Journal of Health, Medicine and Nursing
ISSN 2422-8419 An International Peer-reviewed Journal
Vol.33, 2016

Impact of Designed Teaching Program for Pregnant Women with Gestational Diabetes on Maternal outcomes

GHada N, Mohammed Abeer Eswi Hanan Fahmy Mohamed H, Shehata
Assist. Lecturer, Professor, Assist. Professor of Maternal & Newborn Health Nursing. Faculty of Nursing, Cairo University, Egypt. Professor of Obstetrics & Gynecology Faculty of Medicine Cairo University

Abstract
Background: Gestational diabetes mellitus (GDM) was defined as any degree of glucose intolerance with an onset or first recognition during pregnancy. ***Aim of this research***: was to examine the impact of designed teaching program for pregnant women with gestational diabetes on maternal outcomes. ***Subjects & Methods***:- ***Design:*** quasi experimental pre-post one group design was utilized for the current study. ***Setting***: The study was carried out at Antenatal outpatient clinic at El-Manial Obstetrics and Gynecology Hospital. ***Sample***: A convenient sample of 100 gestational diabetic women was recruited for the study. ***Data collection:*** different tools were used to collect the data; (1) Structured Interviewing Schedule; (2) Physical assessment sheet; (3) Pretest for assessing knowledge; (4) Follow up tool to asses women's compliance to the given instructions; (5) Post test for assessing knowledge, and Post partum questionnaire. ***Results***: revealed that, the mean post-test knowledge score (18.45) was significantly higher than the mean pre-test knowledge score, there was weak positive relationship between the mean post-test knowledge score and maternal compliance to the given instructions ($r = 0.304$), no statistically significant relationship were found in relation to post test knowledge score and blood glucose level in the current pregnancy ($P=0.37$), Moreover, there was high statistically significant relationship between the mean posttest knowledge score and mode of the current delivery ($P =0.016$). All over there was high statistically significant relationship between post-test knowledge score and maternal outcomes ($P < 0.001$). ***In conclusion***: participating of designed teaching program for gestational diabetic women lead to increase knowledge score about the disease and increase women's awareness of how to decrease its complications. ***This research recommended that:*** Raise pregnant mother's awareness regarding Gestational Diabetes Mellitus, definition, diagnosis, symptoms and signs , frequency of antenatal visits, and ways to adopting healthy life style as follow dietary program and practice exercises.
Keywords: Gestational Diabetes Mellitus, Women compliance, , Postpartum questionnaire

Introduction

Gestational Diabetes mellitus was defined as decreased carbohydrate tolerance that develops or is first identified during pregnancy, but in 2010 the definition was changed as following. Thus, GDM is a carbohydrate intolerance that is not diabetes that has developed or been discovered for the first time during pregnancy. The GDM definition therefore does not include overt diabetes in pregnancy. Accordingly, hyperglycemic disorders that are thought to have been overlooked until the pregnancy are excluded from the definition of GDM and are instead diagnosed as "overt diabetes in pregnancy.(Sugiyama. T,2011). Gestational Diabetes diagnosis generally established in the third trimester and a specific and timely treatment is required (Sen E, Sirin, A, 2014). It is asserted that to encourage lifestyle changes including training and family support in the care of diabetic pregnant a multidisciplinary approach must be accepted. The studies showing nursing attempt efficiency in improving diabetic patient results are gradually increasing. However much more studies are required about this subject.

Gestational diabetes mellitus (GDM) is a global health concern, not only because its prevalence is high and on the increase, but also because of the potential implications for the health of mothers and their offspring. Unfortunately, there is considerable controversy in the literature surrounding the diagnosis and treatment of GDM, as well as the possible long-term consequences for the offspring. As a result, worldwide there is a lack of uniformly accepted diagnostic criteria and the advice regarding the treatment of GDM, including diet, insulin therapy, and the use of oral blood glucose-lowering agents, is highly variable (Konong. S, Hoogenberg K, Luters HL & Bruce HR, 2016).

The prevalence of abnormal glucose tolerance and obesity is increasing dramatically in women of childbearing age. Universal testing for hyperglycemia at the first pregnancy visit should be encouraged. Women with previous GDM, or those with multiple risk factors, ideally will have an oral glucose tolerance test (OGTT). The best means of testing lower risk women has not been defined. Women with clearly elevated glucose levels early in pregnancy are managed as for pre-existing DM, including screening for complications (Church D, Halsall D. Meck C, Parker R etal, 2011).

