Effect of an Educational Program based on PRECEDE-PROCEED Model on Sexual Function and Health Behaviors among Women with Gestational Diabetes

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Abstract:

Background: Gestational diabetes mellitus is a disorder that develops during pregnancy. Sexual dysfunction is one of the important problems in gestational diabetes. Health behaviors modifications play an important role in management of GDM. **Aim:** The study aimed to evaluate the effect of an educational program based on PRECEDE- PROCEED model on sexual function and health behaviors among women with gestational diabetes. **Design:** Quasi- experimental design. **Setting:** Obstetrics and gynecological outpatient clinic, Benha University. **Sample:** A Purposive sample was used to conduct the study, included 140 pregnant woman who fulfill inclusion criteria. **Tools of data collection:** Four tools were used. Tool (1); A structured self-administered questionnaire that includes: general characteristics of the studied women, history of gestational diabetes and Obstetric history. Tool (2): The PRECEDE-PROCEED model construct (enabling, predisposing and reinforcing factor). Tool (3): Female Sexual Function Index. Tool (4): Health Promoting Lifestyle profile-II**. Results:** The results indicated that at pre-intervention phase, there were no statistically significant differences in the average scores of knowledge, attitude, enabling factors, reinforcing factors, sexual function, and health behaviors between both groups. However, statistically significant difference was noted at post-intervention phase ($p<0.001$). Moreover, there was a highly statistically significant positive correlation between total sexual function score as well as total health-promoting lifestyle and (total knowledge, attitude, enabling factors and reinforcing factors) among both study and control groups at pre and post intervention phase ($P <0.001^{**}$). **Conclusion:** The utilization of the PRECEED-PROCEED model had a significant effect in the improvement of sexual function, and health behaviors of gestational diabetic women as a consequence to increase their awareness. **Recommendation:** Applying ongoing educational programs based on PRECEDE- PROCEED model for gestational diabetic women to increase awareness about gestational diabetes and sexual problem.

Keywords: Gestational Diabetes**,** Health Behaviors, PRECEDE-PROCEED Model, Sexual Function

Introduction:

Gestational diabetes mellitus (GDM) is one of the most common pregnancy complications worldwide. It is defined as any degree of glucose intolerance with onset or first recognition during pregnancy. In the past 20 years, the prevalence of GDM has increased, so that up to 14% of all pregnancies worldwide are complicated by GDM **(Eberle et al., 2022).**

The prevalence of gestational diabetes mellitus has been increasing globally, with urbanization, sedentary lifestyle, physical inactivity and dietary changes as significant contributing factors around 14% of pregnant women worldwide are affected by GDM

(Claire et al., 2023). Egypt is one of the top ten countries as regards diabetes prevalence worldwide. As a consequence, the rate of GDM diagnosis is steadily rising. Despite the medical and scientific progress in the field of diabetes, data about basic knowledge of GDM and its prevention still lack, especially in Egypt. GDM affect around 18% 0f women in Egypt **(Abouzid et al., 2023).**

Gestational diabetes etiology is apparently related to the pancreatic beta-cell dysfunction or the delayed response of the beta cells to the glycemic levels, and the marked insulin resistance secondary to placental hormonal release. The human placental lactogen is the main hormone related to increased insulin resistance in GDM. Other hormones related to the development of this disease are growth hormone, prolactin, corticotropin-releasing hormone, and progesterone. These hormones contribute to the stimulation of insulin resistance and hyperglycemia in pregnancy **(Quintanilla&Mahdy, 2023).**

One of the most serious complications of GDM is a decrease in sexual function. Having high sugar levels for a period of time can damage blood vessels and nerves, including the ones that supply sexual organs. This can restrict the amount of blood flowing to sexual organs, so GDM can cause some problems such as loos some sensation, vaginal dryness, less stimulation, difficulty feeling aroused and urinary tract infection **(Derosa and Romano, 2024).**

Health behaviors modifications play an important role in management of GDM. GDM is managed through lifestyle adjustments. These adjustments require changes in behavior toward eating healthier and increasing exercising. Nutrition is the primary factor affecting glucose levels but also physical activity, stress management, responsibility for health, interpersonal relationship and spiritual growth have an impact on glucose homeostasis **(Suzanne et al., 2023).**

The PRECEDE–PROCEED model is a cost–benefit evaluation framework proposed in 1974 by Lawrence W. Green that can help health program planners, policy makers and other evaluators, analyze situations and design health programs efficiently. It provides a comprehensive structure for assessing health and quality of life needs, and for designing, implementing and evaluating health promotion and other public health programs to meet those needs **(Khani et al., 2023).**

Nurses play a critical role in management of GDM. Diabetic education and women engagement are critical in management of GDM. Also nurse help women cope with the challenges of gestational diabetes, and improve overall well-being. Interventions include cognitive-behavioral therapy, sex therapy, mindfulness and relaxation techniques, psycho -education, and couple's counseling. Lifestyle modification is the gold standard for care. Treatment typically begins with medical nutrition therapy (MNT), physical activity, and weight management. Women have better outcomes if they can manage diet (carbohydrate and overall caloric restriction), exercise regularly (over 150 minutes weekly), and independently monitor glucose **(Bomfim et al., 2024).**

Significant of the study:

Gestational diabetes mellitus is a global problem that occurs in the world. This case occurred in pregnant women at 24-28 weeks of gestation. The global prevalence of GDM varies widely from 1% to 28% **(Dewi et al., 2023)**. The prevalence of GD is lower in Europe (5.8%) and Africa (8.0%) than in

Southeast Asia (11.7%) and Central and South America (11.2%) and Egypt was ranked among the top 21 nations with an incidence rate of 17.9% **(Stan et al., 2023).**

One of the major problems with GDM is that it's few symptoms and the pregnant woman is usually unaware that she has GDM until it is diagnosed at prenatal screening. However, despite being virtually symptom free, serious pregnancy complication are associated with GDM that include macrocosmic babies, risk of injuries during delivery, shoulder dystocia, fetal death in the uterus, respiratory distress syndrome, hypoglycemia, hyper- bilirubinemia, cardiomyopathy, perinatal mortality due to unexplained anomalies. In addition, certain symptoms such as high blood pressure, premature delivery, infectious complication, hydramnios, pre-eclampsia, and higher likelihood of incidence of type II diabetes in postpartum period could involve the mother **(Vaishnavi and Jogdand, 2024).**

Sexual function plays an essential role in marital satisfaction. Thus, people who have satisfying sexual relations have a higher quality of life and do not fail to express love and affection to their spouse and have more understanding and empathy in life. As a result, if sexual function is impaired, quality of life and marital satisfaction are affected. The global prevalence of SD in women with GDM is estimated to be 20–80% **(Canan et al., 2024).**

Therefore, this study was conducted to evaluate the effect of an educational program based on PRECEDE- PROCEED model on sexual function and health behaviors among women with gestational diabetes.

Aim of the study:

The study aim was to evaluate the effect of an educational program based on PRECEDE –PROCEED Model on sexual function and health behaviors among women with gestational diabetes.

Research hypotheses:

H1: Gestational diabetic women who were received an educational program based on PRECEDE – PROCEED model were engaged in health behaviors than those who don't received it.

H2: Gestational diabetic women who were received an educational program based on PRECEDE – PROCEED model were exhibited better sexual function than those who don't received it.

Subjects and Method:

Research Design: A quasi- experimental design was used to fulfill this study (two groups control and study).

Research setting:

The study was conducted at obstetrics and gynecological outpatient clinic in Benha university hospital.

Sampling:

Sample type: A purposive sample was used.

Sample size and technique:

- 140 pregnant women were selected. The sample size was estimated by using 10% of the previous year hospital census report of Benha university (BUH statistical center at 2022) (N= 1400 pregnant women). Women were divided randomly into two equal groups. The study group was including 70 women who received the educational program based on PRECEDE model in additional to the routine hospital care, the control group was include 70 women who received the routine hospital care only.

Inclusion criteria:

- Women with gestational diabetes
- Women between 26-28 weeks gestational age.
- Free from any medical or obstetrical complication.

- Willing to participate in the study.
- Women who read and write.

Tools of data collection

Four tools were used for collecting data.

Tool I: A structured self-administered questionnaire: It was constructed and translated into Arabic language by the researchers after reviewing related literature **(Buckner, 2020; Callis, 2020).** It included three parts:

Part (1): General characteristics of the studied women as (age, level of education, occupation, residence and body mass index (BMI)).

Part (2): History of gestational diabetes such as (history of gestational diabetes, family history of gestational diabetes mellitus).

