al., 2016). Typically, the screening and diagnosis of GDM occur between 24–28 gestational weeks. Prevalence of GDM is increasing coincidently with the

dramatic increase in the prevalence of overweight and obesity, as well as other risk factors as a family history of insulin resistance or diabetes, and advanced maternal age. The International Diabetes Federation (IDF) estimated that GDM affects about 14% percent of pregnancies worldwide, accounting for around 18% million births a year (International Diabetes Federation, 2017).

Evidence showed that DM had wide-ranging effects for both the mother and neonate during pregnancy. The potential complications for pregnant mothers with DM include non-elective cesarean delivery, gestational hypertension, and preeclampsia. Neonates of diabetic mothers have an elevated risk of neonatal hypoglycemia, macrosomia, as well as respiratory distress syndrome, hyperbilirubinemia, shoulder dystocia, and birth trauma (Barakat et al., 2013).

In diabetes, self-efficacy has been shown to have a direct association with self-management. The idea of self-efficacy is grounded on social cognitive theory, which explains the connection in health and chronic disease between personal, behavioral, and environmental influences in chronic illness and health. Self-efficacy theory indicates that the trust of patients in their ability to conduct healthy habits affects their participation in activities positively. The level of self-efficacy is pertinent for improving patient self-management as diabetes self-management integrates personal, behavioral, and environmental factors into the day to day performance of prescribed activities (Bandura, 2002; Rose et al., 2009).

Being extremely self-efficacious is a key factor in successful chronic disease self-management. Self-efficacy or the belief that one can control one's health is an essential goal of health care providers, particularly in the case of chronic disease. Psychological factors, such as self-efficacy, play a significant role in treatment adherence, blood glucose regulation, and pregnancy outcomes (Al-Hashmi et al., 2018). Based on the chronic nature of diabetes and the high cost of disease control, the necessity for adopting self-management behavior seems to be crucial. According to the recommendations of the World Health Organization, women must take an active role and develop their capacity for making healthy choices during pregnancy to improve neonatal and maternal health (World Health Organization, 2012).

Few studies have investigated the best strategies to improve diabetic pregnant women's adherence to healthy behaviors (Amason et al., 2016). Perceived self-efficacy has been established as a good predictor of healthy behaviors in diabetic patients, such as dietary change, weight loss, and physical activity. Reliance on coping mechanisms and pertinent knowledge is not adequate to enhance a healthy lifestyle adherence. Diabetic pregnant women need serious self-efficacy traits, such as positive reinforcement, reasonable expectations for performance, a high degree of confidence and the motivation required to achieve their desired goals (Chen and Lin, 2010).

Accordingly, this study aimed to explore the relationship between self-efficacy and self-management behavior among diabetic pregnant women.

Aim of the study

To investigate the relationship between self-efficacy and self-management behavior among diabetic pregnant women.

Research questions

1. Does the perceived self-efficacy of diabetic pregnant women promote self-management behaviors?
2. What are the factors that improve self-efficacy and self-management behavior among diabetic pregnant women?

Research Hypothesis

Self-efficacy and self-management behavior would be positively correlated among diabetic pregnant women.

METHODS

Study design, sample, and setting

A descriptive correlational study was utilized to achieve the aim of this study using Bandura's social cognitive theory as a theoretical framework (Bandura, 2002) to examine the relationship between self-management and self-efficacy using a convenience sampling approach. The estimated sample size was 120 participants, at confidence level 98%, and the precision rate at 0.05 by using Steven equation, 2012 (Suresh and Chandrashekara, 2012), so the total number of the participants was 125 pregnant women who had DM to compensate for dropouts. Pregnant diabetic women who free from any other chronic disease and not high-risk pregnancy for another cause than DM were eligible to participate in the study. The participants were recruited during their visit to an antenatal clinic to Maternity University Hospital (capacity 376 beds) in Alexandria-Egypt.

