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PREVALENCE AND RISK FACTORS OF GESTATIONAL DIABETES MELLITUS IN WOMEN ATTENDING BURDWAN MEDICAL COLLEGE & HOSPITAL IN WEST BENGAL

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ABSTRACT

Introduction: Metabolic adaptations are necessary during pregnancy for the growth and development of the fetus, and also to meet the altered demands of the mother. Pregnancy has been described as a transient excursion into the metabolic syndrome and as a window to women's health.

Aims and Objectives: To understand the prevalence of GDM in patients attending antenatal clinic of our hospital and to focus on the modification of risk factors in this rural and sub urban population. So that, we can prevent the maternal and fetal complications of GDM at an early stage.

Methods: The present observational cross-sectional hospital based study was undertaken in the, Department of Obstetrics and Gynaecology, Burdwan Medical College and Hospital during the period of January 2020 to June 2021. A total of 452 pregnant ladies attending the antenatal clinic.

Results: In GDM group the mean WHR is 0.98 varying from 0.87 to 1.14. In non GDM group the mean WHR is 0.99 varying from 0.79 to 1.09. P value is more than 0.05 (p=0.38) hence not statistically significant. In GDM Group, mean 2 hr. PPBG was 167 mg/dl varying from 140 to 309 mg/dl. In non GDM Group, mean 2 hr. PPBG was 103 mg/dl varying from 40 to 139 mg/dl. P -value < 0.0001 highly significant.

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Conclusion: In conclusion, the prevalence of gestational diabetes mellitus (GDM) continues to rise, influenced by various risk factors such as advanced maternal age, obesity, genetic predisposition, and lifestyle choices. Understanding these factors is crucial for early identification and intervention, which can significantly improve maternal and neonatal outcomes. Public health initiatives aimed at educating women about the risks associated with GDM and promoting healthier lifestyles before and during pregnancy can help mitigate its prevalence. Continued research is essential to develop targeted prevention strategies and improve the overall management of GDM in diverse populations.

Keywords: Gestational Diabetes Mellitus, Prevalence, Risk Factors and Genetics

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INTRODUCTION

Metabolic adaptations are necessary during pregnancy for the growth and development of the fetus, and also to meet the altered demands of the mother. Pregnancy has been described as a transient excursion into the metabolic syndrome [1] and as a window to women's health.[2] Glucose seems to be the major substrate for the human fetus throughout pregnancy. So glucose metabolism has been the most extensively studied, yet little explored, subject of metabolism in pregnancy.

In the pre-insulin era, diabetes was thought to be incompatible with successful pregnancy. Blott [3] in 1856, in Paris concluded that "true diabetes was inconsistent with conception." Even in those who managed to conceive, death from uncontrolled diabetes was exceedingly common.

Diabetes mellitus is one of the oldest diseases known to mankind, being described in ancient texts more than 2000 years back. However definitive medical literature on diabetic pregnancy has been scanty. With the advancement of pregnancy there are progressive changes in the carbohydratemetabolism which along with placental hormones leads to insulin resistance. So, there is compensatory increase in insulin secretion. When our body fails to compensate this diabetogenic excursion, Gestational Diabetes Mellitus develops.[4]

Gestational diabetes mellitus (GDM) is defined as any degree of glucose intolerance with onset or first recognition during pregnancy.[5] The definition applies irrespective of whether insulin or dietary only treatment is utilized and whether the condition persists after pregnancy. It does not exclude the possibility that unrecognized glucose intolerance may have antedated or begun concomitantly with the pregnancy.

The epidemiology of Gestational Diabetes Mellitus (GDM) depends on various factors such as the population to be screened, the screening methods, the gestational weeks for screening and the glycemic criteria for diagnosis. Screening recommendations range from universal screening (all pregnant women) to selective screening i.e. those having specific risk factors, e.g., age > 25 years, obesity: BMI > 30kg/m2, ethnicity: Hispanic, Native American, Asian-American, African-American, family history of DM in first degree relative, and previous GDM or h/o large for gestational age infant. The aim to understand the prevalence of GDM in patients attending antenatal clinic of our hospital and to focus on the modification of risk factors in this rural and sub urban population. So that, we can prevent the maternal and fetal complications of GDM at an early stage.