Part (3): Obstetric history such as (gestational age, gravida, parity, abortion and mode of delivery).

Tool II: The PRECEDE-PROCEED model construct: The questions designed by the researchers according to educational-ecological assessment phase to determine Predisposing, Enabling and Reinforcing factors.

1. Predisposing factors which included 2 sections:

A. **Section (I) knowledge assessment sheet:** It included (11) MCQ questions.

Scoring system:

Every item received a score (2) for correct answer and a score (1) for incorrect answers. The sum of the scores for correct answers determined the total knowledge score. Higher scores indicated a greater understanding of GDM.

Total knowledge score:

- Satisfactory knowledge: when the total knowledge score was ≥ 60%.
- Unsatisfactory knowledge: when the total knowledge score was < 60%

B. **Section (II) Attitude assessment sheet**: It included (13) items developed by the researchers for assessing women's attitude regarding gestational diabetes.

Scoring system:

The attitude assessment sheet had three points as Likert-type scale ranging from Disagree (1), Neutral (2) and Agree (3).

Women' total attitude score was classified as the following:

- Low attitude when the total score was < 60%
- Moderate attitude when the total score was 60 % to < 75%.
- High attitude when the total score was ≥ 75%.

2- Enabling factors: it included (6) questions developed by the researchers for assessing women's social activities regarding gestational diabetes.

Scoring system:

The enabling factor sheet had three points as Likert-type scale (no (1), sometimes (2) and yes (3).

Women' total enabling factors score was classified as the following:

- Low social activities were < 60%.
- Moderate social activities was 60% to < 75%.
- High social activities were ≥ 75%.

3- Reinforcing factors: it included (5) questions developed by the researchers to measure women's support and encouragement of peers, family and heath care staff regarding gestational diabetes.

Scoring system:

The reinforcing factor sheet had three points as Likert-type scale (no (1), sometimes (2) and yes (3).

Women' total reinforcing factors score was classified as the following:

- Low support and encouragement were > 60%.

- Moderate support and encouragement were 60% < 75%.

High support and encouragement were ≥ 75%.

Tool III: Female Sexual Function Index (FSFI):

It was adapted from **(Anis et al., 2011** and **Rosen et al., 2000)** and the necessary modifications were done by the researchers. The Female Sexual Function Index was translated into simple Arabic language to suit the women level of understanding. The FSFI was a brief six-item self-administered questionnaire designed to assess the core elements of sexual functioning as Desire, arousal, lubrication, orgasm, satisfaction and pain. It was consisted of 19 questions to detect and evaluate female sexual function.

Scoring system:

Score range from either 0/ 1 (no sexual activity or sexual dysfunction respectively) to 5 (suggestive of normal sexual activity).

The score of total sexual function was classified as the following:

- **Better:** when the total scores of sexual functions was ≥ 75%.
- **Much the same:** when the total score of sexual function was 60% - < 75%.

Worst: when the total score of sexual function was <60%.

Tool IV: Health Promoting Lifestyle profile-II:

Health Promoting Lifestyle profile-II (HPLP II) was adapted from English version **(Walker et al., 1987)** and Arabic version **(Abo- Ali, & Oka, 2021)** to measure health-promoting behaviors of the pregnant women. It contained 41 items and five subscales as follow; health responsibility (eight items), physical activity (seven items), nutrition (eleven items), interpersonal relationships (seven items), and stress management (eight items).

Scoring system:

The Health Promoting Lifestyle profile-II (HPLP II) had three points as Likert- type scale (never (1), sometimes (2) and always (3)). The total score of each dimension was computed by calculating the mean of responses to all that the dimensions items 41 items. The overall score was obtained by calculating the mean of response to overall HPLP- II score ranged from 41 – 123, higher score showed more health promoting behaviors.

Women's total lifestyle score was classified as the following:

- Poor lifestyle behaviors, when the total score was < 60%.
- Moderate lifestyle behaviors, when the total score was 60 < 75%.
- High lifestyle behaviors, when the total score was ≥ 75%.

Tools validity:

The tools of data collection were thoroughly reviewed by three experts, in Obstetrics & Gynecological health nursing to test the content validity. Modifications were carried out according to the panel' judgments on clarity of sentences and the appropriateness of content. Example Women self-care activities are more valuable in management of gestational diabetes.

Tools Reliability:

Reliability of tools was tested by using Cronbach's alpha coefficient test, which revealed that the tools consisted of relatively homogenous items as shown by the moderate to high reliability of each tool. The internal consistency of knowledge assessment sheet was (α = 0.83), attitude likert scale was (α = 0.86), enabling factors sheet was (α = 0.76), reinforcing factors sheet was (α = 0.73), female sexual function index was (α = 0.85) and finally health promoting lifestyle questionnaire was (α =

0.84) and it was ranged from 0.79 to 0.87 for the six subscales.

Ethical considerations:

Ethical aspects were considered before starting the study as the following:

- Approval of faculty ethics committee for scientific research was obtained for fulfillment of the study.
- The aim of the study was explained to each woman before applying the tools to gain confidences and trust.
- An oral consent was obtained from each woman to participate in the study and withdrawal when she needs.
- The study was not having any physical, social, or psychological risk on the participant.
- The data was collected and treated confidentially.
- Each woman was informed about time throughout the study.
- The educational booklet was provided to pregnant women in the control group at the end of study to benefit in the subsequent pregnancies.

Pilot study:

The pilot study was conducted on 10 % of the total sample (14 women). It was conducted to test the simplicity, feasibility, clarity and applicability of the developed tool, also to find out the possible obstacles and problems that face the researchers and interfere with data collection. According to the result of the pilot study. The required modification was done. The pilot sample was excluded from the study.

Field work:

❖ Upon obtaining official permission from director of Benha university hospital, data were collected through five phases. The following phases were adopted to fulfill the aim of the current study: preparatory, interviewing, planning, implementation and evaluation phases. The field work of the current study was carried out from beginning of April 2023 to the end of March 2024 covering one year. The researchers visited Benha University Hospital three days/ week (Saturday, Monday and Wednesday).

❖ **Preparatory phase:**

The preparatory phase was the first phase of the study. The study was carried out through reviewing of past and current literature covering the various aspect of the problem using books, articles, magazines and network about studies related to effect of an educational program based on PRECEDE-PROCEED model on sexual function and health behaviors among women with gestational diabetes.

Interviewing and assessment phase:

❖ The researchers were welcomed with the participant woman and introduced herself to the women. The researchers were explained the purpose of the study and provide the woman with all information about the study such as (purpose, duration and activities) and the process of the study was explained to the participant women to gain confidence and trust, then the researchers was taken oral consent from all participant women were participate in the study. The researchers provided an appropriate place for the participant in this study to maintain the privacy and confidentiality of the study.

❖ **Planning phase:**

Based on the baseline data obtained from pre-program assessment and the existing relevant scientific resources (**Eberle et al., 2022 and Ghaffari et al., 2021**), the researchers designed a booklet in Arabic language supported by figures and based on women's knowledge deficit about gestational diabetes mellitus, health promoting lifestyle and health adaptive measures regarding gestational diabetes and sexual function. The educational program was developed using

PRECEEDE- PROCEED model as guideline then the researchers designed 6 scientific sessions as the following 4 theoretical session and 2 practical sessions the average time was (25-30) minutes.

❖ **Implementation phase**

The researchers were provided health education program to the participant women about gestational diabetes through applying the precede proceed model.

The researchers were interviewed and assessed the participant woman and distributed tool I, II, III and IV to all the participant woman according to each group.

❖ **Evaluation phase:**

After 4 weeks post intervention data was collected to be compared with pre-intervention data using the same pre-assessment tools to evaluate the effect of an educational program based on PRECEDE-PROCEED model on sexual function and health behaviors among women with gestational diabetes. Evaluation started first with control group then with study group to avoid bias. The educational booklet was provided to women in the control group to benefit in subsequent pregnancies.

Statistical analysis:

Data was verified prior to computerized entry. The statistical package for social sciences (SPSS Version 0.22) was used for that purpose, followed by data tabulation and analysis. Descriptive statistics were applied (e.g., mean, standard deviation, frequency and percentages). Chi-square tests, independent T- test and person correlation coefficients were used. Nonsignificant level value was considered when $p > 0.05$. A significant level value was considered when $p \leq 0.05$. And a highly significant level value was considered when $p \leq 0.001$.

