

Effect of Instructional Package on Knowledge and Attitudes among Gestational Diabetic Women

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Abstract

Background: Gestational diabetes defined as abnormal glucose metabolism with the first recognition during pregnancy and usually resolves after the birth. **Aim of the study** to evaluate the effect of instructional package on knowledge and attitudes among gestational diabetic women. **Research design:** A quasi-experimental study design (one group) was used to fulfill the aim of study. **Research setting:** This study was conducted at obstetrics and gynecological outpatient clinic and Obstetrics and Gynecological department in Benha University hospital. **Study subjects:** A purposive sample of 64 pregnant women medically diagnosed with gestational diabetes. **Tools of data collection:** Three tools were used for data collection: **Tool (I):** A structured interviewing questionnaire sheet, **Tool (II):** Maternal knowledge questionnaire and **Tool (III):** Modified likert scale to assess women's attitudes regarding gestational diabetes. **Results:** There was a highly statistical significant difference between the result of the post intervention and follow up phases compared with pre intervention about knowledge and attitudes regarding gestational diabetes. **Conclusion:** There was a marked improvement in pregnant women' total knowledge and attitudes regarding gestational diabetes after implementation of the instructional package. **Recommendations:** Development of a training program and evidence based interventions to provide a better view of the women health promotion strategies related to gestational diabetes.

Keywords: Attitudes, Gestational diabetes, Instructional package, Knowledge.

Introduction:

Gestational diabetes is a global disorder and one of the most common complications during pregnancy. Pregnant women with diabetes can be categorized as follows: women who have been diagnosed with diabetes before pregnancy and women with GDM disease occurs and diagnosed for the first-time during pregnancy (**Abdelmonem et al., 2022**). Also, GDM can be defined as carbohydrate intolerance of varying severity first recognized during pregnancy. This definition can include women with previously undiagnosed diabetes as well as who become transiently hyperglycemic as a result of

pregnancy-induced insulin resistance (**Osman et al., 2022**).

Gestational diabetes mellitus may be caused by the action of pregnancy hormones, the placenta excretes hormones which help the baby to grow and develop. Some of these hormones block the action of the mother's insulin which is called insulin resistance. This prevents cells to take glucose properly and causes glucose to remain in blood and continues to rise (**Abdel-Moaty et al., 2023**). There are several risk factors enhances the development of GDM as increased body weight, multipara, advanced maternal age (over 30 years) and infertility treatment.

Other risk factors include family history of gestational diabetes in a first degree relative a prior macrosomic baby (<4.5 kg), unexplained fetal/perinatal loss and repeated miscarriage (**Mahmoodi et al., 2020**).

Gestational diabetes leads to maternal and fetal complications. Maternal complications occur as preeclampsia, polyhydramnios, preterm labor, infection, cesarean section and fetal demise. Fetal and neonatal complications occur as shoulder dystocia, fetal malformation, macrosomia, hypoglycemia, respiratory distress syndrome and perinatal mortality. Furthermore, in later life, other complications may develop and affect both women and their infants as obesity, type 2 diabetes mellitus and heart diseases (**Mohamady et al., 2022**).

Concerning diagnosis, GDM is symptomatic although women may notice increased thirst, urinary frequency, hunger or fatigue especially during the late second or third trimester of pregnancy (**Hailu et al., 2019**). Therefore, all pregnant women regardless of risk factors should be screened for GD toward the end of the second trimester (**Shabibi et al., 2019**). Women with risk factors for GDM should be screened earlier in pregnancy. Typically, screening is based on (Two-Step approach) including Glucose Challenge Test (GCT) then blood glucose level of 130 to 140 mg/dl is considered as cut off point for a subsequent Oral Glucose Tolerance Test (OGTT) So undiagnosed or inadequately managed GDM can lead to range of adverse pregnancy outcomes (**Mahmoodi et al., 2020**)

Gestational diabetes mellitus is treated with pharmacological therapy, medical nutritional therapy, glycemic monitoring, fetal monitoring by ultrasound and planning on delivery. Pharmacological therapy includes medications such as insulin, metformin and glyburide. Insulin is the first-line agent recommended for treatment of GD and has

been demonstrated to improve perinatal outcomes. Insulin is the preferred medication for treating hyperglycemia in gestational diabetes mellitus (**Tarry et al., 2019**).

The maternity nurse's key role during antenatal period is preventing and reducing complications as much as possible by teaching about regular exercise, diet regimen and treatment during their pregnancy period. Also, counseling before and during pregnancy along with effective management are crucial for enhancing the awareness and good perinatal outcomes (**El-Ansary&Fouad, 2020**). Moreover, nurses play a significant role in increasing women's knowledge and awareness about GDM that will be translated to improve health-related measures which ultimately will contribute to complications reduction (**El-Nagar et al., 2019**)

Significance of the study:

In Egypt, the rate of gestational diabetes among pregnant women is between 2-14% of all pregnancies and occurs during that period due to the resistance of hormones produced by the placenta to the work of insulin. The prevalence of GD increases from 8% to 26% in women aged 30 years or more. According to the most recent **International Diabetes Federation (IDF)** estimates, there are nearly about 204 million women worldwide had GDM and is expected to increase to 308 million by 2045. The rate of diabetes in Egypt has significantly increased exceeding international rates. The **International Diabetes Federation (IDF)** listed Egypt among the world top 10 countries in the number of patients with diabetes (**Eltoony et al., 2021**). In Egypt, there is lack of knowledge about GDM effect, management as well as nursing care measures to reduce complications. Also, there is an imperative need for the development of health resources to teach, motivate and empower women to self-manage and control their GDM

Effect of Instructional Package on Knowledge and Attitudes among Gestational Diabetic Women

(Byakwaga et al., 2021). So this study was conducted to evaluate the effect of instructional package on knowledge and attitudes among gestational diabetic women.