David E, Dunger SH, Shane B, & Norris A, (2014) reported that pregnancies affected by GDM pose a risk for adversities such as the need for Caesarean sections due to fetal macrosomia. Macrosomia occurs as a result of accelerated fetal growth fuelled by maternal hyperglycemia. In approximately 95% of GDM cases maternal glucose metabolism returns to normal after delivery of the baby, however, an association between

GDM and the development of type 2 diabetes mellitus in the mother later in life exists. In addition, research into the long term effects of poor maternal glucose metabolism on the fetus has revealed that offspring born to mothers with GDM are susceptible to IGT and obesity. With these associations in mind it would be important to identify pregnant women at risk for GDM so that prevention management such as lifestyle modifications can be implemented.

Lifestyle management is the preferred means of managing GDM. Diet is based around the principles of optimal nutrition and controlled weight gain. The carbohydrate content of the diet, with an emphasis on the quantity, distribution and type (low glycemic index) of carbohydrate is critical. The effectiveness of diet can be monitored by measuring weight and self-monitoring of BG levels. Exercise can be helpful in lowering BG levels. The most acceptable form of exercise for most women is walking in their normal daily routine (Nankervis A, Conn J, 2013).

The World Health Organization (WHO) recognizes the importance of antenatal care (ANC) within a continuum of reproductive and maternal-newborn care. WHO recommends early identification of pregnancy and at least four ANC visits, starting prior to 14 weeks gestation, during which a prescribed package of preventative, screening, and educational interventions are delivered, (W.H.O, 2015). Unfortunately, such a consistent, integrated continuum of comprehensive care although defined on paper, and codified in many national health policies often does not translate into actual practice in some resource-limited settings,(Chumu A, Chilibu CM, Koch SF, 2013). For example, while it is widely acknowledged that ANC is most effective if it is initiated early and consistently throughout pregnancy (Pervin J, Moran A, Rahman M, Razzaque A etal, 2012). Many pregnant women in resource-limited settings initiate ANC late in pregnancy (e.g., during the 2nd or 3rd trimester) and do not receive the WHO-defined minimum of at least 4 ANC visits. ,(Chumu A, Chilibu CM, Koch SF, 2013).

Significance of the study

Pregnancies complicated by diabetes are associated with a high rate of miscarriage, preterm delivery, preeclampsia, perinatal mortality and congenital malformations compared to the background population. A recent systematic review showed that pregnancies complicated by type 2 diabetes mellitus (T2DM) are associated with worse perinatal mortality and neonatal mortality than those complicated by type 1 diabetes mellitus (T1DM) (Metzger BE, Gabbe SG, Persson B, etal, 2010).

Healthcare professionals should seek to empower women with diabetes to make the experience of pregnancy and childbirth a positive one by providing information, advice and support that will help to reduce the risks of adverse pregnancy outcomes for mother and baby. Women with diabetes who are planning to become pregnant should be informed that establishing good glycemic control before conception and continuing this throughout pregnancy will reduce the risk of miscarriage, congenital malformation, stillbirth and neonatal death. It is important to explain that risks can be reduced but not eliminated (NICE, 2015).

It's hoped that the findings of this study might establish evidence that can promote nursing practice and improve knowledge for pregnant women with gestational diabetes.

Operational definition

Pregnancy outcomes: In the current study the course of pregnancy outcomes will be measured through recording of complications during pregnancy, delivery and assessment of newborn after birth by APGAR score.

Aim of the study

The aim of the current study was to examine the impact of designed teaching program for pregnant women with gestational diabetes on maternal outcomes.

Research Hypothesis:

To achieve the aim of this study the following research hypotheses were formulated: H1. The post- test knowledge score of pregnant women with gestational diabetes attending the designed teaching program will be significantly higher than their pre- test knowledge score. H2. The pregnant women with gestational diabetes who will attend designed teaching program will have better maternal outcomes.

Subjects and Methods

Design

A quasi experimental pre-post one group design was utilized for the current study to examine the impact of designed teaching program during pregnancy on maternal outcomes.

Setting:

The study was carried out at El-Manial Obstetrics and Gynecology Hospital at antenatal outpatient clinic. According to Statistical Department, (2011) at El- Manial Maternity University Hospital, the antenatal clinic record about 28.000 women. This is a university affiliated hospital that provides free health services.

