# Impact of Diet and Exercise Protocol for Pregnant Diabetic Women on Pregnancy and Labor Outcomes

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*Abstract:* **Normal pregnancy is a non pathological condition characterized by a series of complex hormonal adaptations that occur to ensure that sufficient glucose is available to meet the nutritional requirements of the growing fetus without causing maternal hypoglycemia. Hyperglycemia, a hallmark of diabetes, it is an important cause of maternal and fetal complications in pregnancies of women with any type of diabetes. Generally, the pregnancy in women with diabetes is associated with high risk of obstetric and neonatal complications, morbidity and mortality. Aim*: Evaluate the impact of diet and exercise protocol for pregnant diabetic women on pregnancy and labor outcomes. Subjects and methods: Quasi experimental Research – design was carried out in this study, Sample size was estimated to be100 individuals divided into two groups, one control group (50 case) and one study group (50 case) conducted at the Obstetric and Gynecology department (Antenatal clinics, labor ward) in Suez Canal University Hospital , Maternal and child Health Centers in Ismailia City. Results*: This study revealed that there are no statistical significant difference between two groups ( control and study) in pre intervention , also revealed that there high statistical significant difference between pre and posttest in study group regarding to short and long term complications related to diabetes during pregnancy as body mass index ,blood glucose level , blood pressure level of women , macrosomia , shoulder dystochia of their babies. Conclusion: This study found that lifestyle intervention which include change in diet and exercises behavior showed significant benefit in risk factors that are known to be associated with development of short and long term maternal complications as uncontrolled in blood pressure ,blood sugar level , pre-eclampsia , eclampsia and perinatal complications as macrosomia , shoulder dystochia ,cardiovascular disease. Incidence of gestational diabetes can be prevented through increased awareness and education of pregnant women about having appropriate lifestyles during pregnancy and any intervention that would lead to improved lifestyle. Recommendations: it is important to counsel diabetic women regarding the Pregnancy should be planned in women with preexisting diabetes, which includes a strict metabolic control with near or near-normal glucose levels, reached through lifestyle modifications, a healthy diet, and an exercise planning program to avoid short and long term complications for maternal and perinatal complications .**

*Keywords:* **Diabetes, Exercise, Diet, Pregnancy, Labor, Women, Fetus.**

## 1. INTRODUCTION

Women with GDM are at risk for short term and long term consequences of the disease. Complications associated with GDM for the mother include an increased risk of prolonged labor, postpartum hemorrhage, polyhydraminos, and infection *(Schillinger, 2016).* Cesarean section rates are high in women with GDM due to cephlopelvic disproportion and macrosomia leading to increase risk for postpartum complications associated with a surgical procedure *(Alfadhli etal., 2017).*

The most common fetal and neonatal adverse outcomes found in pregnancies and labor of women with diabetes are fetal and neonatal loss, a great variety of congenital abnormalities and gross malformations, premature delivery, fetal growth acceleration and macrosomia  which associated with several obstetric complications like birth trauma, hypertrophic cardiomyopathy, stillbirth, respiratory distress syndrome, neonatal hypoglycemia, hypocalcemia, hyperbilirubinemia and polycythemia **(Annsophie,*2016)*.

In women with DM, dietary improvements and regular physical activity are sufficient to manage hyperglycemia, management of blood glucose levels ensures better pregnancy outcomes and improves the health of both the mother and the fetus **(Bellamy etal.,2017).** Regular exercise and  diet help keep glucose level in the normal range and has many other benefits, including controlling weight, boosting energy, aiding sleep, and reducing backaches, constipation, and bloating. Diabetic Women may be able to control it with lifestyle management during pregnancy*(***Calvin***,2016)*.