Data collection tools

The study consists of three tools. First, bio-socio-demographic characteristics. Information in this subscale include general information (e.g., age, educational level, employment status, number of graduate, number of parity, type of last delivery, and duration of pregnancy)

and diabetes-related information (onset of DM, duration of DM, treatment regime of DM, last fasting blood sugar level and body mass index). Second is the Diabetes Management Self-efficacy scale (DMSES). It was used to assess the women self- efficacy in implementing several self-care activities that affect blood glucose levels, including managing diabetic diet and adhering to prescribed medication. Specifically, the current study utilized the British version of the scale (Sturt et al., 2010). This scale is composed of 15 statements scored as a five-point Likert scale representing the respondent efficacy expectation level for each statement with the higher the scores, the greater the levels of self-efficacy. Accordingly, the maximum total score was equal to 75 (15 x 5) points, and a minimum total score was equal to 15 (15 x 1) points. From a reliability stand, the scale has accepted reliability of (0.89) Cronbach's alpha value and (0.77) intra-class correlation coefficient. The third is the Diabetic Self-Management Questionnaire (DSMQ) (Schmitt et al., 2013). This scale has 16 items, four points Likert scale to evaluate the glucose management self-care behaviors such as physical activity, dietary control, and utilization of health-care services. The scale was scored from 0-3, some items were positive (items number 1,2,3,4,6,8.9) and scored as the following: three scores gave to applies very much, two scores gave when the statement applied a considerable degree, one score gave when the statement applies to some degree, and zero score gave when the statement does not apply. Other scale statements were negative (items number 5,7,10,11,12,13,14,15,16) and scored as the following zero score gave to applies very much, one score gave to applies a considerable degree, two scores gave to applies some degree, and three scores gave to do not apply. Accordingly, the maximum total score was equal to 48 (16 x 3) points, and a minimum total score was equal to 0 (16 x 0) points. From a reliability stand, the scale has accepted the reliability of (0.84) Cronbach's alpha value.

Content validity of DMSES and DSMQ scales was shown adequately through previous research study (McDowell et al., 2005; Song et al., 2014; Sturt et al., 2010). The tools were translated into Arabic language and back translated by a translator. The content validity of translated tools was checked by a group of experts in the field of nursing. The study tools piloted on 10 participants to assess the accuracy and time required to fill in the questionnaires and the feasibility of the research process. Modifications were done accordingly, and the pilot sample was excluded later from the primary study sample.

Data Collection

Official permission was obtained from the director of the hospital to conduct the current study. Then the researchers arranged an interview with the head nurse of the antenatal clinic to explain the study aim and the process of data collection. The researchers collected data from women in the antenatal clinic through individualized interviews. The data were collected on approximately six days per week over one month, "January 2018". The average time of the interview was 20-30 minutes.

Ethical Considerations

The Faculty of Nursing / Alexandria University has given ethical approval for conducting this study. Besides, the administration department of the data collection location granted permission. Potential participants got verbal descriptions of the study's intent and significance. Participants were told that their participation in the study was voluntary, and they could withdraw from the study at any time and that their medical treatment would not be affected. Privacy, as well as confidentiality, was ensured for the participants. Before data collection, written consent to participate in the study was obtained from individual respondents.

Statistical analysis of the data

Data were recorded, classified, tabulated, and fed to a personal computer and analyzed through IBM SPSS software package version 20.0. (Armonk, NY: IBM Corp). Quantitative data were represented as mean and standard deviation, and range (minimum and maximum). Qualitative statistics were presented by number and percentage. The obtained results were considered significant at $p \leq 0.05$. The used tests were; Pearson coefficient to correlate between two normally distributed quantitative variables, F-test (ANOVA) for normally distributed quantitative variables, to compare between more than two groups, and Student t-test for normally distributed quantitative variables, to compare between two studied groups.