Results:

Table (1) illustrates that there was no statistically significant difference between the control and study demographic data group at ($p > 0.05$). Also, this table reveals that 38.6% of control group & 41.4% of study group aged ≥ 30 year with Mean ± SD 27.68 ± 6.51 for control group and 27.98 ± 7.13 for study group, Furthermore, 58.6% of control group & 64.3% of study group lived in rural area, Moreover, 51.4% of control group & 41.4% of study group had secondary education. Regarding occupation, 62.9% of control group & 71.4% of study group were not employees.

Table (2) illustrates that there was no statistically significant difference between the control and study groups anthropometric measurements at ($p > 0.05$). Also, this table reveals that 55.8% of control group & 52.9% of study group weighed 75 - < 95 Kg with Mean ± SD 81.48 ± 12.34 for control group and 83.24± 13.54 for study group, moreover, 50.0 % of control group & 48.6 % of study group had height of 160 - < 165 respectively. Regarding body mass index, the results revealed that 45.7% of control group & 47.1 % of study group were obese above 30.0 (kg/m^2) with Mean ± SD 29.12 ± 3.50 for control group and 29.95 ± 3.23 for study group.

Figure (1) reveals that, 62.9% of control & 67.1% of study group had no family history of gestational diabetes. On the other hand, 37.1% of control group & 32.9% of study group had family history of gestational diabetes.

Table (3) illustrates that there was no statistically significant difference between the control and study groups anthropometric measurements at ($p > 0.05$). Also, this table reveals that 45.7% of control group & 58.6% of study group were in gestational age of 27 week. Furthermore, 68.6% of control group & 61.4% of study group were multigravida. Moreover, 40.0% of control group & 35.7%

of study group were primi-parous. Increasingly 92.9% of control group & 97.1% of study groups hadn't abortion before. Also, 79.2% of control group & 83.7% of study group hadn't gestational diabetes before.

Figure (2) illustrates that 27.1% of control group and 31.4% of study group had satisfactory knowledge regarding gestational diabetes at pre-intervention phase. Meanwhile, 38.6 % of control group and 78.6% of study group had satisfactory knowledge regarding gestational diabetes at post-intervention phase.

Table (4) indicates that there was no statistically significant difference between Mean ± SD of both study and control groups regarding (knowledge, attitude, enabling factors and reinforcing factors) at pre-intervention ($p>0.05$). Whenever, there was a highly statistically significant difference between Mean ± SD of both study and control group at post intervention phase ($p<0.001$**). As evidenced that, Mean ± SD regarding predisposing factor (knowledge and attitude), enabling factor and reinforcing factor of study group at post intervention phase was 17.85 ± 2.21, 28.62 ± 5.46, 13.88 ± 2.60 and 11.92 ± 2.12 compared to 14.92 ± 1.89, 21.94 ± 3.81, 10.57 ± 2.18 and 9.10 ± 2.18 of control group respectively.

Table (5) indicates that, there was no statistically significant difference in the mean score of the overall sexual function and its dimensions between the both study and control groups in the pre-intervention phase ($P > 0.05$). However, post intervention, the mean difference score for overall and dimensions of sexual function in the study group was higher than the control group scores ($P \leq 0.001$). In the study group, the mean sexual function domain at post intervention phase were 10.77±2.07 in terms of desire, 12.25±1.07 in arousal, 13.04±1.01 in lubrication, 10.70±0.92 in orgasm, 10.32±1.49 in satisfaction and 8.51±1.04 in pain compared to 6.64±2.00, 9.02±1.17, 8.82±1.91, 7.05±1.26, 6.91±1.49 and 10.64±1.71 in control group respectively. As well, the total Mean ± SD of study group was raised in post intervention than pre intervention from 49.45±5.71 to 60.97±7.60 and for control group from 47.95±4.15 to 52.75±9.89 respectively.

Figure (3) illustrates that 65.7 % of control group and 62.9 % of study group had worst sexual function at pre-intervention phase. Whenever, 61.4 % of control group and 27.1% of the study group had worst sexual function at post intervention phase.

Table (6) indicates that, there was no statistically significant difference in the mean score of the overall health promoting lifestyle behaviors and its dimensions between the both study and control groups in the pre-intervention phase ($P > 0.05$). However, post intervention, the mean difference score for overall and dimensions of health promoting lifestyle behaviors in the study group was higher than the control group scores ($P \leq 0.001$). As evidenced that total Mean ± SD of study group was raised in post intervention than pre intervention from 58.61 ±21.88 to 96.71±38.02 and for control group from 59.31±21.81 to 75.44±19.59 respectively.

Figure (4) illustrates that 5.7 % of control group and 4.3 % of study group had high lifestyle behaviors regarding gestational diabetes at pre-intervention phase. Whilst, 8.6 % of control group and 57.1 % of study group had high lifestyle behaviors regarding gestational diabetes at post-intervention phase.

Table (7) reveals that there is a highly statistically significant correlation between Total health-promoting lifestyle score and predisposing factors (total knowledge,

attitude, enabling factors and reinforcing factors) at p value <0.001**).

Table (8) reveals that there was a highly statistically significant positive correlation between total sexual function score and predisposing factors (total knowledge, attitude, enabling factors and reinforcing factors) among both study and control groups at pre and post intervention phase (P <0.001**).

Table (1): Distribution of control and study groups according to socio-demographic characteristics (n=140).

Group / Socio-demographic characteristics	Control group (n=70)		Study group (n=70)		X^2	P - value
	No.	%	No.	%		
Age (years)						
< 20	15	21.4	18	25.7	0.855	0.836
20 - < 25	8	11.4	7	10.0		
25 - < 30	20	28.6	16	22.9		
≥ 30 years	27	**38.6**	29	**41.4**		
Mean ± SD	**27.68 ± 6.51**		**27.98 ± 7.13**		**t=0.260**	**0.795**
Residence						
Rural	41	**58.6**	45	**64.3**	0.482	0.487
Urban	29	41.4	25	35.7		
Educational level						
Read and write	2	2.9	5	7.1	2.238€	0.536
Basic education	12	17.1	14	20.0		
Secondary education	36	**51.4**	29	**41.4**		
High education	20	28.6	22	31.4		
Occupation						
Employee	26	37.1	20	28.6	1.166€	0.280
Not employee	44	**62.9**	50	**71.4**		

statistically significant difference (p > 0 .05) **t= independent t test** **€ Fisher Exact Test**

Table (2): Distribution of the studied women in both groups according to anthropometric measurements (n=140).

Group / Anthropometric items	Control group n= 70		Study group n=70		X^2	P- value
	No.	%	No.	%		
Weight (kg)						
55 - < 75	12	17.1	10	14.2	0.516	0.735
75 - < 95	39	**55.8**	37	**52.9**		
≥ 95	19	27.1	23	32.9		
Mean ± SD	**81.48 ± 12.34**		**83.24± 13.54**		**t= -0.802-**	**0.424**
Height (cm)						
155 - < 160	13	18.6	11	15.7	0.373	0.830
160 - < 165	35	**50.0**	34	**48.6**		
≥165	22	31.4	25	35.7		
Mean ± SD	**162.97 ± 2.85**		**163.91 ± 3.33**		**t= -1.796-**	**0.075**
Body Mass Index (BMI) (kg/m²)						
Normal 18.5-24.9	9	12.9	6	8.6	0.682	0.711
Overweight 25.0 – 29.9	29	41.4	31	44.3		
Obese Above 30.0	32	**45.7**	33	**47.1**		
Mean ± SD	**29.12 ± 3.50**		**29.95 ± 3.23**		**t= -1.466-**	**0.145**

t= independent t test **No statistical significant difference (p > 0 .05)**

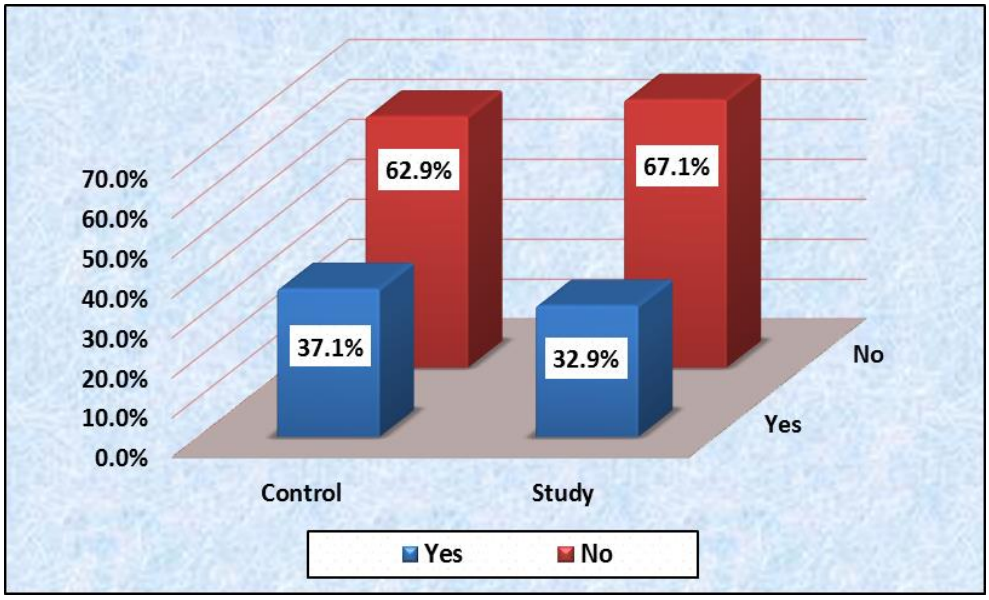

Figure (1): Distribution of the studied women in both groups in relation to family history of gestational diabetes (n=140).