Pregnant diabetic women should have a clinical evaluation prior to starting an exercise, to ensure that there are no medical contraindications, and that women was encouraged to participate in walking , aerobic and strength-conditioning exercises. Before starting exercises should wear loose fitting, breathable clothing and supportive shoes, warm up before exercise, exercise stopped when woman feeling with dyspnea , sweeting **(ACOG,2015).** Exercise frequently 4to5 days per week to get the blood glucose advantages of an exercise program. Those moderate intensity activities such as walking for 20–30 minutes each  day *(Health line.com*,**2018) .**

The role of the nurse in delivering for women with gestational diabetes is considered an essential part in managing client's condition. As nurses working with gestational diabetic women, a number of responsibilities are involved in care of client with gestational diabetes including assessment and providing optimal intervention. Effective assessment will enable the nurse to create appropriate  plan  regarding  client's  condition  and provide best care. the nurse  assess  other factors that could affect client's health such as safety of living environment. types of daily living activities, medication awareness and compliance, and parenteral nutrition**(Cianni et al ,2017)**

In 2015, there were an estimated 199,5 million women worldwide with diabetes. By 2030, this number is expected to rise to 313,3 million women worldwide, two out of every five women with diabetes are of reproductive age, accounting for over 60 million women worldwide **( Morrish etal.,2017)**

Morbidity and mortality rates are also higher among pregnant women with diabetes. Rates of pre-eclampsia (12.7%), Cesarean section (44.3%) and maternal mortality (0.6%) found among women with type 1 diabetes are considerably higher than in the background population **(Frisch etal.,2016) .** So ,the present study will show light on the importance of following protocol of healthy diet and exercises for pregnant diabetic women

**Aim of study:**

Evaluate  the impact of diet and exercise protocol for pregnant diabetic women on pregnancy and labor outcomes.

**Research objectives**

- Determine the profile of pregnant diabetic women

- Determine the women eating and exercise habits during current pregnancy.

- Estimate the impact of protocol guidelines about diet and exercises on the pregnancy and labor outcomes .

**Research hypothesis**

Diet protocol followed by pregnant women will show positive impact on maternal, fetal, and neonatal outcomes during pregnancy and labor in the study group when compared with control group .

Exercise protocol followed by pregnant women will show positive impact on maternal, fetal, and neonatal outcomes during pregnancy and labor in the study group when compared with control group

## 2. SUBJECTS AND METHODS

**Technical design**

**Study design:**

The design of this study a quasi- experimental design was used to achieve the aim of the study

**Setting**

The study was conducted at the Obstetric and Gynecology department (Antenatal clinics, labor ward) in Suez Canal University Hospital , Maternal and child Health Centers in Ismailia City These places provide free services to women who are resident in Ismailia city.

**Subjects**

A purposive sample of pregnant diabetic women attended out-patient clinics of the maternity hospitals of Suez canal University were chosen over a period of one year , the sample of this study was included 100 women according inclusion and exclusion criteria and was divided into two equal groups {study group ,control group} each group included 50 women, according to the following criteria.

**Target population:** pregnant diabetic women.

**Inclusion criteria:-**

▪ Women from (18-45) years .

▪ Women at second trimester of pregnancy

▪ Women have blood glucose level more than normal

**Exclusion criteria**.

▪ Women with any chronic or acute diseases as cardiac disease , restrictive lung disease.

▪ Women with incompetent cervix or cerclage, multiple gestation at risk of preterm birth, persistent second or third trimester bleeding, placenta previa after 26 weeks' gestation, preterm labor ruptured membranes, pre-eclampsia or pregnancy-induced hypertension, severe anemia (**The American College of Obstetricians and Gynecologists ,2015).**

**Sample size**

The sample size for through one year was chosen in compliance according to the total number ratio through of women attending in outpatient clinic, the study sample will comprise 10% equally (100 ) of the total number of women attended in out –patient clinic

**Tools of data collection**

**First tool: An interviewing questioner (Appendix I):**

This tool was used before starting study intervention. it include 2 parts:

**Part (1) Socio demographic characteristics as** age, age at marriage, residence, level of education, occupation, ……. (8 questions**)**

**Part (2 )** it concerning with history of pregnant diabetic women which include the following

a-  **Obstetrical history as** number of gravidity, Parity, abortion,..…… (4 questions)

b-  **Past medical history** as onset of diabetes, family history of diabetes, type of diabetes,.…… (23 questions)

c-  **Present history:** as measurement of blood glucose level, type of treatment, and present complains. (21questions)

**Second tool: physical assessment sheet for observation (Appendix II):**

It was used pre - post starting study intervention , it include 3 parts:

**part (1)** Assessment of body mass index

**part (2)** Assessment of blood pressure level

**part (3)** Assessment of blood glucose level

**Classification of body mass index = <u>weight in (kg)</u>**

$$\text{Height (m)}^2$$

| Item | BMI |
|---|---|
| Normal | 18.5-24.9 |
| Overweight | 25-29.9 |
| Obese | 30-339.9 |
| Morbidly | 40 or higher |

**Classification of blood pressure for adults**

| Classification | Systolic BP (mm Hg) | Diastolic BP Pressure (mm Hg) |
|---|---|---|
| Normal | 110-139 | 60–89 |
| Hypertension | 140–159 | 90–99 |
| Hypotension | <110 | <60 |

**Classification of blood glucose levels**

| Blood glucose level | mg/dL |
|---|---|
| Normal | 70 mg/dL to 140 mg/dL |
| Hyperglycemia | Above 180 mg/dL |
| Hypoglycemia | Below 70 mg/dL |

**Third tool: Antenatal assessment check list (Appendix III):**

This tool will be used after starting study intervention and based on patient medical record , it include 2 parts:

**Part (1) Maternal complications assessment :**

Hypertensive disorders of pregnancy (pre-eclampsia and eclampsia ) , hyperglycemia , eye, skin ,gastric problems, …… (8 Items )

**Part (2) Fetal complications assessment :**

congenital abnormalities and malformations **-** fetal growth acceleration **-** Neurosensory disability. (3 Items)

**Part (3) Assessment degree of satisfaction** of gestational diabetic women post program (3 questions)

**Fourth tool : Intra partum assessment check list (Appendix VI)**

This tool will be used after starting study intervention during labor, it include 2 parts:

**part (1) Maternal complications assessment**

Disturbance in glucose level, Increase risk for cesarean section , Cephalopelvic disproportion , Prolonged labor , Obstructed labor, Dystocia (6 questions).

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**part (2) Neonatal complications assessment**

Macrosomia, Shoulder dystocia, Intrauterine asphyxia, Sudden intrauterine fetal death (4 questions)

### Operational design

### A- Pilot study

It was carried out 10% (10) of pregnant women with gestational diabetes to evaluate the validity, reliability and applicability of the tool, these women was excluded from the study sample, According to the results of the pilot, tools modifications was done therefore, the rewording or rephrasing of statements was done, also, any modification in the protocol. It also helped in the estimation of the time needed to fill the form.

### B – Field of work

- Data collection for this study was carried out through one year from January 2018 to January 2019

- The sample was collected in the antenatal clinics for pregnant diabetic women according the inclusion and exclusion criteria at the **second trimester** ($4^{th}$ or $5^{th}$ or $6^{th}$ month of gestation ) by researcher through three days per week. The researcher was attended to the hospital at 9:00 am to 3:00 pm. The studied sample fulfilling the research criteria was assigned into two groups (study group and control group ) by systemic allocation where the first 2 women was assigned into study group, then the other 2 women was assigned into control group.

- After introducing myself and explain the purpose of the study to the subjects and the written consent from every participants to share in the study. An interviewing questionnaire was done & physical assessment was done by measurement weight & height to assesse body mass index , also measured blood pressure and blood sugar. Assessed knowledge about diabetes ,diet and exercises for pregnant diabetic women (pre- test) .

- All tools lasted 30 – 35 minutes for each women included in the study.

- Face to face interview by using structured questionnaire was done by the researcher for all women (at $4^{th}$ or $5^{th}$ or $6^{th}$ month of gestation) in the two groups in the antenatal clinics, . **The control group** received standard prenatal care only according Suez Canal University Hospital . **The study group** in addition, standard prenatal care, received nutritional and exercise protocol (intervention) which include four sessions ( two sessions about exercises and two session about diet regime ).

- In antenatal clinics all women in the study and control groups will be assessed using antenatal assessment check list to evaluate maternal and fetal outcomes during pregnancy .

- The educational program was developed and implemented by researcher for study group only in the form of health education.

- Booklet included information about gestational diabetes, diet and exercises knowledge for pregnant diabetic women designed by researcher and distributed to the pregnant diabetic women .