Aim of the Study:

The study aimed to evaluate the effect of instructional package on knowledge and attitudes among gestational diabetic women.

Study Hypotheses:

H1: Implementation of instructional package would improve knowledge of the pregnant women regarding gestational diabetes

H2: Implementation of instructional package would improve attitudes of the pregnant women regarding gestational diabetes.

Subjects & Method:

Research design: A quasi-experimental study design (one group: time series quasi experimental design) was used to fulfill the aim of study.

Setting: This study was conducted at obstetrics and gynecological outpatient clinic and Obstetrics and Gynecological department in Benha University hospital.

Sample type: A Purposive sample was used to achieve the aim of the study.

Sample size: All pregnant women diagnosed with gestational diabetes and attained to the pre-mentioned setting for 9 months (64 women) according to following inclusion criteria:

- Pregnant women medically diagnosed with gestational diabetes.
- Gestational age during the second and third trimester of pregnancy between 24-28 weeks

Tools of data collection:

Three tools were used in this study:

Tool (I): A structured interviewing questionnaire: This tool was constructed by the researcher in Arabic language based on reviewing the related literatures It comprised two main parts: **Part 1: Socio demographic characteristics** of the pregnant women

consisted of closed ended questions (4 items) such as (age, residence, level of education and occupation). **Part 2: Obstetric history:** consisted of closed and open ended questions (5 items) such as (gestational age, gravidity, parity, previous history of gestational diabetes and family history of gestational diabetes).

Tool II: Maternal knowledge questionnaire: This tool was constructed by the researcher in Arabic language based on reviewing the related literature (El-Ansary & Fouad, 2020) and (Eigenmann et al., 2011) to assess knowledge of pregnant women related to gestational diabetes mellitus. It consisted of 15 questions.

Scoring system:

All knowledge variables were weight according to items included in each question. The answer of the questions was classified into two categories. The answer had score (2) for correct answer and score (1) for incorrect answer. **Total knowledge score was classified as the following:**

- Adequate $\geq 60\%$.
- In adequate $< 60\%$.

Tool III: Modified likert scale: This tool was constructed by the researcher in Arabic language based on reviewing the related literatures (El-Ansary & Fouad, 2020) and (Anderson et al., 1998) to assess pregnant women's attitudes regarding gestational diabetes mellitus. Each item was evaluated and rated by three point Likert scale: agree, uncertain and disagree. It consisted of 11 statements.

Scoring system:

All attitude variables were weighted according to items included. The answer calculated as: (3) for "agree", (2) for "uncertain" and (1) for "disagree". The higher scores reflected higher levels of attitude.

Total attitude score was classified as the following:

- Positive attitude $\geq 60\%$.

- Negative attitude < 60%.

Administrative approval:

An official approval was obtained from Dean of Faculty of Nursing in Benha University to director of Benha University hospital affiliated to Ministry of High Education. A clear explanation was given about the nature, importance and expected outcomes of the study to carry out the study with minimal resistance.

Content validity:

Tools of data collection were investigated for content validity by panel of three jury experts in the field of obstetrics and gynecological nursing at Benha University to judge clarity, relevance, comprehensiveness, understanding and applicability of tools. All of their remarks were taken into considerations and the tools were considered valid from the experts' point of view.

Reliability of the tools:

Reliability for tools was applied by the researcher for testing the internal consistency of the tools by administrating of the same tool to the same subjects under similar condition. Internal consistency reliability of all items of the tools was assessed using Cronbach's alpha coefficient test. The internal consistency of knowledge was 0.88 and attitude was 0.83.

Ethical considerations:

Approval of the Faculty Ethical Committee for Scientific Research was obtained for the fulfillment of the study. An official permission from the selected study settings was obtained for the fulfillment of the study. The aim of the study was explained to all pregnant women before applying the tools to gain confidence and trust. Oral consent was obtained from pregnant women to participate in the study and confidentiality was assured. The data was collected and treated confidentially. The study hadn't any physical or psychological risk of the women and freedom to withdrawal at any time of data collection and with no obligation.

Pilot study:

The pilot study was conducted on 10% of the total duration of data collection (4 weeks - 8 pregnant women). In order to test applicability of the constructed tools, the clarity of the included questions and the time needed for each subject to fill the questions. According to the results of the pilot study, required modifications were done. Women involved in the pilot were excluded from the study to avoid contamination of the sample.

Field work:

Interviewing and assessment phase:

At the beginning of the interview the researcher introduced herself to each pregnant woman and greeted them, explained the purpose of the study to the participants and provided the women with all information about the study (purpose, duration and activities), feedback about the study and take oral consent. Then the researcher distributed tool **I** for collecting data, **tool II:** Maternal knowledge questionnaire, **tool III:** Modified Likert scale to assess maternal attitude regarding gestational diabetes. Average time for the completion of each woman interview was around 45-60 minutes. The number of interviewing women ranged from 3-4 women per week.

Planning phase:

Based on baseline data obtained from assessment phase and relevant review of literature, the researcher designed 2 sessions regarding GD, one for knowledge and one for attitude. The number of sessions and its contents, different methods of teaching and instructional media were determined and explained to the participants. The contents of instructional package were prepared according to the pregnant women level of understanding in simple, organized and scientific Arabic language.