Table (3): Distribution of the studied women in both groups according to obstetrical history (n=140)

Group / Obstetrical history	Control group (n=70)		Study group (n=70		X^2	P - value
	No.	%	No.	%		
Gestational age (weeks)						
- 26	18	25.7	15	21.4		
- 27	32	**45.7**	41	**58.6**	2.441	0.295
- 28	20	28.6	14	20.0		
Mean ± SD	**27.02 ± 0.74**		**26.98 ± 0.64**		**t =0.364**	**0.716**
Gravidity						
Primi gravida	22	31.4	27	38.6	0.785	0.376
Multi gravida	48	**68.6**	43	**61.4**		
Parity						
Non	22	31.4	27	38.6		
Primi parous	28	**40.0**	25	**35.7**	0.785	0.675
Multi parous	20	28.6	18	25.7		
Suffered from abortion before						
Yes	5	7.1	2	2.9	1.353	0.245
No	65	**92.9**	68	**97.1**		
Previous gestational diabetes	**(n=48)**		**(n=43)**			
Yes	10	20.8	7	16.3	0.310	0.578
No	38	79.2	36	83.7		

t=independent t test **No statistical significant difference (p > 0 .05)**

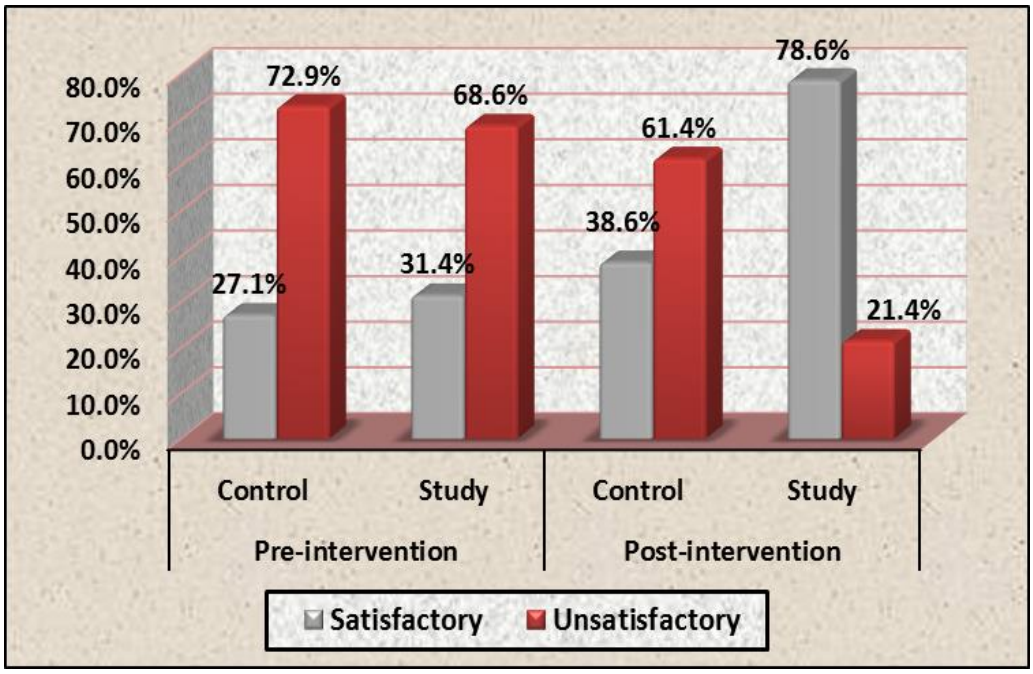

Figure (2): Distribution of the studied women in both groups according to total knowledge score regarding gestational diabetes at pre and post intervention phases of precede proceed model (n=140).

Table (4): Comparison of the mean scores of educational and ecological assessment phase structures of PRECEDE - PROCEED model of the studied women in both groups at pre and post intervention phases (n=140).

Items	Pre-intervention			Post-intervention		
	Control group n=70	Study group n=70	t test p-value	Control group n=70	Study group n=70	t test p-value
	Mean ± SD	Mean ± SD		Mean ± SD	Mean ± SD	
Predisposing factors (Driving Forces)						
Knowledge	14.64 ± 1.83	14.35 ± 1.71	0.953 0.342	**14.92 ± 1.89**	**17.85 ± 2.21**	-8.413- 0.000**
Attitude	21.38 ± 4.16	20.68 ± 4.07	1.00 0.316	**21.94 ± 3.81**	**28.62 ± 5.46**	-8.389- 0.000**
Enabling factors	10.00 ± 2.25	9.54 ± 2.59	1.111 0.268	**10.57 ± 2.18**	**13.88 ± 2.60**	-8.153- 0.000**
Reinforcing factors	8.44 ± 2.26	8.18 ± 2.32	0.662 0.509	**9.10 ± 2.18**	**11.92 ± 2.12**	-7.765- 0.000**

No statistical significant difference (p > 0 .05) **A high statistical significant difference (P ≤ 0.001)
t= independent t test

Table (5): Comparison of the mean scores of sexual function domain regarding gestational diabetes in both groups at pre and post intervention phases (n=140).

Dimensions	Maximum score	Control group	Study group	t test	P value
		Mean ±SD	Mean ±SD		
Total desire					
Pre-intervention Post-intervention	10	6.32±1.87 **6.64±2.00**	6.85±2.24 **10.77±2.07**	-1.510- -11.95-	0.133 ns 0.000**
Total arousal					
Pre-intervention Post-intervention	20	8.71±1.06 **9.02±1.17**	8.92±1.19 **12.25±1.07**	-1.120- -16.94-	0.265 ns 0.000**
Total lubrication					
Pre-intervention Post-intervention	20	8.57±1.79 **8.82±1.91**	8.77±1.37 **13.04±1.01**	-.741- -16.30-	0.460 ns 0.000**
Total orgasm					
Pre-intervention Post-intervention	15	6.81±1.54 **7.05±1.26**	6.92±1.45 **10.70±0.92**	-.450- -19.50-	0.653 ns 0.000**
Total satisfaction					
Pre-intervention Post-intervention	15	6.48±1.46 **6.91±1.49**	6.65±1.54 **10.32±1.49**	-.675- -13.81-	0.501 ns 0.000**
Total pain					
Pre-intervention Post-intervention	15	11.04±1.72 **10.64±1.71**	11.31±1.71 **8.51±1.04**	-.934- 8.84	0.352 ns 0.000**
Overall score					
Pre-intervention Post-intervention	95	**47.95±4.15** **52.75±9.89**	**49.45±5.71** **60.97±7.60**	-1.775- -4.837-	0.078 ns 0.000**

Ns No statistical significant difference (p > 0 .05) **A high statistical significant difference (P ≤ 0.001)
t= independent t test