Sample:
A convenient sample of 100 gestational diabetic women was recruited for the study. A Power of .80 (β = 1-.80 = .20) at alpha .05 (one-sided) was used as the significance level, because these levels have been suggested for use in the most areas of behavioral science research (Al fadhli E, 2015). In addition, the medium effect size (0.5) is conventional effect size in behavioral science that was used when the new area of research and when instruments have not well been tested. Women were recruited in the study according to the following criteria: Gestation age of 28 weeks or more at the time of delivery, calculated from the last menstrual period and/or early ultrasound scan, singleton pregnancy, women diagnosed with gestational diabetes mellitus (GDM) and women were able read and write.

Data collection tools:
Six tools were used for data collection:-

1). Structured Interviewing Schedule. This tool was designed by the investigator; this tool includes four sections a). Sociodemographic data , as years of marriage, age, occupation and income, b). medical and family history, which includes data related to (Diabetes, Hypertension, renal disease or cardiac disease). c). obstetric history. This included data related to, (parity, gravidity, height, weight, body mass index (BMI), any complication related to pervious pregnancy or delivery, such as gestational diabetes, type 1 diabetes mellitus (T1DM), pre eclampsia, macrosomic baby, twins' baby) & type of previous delivery. d). clinical picture of gestational diabetes , This included data regarding diabetes mellitus as frequent and urgent urination, drowsiness or fainting, frequent feeling of hunger, medications related to the disease, and way of monitoring her blood glucose.

2). Physical Assessment Sheet. This tool was developed by the researcher to assess the height, weight, blood glucose, and body mass index of the gestational diabetic women.

3). Pre test tool. For assessing the base knowledge of the women about the disease(definition of gestational diabetes, causes and risk factors of gestational diabetes & effect of gestational diabetes on pregnancy) , her nutritional life style and hygienic care.

4). Follow up tool. In this tool gestational diabetic women was asked about their compliance to the given instructions.

5). Post test tool. To assess the effect of designed structured teaching program on maternal (knowledge, compliance, weight, and blood glucose level).

6). Postpartum Assessment Sheet. To assess maternal outcomes which included, mode of delivery, complications during and after delivery, and blood glucose level.

Tools Validity
Tools were submitted to five experts in the field of, maternity nursing and obstetric medicine to test the content & face validity. Modifications were carried out according to the panel judgment on clarity of sentences and appropriateness of content.

Pilot Study
A pilot study was conducted in order to assess the feasibility of the study as well as the clarity and objectivity of the tools, the need to add or omit questions, and the time needed to answer questions. A total of 10% of sample (10) were recruited for the pilot study Based on the result of the pilot study some modifications were carried out on the tool, as adding some questions related to women compliance to the given instruction and some questions related to life style. So, subjects were included in the pilot study were excluded.

Procedure
A primary approval was obtained from the ethical committee of research in the faculty of nursing, Cairo University; an official permission was obtained from the director of El-Manial Obstetrics and Gynecology Hospital to carry out the study. Data was collected through a period of one year from November 2014 to November 2015. The researcher introduced herself to the women and explained the purpose of the study in order to obtain their written consent to be recruited in this study as well as to gain their cooperation. Data collection was carried out through 5 phases: 1) interviewing phase; 2) assessment phase; 3) implementation phase; 4) follow up phase; and 5) evaluation phase

1)- Interviewing phase. The investigator collected data from diabetic pregnant women through interview. a) Interviewing. During the initial visit, the investigator met the diabetic pregnant women visited for the first time at antenatal outpatient clinic in the interviewing phase, all diabetic pregnant women were interviewed with (structured interview) to collect data related to personal data, medical history, obstetric history, as well as clinical features of gestational diabetes mellitus 2)- Assessment phase. In this phase, physical examination was done by the investigator to the diabetic pregnant women this was included measurement of height, weight and calculation of their body mass index (BMI) through divide the new weight in kg, by height in meters squared (wt/ htm2). After that, the researcher checked the level of blood glucose fasting and after two hours, blood pressure, type of medical treatment. This assessment was repeated for the diabetic women after the 6th week and at the end of 12th week in the subsequent visits before timing of delivery. This assessment was