Implementation phase:

The researcher attended the previous mentioned study setting and provided

Effect of Instructional Package on Knowledge and Attitudes among Gestational Diabetic Women

appropriate separate place for the pregnant women during the interview. The researcher designed the instructional package to improve women's knowledge and attitudes regarding GDM. At the beginning of the first session pregnant women were oriented with the program contents. The women were interviewed in small groups by the researcher to implement the instructional package regarding gestational diabetes. The number of women participated in each session were 3-4 pregnant woman. The researcher used teaching methods such as lectures, discussion, demonstration and re-demonstration and suitable teaching media included booklet, posters, figures and laptop. The booklet about GD and its management which constructed by the researcher in simple Arabic language to suit level of understanding and satisfy the studied pregnant women's deficit knowledge and change attitudes positively regarding GDM. The researcher applied the instructional package through 2 sessions over 2 weeks. The duration of each session was (45-60) minutes according to women's achievement and feedback. The sessions conducted for small groups and each group involved 3-4 pregnant women. The researcher discussed sessions as following:

First session: At the beginning of the first theoretical session the researcher gave the pregnant woman the handout (booklet) and introduced an orientation of the booklet including the general and specific objectives. Then the researcher provided studied women with knowledge about G.D.M and its management including concept of gestational diabetes, risk factors, causes, symptoms of gestational diabetes, symptoms of hypoglycemia, diagnosis, investigations, and fetal complications, guidelines for treating

gestational diabetes, pharmacological therapy of gestational diabetes, proper nutrition, importance of practicing exercise and importance of follow up schedule during pregnancy and postpartum period.

Second session: It is the second theoretical session included healthy attitudes regarding gestational diabetes such as all pregnancies should be routinely screened using a standardized protocol for the early detection, it is necessary to provide special care to the mother with gestational diabetes, early diagnosis is crucial and important to prevent complications of gestational diabetes.

Evaluation phase:

The evaluation phase emphasized on determining the effect of instructional package on knowledge and attitudes of pregnant women regarding GD by comparing the results pre, post and follow-up implementation. Post-test was done after two weeks of intervention from the last session and follow up test was done after another two weeks to evaluate the effectiveness of the instructional package. At almost time the researcher followed women via telephone.

Statistical analysis:

Data was verified prior to computerized entry. The Statistical Package for Social Sciences (SPSS version 22.0) was used for that purpose, followed by data tabulation and analysis. Descriptive statistics were applied (e.g., mean, standard deviation, frequency and percentages). Test of significance (Friedman test, chi-square) as well as person correlation coefficient was used to investigate relation between study variables. Degrees of significance of results were considered as follows: P-value > 0.05 Not significant (NS), P-value ≤ 0.05 Significant (S), and P-value ≤ 0.001 Highly Significant (HS).

Results:

Table (1): Shows socio-demographic data of the studied sample. It was cleared that (60.9%) of studied sample were in age group > 30 years. More than half (51.6%) of them lived in rural areas. Moreover, (76.6%) were housewives and (54.7%) of them had secondary education

Table (2): Illustrates that (73.4%) and (68.8) of the studied sample were multigravida and multipara respectively. The mean gestational age of them was (26.031 ±1.943) weeks, (82.8%) of them had no previous history of GD and (85.9%) of the studied sample had no family history of GD.

Table (3): Shows that, there was a marked improvement in knowledge of studied sample regarding GD after implementation of the instructional package with a highly statistical significant difference ($p < 0.001$) at pre, 2 weeks post and one-month post-intervention phases.

Table (4): Reveals that, there was a marked improvement in attitude of studied sample regarding GD after implementation of the instructional package with a highly statistical significant difference ($p < 0.001$) at pre, 2 weeks post and one-months post-intervention phases.

Figure (1): Displays that, (21.9%), (82.8%) and (81.8%) of studied sample had adequate knowledge regarding gestational diabetes at pre, 2 weeks post and one-month post-intervention phases respectively. While, it was revealed that (78.1%), (17.2%) and (18.8%) of them had inadequate knowledge regarding GD at pre, 2 weeks post and one-month post-intervention phases respectively.

Figure (2): Illustrates that, (31.3%), (76.6%) and (79.7%) of studied sample had positive attitude regarding GD at Pre, 2 weeks and one-month post-intervention phases

respectively. While, it was revealed that (68.8%), (23.4%) and (20.3%) of them had negative attitude regarding GD at Pre, 2 weeks and one-month post-intervention phases respectively.

Table (5): Clarifies that, there was a statistically significant relation between total knowledge score regarding GD and (educational level and occupation) of the studied sample at pre-intervention phase ($p \leq 0.05$). While, there was no statistically significant relation between total knowledge score and socio-demographic data of the studied sample at 2 weeks and one-months post-intervention phases ($P > 0.05$).

Table (6): Clarifies that, there was a statistically significant relation between total attitude score regarding GD and only (educational level) of the studied sample at pre-intervention phase ($p \leq 0.05$). While, there was no statistically significant relation between total attitude score and socio-demographic data of the studied sample at 2 weeks and one-months post-intervention phases ($P > 0.05$).

Table (7): Clarifies that; there was a highly statistical significant positive correlation between total knowledge and total attitude scores regarding GD at 2 weeks and one-month post-intervention phases ($P \leq 0.001$).

Effect of Instructional Package on Knowledge and Attitudes among Gestational Diabetic Women

Table (1): Distribution of the studied sample according to their socio-demographic characteristics (n=64).

Socio-demographic characteristics	No.	%
Age:		
<20	8	12.5
20 – 30	17	26.6
>30	39	60.9
Mean ± SD = 26.02±7.57		
Residence:		
Rural	33	51.6
Urban	31	48.4
Level of education:		
Read/write	7	10.9
Secondary education	35	54.7
University education	22	34.4
Occupation:		
Housewife	49	76.6
Working	15	23.4

Table (2): Distribution of the studied sample regarding their obstetric history (n=64).