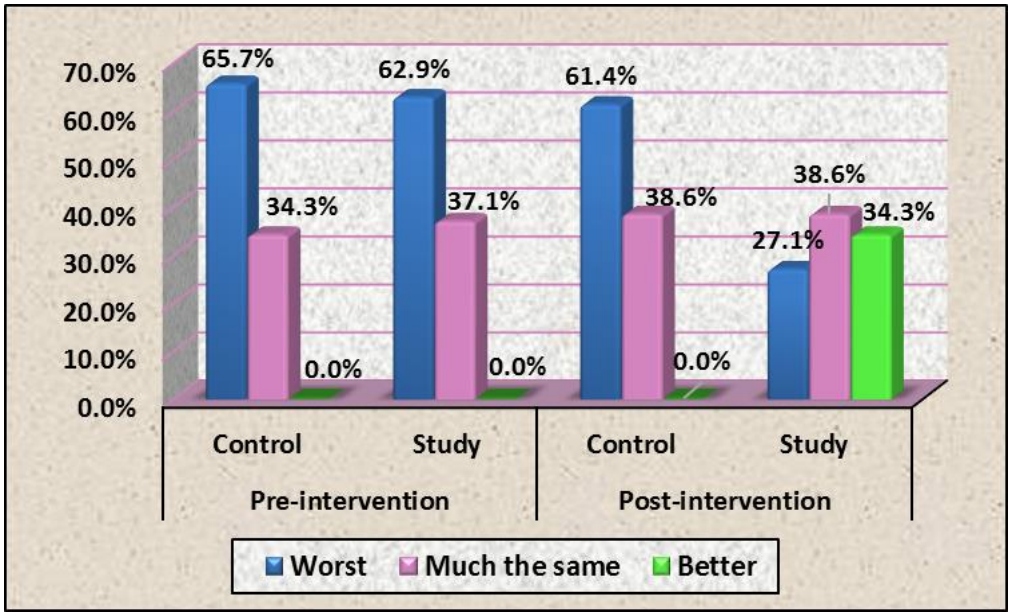

Figure (3): Distribution of studied women' total sexual function score at pre and post intervention phases (n=140).

Table (6): Comparison of the total mean scores of health promoting lifestyle behaviours regarding gestational diabetes in both groups at pre and post intervention phases (n=140).

Dimensions	Range of possible score	Control group	Study group	t test	P value
		Mean ±SD	Mean ±SD		
Total health responsibility					
Pre-intervention	8-24	12.25±4.51	11.97±4.42	0.37	0.70 ns
Post-intervention		15.40±3.78	18.72±7.34	3.37	0.000**
Total physical activity					
Pre-intervention	7-21	10.28±3.99	10.12±4.02	0.23	0.81 ns
Post-intervention		12.81±3.38	16.51±6.50	4.22	0.000**
Total nutrition					
Pre-intervention	11-33	15.87±6.10	15.70±6.16	0.16	0.86 ns
Post-intervention		20.40±5.31	26.05±10.27	4.09	0.000**
Total interpersonal relations					
Pre-intervention	7-21	9.80±3.42	9.84±3.41	0.07	0.94 ns
Post-intervention		12.77±3.32	16.47±6.47	4.25	0.000**
Total stress management					
Pre-intervention	8-24	11.10±4.11	10.97±4.02	0.18	0.85 ns
Post-intervention		14.30±4.57	18.94±7.46	4.43	0.000**
Overall score					
Pre-intervention	41-123	**59.31±21.81**	**58.61±21.88**	0.19	0.85 ns
Post-intervention		**75.44±19.59**	**96.71±38.02**	4.16	0.000**

Ns No statistical significant difference (p > 0 .05) ****A high statistical significant difference (P ≤ 0.001)**
t= independent t test

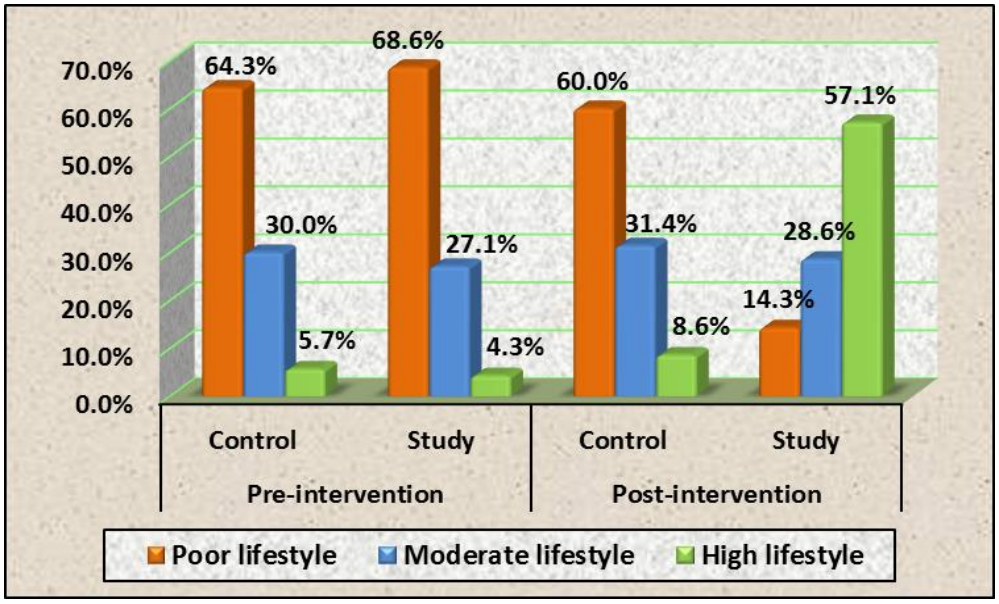

Figure (4): Distribution of studied women' total lifestyle behaviours score at pre and post intervention phases (n=140).

Table (7): Correlation between total health-promoting lifestyle score and educational and ecological assessment phase structures of PRECEDE – PROCEED model of both groups at pre and post intervention phases (n=140).

Variables	Total health-promoting lifestyle score							
	Control group n=70				Study group n=70			
	Pre-intervention		Post-intervention		Pre-intervention		Post-intervention	
	r	P-value	R	P-value	r	P-value	r	P-value
Predisposing factors								
Total knowledge score	0.583	0.000**	0.539	0.000**	0.499	0.000**	0.548	0.000**
Total attitude score	0.487	0.000**	0.467	0.000**	0.541	0.000**	0.651	0.000**
Enabling factors	0.556	0.000**	0.621	0.000**	0.574	0.000**	0.632	0.000**
Reinforcing factors	0.422	0.000**	0.453	0.000**	0.494	0.000**	0.593	0.000**

****A high statistical significant difference (P ≤ 0.001).**

Table (8): Correlation between total sexual function score and educational and ecological assessment phase structures of PRECEDE – PROCEED model of both groups at pre and post intervention phases (n=140).

Variables	Total sexual function score							
	Control group n=70				Study group n=70			
	Pre-intervention		Post-intervention		Pre-intervention		Post-intervention	
	r	P-value	R	P-value	r	P-value	r	P-value
Predisposing factors								
Total knowledge score	0.515	0.000**	0.541	0.000**	0.477	0.000**	0.528	0.000**
Total attitude score	0.421	0.000**	0.411	0.000**	0.536	0.000**	0.611	0.000**
Enabling factors	0.532	0.000**	0.501	0.000**	0.480	0.000**	0.497	0.000**
Reinforcing factors	0.465	0.000**	0.492	0.000**	0.429	0.000**	0.507	0.000**

****A high statistical significant difference (P ≤ 0.001).**

Discussion:

Gestational diabetes mellitus is a type of glucose intolerance that develops during pregnancy and normally goes away after the baby is born. It is diagnosed during pregnancy that does not type 1 or 2 diabetes. It is diagnosed in the second or third trimester. It is a common medical complication in pregnancy that has been rapidly increasing worldwide **(American Diabetes Association, 2020)**

The current study aimed to evaluate the effect of an educational program based on PRECEDE- PROCEED model on sexual function and health behaviors among women with gestational diabetes. This aim was significantly achieved through a quais-experimental design the findings of current study will be discussed under the following sections.

Regarding General characteristics of studied sample, the result of the present study revealed that there was no statistically significant difference between the control and study group regarding demographic data. Also, the results revealed that more than one third of both control group & study group aged ≥ 30 year with Mean ± SD 27.68 ± 6.51 for control group and 27.98± 7.13 for study group, Furthermore, more than half of control group & more than two thirds of study group lived in rural area, Moreover, more than half of control group & more than one third of study group had secondary education. Regarding occupation, less than two thirds of control group & less than three quarters of study group were not employee.

These results are in accordance with a study of the prevalence and risk factors for gestational diabetes according to diabetes in the pregnancy study group in India in comparison to the international association of diabetes and pregnancy study group in El Minya, Egypt by **El Sagheer & Hamdi (2018)** and found that more than half of women aged from 18 years to 42 years with mean age (26.5. ±5.5). From the researchers' point of view, this age group represents the most prevalent reproductive age group and reflects the fact that women were likely to be in middle age groups and this may be one of

the knowledge deficit and resource deficiency in rural area than in urban area.