RESULTS

Table 1 shows the frequency and percentage distribution of studied participants' bio-sociodemographic characteristics. The table reveals that the mean score age of women was 30.72 ± 6.91, while 52% of them had middle and secondary education, and 72% of women unemployed. Regarding obstetrical history, 28.8% of women had three times of gravida, 33.6% had two times of para. Meanwhile, 77.2% of them delivered through cesarean section, and 48% of them were in the second trimester in the current pregnancy.

Table 2 illustrates the distribution of the study participants according to their diabetic history. The results

Table 1. Frequency and percentage distribution of the study participants according to their bio-sociodemographic characteristics (n=125)

Bio-sociodemographic characteristics	No.	%
Age (years)		
<20	6	4.8
20 – <30	42	33.6
30 – 40	77	61.6
Min. – Max.	18.0 – 40.0	
Mean ± SD.	30.72 ± 6.91	
Educational level		
Illiteracy	6	4.8
Read and write & primary education	23	18.4
Middle &secondary education	66	52.0
Diploma	24	19.2
University	6	4.8
Employment status		
Unemployed	90	72.0
Employee	35	28.0
Number of Gravida		
One	26	20.8
Two	27	21.6
Three	36	28.8
More than three	36	28.8
Number of Parity		
One	29	23.2
Two	42	33.6
Three	6	4.8
More than three	24	19.2
Zero	24	19.2
Type of Last Delivery	(n=101)	
Normal vaginal delivery	23	22.8
Cesarean Section	78	77.2
Duration of pregnancy		
First trimesters	18	14.4
Second trimesters	60	48.0
Third trimesters	47	37.6

Table 2. Frequency and percentage distribution of the studied participants' diabetic history (n=125)

Diabetic history	No.	%
The onset of diabetes mellitus		
From childhood	18	14.4
Before Pregnancy	30	24.0
During pregnancy	77	61.6
Duration of diabetes mellitus		
Less than a year	71	56.8
1 – 5 years	36	28.8
6 – 10 years	6	4.8
More than ten years	12	9.6
A treatment regime of diabetes mellitus		
Tablet	36	28.8
Insulin	54	43.2
Tablet and Insulin	35	28.0
Last fasting blood glucose level	mg/dL	
Min. – Max.	120.0 – 300.0	
Mean ± SD.	191.60 ± 52.34	
Body Mass Index		
Min. – Max.	2.70 – 38.0	
Mean ± SD.	31.37 ± 4.75	

Table 3. Mean score of diabetic women self-efficacy (n=125)

Item no	Item of diabetes self-efficacy	Mean ± Sd
1.	I am able to check my blood/ urine sugar if necessary.	3.104±0.974
2.	I am able to correct my blood sugar when the sugar level is too high	2.480±0.857
3.	I am able to correct my blood sugar when the sugar level is too low	3.480±0.799
4.	I am able to choose the correct food	3.144±0.779
5.	I am able to keep my weight under control	1.960±0.846
6.	I am able to examine my feet for cuts	3.104±1.236
7.	I am able to adjust my eating plan when ill	3.096±0.688
8.	I am able to follow a healthy eating pattern most of the time	3.048±0.489
9.	I am able to take more exercise if the doctor advises me to	2.296±0.880
10.	When taking more exercises, I am able to adjust my eating plan	2.152±0.707
11.	I am able to follow a healthy eating pattern when I am away from home.	2.008±1.073
12.	I am able to follow a healthy eating pattern when I am eating out or at a party	2.328±0,840
13.	I am able to adjust my eating plan when i am feeling stressed or anxious	3.576±0.732
14.	I am able to take my medication as prescribed	4.280±0.768
15.	I am able to adjust my medication when I am ill	3.752±1.111
	Min. – Max.	**29.0 – 60.0**
	Mean ± SD.	**43.81 ± 7.24**

showed that 61.6% of participants were diagnosed with diabetes during pregnancy, 56.8% have had diabetes for less than one year, and 43.2% of them dependent on insulin. Moreover, the results indicated that the mean score of last fasting blood glucose level was 191.60 mg/dL± 52.34, and the mean of the body mass index was 31.37 ± 4.75.