Obstetric history	No.	%
gestational age in weeks:		
Mean ± SD = 26.031 ±1.943		
Gravida:		
Primigravida	17	26.6
Multigravida	47	73.4
Parity:		
Nulliparous	17	26.6
Primipara	3	4.7
Multipara	44	68.8
Previous history of gestational diabetes:		
Yes	11	17.2
No	53	82.8
Family history of gestational diabetes:		
Yes	9	14.1
No	55	85.9

Table (3): Distribution of the studied sample regarding their knowledge about gestational diabetes at Pre, 2 weeks and one-month post-intervention phases (n=64).

Knowledge items	Pre-intervention		2 weeks post-intervention		One-month post-intervention		Friedman test	
	Correct answer	Incorrect answer	Correct answer	Incorrect answer	Correct answer	Incorrect answer	X2	P-value
	No %	No %	No %	No %	No %	No %		
Concept of gestational diabetes	19 29.7	45 70.3	43 67.2	21 32.8	41 64.1	23 35.9	44.33	0.000 **
Risk factors of gestational diabetes	14 21.9	50 78.1	41 64.1	23 35.9	41 64.1	23 35.9	54.00	0.000 **
Causes of gestational diabetes	12 18.8	52 81.3	39 60.9	25 39.1	38 59.4	26 40.6	50.07	0.000 **
Symptoms of gestational diabetes	25 39.1	39 60.9	55 85.9	9 14.1	53 82.8	11 17.2	56.26	0.000 **
Symptoms of hypoglycemia	8 12.5	56 87.5	35 54.7	29 45.3	40 62.5	24 37.5	55.56	0.000 **
Diagnosis of gestational diabetes	13 20.3	51 79.7	40 62.5	24 37.5	39 60.9	25 39.1	52.07	0.000 **
Most important investigations for a woman with gestational diabetes	18 28.1	46 71.9	35 54.7	29 45.3	36 56.3	28 43.8	34.11	0.000 **
Maternal complications of gestational diabetes	22 34.4	42 65.6	51 79.7	13 20.3	50 78.1	14 21.9	56.06	0.000 **
Fetal complications of gestational diabetes	16 25.0	48 75.0	40 62.5	24 37.5	40 62.5	24 37.5	48.00	0.000 **
Guidelines for treating gestational diabetes	17 26.6	47 73.4	44 68.8	20 31.3	42 65.6	22 34.4	50.29	0.000 **
Pharmacological therapy of gestational diabetes	20 31.3	44 68.8	54 84.4	10 15.6	53 82.8	11 17.2	66.05	0.000 **
Proper nutrition for pregnant women with gestational diabetes	19 29.7	45 70.3	42 65.6	22 34.4	43 67.2	21 32.8	46.08	0.000 **
Importance of practicing exercise	7 10.9	57 89.1	30 46.9	34 53.1	29 45.3	35 54.7	44.08	0.000 **
Importance of follow-up schedule during pregnancy	23 35.9	41 64.1	53 82.8	11 17.2	51 79.7	13 20.3	56.26	0.000 **
Importance of follow-up schedule during postpartum	14 21.9	50 78.1	28 43.8	36 56.3	27 42.2	37 57.8	26.14	0.000 **

Effect of Instructional Package on Knowledge and Attitudes among Gestational Diabetic Women

Table (4): Distribution of the studied sample regarding their attitudes about gestational diabetes at Pre, 2 weeks and one-month Post-intervention phases (n=64).

Attitudes items	Pre-intervention			2 weeks post-intervention			One-month post-intervention			Friedman test	
	Agree	Uncertain	Disagree	Agree	Uncertain	Disagree	Agree	Uncertain	Disagree	X2	P-value
	No %	No %	No %	No %	No %	No %	No %	No %	No %		
All pregnancies should be routinely screened using a standardized protocol for the early detection of gestational diabetes.	13 20.3	20 31.3	31 48.4	45 70.3	5 7.8	14 21.9	46 71.9	7 10.9	11 17.2	74.00	0.000 **
It is necessary to provide special care to the pregnant mother with gestational diabetes.	21 32.8	9 14.1	34 53.1	50 78.1	3 4.7	11 17.2	51 79.7	3 4.7	10 15.6	63.50	0.000 **
Early diagnosis is crucial and important to prevent complications of gestational diabetes.	26 40.6	7 10.9	31 48.4	38 59.4	20 31.3	6 9.4	39 60.9	22 34.4	3 4.7	64.09	0.000 **
Gestational diabetes is not considered a very serious condition.	11 17.2	28 43.8	25 39.1	25 39.1	25 39.1	14 21.9	25 39.1	25 39.1	14 21.9	50.00	0.000 **
All pregnant women should check the glucose level, regardless of have risk factors or not.	17 26.6	14 21.9	33 51.6	38 59.4	19 29.7	7 10.9	39 60.9	20 31.3	5 7.8	79.66	0.000 **
Regular blood glucose testing is required for women with gestational diabetes to ensure that the blood sugar level is normal.	25 39.1	14 21.9	25 39.1	56 87.5	8 12.5	0 0.0	58 90.6	6 9.4	0 0.0	76.75	0.000 **
Pregnant women should monitor and check blood sugar level regularly after pregnancy.	23 35.9	20 31.3	21 32.8	47 73.4	11 17.2	6 9.4	47 73.4	11 17.2	6 9.4	70.00	0.000 **
Complications of gestational diabetes can be prevented.	16 25.0	19 29.7	29 45.3	42 65.6	6 9.4	16 25.0	44 68.8	4 6.3	16 25.0	62.77	0.000 **
Exercising during pregnancy is important to prevent excessive weight gain, increased blood glucose and reduce complications of gestational diabetes.	12 18.8	15 23.4	37 57.8	3351. 6	1421.9	17 26.6	35 54.7	15 23.4	14 21.9	69.25	0.000 **
Diet should be maintained during pregnancy to avoid complications of gestational diabetes.	35 54.7	0 0.0	29 45.3	6093. 8	46.3	0 0.0	60 93.8	4 6.3	0 0.0	58.00	0.000 **
There is a need to improve the information and attitudes of women with gestational diabetes through comprehensive education programs on gestational diabetes.	18 28.1	30 46.9	16 25.0	5179. 7	710.9	6 9.4	53 82.8	5 7.8	6 9.4	78.75	0.000 **