done for every woman diagnosed as gestational diabetes at outpatient clinic. At the same phase the researcher assessed the base line knowledge of the women about the disease, their nutritional life style and their hygienic care through pre test sheet. 3- Implementation phase. The instructional teaching program was provided to the women through structured booklet that consisted of instructions and knowledge about the disease, diet, and hygienic care. which started immediately after assessment and it consisted of one teaching session with a period of 30 minutes, the session took about 20- 30 minutes; in each teaching session, which started at the beginning of the 28 weeks of pregnancy and it included knowledge about nature of gestational diabetes. The investigator discussed with diabetic pregnant woman, meaning of the disease, types of gestational diabetes, the symptoms and signs of gestational diabetes, effect of gestational diabetes on pregnancy and effect of pregnancy on gestational diabetes, the expected pregnancy outcomes with uncontrolled gestational diabetes, monitor blood sugar level frequently. 4)- Follow up phase. It was carried out after 6 weeks from the first visit, to evaluate the effect of the instructional program on improvement of the maternal status which may reflected by level of blood glucose and weight. 5)- Evaluation phase. after 12 weeks from the 1st session for the purpose of evaluating the improvement of maternal status, knowledge by post-test and final evaluation was done by post test sheet and postpartum assessment to evaluate the maternal outcomes.

Ethical consideration

A primary approval was obtained from the research ethics committee of Faculty of Nursing Cairo University to conduct the study. Each participant was informed about the purpose of the study and its importance. Informed written consent was obtained from the participant who are willing to share in the study after explaining the aim of the study and the participants were assured that their participation is voluntary and all data are confidential and anonymous. Every participant has the right to withdraw from the study at any time.

Statistical Design

Statistical package for the social science (SPSS) was used for statistical analysis of data, as it contains the test of significance given in the standard statistical books. Collected data were summarized and tabulated by using descriptive statistics. Parametric inferential statistics (T-test &chi square) used to examine the differences and similarities between pre & post test

Results

Findings of this Pre-posttest quasi experimental research design was presented in three main sections : A. description of the sample by socio- demographic characteristics ,medical history and obstetrical profile are presented in the first section; effectiveness of designed teaching program on knowledge provided to gestational diabetic mothers in the second section, and effectiveness of the designed teaching program on maternal outcomes are presented in the third section.

1. Description of the Sample:

This section includes five parts a) socio-demographic characteristics of gestational diabetic women which includes; age, occupation and duration of work; b) Personal and family medical history c) Anthropometric measures which describes weight(kg), height(cm) and body mass index d) obstetric profile which describes their parity, gravidity, modes of delivery and complications in the previous pregnancy and clinical picture of gestational diabetic women which describes level of blood glucose, significance symptoms affect the course of pregnancy and medications related to the disease.

A. Socio-demographic Characteristics: The sample was consisted of 100 gestatio(nal diabetic women. The mean average age of the sample was ($\bar{x}$ = 31.03 $\pm$ 6.7162), years As half of the sample 50% ranged between (28-37 years of age), whenever 30% of the sample ranged between (18-27 years) and 20% of the sample ranged between (38-45 years). More than fifty percentage of the sample were not working rather than 48% of them were working as 22% were working in clerical work, 9% were working in professional work and 17% were working at hard physical work. 45% of working women were spent (3-7 hours) in their work per day. (Table 1).

B. Personal and family medical history . The majority of the sample 78% has no history of chronic medical disease, similar to 81% of them has no family history of medical disease . Hypertension was the most common chronic disease among 15% of women had medical chronic disease out of 22%. (Table 2).

D. Obstetric profile : During the previous pregnancy, the majority of gestational diabetic women (73%) had complications in previous pregnancy. The complications were primarily preterm labor (16%), premature rupture of membrane (26%), postpartum hemorrhage (5%), preeclampsia (4%), post term labor (2%), and abortion (20%). Whenever (38%) of the sample had neonatal and fetal complications in the previous pregnancy, as (14%) still birth, (13%) macrosomic baby, (4%) congenital malformation, (4%) low APGAR score, and (3%) neonatal death. ((Table 3)

Concerning previous pregnancy mode of previous delivery among gestational diabetic women. The highest percentages (38% respectively) were delivered vaginally with episiotomy, while for the least percentages (26% respectively), it was cesarean delivery. Slightly more than half 81% were multigravida, while 19% were primi gravida. The range of gravidity in the sample was 1 – 6 (Table 4).