Table 3 reveals that high mean scores of diabetic self-efficacy were related to participant's ability to take their medication as prescribed and the ability to adjust their medication when they are ill (4.280±0.768 and 3.752±1.111 respectively). While low mean scores were related to participant ability to keep their weight under control, and the ability to keep on a healthy eating pattern when they are away from home (1.960±0.846 and 2.008±1.073 respectively). Also, the mean score of total self-efficacy was 43.81 ± 7.24, with a maximum score of 60.0 and a minimum score of 29.0.

Table 4 reveals that high mean scores of diabetic self-management were related to taking diabetes medication as prescribed and Keeping recommended doctors' appointments, which were (2.240±0.529 and 1.904±0.614, respectively). While, low mean scores of doing physical activity to achieve optimal sugar level and recording blood sugar level regularly, which were (0.808±0.591 and 1.088±0.751 respectively). Also, the

Table 4. Mean score of diabetic women self-management (n=125)

Item no	Item of diabetes self-management	Mean±Sd
1.	Check blood sugar levels with care and attention	1.720±0.702
2.	Choose food to achieve optimal blood sugar easily	1.568±0.664
3.	Keep recommended doctors' appointments	1.904±0.614
4.	Take diabetes medication as prescribed	2.240±0.529
5.	Occasionally eat lots of sweets/ high-carb foods	1.416±0.662
6.	Record blood sugar levels regularly	1.088±0.751
7.	Avoid diabetes-related doctors' appointments	0.952±0.489
8.	Do a physical activity to achieve optimal sugar levels	0.808±0.591
9.	Follow specialist's dietary recommendations	1.856±0.470
10.	Do not check blood sugar levels frequently enough	1.520±0.736
11.	Avoid physical activity, although good for diabetes	1.520±0.875
12.	Forget to take/ skip diabetes medication	2.328±0.715
13.	Sometimes have real 'food binges.'	0.824±0.582
14.	Should see medical practitioner(s) more often	2.136±0.711
15.	Skip planned physical activity	1.952 ± 0.821
16.	Diabetes self-care is poor	0.768± 0.685
	Min. – Max.	14.0 – 30.0
	Mean ± SD.	24.60 ± 4.67

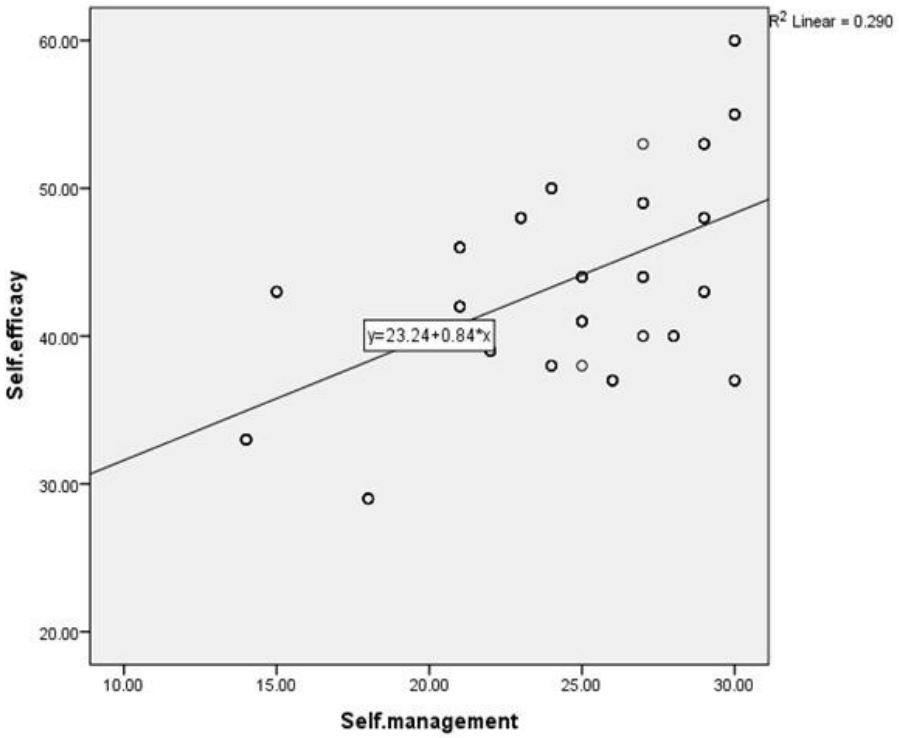

Figure 1. Correlation between diabetic self-efficiency and self-management among study participants (n=125)