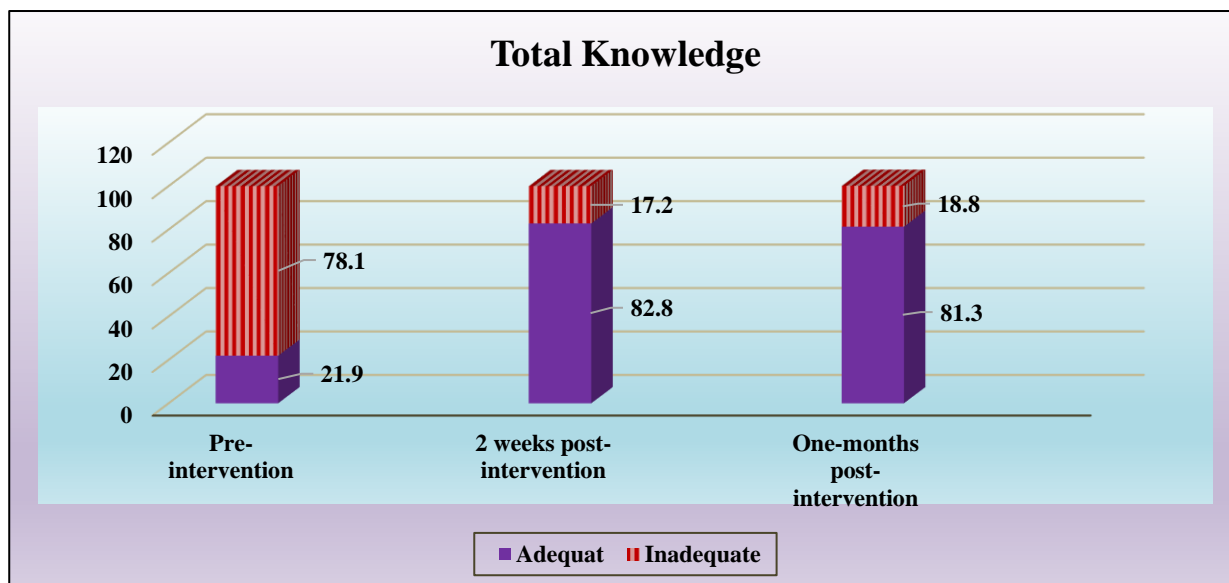


Figure (1): Percentage distribution of the studied sample regarding their total knowledge score about gestational diabetes at Pre, 2 weeks and one-month post-intervention phases (n=64).

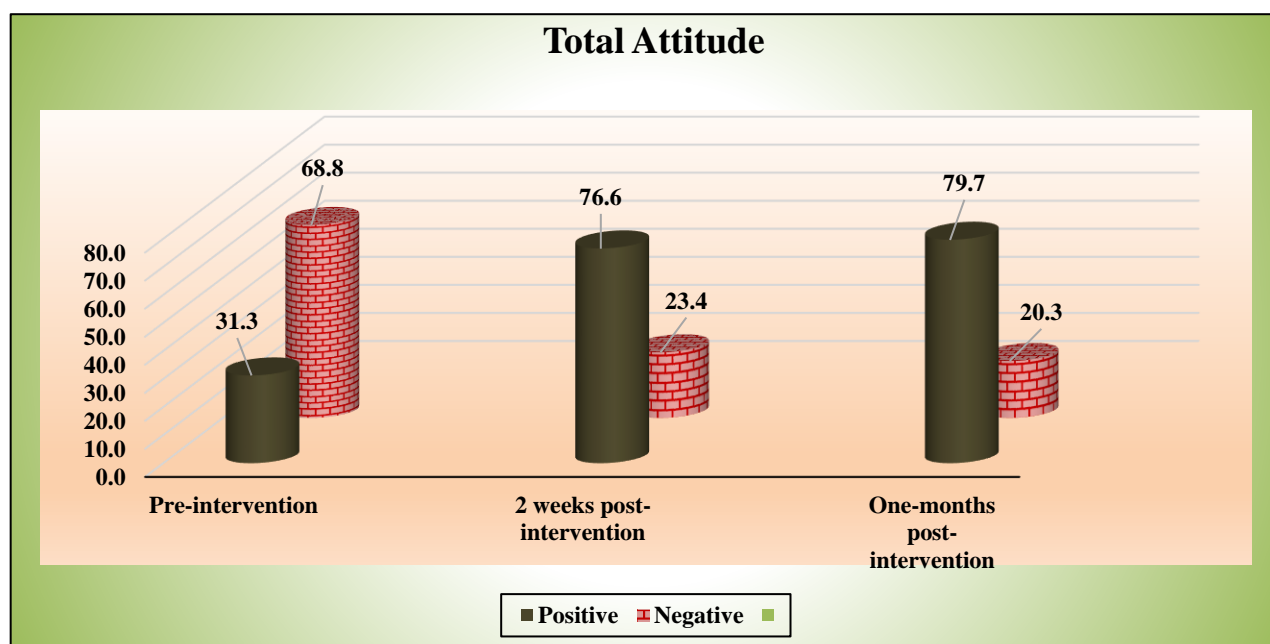


Figure (2): Percentage distribution of the studied sample regarding their attitude about gestational diabetes at Pre, 2 weeks and one-month post-intervention phases (n=64).