Section 2. Effectiveness of designed teaching program on knowledge gain among gestational diabetic mothers: This section includes four parts a). distribution of mothers according to the level of knowledge before and after attending the designed structured teaching program, b). distribution of mothers according to compliance of instruction after attending the designed structured teaching program , c) comparison of mean pretest knowledge score with mean posttest knowledge score among mothers attended designed structured teaching program, d) correlation between posttest knowledge score and compliance of instruction score of mothers

A. Distribution of mothers according to level of knowledge before and after attending designed structured teaching program. Pretest and posttest tool used to assess the gestational diabetic mothers for level of knowledge before and after attending the structured designed teaching program ,as the knowledge were related to meaning of gestational diabetes, maternal and neonatal complications, effect of gestational diabetes on pregnancy and so on. the majority of the sample 71% had inadequate knowledge with score (0-9), whenever 24% of them had moderate level of knowledge with score (10-18), and 5% only had adequate knowledge with score (19-27) before attending the program. On the other hand after attending the program adequate and moderate level of knowledge were (51% &49%) (Table 5).

B. Distribution of mothers according to compliance of instruction after attending the structured designed teaching program. An follow up tool was created to assess mother's compliance of instructions after attending the structured designed teaching program, more than fifty percent of mothers had fair compliance with score (13-24), while 41% of the sample had poor compliance with score (0-12). (Table,6).

C. Comparison of mean pretest knowledge score with mean posttest knowledge score among mothers attended designed structured teaching program.

Hypothesis 1: The post- test knowledge score of pregnant women with gestational diabetes attending the designed structured teaching program will be significantly higher than their pre- test knowledge score. Difference between posttest knowledge mean score of gestational diabetic women whose attended the structured designed teaching program had achieved high statistically significant improvement than pretest knowledge mean score (P =0.0001). (Table, 7).

D. Correlation between Posttest Knowledge score and Compliance of instruction score of mothers . To test significant relationship between posttest knowledge level and compliance of instruction which supposed to be reflected through modifications in life style specially diet, and physical activity, and follow instructions of medical team regarding to medications. Pearson correlation coefficient was calculated which revealed a statistically significant weak positive relationship, r value =0.304 was obtained at 0.05 level of significance ,the p value 0.002 < 0.05 confirms a statistical significance. (Table, 8).

Section 3. Effectiveness of the structured designed program on Maternal outcomes among mothers attending the program: This section includes two parts a). distribution of mothers according to maternal outcomes after attending the program ,b) correlation between posttest knowledge score and maternal outcome score of the mothers,

A: Distribution of mothers according to maternal outcome after attending designed teaching program. Maternal out comes were resembled on mode of delivery, level of blood glucose, presence of complication after birth. The majority of the sample had fair out comes 55% with score (4-6), while 45% had good maternal outcomes with score (7-9). (Table 9).

B. Correlation between Post test Knowledge score and Maternal outcome score of the mothers H2. The pregnant women with gestational diabetes who will attend designed structured teaching program will have better pregnancy outcomes. A one way between subjects ANOVA with Post hoc (scheffe) was conducted to compare the effects of posttest knowledge score ($\bar{x}$ = 14.02 ± 0.4964) on maternal outcome ($\bar{x}$ = 7.02 ± 0.184763) in three levels of posttest knowledge ie (Adequate knowledge ,moderate knowledge and inadequate knowledge.) Analysis of variance showed that the effect (impact) of posttest knowledge on maternal outcome was highly significant ($F(2,97)=17.024$, $P < 0.001$). Table (10).

Maternal outcomes were reflected through comparison between maternal complications during current and previous pregnancy. As it was clear reduction in maternal complications for the current pregnancy than in the previous pregnancy, which support the second hypothesis, and considered a positive result from knowledge increment. Table, (11).