mean score of total self-management was 24.60 ± 4.67, with a maximum score of 30 and a minimum score of 14.

Figure 1 shows a highly positive statistical correlation between self-efficacy of studied subjects and their self-management at p-value <0.01.

Table 5 demonstrates the relationship between total diabetic self–efficacy, self-management, and bio-sociodemographic characteristics of study participants. The table indicates a significant statistical difference between women's age and both self-efficacy and self-management (F =33.294 - P <0.001, F =6.750- P<0.002 respectively). The results also showed that women who have a university degree obtained higher mean scores concerning diabetic self-efficacy and self-management

Table 5. Relationship between total diabetic self–efficacy, self-management and bio-sociodemographic characteristics of study participants (n=125)

Bio–sociodemographic characteristics	Self-efficacy			Self-management		
	Mean ± SD.	Test of Sig.	P	Mean ± SD.	Test of Sig.	P
Age (years)						
<20	60.0 ± 0.0			30.0 ± 0.0		
20 – <30	46.14 ± 5.58	F =33.294	<0.001**	25.48 ± 4.91	F =6.750	0.002**
30 – 40	41.27 ± 6.21			23.70 ± 4.36		
Level of education						
Illiteracy	37.0 ± 0.0			26.0 ± 0.0		
Read and write / Primary	35.39 ± 5.11			19.09 ± 3.79		
Middle / Secondary	45.45 ± 5.99	F =22.685	<0.001**	24.64 ± 4.28	F =22.530	0.001**
Diploma	46.75 ± 5.88			28.42 ± 1.21		
University	53.0 ± 0.0			28.67 ± 0.82		
Number of Gravida						
One	51.15 ± 6.70			27.23 ± 3.82		
Two	44.67 ± 4.66			23.52 ± 4.87		
Three	44.33 ± 5.16	F =33.300	<0.001**	26.78 ± 2.62	F =15.954	0.001**
More than three	37.33 ± 5.19			21.33 ± 4.52		
Number of Parity						
One	44.21 ± 4.81			23.55 ± 4.69		
Two	42.71 ± 6.23			25.24 ± 5.18		
Three	44.0 ± 0.0	F =25.063	<0.001**	25.0 ± 0.0	F =5.937	0.001**
More than three	36.75 ± 4.92			21.75 ± 2.92		
Zero	52.25 ± 5.70			27.50 ± 3.86		
Type of last delivery (n = 101)						
Normal vaginal delivery	38.26 ± 8.02			20.22 ± 4.94		
Cesarean Section	42.85 ± 4.90	t =2.603	<0.015*	25.0 ± 3.89	F=4.265	0.001**
The onset of diabetes mellitus						
From childhood	54.33 ± 5.06			27.67 ± 3.40		
Before pregnancy	40.40 ± 2.19	F =36.643	<0.001**	24.60 ± 2.92	F =5.106	0.007**
During pregnancy	42.68 ± 6.78			23.88 ± 5.20		
Duration of diabetes mellitus						
Less than a year	41.63 ± 6.31			24.32 ± 4.52		
1 – 5 years	42.83 ± 5.12			23.61 ± 4.98		
6 – 10 years	60.0 ± 0.0	F =27.775	<0.001**	30.0 ± 0.0	F =4.271	0.007**
More than ten years	51.50 ± 3.66			26.50 ± 3.66		
Fasting blood glucose level						
<126	51.50 ± 3.66			26.50 ± 3.66		
126 – <160	43.59 ± 5.93			25.83 ± 3.08		
160– <200	42.50 ± 12.60	F =7.810	<0.001**	22.75 ± 7.05	F=2.398	0.054
200 – <240	45.81 ± 3.09			23.71 ± 4.50		
≥240	39.79 ± 1.78			25.07 ± 3.48		