Effect of Instructional Package on Knowledge and Attitudes among Gestational Diabetic Women

Table (5): Relation between socio-demographic data of the studied sample and total knowledge score regarding gestational diabetes at Pre, 2 weeks and one-month post-intervention phases (n=64).

Socio-demographic data	Total knowledge											
	Pre-intervention				2 weeks post-intervention				one-month post-intervention			
	Adequate (n=14)	Inadequate (n=50)	Chi-square test	P-value	Adequate (n=53)	Inadequate (n=11)	Chi-square test	P-value	Adequate (n=52)	Inadequate (n=12)	Chi-square test	P-value
	No %	No %			No %	No %			No %			
Age												
<20	3 (21.4)	5 10.0	1.363	0.506	6 11.3	21 8.2	2.173	0.337	6 11.5	2 16.7	0.750	0.687
20 – 30	3 (21.4)	14 28.0			16 30.2	1 9.1			13 25.0	4 33.3		
>30	8 (57.2)	31 62.0			31 58.5	8 72.7			33 63.5	6 50.0		
Residence:												
Rural	8 57.1	25 50.0	.223	0.636	28 52.8	5 45.5	0.198	0.656	25 48.1	8 66.7	1.349	0.245
Urban	6 42.9	25 50.0			25 47.2	6 54.5			27 51.9	4 33.3		
Educational level:												
Read/write	1 7.2	6 12.0	11.018	0.004 *	5 9.4	2 18.2	0.860	0.651	5 9.6	2 16.7	0.857	0.652
Middle education	3 21.4	32 64.0			30 56.6	5 45.4			28 53.9	7 58.3		
University education	10 71.4	12 24.0			18 34.0	4 36.4			19 36.5	3 25.0		
Occupation:												
Housewife	7 50.0	42 84.0	7.046	0.008 *	41 77.4	8 72.7	0.109	0.741	39 75.0	10 83.3	0.377	0.539
Working	7 50.0	8 16.0			12 22.6	3 27.3			13 25.0	21 6.7		

*A Statistical significant $p \leq 0.05$

**A Highly Statistical significant $p \leq 0.001$

Table (6): Relation between socio-demographic data of the studied sample and total attitude score regarding gestational diabetes at Pre, 2 weeks and one-month post-intervention phases (n=64).

Socio-demographic data	Total attitudes											
	Pre-intervention				2 weeks post-intervention				one-month post-intervention			
	Positive (n=20)	Negative (n=44)	Chi-square test	P-value	Positive (n=49)	Negative (n=15)	Chi-square test	P-value	Positive (n=51)	Negative (n=13)	Chi-square test	P-value
	No %	No %			No %	No %			No %			
Age												
<20	2 10.0	6 13.6	0.279	0.870	6 12.3	2 13.3	0.014	0.993	6 11.8	2 15.4	0.352	0.839
20 – 30	6 30.0	11 25.0			13 26.5	4 26.7			13 25.5	4 30.8		
>30	12 60.0	27 61.4			30 61.2	9 60.0			32 62.7	7 53.8		
Residence:												
Rural	11 55.0	22 50.0	0.138	0.711	26 53.1	7 46.7	0.188	0.665	26 51.0	7 53.8	0.034	0.854
Urban	9 45.0	22 50.0			23 46.9	8 53.3			25 49.0	6 46.2		
Educational level:												
Read/write	1 5.0	6 13.6	8.557	0.014*	5 10.2	2 13.3	0.514	0.774	5 9.8	2 15.4	0.359	0.836
Middle education	7 35.0	28 63.6			28 57.1	7 46.7			28 54.9	7 53.8		
University education	12 60.0	10 22.8			16 32.7	6 40.0			18 35.3	4 30.8		
Occupation:												
Housewife	15 75.0	34 77.3	0.040	0.842	39 79.6	10 66.7	1.069	0.301	39 76.5	10 76.9	0.001	0.937
Working	5 25.0	10 22.7			102 0.4	5 33.3			12 23.5	3 23.1		

*A Statistical significant $p \leq 0.05$

**A Highly Statistical significant $p \leq 0.001$

Effect of Instructional Package on Knowledge and Attitudes among Gestational Diabetic Women

Table (7): Correlation between total knowledge and attitude scores of the studied sample regarding gestational diabetes at Pre, 2 weeks and one-month post-intervention phases (n=64).

Variables	Total knowledge					
	Pre-intervention		2 weeks post-intervention		One-month post-intervention	
	r	P-value	r	P-value	r	P-value
Total attitude	0.460	0.000**	0.714	.000**	0.694	0.000**

**A Highly Statistical significant $p \leq 0.001$

Discussion:

Pregnancy is considered high risk when gestational diabetes develops. Gestational diabetes is a global disorder defined as abnormal glucose metabolism with the onset or first recognition during pregnancy and usually resolves after delivery (ElSayed et al., 2023).

The finding of the present study revealed that more than three fifth of studied pregnant women were in age group > 30 years with a mean age of 26.02 ± 7.57 years. This result was in the same line with El-Ansary & Fouad, (2020) who conducted “Effect of Educational Sessions on Knowledge, Attitude and Self - Care Practices among Pregnant Women with Gestational Diabetes” and found that that less than two-thirds of the pregnant women aged >30 years with mean \pm SD 27.6 ± 5.9 . From the researcher point of view, similarity of the finding may be due the incidence of GDM was especially high in women who were older than 30 years. This also could be due to the correlation between the age and the risk of GDM. Meanwhile, this result disagreed with George et al., (2021) who conducted “A study to assess the Knowledge and Self Care Practice Regarding Gestational Diabetes Mellitus among Pregnant Mothers Attending Selected Hospitals of Kottayam District” and

found that 73.3% of pregnant women belong to the age group of 20-30 years and 26.7% belongs to the age group of 30-40 years.