The result of current study disagreed with **El-Ansary and Fouad (2020)** who studied effect of educational sessions on knowledge, attitude and self -care practices among pregnant women with gestational diabetes and in Egypt illustrated that most of pregnant women whose age ranged between 20> 30 years with a mean ± SD of 23.14 ± 4.68, less than one third of them had primary education. Meanwhile, it is pointed out that more than two thirds of pregnant women were not working, less than two thirds of pregnant women lived in rural areas and more than one third of them were from urban areas.

Concerning the studied women in both groups in relation to family history of gestational diabetes, the current study reported that less than two thirds of control group and more than two thirds of study group had no family history of gestational diabetes. On the other hand, more than one third of control group and less than one third of study group had family history of gestational diabetes.

These findings are congruent with **Mahmoud et al., 2024**, who achieved a study to explore the effect of instructional package on knowledge and attitudes among gestational diabetic women in Egypt. The results showed that the majority of studied sample hadn't family history of diabetes mellitus.

Meanwhile, this result congruent to **Tora and Vahitha, (2021)** who studied effect of structured teaching program on knowledge regarding self-care management of gestational diabetes mellitus among gestational diabetic women" in India found that nearly two thirds of mothers had family history of diabetes and nearly one third had no such history.

On the contrast, these results are in disagreement with, **Mohamed et al., (2021)** who carried out a study to evaluate effect of educational program about gestational diabetes mellitus on knowledge and reported practice among women at Assiut city in Egypt and found that most of the studied pregnant women had history of gestational diabetes.

Referring to the studied women in both groups according to obstetrical history, the actual study revealed that less than half of control group and more than half of study group had gestational age of 27 week. Furthermore, two thirds of both control group and study group were multigravida. Moreover, more than one third of the control group and study group were primi-parous. Increasingly the majority of control group and study groups didn't have abortions before. Also, more than three quarters of control group and most of study group hadn't gestational diabetes before. From the researchers' point of view this reflect that gestational diabetes is more common in women whose gestational age more than 27 weeks and in multigravida women.

In this respect, this result partially agreed with **El-Ansary and Fouad, (2020)** who reported that more than three quarters of the pregnant women were multigravida, and more than two thirds were multipara. Among pregnant women, less than one quarter had personal history of gestational diabetes. Women disagree with the average gestational age of the current pregnancy was 31.9 ±3.5. This result may be due to early detection of gestational diabetes during antenatal care and periodic examination.

The present finding are supported by **Khalil et al., (2017)** who carried out a study to apply screening for gestational diabetes among pregnant women attending a rural family health center-Menoufia governorate-Egypt, showed that less than two-fifths of the

pregnant women were multigravida and more than half of them were multipara.

Lack of women's knowledge about gestational diabetes causes inadequate understanding of the medical information, which in turn leads to limited adherence to dietary and lifestyle changes and exposes both woman and fetus to more serious complications **(El-Ansary and Fouad, 2020).**

Concerning the studied women's knowledge regarding gestational diabetes at pre and post intervention phases, present study shows that there was no statistically significant difference between the study and control group regarding knowledge about gestational diabetes at pre intervention phase whenever, there was a highly statistically significant difference between the study and control group at post intervention phase.

This significant improvement is very valuable, because acquisition of accurate knowledge is considered the basis for and linked to positive attitude and better self-care practice but the women need follow up for some time to change behaviors and make correct decisions. These result may be due to implementing intervention based on PRECEDE model being effective in improving knowledge regarding gestational diabetes.

This result is in line with **Ugwu and Ene, (2020)** who studied effect of diabetes education program on gestational diabetes mellitus knowledge among diabetic pregnant women clarified that more than three quarters of control group and more than one quarter of study group had unsatisfactory knowledge regarding gestational diabetes at pre- diabetes education program.

Meanwhile, more than one third of control group and more than three quarters of study group had satisfactory knowledge regarding gestational diabetes at post-diabetes education program. Similar finding was reported in a quasi-experimental study by **Mohamed and Ahmed (2019**) to assess the effect of educational program on maternal and fetal outcomes for 50 pregnant women with gestational diabetes at Assiut city, Upper Egypt. They reported a statistical significant difference between knowledge score pre and post the educational program.

These findings were congruent with the study of **Said and Aly (2019)** that was conducted in Benha, Egypt on 70 gestational diabetic women to investigate the effect of educational package regarding lifestyle and clarified that there was a highly statistically significant difference regarding knowledge before and four weeks after the educational intervention, less than one third of study group had satisfactory knowledge regarding gestational diabetes at pre-intervention phase. Meanwhile, more than three quarters of them had satisfactory knowledge regarding gestational diabetes at post-intervention phase.

Also, **Saboula, et al., (2018)** who assessed the impact of nursing intervention on knowledge, attitude and self-care activities among gestational diabetic women in Shebin Elkom, Egypt. They concluded a significant increase in the total knowledge score of gestational diabetic women post-intervention

Concerning mean gestational age among the studied pregnant women was 26.34 ± 3.56. This explained the similarity in characteristics of studied sample. In relation to comparison of the mean scores of educational and ecological assessment phase structures of PRECEDE - PROCEED model of the studied women in both groups at pre and post intervention phases, the present study illustrated that there was no statistically significant difference between Mean ± SD of both study and control groups regarding (knowledge, attitude, enabling factors and reinforcing factors) at pre-intervention.

Whenever, there was a highly statistically significant difference between Mean ± SD of both study and control group at post intervention phase.

This reflect the good effect of introducing the intervention based on PRECEDE model. Similarly, **Asker et al., (2021)** who studied effect of educational intervention based on PRECEDE Model on preventive behaviors among high-risk individuals for diabetes type 2 in Egypt found that the mean knowledge, enabling, and reinforcing factors scores regarding diabetes were decreased pre-educational intervention implementation. While there was an increase in the mean scores of knowledge, enabling and reinforcing factors score with statistical significance immediately and after three months of nursing intervention implementation.

Also, the results are supported by **Moshki et al., (2017)** who conducted a study titled with "Effect of Precede–Proceed Model on Preventive Behaviors for Type 2 Diabetes Mellitus in High-Risk Individuals" and reported that PROCEED model was very effective in improving and promoting knowledge, attitude and reinforcing factors for type 2 DM among high-risk patients.

Recent evidence indicates that diabetic women are at higher risk for developing sexual dysfunction compared to those without diabetes. Sexual dysfunction is a problem which affects overall quality of diabetic women lives **(Ozcan and Kirca, 2018).**

For comparison of the mean scores of sexual function domain regarding gestational diabetes in both groups at pre and post intervention phases, the current study demonstrated that there was no statistically significant difference in the mean score of the overall sexual function and its dimensions between the both study and control groups in the pre-intervention phase. However, post intervention, the mean difference score for overall and dimensions of sexual function in the study group was higher than the control group scores.

Regarding the studied women' total sexual function score at pre and post intervention phases, the current study illustrated that less than two thirds of control group and study group had worst sexual function at pre-intervention phase. Whenever, less than two thirds of control group and more than one quarter of the study group had worst sexual function at post intervention phase. From the researchers point of view this reflect the importance of educational program based on PRECEDE- PROCEEDE model to improve sexual health. Also, the sources of information for the study group from health care providers guideline and health care providers play an important role in improving women's awareness regarding sexual health.

In the same direction, **Abdelkhaliek et al., (2024)** who carried out a study to explore effect of counseling model on diabetic women regarding sexual dysfunction in Egypt represented that there was a statistically significant improvement in sexual function among the studied women post-counseling model compared to decrease in their sexual function pre- counseling model.

Also, these findings are in the same context with **Fayyazian et al., (2021)** who applied a study about the effect of a sexual health promotion training program on sexual function of pregnant women with gestational diabetes mellitus in Zahedan and revealed that a statistically significant difference between the intervention and control groups in all subscales of sexual function. Moreover, the results of ANCOVA for the total sexual function score showed that the women in the

intervention group had significantly higher levels of sexual function (22.89 ± 3.24) compared to the women in the control group (16.78± 3.16) (P = 0.001).

In the same direction, **Abd-elatief et al., (2019)** a study to evaluate effect of counseling model on sexual dysfunction among women with diabetes and their sexual quality of life in Egypt reported that there were statistically significant differences regarding to the female sexual function index total mean scores and regarding to female sexual quality of life total scores between pre and post six months of education.