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MATERIAL AND METHODS

Study Type: Analytical, Observational, Epidemiological Study

Study design: Cross-sectional study

Study Hospital: BURDWAN MEDICAL COLLEGE AND HOSPITAL

Target population: All pregnant women

Study Population: All the pregnant women attending Obstetrics and Gynaecology outdoor of the BURDWAN MEDICAL COLLEGE AND HOSPITAL.

Sample size: Sample size of the present study was 452.

Inclusion Criteria

- Pregnant women of any parity
- Singleton pregnancy

Exclusion Criteria

- Pre-gestational Diabetes
- Consumption of drugs that alter glucose metabolism
- Women who refuse to participate

Duration of the study: The data was collected in Four months of time from January 2020 to June 2021 after obtaining Scientific and Ethical Committee clearance.

Statistical Analysis:

For statistical analysis, data were initially entered into a Microsoft Excel spreadsheet and then analyzed using SPSS (version 27.0; SPSS Inc., Chicago, IL, USA) and GraphPad Prism (version 5). Numerical variables were summarized using means and standard deviations, while categorical variables were described with counts and percentages. Two-sample t-tests, which compare the means of independent or unpaired samples, were used to assess differences between groups. Paired t-tests, which account for the correlation between paired observations, offer greater power than unpaired tests. Chi-square tests (χ^2 tests) were employed to evaluate hypotheses where the sampling distribution of the test statistic follows a chi-squared distribution under the null hypothesis; Pearson's chi-squared test is often referred to simply as the chi-squared test. For comparisons of unpaired proportions, either the chi-square test or Fisher’s exact test was used, depending on the context. To perform t-tests, the relevant

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formulae for test statistics, which either exactly follow or closely approximate a t-distribution under the null hypothesis, were applied, with specific degrees of freedom indicated for each test. P-values were determined from Student's t-distribution tables. A p-value ≤ 0.05 was considered statistically significant, leading to the rejection of the null hypothesis in favour of the alternative hypothesis.

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RESULT

Table 1: Distribution of mean Waist Hip ratio with GDM and NON GDM and 2hr. PPBG with GDM and NON GDM

		Number	Mean	SD	Minimum	Maximum	Median	p-value
Waist Hip ratio	**GDM**	68	0.9892	0.0426	0.8734	1.1446	0.9889	0.3837
	NON GDM	384	0.9939	0.0408	0.7976	1.0957	0.9896	
2hr. PPBG	**GDM**	68	167.0147	27.6262	140	309	157.5	<0.0001
	NON GDM	384	103.4453	17.7105	40	139	102	

Table 2: Association between PREVIOUS MACROSMIC BABY with GDM and NON GDM and PREV. STILL BIRTH with GDM and NON GDM

		GROUP		
		GDM	**NON GDM**	**TOTAL**
PREV MACROSMIC BABY	**<3.5**	24	137	161
	Row %	14.9	85.1	100.0
	Col %	77.4	93.2	90.4
	≥3.5	7	10	17
	Row %	41.2	58.8	100.0
	Col %	22.6	6.8	9.6
	TOTAL	31	147	178
	Row %	17.4	82.6	100.0
	Col %	100.0	100.0	100.0
PREV STILL BIRTH	**NO**	25	145	170
	Row %	14.7	85.3	100.0
	Col %	80.6	98.6	95.5
	YES	6	2	8
	Row %	75	25	100.0
	Col %	19.4	1.4	4.5
	TOTAL	31	147	178
	Row %	17.4	82.6	100.0
	Col %	100.0	100.0	100.0

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Figure 1: Association between HTN with GDM and NON GDM