Table:(1)
Demographic Characteristics of gestational diabetic women

Variables	group (n= 100)	
	N %	%
Age (in years)		
18-27	30	30
28-37	50	50
38-45	20	20
$\bar{x}$ = 31.03 ± 6.7162		
Occupation		
Housewives	52	52
Working	48	48
Type of work		
Clerical work	22	22
Professional work	9	9
Hard physical work	17	17
Total work hours per day		
3-7 hours	45	45
8-12 hours	3	3
$\bar{x}$ = 38.43 ± 7.019		

Table: (2)
Medical history

Variables	(n= 100)	
	No	%
Previous medical history		
None	78	78
hypertension	15	15
Cardiac	5	5
Renal	2	2
Family history of chronic disease		
None	81	81
Diabetes mellitus	11	11
Hypertension	8	8

Table(3): Obstetric profile

Variables	(n= 100)	
	No	%
Complications of previous pregnancy		
None	27	27
Preeclampsia	5	5
PROM	26	26
Postpartum hemorrhage	2	2
Preterm labor	16	16
Post term labor	4	4
Abortion	20	20
Fetal and neonatal complications occurred in previous pregnancy		
None	30	30
Yes	38	38
Macrosomic baby	13	13
Still birth	14	14
Congenital malformations	4	4
Low Apgar score	4	4
Neonatal death	3	3
Modes of previous delivery		
None	32	32
Normal vaginal delivery	4	4
Vaginal delivery with episiotomy	38	38
Cesarean section	26	26
Primigravida	19	19
Multigravida	81	81

Table (5) : distribution of mothers according to level of knowledge before and after attending designed structured teaching program.

Level of knowledge	Pretest (n=100)		Posttest(n=100)	
Inadequate knowledge (0-9)	f	%	f	%
	71	71	0	0
Moderately adequate knowledge (10-18)	24	24	49	49
Adequate knowledge (19-27)	5	5	51	51

Table (6): Distribution of mothers according to compliance of instruction after attending the structured designed teaching program

Level of compliance of instruction	N=(100) n= (100)	
	f	%
Poor Compliance (0-12)	41	41
Fair compliance(13-24)	59	59
Good compliance (25-36)	-	-

Table; (7). Comparison of mean pretest knowledge score with mean posttest knowledge score among mothers attended designed structured teaching program.

Knowledge	Mean	Mean difference	't'	df	Level of Significance (α value)	P value
Pretest	13.38 ±0.50	0.64	4.003*	99	0.05	0.0001
Post test	14.02± 0.49644					

Table (8). Correlation between Posttest Knowledge score and Compliance of instruction score of mothers

Variable		SD	Coefficient of Mean Correlation	P value	Level of Significance (α value)	Remarks
Posttest knowledge score	18.45	6.21	0.304058836	0.002101	0.05	Significant
Compliance of instructions score	14.26	4.24				

Table (9) : Distribution of mothers according to maternal outcome after attending designed teaching program

Maternal outcomes	f	%
Excellent Outcome (10-12)	0	0
Good Outcome (7-9)	45	45
Fair Outcome (4-6)	55	55
Poor Outcome (0)	0	0

Table (10): Correlation between Post test Knowledge score and Maternal outcome score of the mothers

Source of variation	Sum of Squares	DF	Mean Square	F	P Value
Between groups (Post test knowledge - influence factor)	87.8047	2	43.9023	17.024	P < 0.001
Within groups (other fluctuations)	250.1553	97	2.5789		
Total	337.9600	99			

Table (11): comparison between maternal complications during current and previous pregnancy.

	Current Pregnancy n=100		**Previous Pregnancy n=73**		**Maternal Complication Odds ratio**	
	Present	Absent	Present	Absent		
Preeclampsia	3	97	8	65	OR =0.2513 FET	P=0.05* p=0.55
Pre rupture of membrane	6	94	20	53	OR=0.1691 χ^2 = 15.1	P=0.0001* p<0.0001*
Antepartum hemorrhage	1	99	6	67	OR =0.1128 FET	P=0.02292* p=0.043*
Postpartum Hemorrhage	5	95	10	63	OR=0.3316 χ^2 = 4.03	P=0.05* p=0.045*
Preterm	8	92	14	59	OR = 0.3665 χ^2 = 4.75	P=0.03758* p=0.029*
Post term	3	97	8	65	OR=0.2513 FET	P=0.05* p=0.55
Vaginal tear	1 (n=70)	69	2(n=42)	40	OR =0.28 FET	P=0.55 p=0.209
Abortion	0	100	32	41	OR = 0 FET	p=0.0001*

Discussion

Findings of the current study are discussed within the following frame of references:- a) the sample, b) effect of designed structured teaching program on knowledge gain c) effect of designed structured teaching program on maternal outcomes.

Maternal age is one of the factors in gestational diabetes mellitus and is associated with a variety of complications.