- A post-test was done after the program implementation

- Follow up was done after three months of intervention (from $7^{th}$ to $9^{th}$ month of gestation) as woman who started study in $4^{th}$ month of gestation the follow up was done in $7^{th}$ month of gestation , woman who started study in $5^{th}$ month of gestation the follow up was done in $8^{th}$ month of gestation, woman who started study in $6^{th}$ month of gestation the follow up was done in $9^{th}$ month of gestation in antenatal clinics for all participants in the two groups (study group and control group ).

- In the time of labor all women in the study and control groups will be assessed using intra partum assessment check list to evaluate maternal and fetal outcomes during labor .

**Educational program for pregnant women with gestational diabetes**

**Time allocated:**

The program was applied in the waiting area in outpatient clinic from 9 am – 3 pm through 3 days per week.

**Target population**

Sample of pregnant diabetic women attended in out – patient clinic with one year of data collection.

**c- Program description**

Based on identified, educational needs of the pregnant diabetic woman , its mean, causes, clinical manifestation , complication , signs of hypoglycemia and hyperglycemia, number and regularity of meals, foods avoided, regularity and type of exercise performed, points to keep in mind before starting , recommended exercise during pregnancy, exercises to avoid during pregnancy, and benefits of exercise during pregnancy

**Implementation phase**

Implementing of educational program and its content according to its objectives, this program was designed to pregnant diabetic women to study the effect of educational program on outcomes for pregnant diabetic women and infant . it was done through sessions, the health education sessions was given two days in a week / four weeks with a total of 4 sessions each session take 1 hour

**Finally: the evaluating phase**

In this phase estimating the effectiveness of health educational program on pregnant diabetic women was done. Health educational program outcomes were assessed through pre and post test through comparing the change in pregnancy and labor outcomes .

**ADMINISTRATIVE DESIGN**

Before conducting the study an official permission was taken from the director of Suez canal University Hospital, Maternal and Child Health and the head of Obstetrics and Gynecology department. written informed consent obtained from each women included in the study. It included full explanation of the procedure, and rights for privacy and confidentiality.

**Ethical considerations:**

The study follow common ethical principles in clinical research. written consent obtained from women or guidance that are willing to participate in the study, after explaining the nature and purpose of the study. Subjects' privacy considered during collection of data and confidentiality and anonymity was assured. All study subjects have the right to refuse to participate and or withdraw from the study without any rational. Before conducting this study the research proposal was approved from ethical committee in Faculty of Nursing.

**4- Statistical design**

Data was categorized, coded and was entered using excelling while statistical analysis was done using statistical package for social sciences ( SPSS ) version 16. Data collected were analyzed and results were presented in tables and graphs using frequency distribution tables. The percentages were used in all tables. The statistical significance of observed differences was assessed using chi square

**<u>Obstacles and limitation of the study:</u>**

- some women refused attending to follow up in next visits .

## 3. RESULTS

**Table (1): Distribution of the diabetic women in two groups according to their socio demographic characteristics**

| Variable | Control N=(50) | | Study N=(50) | | Chi square test | |
|---|---|---|---|---|---|---|
| | Pre | | Pre | | | |
| | No. | % | No. | % | $X^2$ | P value |
| **Age** | | | | | | |
| • 20-25 | 18 | 36.0% | 20 | 40.0% | 0.657 | 0.720 |

| | | | | | | |
|---|---|---|---|---|---|---|
| • 25-30 | 10 | 20.0% | 7 | 14.0% | | |
| • 30-35 | 22 | 44.0% | 23 | 46.0% | | |
| **Educational level** | | | | | | |
| • Illiteracy | 7 | 14.0% | 5 | 10.0% | 0.520 | 0.914 |
| • Read &write | 8 | 16.0% | 9 | 18.0% | | |
| • secondary education | 21 | 42.0% | 23 | 46.0% | | |
| • High education | 14 | 28.0% | 13 | 26.0% | | |
| **Occupation** | | | | | | |
| • Housewife | 31 | 62.0% | 32 | 64.0% | 0.043 | 0.835 |
| • Employment | 19 | 38.0% | 18 | 36.0% | | |
| **Residence** | | | | | | |
| • Rural | 15 | 30.0% | 20 | 40.0% | 1.099 | 0.294 |
| • Urban | 35 | 70.0% | 30 | 60.0% | | |