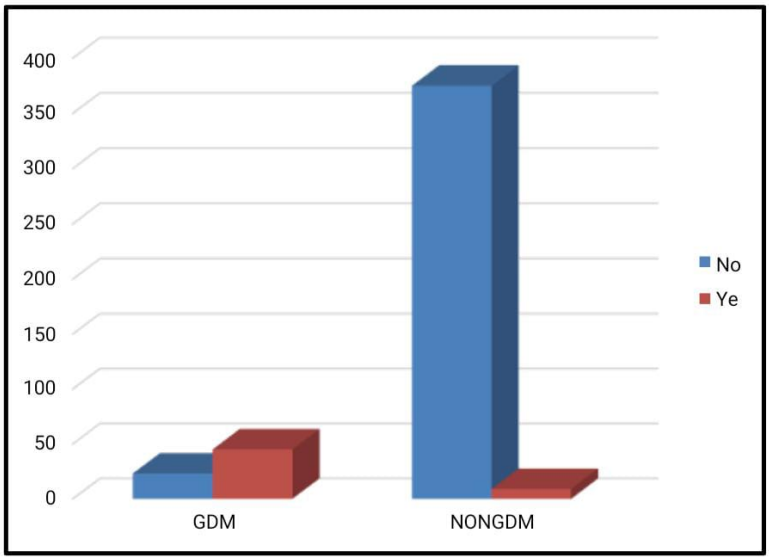
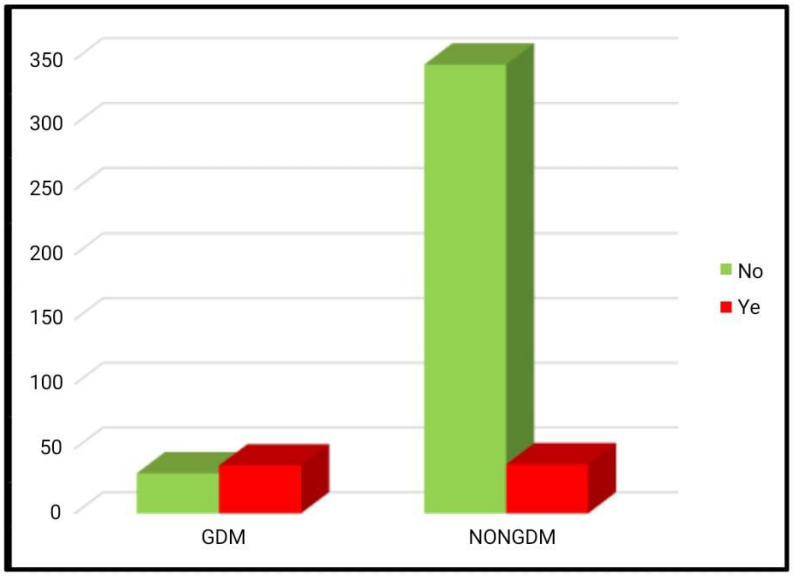


Figure 2: Association between family history of DM with GDM and NON GDM



In GDM group the mean WHR is 0.98 varying from 0.87 to 1.14. In non GDM group the mean WHR is 0.99 varying from 0.79 to 1.09. P value is more than 0.05 (p=0.38) hence not statistically significant. In GDM Group, mean 2 hr. PPBG was 167 mg/dl varying from 140 to 309 mg/dl. In non GDM Group, mean 2 hr. PPBG was 103 mg/dl varying from 40 to 139 mg/dl. P -value < 0.0001 highly significant. Association between previous macrocosmic baby with GDM and NON GDM was statistically significant and risk was significant. Association

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between PREV STILL BIRTH with GDM and NON GDM was statistically significant and risk was significant. Association between HTN with GDM and NON GDM was statistically significant and risk was significant. Association between history of first degree relative DM with GDM and NON GDM was statistically significant and risk was significant

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DISCUSSION

Prevalence of GDM was highest (55.9%) in overweight group i.e., BMI 25-25.9, so, BMI was associated with GDM.

In a study in yeman [6] BMI 30 was found to be a significant factor for GDM and also in study by In GDM group the mean WHR is 0.98 varying from 0.87 to 1.14. In non GDM group the mean WHR is 0.99 varying from 0.79 to 1.09. P value is 0.38, hence not statistically significant.

Out of 452 patients 274(60.6%) were primigravida and 178(39.4%) were multigravida. In primigravida, prevalence of GDM was found to be 13.5%, whereas in multigravida it is found to be 17.4%. P value is 0.25, hence not statistically significant.

In our study, 45.45% patients with previous history of GDM developed GDM in subsequent pregnancy. Occurrence of GDM was 15.5% among those who does not had the history of GDM in previous pregnancy.

P value is 0.0113 hence, it is significant statistically. So, risk of having GDM in pregnancy is more in those who had previous history of GDM.

Among those having hypertension, prevalence of GDM found to be 83.3% compared to 16.7% prevalence of GDM in those not having hypertension. So association of hypertension with GDM was statistically significant (P value < 0.001). Hence, this risk factor was significant for GDM as per our study.

Although study in France [7] in June 2007, showed that in women with GDM prevalence of pre eclampsia was not increased.