According to Neelakandan R, & Sethu PS (2014). There were increased association of GDM with infertility, advanced age, obesity, family predisposition and parity. The study results are consistent with a majority of published literature related to maternal age. In this study there is 20% of the sample ranged between (38-45) years old. In a similar study, Hansberg M, Rosenberg KD, Donatelle RJ (2010) reported that risk factors for GDM include higher parity, advanced maternal age, family history of diabetes mellitus, non white race and overweight . On the other hand our result of the current study estimates that there's a positive relation between young age and GDM as 30% of the sample were ranged between (18-27) years old. While Chen L, Shanshan LI, Chunyan He, Yeyi ZH, Germaine M. etal (2016) reported that women who began having menstrual cycles at

younger age are at greater risk of developing gestational diabetes mellitus.

The current study results are consistent with a majority of published literature related to level of knowledge and awareness for GDM. Sayed Y, (2016) shows that only a small proportion of rural antenatal women (17.5%) had good knowledge, 56.7% had fair knowledge, and 25.8% women had poor knowledge about GDM. A greater proportion of the women were aware of the conditions of DM and GDM. Awareness about time of diagnosis of GDM, diet, and exercise as a treatment option for GDM, and about the probability of untreated GDM posing a risk to the unborn child was also high among the study women. According to the current study the majority of gestational diabetic women before attending the designed structured program 71% were had inadequate knowledge with score (0-9), while 24% of them had moderate level of knowledge with score (10-18), and small proportion of them 5% had adequate knowledge with score (19-27). While the majority of the gestational diabetic women had adequate and moderate level of knowledge .

Maternal outcomes include; level of blood glucose, pattern of weight gain, mode of delivery, and complications which occurred during pregnancy and labor. Most of the sample had fair and good maternal outcomes (55%&45&) with score (4-6 & 7-9). Regarding to level of blood glucose, association between posttest knowledge score and level of blood glucose in the current pregnancy was done, it was not significant with P value =0.37, which means that gestational diabetic women who had attended the program had more knowledge, but with poor compliance as the level of blood sugar does not decreased or being affected with the level of knowledge in the current pregnancy. That was in consistent with Sen E, Sirin A (2014) in their study for post education blood glucose follow up for the intervention group as P value of pre-prandial level was 0.011, P value of postprandial level was 0.007.

The current study results are consistent with a majority of published literature related to level of knowledge and awareness for GDM. Sayed Y, (2016) shows that only a small proportion of rural antenatal women (17.5%) had good knowledge, 56.7% had fair knowledge, and 25.8% women had poor knowledge about GDM. A greater proportion of the women were aware of the conditions of DM and GDM. Awareness about time of diagnosis of GDM, diet, and exercise as a treatment option for GDM, and about the probability of untreated GDM posing a risk to the unborn child was also high among the study women. According the current study the majority of gestational diabetic women before attending the designed structured program 71% were had inadequate knowledge with score (0-9), whenever 24% of them were had moderate adequate level of knowledge with score (10-18), and small proportion of them 5% were had adequate knowledge with score (19-27). Whenever majority of the gestational diabetic women were had adequate and moderate adequate level of knowledge (51% &49%) after attending the program.

According to our study the mean post test knowledge score (18.45) of gestational diabetic women was significantly higher than their pre-test knowledge score which supports the researcher hypothesis, that are consistent with study done by Sen E, Sirin A (2014) indicates & the effect of gestational diabetes mellitus training up on metabolic control, maternal and neonatal outcomes, This study, performed with the objective of characterizing the effect of patient education according to HPM and Social-Cognitice Theory in pregnants with GDM, showed patient education contributed to a major improvement in Gestational Diabetes and Management Achievement Test mean scores and metabolic control follows-up scores in intervention group, however didn't contribute in usual care group. This result confirms the hypothesis of the study. Starting from these findings, it is believed that the education given to intervention group is effective in the blood glucose regulation and to increase the level of knowledge about GDM of the pregnant women.