**Table (2): Distribution of the diabetic women in two groups according to their body mass index.**

| Variable | Pre | | | | Chi square test | | Post | | | | Chi square test | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Control N=(50) | | Study N=(50) | | | | Control N=(50) | | Study N=(50) | | | |
| | No. | % | No. | % | $X^2$ | P value | No. | % | No. | % | $X^2$ | P value |
| **Body mass index** | | | | | | | | | | | | |
| Normal ( 18.5-24.9 ) | 7 | 14.0% | 6 | 12.0% | 0.125 | 0.988 | 6 | 12.0% | 17 | 34.0% | 7.808 | 0.050 |
| Overweight ( 25-29.9 ) | 8 | 16.0% | 8 | 16.0% | | | 8 | 16.0% | 8 | 16.0% | | |
| Obese 39.9 | 10 | 20.0% | 11 | 22.0% | | | 11 | 22.0% | 10 | 20.0% | | |
| Morbidity 40 or higher | 25 | 50.0% | 25 | 50.0% | | | 25 | 50.0% | 15 | 30.0% | | |

**Table (3): Distribution of the diabetic women in two groups according to their blood glucose level.**

| Variable | Pre | | | | Chi square test | | Post | | | | Chi square test | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Control N=(50) | | Study N=(50) | | | | Control N=(50) | | Study N=(50) | | | |
| | No. | % | No. | % | $X^2$ | P value | No. | % | No. | % | $X^2$ | P value |
| **Blood glucose level** | | | | | | | | | | | | |
| In normal range | 10 | 20.0% | 8 | 16.0% | 0.374 | 0.829 | 10 | 20.0% | 30 | 60.0% | 26.750 | <0.001 |
| Hyperglycemia | 30 | 60.0% | 31 | 62.0% | | | 30 | 60.0% | 10 | 20.0% | | |
| Hypoglycemia | 10 | 20.0% | 11 | 22.0% | | | 10 | 20.0% | 10 | 20.0% | | |

**Table (4): Distribution of the diabetic women in two groups according to their blood pressure level.**

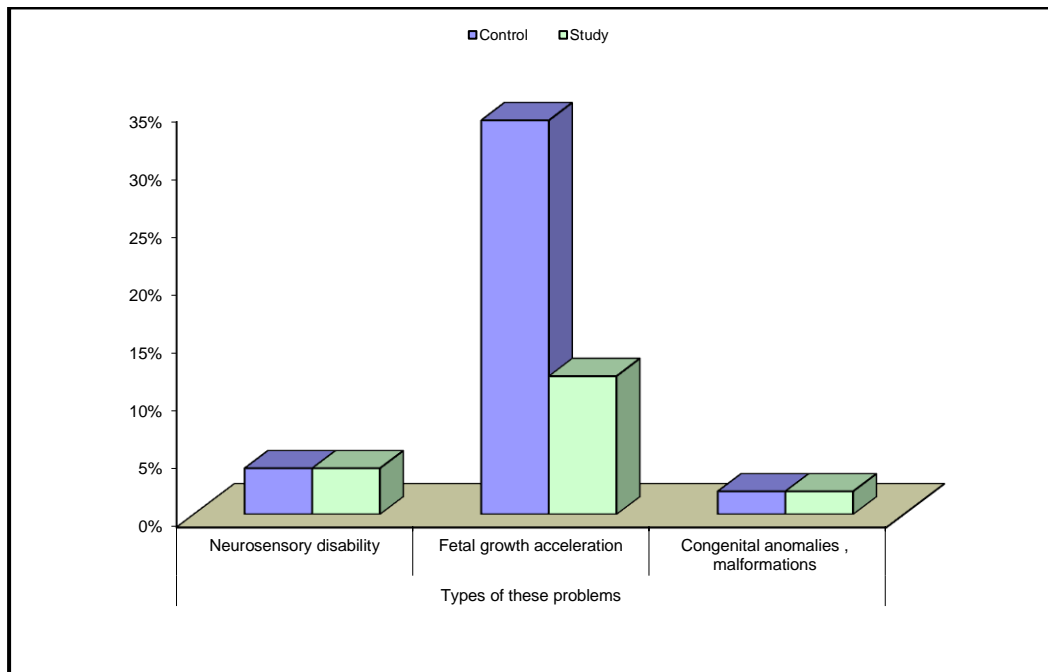| Variable | Pre | | | | Chi square test | | Post | | | | Chi square test | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Control N=(50) | | Study N=(50) | | | | Control N=(50) | | Study N=(50) | | | |
| | No. | % | No. | % | $X^2$ | P value | No. | % | No. | % | $X^2$ | P value |
| **Blood pressure level** | | | | | | | | | | | | |
| In normal range | 8 | 16.0% | 10 | 20.0% | 0.287 | 0.866 | 9 | 18.0% | 30 | 60.0% | 17.250 | <0.001 |
| Hypertension | 32 | 64.0% | 30 | 60.0% | | | 31 | 62.0% | 13 | 26.0% | | |
| Hypotension | 10 | 20.0% | 10 | 20.0% | | | 10 | 20.0% | 7 | 14.0% | | |