t: Student t-test **F**: **ANOVA test**

* Statistically significant at p <0.05 **Highly significant <0.01

than women who only were able to read and write. Also, the differences were statistically significant (F =22.530, P<0.001); highly significant relations were found between the number of parity and both self-efficacy and self-management (F=25.063- P<0.001, F =22.530- P<0.001 respectively). Also, the results revealed a statistically significant relationship between the onset of diabetes and both self-efficacy and self-management (F =36.643 - P<0.001, F =5.106 -P<0.007, respectively). The findings also showed that self-efficacy and self-management were significantly higher among women who had diabetes from 6 to less than ten years ago (F =27.775- P<0.001, F =4.271- P<0.007 respectively). The table also illustrates that self-efficacy and self-management were significantly higher among women whom their fasting blood glucose level less than 126mmHg.

DISCUSSION

Presently, the significant goal of caring for diabetic pregnant women is to prevent disease progression.

Recent guidelines aims to prevent the progression of the disease, promote patients' lifestyle modifications, blood glucose monitoring, diet control, and medication adherence. Therefore, pregnant women with DM must be able to apply self-efficacy strategies and self-management to ensure proper health behavior to avoid maternal and neonatal hazards (Tharek et al., 2018).

The present study examined 125 diabetic pregnant women regarding their self-efficacy and self-management of DM. Those engaged in the study were aged between 18 and 40, with a mean age of 30.72± 6.91 years, about two-thirds of the participants were aged from 30 to 40 years. This result was congruent with the previous study, which indicated that there is a significantly higher incidence of diabetes with increasing maternal age (Kuo et al., 2017).

Regarding educational level of the participants, about one-half of the participants obtained intermediate and secondary school certificate; a previous study indicated that 35.3% had a secondary education level, 9.4% had an intermediate education level (Colberg et al., 2010). More than half of the participants presented with gestational diabetes were multipara. This was in consistent with the results of another study carried out on 300 pregnant women in India (Kalyani et al., 2014).

The mean of last fasting blood glucose level among participant in current study were 191.60mg/dL±552.34, which means that they have uncontrolled DM. Also, the results revealed that the mean BMI among participant were 31.37±4.75, these results were supported by Qazi et al. (2016) who mentioned that parity and diabetes is strongly linked to obesity and age. Women with higher parity often are older and fatter. Adjustments for BMI, on the opposite hand, may diminish the strength of this link (Qazi et al., 2016).

According to Bandura's interpretation of self-efficacy, it is the person's believes he/she can perform specific tasks to achieve certain goals, and it is a good predictor of healthy behaviors (Bandura, 2002). Highly self-efficacious individuals are more likely to set goals, remain committed to those goals, and work harder to attain the goals. Therefore, they are more likely to change their actions over a long period and stick to these actions, thereby leading to improved health outcomes. Those with low self-efficacy, by comparison, will experience poor performance, have low expectations and little dedication to achieving goals, and give up when tasks become difficult (Gerçek and Şen, 2015).

The results of the present study revealed a significant positive relationship between self-efficacy and self-management among diabetic pregnant women. This result in consistent with other studies that indicated patients with higher self-efficacy practice more self-management behaviors, leading to improved physical functioning and disease control. Self-efficacy has also been described as a self-managing moderator or mediator (Richard and Shea, 2011). Other studies reveled that those with increased self-efficacy reported improved self-management habits in diet, exercise, blood sugar monitoring and medication (Al-Khawaldeh et al., 2012; Wendling and Beadle, 2015).