Concerning the studied women' total lifestyle behaviors score at pre and post intervention phases, the present study revealed that the minority of control group and study group had high lifestyle behaviors regarding gestational diabetes at pre-intervention phase. Whilst, the minority of control group and more than half of study group had high lifestyle behaviors regarding gestational diabetes at post-intervention phase. This finding agreed with **Zakaria et al., (2023)** at a study about the role of lifestyle interventions in the prevention and treatment of gestational diabetes mellitus which discussed that most of the studied subjects reported healthy lifestyle post intervention compared to the minority of them pre-interventions.

Similar to previous result of our study, **Mohsenzadeh-Ledari et al., (2022)** at a study to evaluate the effect of caring intervention (physical activity, diet and counseling) on gestational diabetes for pregnant women with metabolic syndrome in United Arab Emirates and reported there was no significant difference in total lifestyle regarding GD between the intervention and control group pre-interventions while more than two thirds of intervention group had good lifestyle behaviors regarding gestational diabetes at post-intervention phase compared to control group.

For correlation between total health-promoting lifestyle score and educational and ecological assessment phase structures of PRECEDE – PROCEED model of both groups at pre and post intervention phases, the current results demonstrated that there was a highly statistically significant correlation between Total health-promoting lifestyle score and predisposing factors (total knowledge, attitude, enabling factors and reinforcing factors).

These results may be due to enhancing awareness about factors that predispose to GD, leading to maintain the healthy preventive behavior to avoid complications and maintain healthy pregnancy. These results were consistent with **Zandinava, et al, (2019)** who studied the effect of educational packages on self-care Behavior, quality of life, and blood glucose levels in pregnant women with gestational diabetes found that, there was a statistically significant relationship between knowledge, enabling factors, and reinforcing factors scores and gestational diabetes and life style behavior practices scores of the pregnant women throughout the intervention phases group.

Also, these results are similar to **Barasheh, et al, (2018)** who studied the effect of an education program on improving self-care management behaviors in diabetic patients, in Iran found that there was a statistically significant relationship between enabling factors, reinforcing factors scores, knowledge and gestational diabetes lifestyle of the pregnant women throughout the intervention phases.

Concerning correlation between total sexual function score and educational and ecological assessment phase structures of PRECEDE – PROCEED model of both

groups at pre and post intervention phases, our study showed that there was a highly statistically significant positive correlation between total sexual function score and predisposing factors (total knowledge, attitude, enabling factors and reinforcing factors) among both study and control groups at pre and post intervention phase.

This result may be due to the effect of educational program based on PRECEDE – PROCEED model to improve total knowledge and attitude for women with GDM to reduce risk of complication for women and the newborn.

On the same line, **Nejhaddadgar et al., (2019)** clarified that was a highly positive correlation between total sexual function score and predisposing factors (total knowledge, attitude and factors) among the studied sample pre-post intervention. Also, in this respect, **Azar et al., (2018)** in a study about effect of educational intervention based on PRECEDE-PROCEED model combined with self-management theory on self-care behaviors in type 2 diabetic patients revealed that there was positive correlation between total sexual function and self-behaviors.

Conclusion

Based on the finding of the current study, it was concluded that study hypotheses were supported and the application of PRECEED-PROCEED model was effective in the improvement of knowledge, attitude and health behaviors among pregnant women with gestational diabetes with a highly statistically significant difference between pre and post intervention ($p \leq 0.001$).

Recommendations

- Development of training program for maternity nurses and evidence-based interventions to provide a better view of the women health promotion strategies related to gestational diabetes.
- Provide outpatient clinics as well as maternal and child health centers with Arabic booklets and posters of health behaviors modification regarding gestational diabetes.
- Application of the educational program based on precede- proceed model regarding gestational diabetes in the routine care in antennal care clinics and continuously implemented to increase women's knowledge and improve their attitude about gestational diabetes as well as health behaviors and sexual health.
- Assessment of risk factors of gestational diabetes should be included in routine care that is provided at the outpatient clinics and maternal and child health centers.
- Applying educational program and counseling tips in gestational diabetic women discharge teaching plan to maintain healthy lifestyle and maximum glycemic control prior to a future conception.

Further research:

- Investigate the impact of gestational diabetes educational program on women's quality of life.
- Training courses and workshops about gestational diabetic care and management for health care providers at antenatal clinics should be conducted at regular intervals.

References:

Abd-elatief, A. T., Mohasib, S. H., & Mohamed, H. A. E. (2019). Effect of counseling model on sexual dysfunction among women with diabetes and their sexual quality of life. Minia Scientific Nursing Journal, 6(1), 118-127.

Abdelkhaliek, N. A. A., Ramadan, S. A., Ibrahim, S. S., Mohamed, M. R. A., & Elshabory, N. E. M. (2024). Effect of counseling model on diabetic women regarding sexual dysfunction: a quasi-experimental study. BMC Public Health, 24(1), 1161.

Abo-Ali E, Oka A. (2021). health-promoting lifestyle behaviors among women in Tanta, Egypt: an analytic cross-sectional study. Egypt Family Medical journal, 5:125–40. doi: 10.21608/efmj.2021.34033.1037.

Abouzid M., Karim A., Ibrahim E., and Elshafe S., (2023). An Overview of Diabetes Mellitus in Egypt and the Significance of Integrating Preventive Cardiology in Diabetes Management. The Egyptian Journal of Hospital Medicine. 14 (7). doi: 10.7759/cureus.27066

American Diabetes Association. (2020). Classification and diagnosis of diabetes: standards of medical care in diabetes—2020. Diabetes care, 43(Supplement_1), S14-S31.

Anis T., Gheit A., Saied S., & Al_kherbash S. , (2011). Arabic translation of Female Sexual Function Index and validation in an Egyptian population. The journal of sexual medicine, 8(12), 3370-3378.

Asker, R., Mostafa, M., & Yassen, M. (2021). Effect of educational intervention based on PRECEDE Model on preventive behaviors among high-risk individuals for diabetes type 2. Egyptian Journal of Health Care, 12(1), 1217-1229.

Azar, F. E., Solhi, M., Darabi, F., Rohban, A., Abolfathi, M., & Nejhaddadgar, N. (2018). Effect of educational intervention based on PRECEDE-PROCEED model combined with self-management theory on self-care behaviors in type 2 diabetic patients. Diabetes & Metabolic Syndrome: Clinical Research & Reviews, 12(6), 1075-1078.

Barasheh.N., Ghodratollah S., Sedigheh N. , Mohammad H., H., (2018). The effect of educational program based on the precede-proceed model on improving self-care behaviors in a semi-urban population with type 2 diabetes referred to health centers of Bavi, Iran. Elsevier. Diabetes and metabolic syndrome. 11(2). Pages S759-S765.

Bomfim V., Bellotto P., Krebs V., Marques G., and Silva, L., (2024). The role of nurses in care for pregnant with diabetes mellitus. Research, Society and Development. v. 11, (5), p. e20511528105, 2022. DOI: 10.33448/rsd-v11i5.28105. Disponível em: https://rsdjournal.org /index.php/rsd/article/view/28105. Acesso em: 6 jul. 2024.

Buckner, E. B. (2020). The Roy Adaptation Model as Theoretical Underpinning for DNP Education. Samford University, 1(2), 5-27. http://hdl.handle.net/10755/19349.

Callis, A. M. B. (2020). Application of the Roy Adaptation Theory to a care program for nurses. Applied Nursing Research, 56 (18), 1-6.

Canann S., Özgür E., Asıf Y., and Abdulkadir T., (2024). The effect of gestational diabetes mellitus on sexual function, anxiety, depression and quality of life in pregnant women. The natural liberary of medicine. 55(2): 94–101

Claire E., Katherine A., Andreeva R., and Daniel R., (2023). Prevalence of gestational diabetes in the United States and Canada: a systematic review and meta-analysis. BMC Pregnancy and Childbirth . 24 (204)

Derosa G., and Romano D., (2024). Female Sexual Dysfunction in Subjects with Type 2 Diabetes Mellitus.Springer Link sexuality and Disability. 41 (1) p 221–233

Dewi, R. S., Isfandiari, M. A., Martini, S., and Yi-Li, C. (2023). Prevalence and risk factors of gestational diabetes mellitus in Asia: a review. Journal of Public Health in Africa, 14(S2), Article 2583. https://doi.org/10.4081/jphia.2023.2583

Eberle, C., and Stichling, S. (2022). Environmental health influences in pregnancy and risk of gestational diabetes

mellitus: a systematic review. BMC Public Health, 22(1), 1-11.

El Sagheer, G. M., & Hamdi, L. (2018). Prevalence and risk factors for gestational diabetes mellitus according to the Diabetes in Pregnancy Study Group India in comparison to Internationa Association of the Diabetes and Pregnancy Study Groups in El-Minya, Egypt. The Egyptian Journal of Internal Medicine, 30, 131-139.