**Fig (1): Comparison between two groups as regards their complications of diabetes on fetus post intervention**
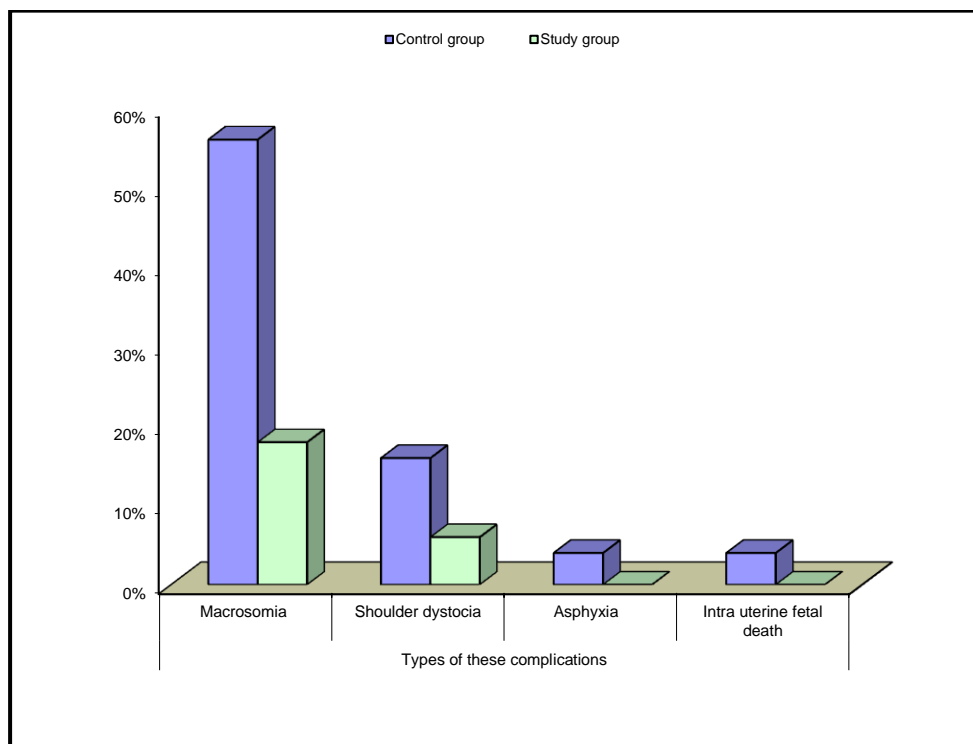


**Figure (2): Comparison between two groups according to the type of complications for babies during labor**

**Table 1 :** shows that there was no statistically significant difference in socio demographic characteristics regarding control and study women. Also reveals that **(44%&46%)** of studied women were in the age group 30-35 and **(42%&46%)** of them had moderate education, **(62%&64%)** of the studied sample was housewife and **(70%&60%)** of them were from urban area

**Table 2 :** shows that there was no statistically significant difference according body mass index between two groups in pretest, reveals **50 %** of studied women morbidity or higher**, ( 20%&22%)** obese and **16 %** overweight**, also** reveals that there

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are statistical significant difference between two groups post educational program regarding to body mass index of women, where **12%** of them normal weight ,**16%** of them overweight, **22%** of them obese, **50%** of them morbidity in control group compared with **34%** of them normal weight **, 16%** of them overweight **, 20%** of them obese, **30%** of them morbidity in study group post educational program.