Participants in the current study were more self-efficacious in activities such as medication intake, checking blood glucose level, managing low blood glucose level and least self-efficacious in controlling their body weight, adjusting their eating plan with exercises, following healthy eating pattern when they were eating out of their home, following doctor's instructions regarding practicing exercise and correcting hyperglycemia.

These results were comparable to the research study carried out in Malaysian hospital, which showed the highest mean self-efficacy score of patients was for the intake of medication, and the lowest mean self-efficacy score was for following of their eating plan (Sharoni and Wu, 2012). The same findings were revealed in a Jordanian study with the highest self-efficacy in medication intake and the least self-efficacy in performing physical activity (Al-Khawaldeh et al., 2012). A possible interpretation for the highest self-efficacy in medication intake is that it is a straightforward task and requires little effort to perform. The low self-efficacy score in our sample population in correcting blood sugar when the sugar level is too high has highlighted the need to teach patients to control their blood glucose and improve their self-efficacy in order to perform this function.

It was observed that high mean scores of self-managements in current study were related to medication adherence and low mean scores related to following therapeutic diet and physical activity. The interpretation of our results is most women believe that GDM only affects them during pregnancy, and the condition is no longer a health issue once the baby is born (Rose et al., 2009). In this context, Karen L. et al. (2017) reported that the primary treatment for GDM remains to be diet control and exercise practice (Karen L. Whalen, Pharm.D., BCPS, CDE, 2017). Moreover, a study by Moses et al. (2009) illustrated that dietary therapy delays pharmacologic therapy, and it revealed prospectively that a low-glycemic diet decreased insulin demand and timing (Moses et al., 2009). On the other hand, Padayachee (2015) emphasized that if exercise is not contraindicated for other obstetric complications during pregnancy, any form of diabetes will be improved by glycemic control (Padayachee, 2015). Women with GDM should be expected to walk 1 to 2 miles at least three days a week. Furthermore, moderate exercise regimen consisting of 30 minutes most days of the week for women with GDM who have no physical or obstetrical contraindications were recommended by the American College of Obstetricians and Gynecologists (ACOG) (Caughey and Turrentine, 2018), and Endocrine Society guidelines (Blumer et al., 2013). This finding is consistent with previous randomized controlled trials (RCTs) that found that exercise during pregnancy contributed to the

normalization of glycemia in pregnant women, or was successful in reducing the number of GDM patients needing insulin and improving glycemic control (Barakat et al., 2013).

Although the mean self-efficacy score related to medication and therapeutic measures of hypoglycemia were high among the diabetic pregnant women in currents study; a gap exists in vital aspects of self-management like record glucose levels regularly, and do physical activity to obtain optimal blood sugar level, which requisite to be addressed by nurses through periodic educational programs. The explanations for not regularly recording blood glucose levels may be related to the costs of glucometers and the lack of accessible glucometer or glucose strips, even for those on insulin. In this context, Indian study findings revealed that just one-fifth of the patients were aware of "glucometer self-monitoring of blood glucose (SMBG)" as a way of helping them detect hypoglycemia at an early stage, interact with symptoms and take preventive action (Shriraam et al., 2013). Concerning self-efficacy in hypoglycemia management, the majority of the current study participant mentioned that they could increase their blood sugar when the glucose level is too low. This result follows a previous study that concluded that around 80% of the patients knew that they must consume some sweets or chocolates or biscuits during an episode of hypoglycemia (whenever they feel "gare" or "drowsy") (Shriraam et al., 2013).