El-Ansary, E. S., & Fouad, S. (2020). Effect of educational sessions on knowledge, attitude and self-care practices among pregnant women with gestational diabetes. Egyptian Journal of Health Care, 11(3), 275-291.

Fayyazian, E., Khojasteh, F., Saeedinezhad, F., & Haghighi, M. (2021). The effect of a sexual health promotion training program on sexual function of pregnant women with gestational diabetes mellitus. Medical-Surgical Nursing Journal, 10(1).

Ghaffari, M., Rakhshanderou, S., Asadpour, M., Nasirzadeh, M., and Mazar, L. (2021). Design, implementation, and evaluation of a PRECEDE-PROCEED model-based intervention for oral and dental health among primary school students of Rafsanjan city: a mixed method study. BMC public health, 21(1), 1-10.

Khalil, N. A., Fathy, W. M., & Mahmoud, N. S. (2017). Screening for gestational diabetes among pregnant women attending a rural family health center-Menoufia governorate-Egypt. J Fam Med Health Care, 3(1), 6-11.

Khani A., Ali S., and Pooyan A., (2023). Effect of educational intervention based on PRECEDE model on lifestyle modification, self-management behaviors, and hypertension in diabetic patients. Springer calcified tissue international journal. 23 (6). 22.

Mahmoud, L., Hasneen, S., El-Bana, H., & Araby, A. E. W. A. (2024). Effect of instructional package on knowledge and attitudes among gestational diabetic women. Journal of Nursing Science Benha University, 5(2), 74-92.

Mohamed, N. F., Mahamoud, G. A., Abd Elsalam, T. A. E. R., & Kamis, M. A. (2021). Effect of educational program about gestational diabetes mellitus on knowledge and reported practice among women at Assiut city. Assiut Scientific Nursing Journal, 9(26.), 160-171.

Mohamed, S. H., & Ahmed, A. A. (2019). Educational program for health literacy among pregnant women with gestational diabetes: Its effect on Maternal & fetal outcomes. International Journal of Nursing Didactics, 9(04), 61-72.

Mohsenzadeh-Ledari, F., Taghizadeh, Z., Keramat, A., Moosazadeh, M., Yazdani, S., Najafi, A., & Motaghi, Z. (2022). The effect of caring intervention (physical activity, diet and counseling) on gestational diabetes for pregnant women with metabolic syndrome. The Journal of Maternal-Fetal & Neonatal Medicine, 35(21), 4168-4174.

Moshki, A., Dehnoalian, A., & Alami, N. (2017). Effect of Precede–Proceed Model on preventive behaviors for type 2 diabetes mellitus in high-risk individuals, clinical Nursing.

Nejhaddadgar, N., Darabi, F., Rohban, A., & Solhi, M. (2019). The effectiveness of self-management program for people with type 2 diabetes mellitus based on PRECEDE-PROCEDE model. Diabetes & Metabolic Syndrome: Clinical Research & Reviews, 13(1), 440-443.

Ozcan, S., & Kirca, N. (2018). Comparison of women with gestational diabetes and healthy pregnant women in terms of quality

of sex and sexual dysfunction. International Journal of Caring Sciences, 11(2), 1176.

Quintanilla. R. and Mahdy H. (2023). Gestational Diabetes. In: StatPearls . Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK545196/

Rosen, C., Brown, J., Heiman, S., Lieblum, C., Meston, R. and Shabsigh,D., (2000). The female sexual function index(FSFI) Multidimensional self-report instrument for assessment of femal sexual function, Journal of sex & Marital therapy. 26: 2, 191- 208 Doi 10.10801009262300278597

Saboula, N. E., Ahmed, N. A., & Rashad, R. H. (2018). Effect of nursing intervention on knowledge, attitude and self-care activities among gestational diabetic women. International Journal of Novel Research in Healthcare and Nursing, 5(2), 135-146.

Said. A., R., and Aly. F.A., (2019). Effect of the Educational Package Based on Health Belief Model regarding Lifestyle among Women with Gestational Diabetes Mellitus. Journal of Nursing and Health Sciences. 5 (1).

Stan, D., Mazilu, D. C., Zazu, M., Nedelcu, V., Teodor, M., Brătilă, E., and Klugarová, J. (2023). Antenatal and intrapartum care for women with gestational diabetes: a best practice implementation project. JBI Evidence Implementation, 21(S1), S38-S46.

Suzanne P., Donald C., Aaron B., Kristin C., and Todd H., (2023). Protocol for a randomized controlled trial of pre-pregnancy lifestyle intervention to reduce recurrence of gestational diabetes. The natural liberary of medicine. 22 (256).

Tora S. and Vahitha S. (2021). Effect of structured teaching program on knowledge regarding self-care management of gestational diabetes mellitus among gestational diabetic women. Journal of Nursing and Health Science.

Ugwu, U. C., & Ene, O. C. (2020). Effect of diabetes education program on gestational diabetes mellitus knowledge among diabetic pregnant women: An Experimental Study.

Vaishnavi S. N., and Sangita D. J., (2024). A Comprehensive Review of Gestational Diabetes Mellitus: Impacts on Maternal Health, Fetal Development, Childhood Outcomes, and Long-Term Treatment Strategies**.** Cureus. 15(10): e47500. doi: 10.7759/cureus.47500

Walker S. Sechrist K. Pender J. (1987). The Health-Promoting Lifestyle Profile: development and psychometric characteristics. Nurs Res. 36:76–81. doi: 10.1097/00006199-198703000-00002

Zakaria, H., Abusanana, S., Mussa, B. M., Al Dhaheri, A. S., Stojanovska, L., Mohamad, M. N. & Cheikh Ismail, L. (2023). The role of lifestyle interventions in the prevention and treatment of gestational diabetes mellitus. Medicina, 59(2), 287.

Zandinava H., Sehhatti S. F., Mohammed. A. C., Ghanbari H. S., (2019). Effect of Educational Package on Self-care Behavior, Quality of Life, and Blood Glucose Levels in PregnantWomen with Gestational Diabetes: A Randomized Controlled Trial. Iranian Red Crescent Medical Journal . 19(4) ISSN: 2588-4824

تأثيربرنامج تعليمي قائم علي نموذج بريسيد بروسيد علي الوظيفة الجنسية و السلوكيات الصحية بين السيدات المصابات بسكري الحمل

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سكري الحمل هو اضطراب يتطور أثناء الحمل. يُعدّ الخلل الجنسي من أهمّ المشاكل المرتبطة به. تلعب تعديلات السلوكيات الصحية دورًا هامًا في إدارة سكري الحمل. لذا هدفت الدراسة إلى تقييم تأثير برنامج تعليمي مبني على نموذج برسيد بروسيد على الوظيفة الجنسية والسلوكيات الصحية لدى النساء المصابات بسكري الحمل. التصميم: تصمي شبة تجريبي. و تم إجراء هذه الدراسة في العيادة الخارجية لأمراض النساء والتوليد بمستشفى جامعة بنها على عينة هادفة من ١٤٠ سيدة حامل ممن استوفين معاييرالاشتمال. وقد أشارت النتائج إلى عدم وجود فروق ذات دلالة إحصائية في متوسط درجات المعرفة، والمواقف، والعوامل المُمَكِّنة، والعوامل المُعزِّزة، والوظيفة الجنسية، والسلوكيات الصحية بين المجموعتين في مرحلة ما قبل التدخل. ومع ذلك، لوحظ وجود فروق ذات دلالة إحصائية في مرحلة ما بعد التدخل ($p<0.001$). علاوة على ذلك، وُجد ارتباط إيجابي ذو دلالة إحصائية عالية بين إجمالي درجة الوظيفة الجنسية، بالإضافة إلى إجمالي نمط الحياة المُعزّز للصحة، و(إجمالي المعرفة، والمواقف، والعوامل المُمَكِّنة، والعوامل المُعزِّزة) بين كلٍّ من مجموعتي الدراسة والضابطة في مرحلتي ما قبل التدخل وما بعده ($p<0.001$**). كما كان لاستخدام نموذج برسيد بروسيد تأثير كبير في تحسين الوظيفة الجنسية والسلوكيات الصحية لدى النساء المصابات بسكري الحمل نتيجة لزيادة وعيهن. واوصت الدراسة بتطبيق برامج تعليمية مستمرة تعتمد على نموذج برسيد بروسيد للنساء المصابات بسكري الحمل لزيادة الوعي بسكري الحمل والمشكلة الجنسية.