**Table 3:** shows that there was no statistically significant difference in blood glucose level between two groups in pretest, reveals (**60 %＆62%**) of studied women hyperglycemic **, ( 20%&22%)** hypoglycemic and only **(16 %&20%)** within normal range in pretest, **also** reveals that there are high statistical significant difference between two groups post educational program regarding to blood glucose level of women, where **20%** of them normal glucose level ,**60%** of them hyperglycemic, **20%** of them hypoglycemic in control group, compared with **60%** of them normal glucose level**, 20%** of them hyperglycemic **, 20%** of them hypoglycemic in study group, post educational program.

**Table** 4: shows that there was no statistically significant difference regarding blood pressure level between two groups in pretest, reveals (**60 %＆64%**) of studied women hypertensive **,( 20%&20%)** hypotensive and only **(16 %&20%)** within normal range in pretest, **also** reveals that there are high statistical significant difference between two groups post educational program, where **18%** of them normal blood pressure level ,**62%** of them hypertensive, **20%** of them hypotensive in control group, compared with **60%** of them normal blood pressure level**, 26%** of them hypertensive **, 14%** of them hypotensive in study group, post educational program

**Figure 1:** reveals that there are highly statistical significant difference between two groups post intervention regarding to the effect of diabetes on pregnancy outcomes for fetus, women in study group who received intervention during pregnancy, their babies improved in outcomes of pregnancy , **12 %** only had fetal growth acceleration in study group , compared with **34%** had fetal growth acceleration in control group

**Fig 2:** shows reveals that there are highly statistical significant difference between two groups post intervention regarding to the effect of diabetes on labor outcomes **for baby 56%** of babies had macrosomia in control group, compared with **18%** of babies in study group , **16%** had shoulder dystocia in control group , compared with **6%** in study group.

# 4. DISCUSSION

Regarding to the socio-demographic characteristics of gestational diabetic women, the result of this study revealed that more than two thirds of the studied women ( **46%** ) were in the age group 30-35 because this age is a reproductive age. This result means that the incidence of gestational diabetes was higher in middle age than in younger age and old age. This result agreement with **Reeta** *et al (2015)* study about the risks associated with obesity, gestational diabetes in the University of Eastern Finland**,** found that the age range for mothers with gestational diabetes was 30-35this means that the age play an important role in increasing the incidence of occurrence of gestational diabetes mellitus.

Also different with **Dehiya** et al *(2014)* other studies which carried out in Rohtak , Hyderabad , Jodhpur , found that high GDM prevalence among those ≥25 years of age.

In relation to education and occupation, a majority of the studied women in the current study were moderate educated **(46%)** . The majority of them were housewives **.** This result in agree with the result of **Surabhi** *et al* **(2015),** who found increased prevalence of the disease among moderate educated and housewives **( 64% ).** Also agree with **Dave (2014)** study which found the prevalence of GDM positively associated with nonworking group .

Also different with **Rajput (2013)** study showed GDM prevalence significantly associated with higher education. Also different with **Eur (2015)** study carried out in Punjab showed positive association between GDM and illiteracy

In our study almost of women had bad practice, **80 %** don't follow diet plan pre educational program, compared with **96%** follow diet plan post educational program and **50%** not avoided for fat and carbohydrates pre educational program compared with 10% only who not avoided for fat and carbohydrates post educational program **.** This result agree with **Zhang et al (2015),** this study showed the intake of high glycemic index nutrition is positively associated with risk of gestational diabetes

Concerning to walking exercises the study finding that highly statistically significant difference between pre and post educational program, **2%** only who following walking with regularity pre educational program versus **70%** who following

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walking with regularity post educational program similar finding were reported in a study by ( **Deirdre** *et al. 2012)* who reported that walking associated with a significantly lower risk of developing GDM.