The prevalence of GDM was found to be increased i.e., 41.2% among those having history of macrosomic baby (>3.5kg birth weight) compared to 14.9% in women who did not had the history of macrosomic baby. Out of 178 patients 8 (4.5%) had previous history of still birth. Among them prevalence of GDM was found to be 75% compared to 14.7% prevalence of GDM in those having no history of stillbirth.

P value being <0.001, it is statistically significant. So, association with this risk factor with GDM was significant. This risk factor was found to be significant in our study, P value being 0.<001 and Chi square value 82.719. Of total 452 patients, only 75 had positive family history of diabetes mellitus in first degree relative. Among them the prevalence of GDM was found to be 49.3% compared to 8.2% in those not having positive family history of DM.

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Of 452 patients, only 73(16.2%) had the positive family history of hypertension in first degree relative. This risk factor show association with the GDM as P value was found to be <0.001 and Chi square value 100.34.

The prevalence of GDM was found to be 53.4% in those having positive family history compared to 7.7% in those not having positive family history of HTN.

In our study, few patients did not had any idea about the disease status of their parents and other relatives regarding so there was possibly underreporting in this group . Hence, they were kept in negative history group. 56(12.4%)patients gave the history of PCOS out of 452. Among them prevalence of GDM was found to be 71.4% compared to 7.1% in those not having history of PCOS. In our study, this risk factor was found to be significant, P value being <0.001 and Chi square value 158.995.

It was found to be significant risk factor in our study as reported in a study in USA in 1998. [8] They also found that UTI is more common in women with GDM. In our study, we found P value being 0.03 which is statistically significant and Chi square value 4.27. The prevalence of GDM was found to be 28.6% in those having history of recurrent UTI compared to 14.2% in those not having recurrent UTI.

This risk factor did not show any statistical significance in our study P value being 0.23 and Chi square value 1.4022. Although out of 452 patients, 36.3% (164) patients had Moniliasis or had the history of it in the present pregnancy. The prevalence of GDM was found to be 17.7% in those having Moniliasis compared to 13.5% in those not having Moniliasis either present or had not the history of it. But it was more common in non GDM population probably due to unhygienic living conditions rather than to increased blood sugar level. Our result was in contrast with the result found by Yang [9] in China where it was more common in GDM mothers.

Level of education did not show any significance or association in our study. P value being 0.39 and Chi square value is 5.13. In both the groups i.e., GDM and non GDM maximum number of patients had their education up to upper primary. The highest prevalence of GDM was found to be in patients having education up to primary level i.e., 23.1% and lowest prevalence i.e., 7% was found in patients having education up to graduation and post graduation. An inverse relationship was found as in the study of Innes et al [10]. In a study in China by Yang [11] et al no association was found between GDM and Education In some studies, prevalence of GDM

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was found to be more with increasing education level, might be due to the higher age of the women.

In our study maximum number of patients i.e., 216 (47.8%) belongs to the lower middle class society. It's association with GDM was not found significant in our study. P value being 0.57 and Chi square value 1.09. The highest prevalence of GDM was found in lower middle class patients i.e., 16.7% then 16.2% in lower class and 13.1% in upper middle class (lowest prevalence).

This risk factor was found to be highly significant in our study, P value being less than 0.00001 and Chi square value 215.01. Our maximum patients i.e., 394(87.2%) were in the moderate activity group compared to only 12.8% involved in sedentary works. The prevalence of GDM was found to be 79.3% in sedentary workers compared to 5.6% in moderate activity patients. Our most of the patients were Home makers and a few were Teachers and Office workers.

In GDM group, mean was 10.73gm%, varying from 7 to 13.2 gm%. Anaemia also not found to have association with GDM in our study. P value is 0.14 which is not statistically significant.

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CONCLUTION

In conclusion, the prevalence of gestational diabetes mellitus (GDM) continues to rise, influenced by various risk factors such as advanced maternal age, obesity, genetic predisposition, and lifestyle choices. Understanding these factors is crucial for early identification and intervention, which can significantly improve maternal and neonatal outcomes. Public health initiatives aimed at educating women about the risks associated with GDM and promoting healthier lifestyles before and during pregnancy can help mitigate its prevalence. Continued research is essential to develop targeted prevention strategies and improve the overall management of GDM in diverse populations.

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