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Role of Exercise In Prevention of Gestational Diabetes Mellitus Among Pregnant Women

Bushra Zulfiqar,[1] Aneesa Matloob,[1] Syed M. Maqsood [2]

ABSTRACT

Objective — *To find out role of exercise in pregnant women in prevention of gestational diabetes mellitus (GDM).*

Study design — *Comparative cohort study.*

Place & Duration of study — *Al-Tibri Medical College, Isra University Campus Karachi, from June 2022 to December 2022.*

Methods — *The participants were assigned to either Group A or Group B on their first visit after performing oral glucose tolerance test. Group A included pregnant women who were encouraged to engage in brisk exercise for thirty minutes three times a week. The brisk walk was defined as 100 steps per minute. Group B consisted of women who received standard prenatal care. All participants were evaluated every two weeks until they reached 28-week of gestation. Compliance was verified at each appointment. Data were recorded using a specially designed form. Chi square test was applied for statistical significance.*

Results — *A total 110 pregnant women filled/answered the questionnaire. The mean age of the pregnant women was 25.56±4.41 years. Of the total, 70 % women were between the age of 18-27 years. There was a significant difference between the number of women diagnosed with GDM between the two groups (Group A: n=1 - 0.9% versus Group B: n=10 - 9.1%) with p=0.009. No significant difference was found between the family history of diabetes mellitus, BMI, congenital abnormality or weight of the baby in past pregnancies.*

Conclusion — *A significant association was noted between physical exercises and frequency of GDM. Other variables studied like maternal age and BMI of pregnant women were found insignificant.*

Key words — *Exercise, Gestational diabetes mellitus, Pregnant women, Lifestyle modification.*

INTRODUCTION:

An estimated 20 million live births, or roughly one in six, worldwide are anticipated to be affected by gestational diabetes mellitus of which over 90% occur in South and Southeast Asian countries.[12] Around 16.8% of pregnancies are affected by GDM worldwide.[3] In normal pregnancy, the women develop physiological changes to meet the demands of the growing fetus.[4] Among these adaptations insulin sensitivity is an important factor that increases in early pregnancy. This increases the intake of sugar into adipose tissue to meet the energy demands later in pregnancy.[5] With passage of time the insulin sensitivity decreases by the surge of local and placental hormones, like progesterone, estrogen, cortisol, leptin, placental growth hormone and placental lactogen.[6] It leads to a small increase in blood glucose level that supports the growth of fetus. The mild form of insulin resistance breaks down fat reserves and promotes the body's production of glucose on its own, which increases blood glucose and free fatty acid (FFA) concentrations.[7]

[1] Department of Obstetrics and Gynaecology
[2] Department of Community Medicine

Correspondence:
Dr. Bushra Zulfiqar [1*]
Department of Obstetrics and Gynaecology
Al-Tibri Medical College
Karachi
Email: drbztehami@gmail.com

With the above mentioned physiological changes a 57.4% rise in the rate of cesarean deliveries is reported. The effects are more pronounced in women with a prior cesarean section or obesity.[8] Premature rupture of membrane (PROM), intrauterine growth restriction (IUGR), macrosomia, spontaneous abortions, neonatal hypoglycemia, respiratory distress, and the requirement for NICU admittance are additional unfavorable pregnancy-related outcomes.[9]

Adverse perinatal outcomes are linked to a high prevalence of maternal poor glycemic control. The burden of gestational diabetes mellitus has increased in parallel with obesity. The challenges to the mother or fetus are less if regular moderate physical activity is carried out during pregnancy. The effect of exercise on the development of gestational diabetes mellitus are still not agreed.[10] This study was conducted to find out the effects of physical exercise on the occurrence of gestational diabetes mellitus to provide an evidence based data.

METHODS:

Study design, place and duration: This was a comparative cohort study conducted in the Department of Obstetrics & Gynaecology, Al-Tibri Medical College Hospital Karachi, from June 2022 to December 2022.

Ethical considerations: The study was approved by Ethical committee by No IERC/ATMC/02-2022/28 and Informed consent was taken from the women.

Inclusion criteria and exclusion criteria: Pregnant women between 18-years to 35-years of age, with history of gestational diabetes mellitus or diabetes in the first-degree relatives, parity 1 to 4, who had previous healthy infants, were included. Women with multiple pregnancies, known diabetics, pregnancy induced hypertension, cardiac diseases, premature labor, and with any chronic illness, were excluded.