The current study results demonstrated a highly significant relation between self-efficacy and self-management with moderate duration (6- 10 years) of DM. Similar results were revealed by Tharek et al. (2018), who found that higher self-efficacy scores have a significant relation with shorter duration of diabetes (Tharek et al., 2018). Also, the longer the duration of diabetes, the worse is diabetes self-management. Similar findings were found through a Jordanian analysis (Khattab et al., 2010). Where increased period of diabetes, failure to obey a dietitian's prescribed eating schedule, negative attitude to diabetes, and increased barriers to adherence scales were correlated with poor diabetes management. Another study carried out among Urban African American Adults also proved that a long duration of diabetes might impair diabetes self-management (Chlebowy et al., 2010). The results of the current study also revealed a strong negative association between diabetes length and self-efficacy of diabetes. This finding means that people with a long history of diabetes have lower self-efficacy with diabetes. It may be since patients are more overwhelmed by their disease as time goes on, and their self-efficacy will also decrease (Chih et al., 2010). Previous work indicates that blood sugar regulation is getting worse as the length of the disease rises. The findings of a study in the United States showed that low glycemic regulation is followed by a long diabetes period. They claimed that patients 'inability to achieve the optimum level of glycosylated hemoglobin over time contributes to dissatisfaction, disappointment, and thus may reduce their self-efficacy (Trief et al., 2009).

The results of the present study demonstrated a highly significant relation between self-management and self-efficacy and women's educational level. Women with a high level of education obtained high mean score in both scales. These findings were in line with a study carried out at Muscat, Oman. The study indicated that in general, patients with formal education had more self-management and knowledge than those without low level of education (Elliott et al., 2013).

The findings of the current study also illustrate that self-efficacy and self-management were significantly higher among women whom their fasting blood glucose level less than 126mmhg. Similar findings of previous research show that greater self-efficacy is strongly associated with more frequent self-monitoring of blood glucose, and better subsequent 12-month glycemic control (Al Johani et al., 2015). Other research study suggested that diabetic self-management education (DSME) is an essential tool for improving glycemic control and other clinical parameters among type two DM patients. DSME will also be incorporated in clinics with type two DM for improved performance and complications prevention (Dehghan et al., 2017).

CONCLUSION

This study has highlighted the importance of self-management intervention to improve healthy behaviors and diabetic control among pregnant women with diabetes mellitus. Moreover, to improve healthy lifestyle behaviors in diabetic pregnant women, interventions should be focused on reinforcing self-efficacy. The findings of the current study concluded that a highly positive correlation was found between self-efficacy and self-management among diabetic pregnant women. Moreover, high self-efficacy was related to take prescribed medications and adjust medication with illness. While low self-efficacy was related to keeping body weight under control and the ability to follow a healthy diet.

Regarding, diabetic self-management of women, the findings indicated that high self-management were related to taking diabetic medication and keeping recommended doctor appointment. While low diabetic self-management related to the practice of physical activity and recording of blood sugar level regularly. Furthermore, the findings of the current study revealed a significant positive relationship between women's' bio-sociodemographic factors and their diabetic self-efficacy and self-management.

RECOMMENDATIONS

- Early screening of pregnant females should be done for early diagnosis of gestational diabetes mellitus.
- Educational intervention program should be developed to increase self-management and self-efficacy of diabetic pregnant women according to their level of understanding and education to prevent maternal and neonatal hazards. Such program must include lifestyle modification, blood glucose monitoring, control diet, and medication adherence.
- Applying the National Standards for Diabetes self-management education will assist health care educators in clinical settings to provide evidence-based education.

Implications for clinical practice and future research

Self-management is a pillar of diabetes care and improving patient self-management is believed to be a vital road to improving self-efficacy. Nurses have the great responsibility to increase pregnant women confidence in maintaining a healthy lifestyle that leads to better control of diabetes. For example, educating women about therapeutic diets, exercising regularly, and reviewing their behaviors and managing diabetes will help them improve newly learned behaviors. Women should evaluate the current conditions and develop the skills required to make appropriate decisions about their diabetes self-management activities.

The findings of the current study suggest the value of using self-efficacy interventions as the first step in pregnant women's management of DM. Nurses and midwives should make efforts to strengthen the self-efficacy of their patients to enhance their self-care actions and to delay disease progression. Evidence of this study can provide for the development of GDM intervention and education programs.

Future work should address facilitators and obstacles that affect self-efficacy and self-management among pregnant women living with diabetes.

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