Conclusion and Recommendations

Based on the findings of the present study, it can be concluded that structured designed teaching program have a crucial impact on maternal outcomes that was reflected on decreasing maternal complications during and after birth, compared with the previous delivery. Post test knowledge score was higher than pretest knowledge score and was statistically significant with maternal outcomes. Based on the study findings, the following are suggested:

- Raise pregnant mother's awareness regarding Gestational Diabetes Mellitus, definition, diagnosis, symptoms and signs , frequency of antenatal visits, and ways to adopting healthy life style as follow dietary program and practice exercises.
- Ante natal care unit should contain scheduled classless focused on risk factor during pregnancy such as GDM, with consistency of work through distributing booklets as a guidance for mothers who are at risk.
- Further studies are needed to evaluate the impact of maternal compliance to the given instruction on pregnancy outcomes.

.

Acknowledgement

I would like to thank all women who agreed to participate in the study and help the author to accomplish this study.

References

1. Sugiyama T, (2011) Management of Gestational Diabetes Mellitus, Journal of the Japan Medical Association vol, 139, no 10 pp: (2089-2094).
2. Sen E, Sirin A, (2014) The effect of gestational Diabetes Mellitus Training up on Metabolic control, Maternal and Neonatal outcomes, International Journal of caring sciences vol 7 issue 1
3. Konong S, Hoogenberg K, Luters HL & Bruce HR (2016) Gestational diabetes Mellitus current knowledge and unmet needs .Journal of Diabetes published by John Wily and Sons Australia.
4. Buchanan, TA etal,(2012) Gestational Diabetes Mellitus : Risks and management during and after pregnancy volume 8 pp: (639-649) www.nature.com/nrendo.
5. Sachdev P (2011) Gestational Diabetes Mellitus and Indian women cited from www. onlymyhealth.com/gestational-Diabetes-Indian Women- 1274682341).
6. Church D, Halsall D, Meck C, Parker R et al, (2011) Random Glucose measurement at antenatal booking to screen for overt Diabetes in pregnancy, vol 34 pp: 2217-2219.
7. David E , Dunger SH, Shane B, & Norris A, (2014) Management of gestational diabetes Mellitus vol 10 pp:(1104-1109).
8. Nankervis A, Conn J, (2013) Gestational Diabetes Mellitus Negotiating the confusion Australlian Family Physician vol 42, no .8
9. World Health Organization (2015) Diagnostic criteria and classification of hyperglycemia first detected in pregnancy. Available from http://apps.who.int/iris/bitstream/10665/85975/1/WHO_ NMH_MND_13.2_eng.pdf, accessed 20 Apr 2015.
10. Chumu A, Chilibu CM, Koch SF, (2013) Gestational Diabetes Mellitus and pregnancy outcomes vol 54 pp:(256-280).
11. Pervin J, Moran A, Rahman M, Razzaque A et al, (2012), Association of antenatal care with facility delivery and perinatal survival - a population-based study in Bangladesh. BMC Pregnancy Childbirth. 2012 Oct 16;12:111. doi: 10.1186/1471-2393-12-111
12. Metzger BE, Gabbe SG, Persson B et al (2010) International Association of Diabetes and Pregnancy Study Groups recommendations on the diagnosis and classification of hyperglycemia in pregnancy. Diabetes Care 33:676–682
13. National Institute for Health and Care Excellence (NICE) (2015) Diabetes in pregnancy: management of diabetes and its complications from preconception to the postnatal period. Clinical guideline NG3 (2015). Available from www.nice.org.uk/guidance/ng3/ resources/diabetes-in-pregnancy-management-of-diabetes-and-itscomplications-from-preconception-to-the-postnatal-period51038446021, accessed 20 Apr 2015
14. Alfadhli E, (2015) Gestational Diabetes Mellitus Saudi Med J vol 36(4) www.smj.org.sa.
15. Neelakanadan R, Sethu PS, (2014) Early universal screening for gestational diabetes mellitus . Journal of clinical and diagnostic research published online .
16. Hunsberger M, Rosenberg RD, Donatelle RJ, (2010) Racial/ ethnic disparities in gestational diabetes mellitus: findings from a population- based survey. women's health issues. 20(5):323-328 cross ref pubmed.
17. Chen L, Shanshan LI, Chunyan HE, Zhu Y, et al (2016) Age at menarche and risk of gestational diabetes mellitus: A prospective cohort study vol 27 pp:(482-506) Women diabetes care.
18. Sayed Y, (2016) A study to determine awareness of gestational diabetes mellitus amongst pregnant women coming for antenatal care in a medical college hospital situated in rural area of Jaipur, Indian Journal of applied research volume:6 issue1.