Sample size estimation and sampling technique: A total of 110 women were included in the study through non-probability sampling technique. No formal sample size calculation was done as all women who presented during the study period were enrolled.

Study protocol: The gestational diabetes mellitus was described as a fasting blood sugar level of = 100mg/dl or on two hours 75gm oral glucose tolerance test. The null hypothesis stated that there was no role of physical activity (exercise) in prevention of gestational diabetes mellitus. The alternate hypothesis was taken as a positive role of physical activity (exercise) in prevention of gestational diabetes mellitus.

The study participants were divided into groups A or B on their first visit after performing oral glucose tolerance test. Group A comprised of the gravid women who were encouraged to workout briskly for thirty minutes three times a week. The brisk walk was defined as 100 steps per minute. Group B included women who got regular prenatal care only. Each participant was evaluated every two weeks until they reached 28-week of gestation. Patients' compliance was verified at every appointment. Data were recorded and analyzed at weeks 24-28 of gestation.

Statistical analysis:

SPSS 22.0 was used for data entry and analysis. Parity and gestational diabetes mellitus were reported as frequency and percentages. Age and gestation were computed as mean and standard deviation. Chi square test was applied to compare the frequency of GDM between the groups. A p-value below 0.05 was considered as significant.

RESULTS:

A total of 110 pregnant women were included in this study. The mean age of pregnant women was 25.56±4.41 years. Seventy-seven women (70%) were between the age of 18-27-years. The number of women diagnosed with GDM was one (0.9%) in group A and 10 (9.1%) in group B with p=.009. This was statistically significant.(Table-I)

The demographic variables showed that 88 women (96%) were housewife, 46 women (41.2%) had family history of type 2 diabetes mellitus (p=0.787). Sixty-three women (57.3%) had a BMI

Table I: Comparison of GDM Between The Groups

Group	Oral Glucose Tolerance Test		Total	p value
	<150mg/dl	>150mg/dl		
Group A	50	01	51	0.009
Group B	49	10	59	
Total	99	11	110	

in normal range. There was a history of congenital anomalies in newborns in four women (3.6%) during previous pregnancy. Forty-five women (40%) had two children. No significant difference was found between family history of diabetes mellitus, BMI, congenital abnormality or weight of baby in previous pregnancies. (p= 0.009)

DISCUSSION:

The results of our research revealed a significant correlation between physical exercises and pregnancy as it lowered the risk of GDM. The advantage of physical exercises during pregnancy was thus apparent as it helped in preventing gestational diabetes mellitus in number of women enrolled in the study. Studies have indicated that women who engage in regular physical exercise prior to and throughout the early stages of pregnancy are less likely to develop gestational diabetes mellitus.

The results of our investigation are consistent with a study that found a decreased risk of diabetes mellitus in pregnant woman who moderately exercised compared to those who did not. The higher risk of GDM was 1.8% versus 9.41%, respectively between the two groups. Similarly, He J et al results showed that exercises in the early stages of pregnancy reduced the risk of gestational diabetes mellitus.[12] The exercise group risk was 22.0% whereas the control group 40.6%.

A meta-analysis revealed that starting exercises in the first trimester of pregnancy significantly prevented gestational diabetes mellitus (odd ratio:0.57, 95% CI: 0.43-0.75, p=< 0.0001). It is also interesting to note that vigorous activity was not effective in preventing gestational diabetes mellitus (odd ratio=1.09, 95% CI, 0.50-2.38, p=0.83). However, mild-moderate intensity exercises was effective. In our study we could not find a significant association between GDM and maternal age, BMI, previous weight of child and parity.

Limitations of the study: This was a single center study on a small number of pregnant women where many other variables were not taken into the considerations like dietary intake. However, an evidence based data is gathered to further conduct the studies on this problem.

CONCLUSION:

No significant association was found between GDM and maternal age, BMI, previous weight of child and parity. However, physical activity had significant correlation with GDM as its frequency was low.

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Bushra Zulfiqar: Concept, study design, data analysis, manuscript writing and revising.
Aneesa Matloob: Data collection, analysis and manuscript writing.
Syed M. Maqsood: Data analysis and manuscript writing. All authors are accountable for the data presented in this manuscript.

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