As regards the residence, the finding of the present study revealed that more than half of the studied pregnant women lived in rural areas. This result may be attributed to the outpatient clinic in Benha university is accessible and visible for large portion of the population, especially who live in rural area with low and middle socioeconomic status, also this service offer with minimal charge. This result was in accordance with Abdel-Moaty et al., (2023) who studied “Effect of Tele-nursing Guidelines on Knowledge among Women with Gestational Diabetes during COVID-19 Pandemic” and revealed that more than half of the studied pregnant women belonged to rural area. Meanwhile, this finding disagreed with Barani et al., (2021) in a study entitled “A Study to assess knowledge regarding gestational diabetes mellitus among antenatal mothers” indicated that the majority of the pregnant women 52% lived in urban area and 28% of mother lived in rural area.

In relation to the educational level, the finding of the present study revealed that more than half of the studied pregnant women

had secondary education. This result might be due to most Egyptian mothers preferred to stay at home to take care of their husbands and children rather than complete their education. The result was nearly similar to **El-Ansary & Fouad, (2020)** who found that more than half (56.7%) of them had middle education. On the other hand, this result disagreed with **Saboula et al., (2018)** who conducted “Effect of Nursing Intervention on knowledge, Attitude and Self -Care Activities among Gestational Diabetic Women” showed that, the higher percentage of GDW can't read and write while the lower percentage was among secondary school education.

Regarding occupation, the finding of the present study revealed that more than three-quarters of the studied pregnant women were housewives and nearly one quarter of them were employee. This result could be explained due to natural of area of residence where the majority of them live in rural area and more than half of the studied pregnant women have secondary education, which leads to decrease their work opportunities. This result was in consistence with **Saboula et al., (2018)** who found that three quarters (75.0%) of the studied pregnant women were not working.

Pertaining to obstetric history of the studied pregnant women, the finding of the present study revealed that less than three-quarters were multigravida and more than two-thirds of the studied pregnant women were multipara. The mean gestational age of them was (26.031 ±1.943) weeks. Additionally, more than three quarters of the studied pregnant women had no previous history of gestational diabetes. This result was similar to **Byakwaga et al., (2021)** who found that the majority of them had no history of gestational diabetes in previous pregnancies. Also, the result was matched with **Mohamady et al., (2022)** who studied “Effect

of Counseling Program based on Health Literacy Model regarding Gestational Diabetes on Maternal and Fetal outcomes” found that the majority of them were multigravida and multipara.

Concerning the family history of gestational diabetes, the finding of the present study revealed that the majority of the studied pregnant women were no family history of gestational diabetes. This result was in accordance with **Byakwaga et al., (2021)** who conducted a study entitled “Level of and factors associated with awareness of gestational diabetes mellitus among pregnant women attending antenatal care” found that the majority of their family member (90.6%) had no family history with diabetes mellitus. Meanwhile, this result was opposite to **Tora and Vahitha, (2021)** who studied “Effect of structured teaching programme on knowledge regarding self-care management of gestational diabetes mellitus among gestational diabetic women” found that nearly two thirds (61.5%) of mothers had family history of diabetes and nearly one third (38.5%) had no such history.

The finding of the present study also revealed that there was a marked improvement in knowledge of studied pregnant women regarding gestational diabetes after implementation of the instructional package with a highly statistical significant difference ($p < 0.001$) between pre, 2 weeks post and one-month post-intervention phases. From the researcher point of view, this improvement might be due to instructional package sessions affect the knowledge of the pregnant women positively as all women in the sample become more equipped by the important knowledge about gestational diabetes.

In addition, using of various teaching media make the women very interested and gratified during the sessions. This result was in accordance with **El-Ansary & Fouad,**

Effect of Instructional Package on Knowledge and Attitudes among Gestational Diabetic Women

(2020) who illustrated that, nearly two thirds (64.9%) of the pregnant women had poor knowledge regarding gestational diabetes before intervention whereas the majority of them (80.4%) and more than three quarters (77.3%) had good knowledge immediately and two weeks post intervention respectively.

Also, there was a highly statistically significant difference regarding pregnant women total knowledge about gestational diabetes pre and post intervention ($p < 0.001$). Also, this result was supported by **Abd Elmoaty et al., (2019)** who studied “Effect of Educational Program for recently diagnosed Gestational Diabetic Women on their Knowledge and clinical outcomes” reported that the majority of gestational diabetic women had good knowledge in immediate and post 3 months respectively as compared in pre-educational program with highly statistically significance differences. Moreover, this result was in accordance with **Saboula et al., (2018)** who concluded a significant increase in the total knowledge score of gestational diabetic women post-intervention. Similar finding was reported in a quasi-experimental study by **Mohamed & Ahmed, (2019)** to assess the “effect of educational program for health literacy among pregnant women with gestational diabetes” reported a statistical significant difference between knowledge score pre and post the educational program. Increasingly, this result was also similar to **Osman et al., (2022)** who studied “Effect of Intervention PRECEDE Model on Knowledge and Practice of Preventive Behaviors among High-Risk Pregnant Women regarding Gestational Diabetes” revealed that there was an increase in the mean score of knowledge, enabling, and reinforcing factors scores with statistical significance immediately and after one month of educational intervention.

The present study revealed that, there was a marked improvement in attitude of studied pregnant women regarding gestational diabetes after implementation of the instructional package with a highly statistical significant difference ($p < 0.001$) between pre, 2 weeks post and one-months post-intervention phases. This improvement may be due to implementation of instructional package which affect the attitude of the pregnant women positively. Enhancements of women’s attitudes regarding gestational diabetes create a background for women to control the disease. This result was consistent with **El-Ansary & Fouad, (2020)** who revealed that most of the pregnant women (91.8%) had positive attitude toward gestational diabetes two weeks post intervention. There was highly statistically significant difference ($p < 0.001$).