The effect of lifestyle interventions ( diet and exercise protocol ) for pregnant diabetic women on pregnancy and labor outcomes is unclear. Only a limited number of studies have investigated this issue and they utilized a range of interventions and methodologies. Interventions included increased physical activity, reduced caloric intake, dietary education, and counseling and education regarding treatment adherence or disease monitoring. In general, these studies indicated a benefit of lifestyle intervention for pregnant diabetic women on pregnancy and labor outcomes

The presented study showed that more than half of the studied women had BMI $\geq$30 & 40 kg/m$^2$ ( **72%)** pre educational program. This result agreement with **Kalyani et al (2014**) and **Nanda** *et al* **(2014)** found high GDM prevalence among BMI $\geq$30 kg/m$^2$ based on the WHO criteria. Also agree with **Xiong (2011)**, study carried out in Canada which revealed a positive association between National Diabetes Data Group-defined GDM and pre gravid obesity (weight >91 kg).

In our study finding illustrated that highly statistically significant difference between pre and post educational program according BMI which showed **34%** were within normal post educational program compared with **12%** within normal pre educational program **,** this result agree with **Avery et al (2012)** a study showed that Changing physical activity behavior in type 2 diabetes which found significant improvement in BMI with physical activity

In our study finding illustrated that highly statistically significant difference between pre and post educational program according blood sugar level, more than half of diabetic women **(60%)** had normal level of blood sugar post educational program **versus (16%)** only had normal level of blood sugar pre educational program **,** this result agree with **Evenson et al (2012**) a study showed that participation in physical activities reduces blood sugar concentration, increases sensitivity to insulin, improves cardiovascular system, and reduces body fat. There is evidence that indicates these beneficial effects on sensitivity to insulin and beta cells happen during pregnancy.

In our study finding illustrated that highly statistically significant difference between pre and post educational program according blood pressure level **,** which found about **60%** within normal range according study group **,**while about **18%** within normal range in control group. This findings agree with **Koivula et al (2015)** a study showed that Exercise and diabetes-related cardiovascular disease which found physical activity reduced the risk of cardiovascular disease in women with diabetes for interventional group compared with control group.

Also , our findings agree with **Balducci et al. (2014)** a study showed that effect of an intensive exercise intervention strategy on modifiable cardiovascular risk factors in subjects with type 2 diabetes mellitus which found significant improvement in both systolic and diastolic blood pressures with supervised aerobic and resistance training.

Concerning to the effect of diabetes on labor outcomes for mother and her infant found high differences between study and control group post educational program for study group **,** women in study group who received intervention during pregnancy improved in outcomes of labor within **(76%)** compared with **(20%)** only women had not problems in control group who not received intervention, **18%** of women in study group which received intervention had macrosomic baby versus **56%** of women in control group had macrosomic baby ,this findings agree with **howard (2014**) a study showed that benefit of reducing the risk of excessive fetal weight gain.

In our study founding relative between uncontrolled hyperglycemia and macrosomic .birth injuries (shoulder dystocia) ,showed significance differences between two groups post educational program, **6%** had shoulder dystochia in study group compared with **16%** had shoulder dystochia in women who not received intervention this findings similar with **Zhang et al (2014**) a study showed that the perinatal consequences of macrosomia which found changes between two groups post educational program in birth injuries and confirmed that the risk of birth injury increases with birth weight .

## 5. CONCLUSION

This study results showed that lifestyle of women with gestational diabetes was different from that of healthy pregnant women, so that dietary style, physical activity, were more favorable in healthy pregnant women. Incidence of gestational diabetes can be prevented through increased awareness and education of pregnant women about having appropriate lifestyles during pregnancy and any intervention that would lead to improved lifestyle**.**

## 6. RECOMMENDATION

it is important to counsel diabetic women regarding the Pregnancy should be planned in women with preexisting diabetes, which includes a strict metabolic control with near or near-normal glucose levels, reached through lifestyle modifications, a healthy diet, and an exercise planning program to avoid short and long term complications for maternal and perinatal complications .

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