Also, this result was supported by **Mohamed & Ahmed, (2019)** who proved that the educational intervention was significantly effective on pregnant women’s attitude regarding gestational diabetes. Additionally, this result was similar to the study done by **Osman et al., (2022)** who revealed that the majority of high-risk individuals had a positive attitude toward gestational diabetes prevention one month post-intervention.

Increasingly, this result was in the same line with **Saboula et al., (2018)** who conducted showed that the majority of gestational diabetic women under study (85%) had a positive attitude toward gestational diabetes post intervention.

Concerning relations, the finding of the present study clarified that, there was a statistically significant relation between total knowledge scores regarding gestational diabetes and (educational level and occupation) of the studied pregnant women at

pre-intervention phase ($p \leq 0.05$). While, there was no statistically significant relations between total (knowledge scores and attitude scores) and socio-demographic data of the studied women at 2 weeks and one-months post-intervention phases ($P > 0.05$). This result was at the same line with **Abdel-Moaty et al., (2023)** who revealed that there was no significant relation between total satisfactory knowledge level of women with GDM and their demographic characteristics in post intervention phase at ($p > 0.05$). Also, this result was in accordance with **Abd Elmoaty et al., (2019)** who reported that there were statistically significance relationship between total knowledge scores of gestational diabetic women pre-educational program and their educational level. Meanwhile, there is non-statistical relation between the socio-demographic characteristic in the same study at post educational program.

Concerning correlation between total knowledge and total attitude scores of the studied pregnant women at pre, 2 weeks and one-month post-intervention phases, the present study finding revealed that there was a highly statistical significant positive correlation between total knowledge and total attitude regarding gestational diabetes at 2 weeks and one-month post-intervention phases ($P \leq 0.001$). This result was in accordance with **El-Ansary & Fouad, (2020)** who revealed a significant positive correlation between total knowledge and total attitude scores regarding gestational diabetes among pregnant women post intervention.

Also, this finding was consistent with the study done by **Said & Aly, (2019)** who conducted “Effect of the educational package based on health belief model regarding lifestyle among women with gestational diabetes” revealed that there was a positive correlation between women’s knowledge and attitude regarding gestational diabetes after

the intervention. Moreover, this finding was coincided with the results reported by **Noronha et al., (2018)** who studied “Knowledge, attitude and risk perception for diabetes among pregnant women with gestational diabetes” concluded a positive correlation between women’s knowledge and attitude regarding gestational diabetes after the intervention.

Conclusion:

Based on the findings of the present study, it was concluded that, there was a marked improvement in pregnant women’ total knowledge and attitude regarding GD after implementation of the instructional package, with a highly statistical significant difference ($p < 0.001$) at pre, 2 weeks post and one-months post-intervention phases. There was a highly statistical significant positive correlation between total knowledge and total attitude scores regarding gestational diabetes at 2 weeks and one-month post-intervention phases ($P \leq 0.001$). Hence, the aim of the study was achieved and research hypotheses were accepted.

Recommendations:

- Development of a training program and evidence based interventions to provide a better view of the women health promotion strategies related to GD.
- Application of the instructional guidelines regarding GD in the routine care in antenatal care clinics and continuously implemented to increase women’s knowledge and improve their attitude about gestational diabetes.
- Screening program to discover high risk groups for GDM and pregnant women with positive family history to diabetes for early management and follow up.
- **Further research:** Future researches are needed on large probability sample at different settings to generalize the results.

Effect of Instructional Package on Knowledge and Attitudes among Gestational Diabetic Women

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تأثير الحزمة التعليمية على معلومات واتجاهات السيدات المصابات بسكر الحمل

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مرض سكر الحمل هو اضطراب وفرط أنسولين الدم يصيب السيدة الحامل ويتم تشخيصه لأول مرة في الثلث الثاني أو الثالث من الحمل عادة بعد 24 أسبوع. الهدف من الدراسة: تقييم تأثير الحزمة التعليمية على معلومات واتجاهات السيدات المصابات بسكر الحمل. تصميم الدراسة: دراسة شبه تجريبية تم استخدامها لتحقيق هدف الدراسة (مجموعة واحدة). مكان الدراسة: تم اجراء هذه الدراسة في العيادات الخارجية لأمراض النساء والتوليد وقسم النساء والتوليد في مستشفى جامعة بنها. العينة: عينة هادفة من 64 امرأة حامل تم تشخيصهن طبييا بسكر الحمل في الدراسة. أدوات جمع البيانات: تم استخدام ثلاثة أدوات لجمع البيانات: الأداة الأولى: استبيان المقابلة الشخصية، الأداة الثانية: استمارة تقييم معلومات السيدات الحوامل فيما يتعلق بسكر الحمل، الأداة الثالثة: مقياس ليكرت لتقييم اتجاهات السيدات الحوامل فيما يتعلق بسكر الحمل. النتائج: كان هناك فرق ذو دلالة إحصائية عالية بين نتائج الاختبار البعدي والمتابعة مقارنة بالاختبار القبلي للمعلومات والاتجاهات فيما يتعلق بسكر الحمل. الخلاصة: كان هناك تحسن ملحوظ في المعلومات والاتجاهات للسيدات الحوامل فيما يتعلق بسكر الحمل بعد تطبيق الحزمة التعليمية. التوصيات: تطوير برنامج تدريبي وتدخلات قائمة على الأدلة لتقديم رؤية أفضل لاستراتيجيات تعزيز صحة السيدات المتعلقة بسكر الحمل.