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## Prevalence and Determinants of Gestational Diabetes Mellitus among Pregnant Women Attending Antenatal Care

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### ABSTRACT

Gestational Diabetes Mellitus (GDM) is a progressively common condition that presents substantial hazards to both the mother and her offspring. Considering the rapid lifestyle changes in developing countries, it is essential to identify the risk factors in that environment to avert long-term consequences. The study was meant to determine the prevalence of GDM and its relationship with sociodemographic, clinical, and behavioral factors among women who are undergoing ante-natal care (ANC) services in their pregnancies. Quantitative cross-sectional investigation has been carried out on 180 pregnant women at 24-28 weeks in gestation. Data were obtained with the help of the structured questionnaire and analyzed employing R software. The diagnosis of GDM was made with the help of the 75g OGTT; it was performed according to the recent WHO 2013 guidelines of GDM diagnosis. The influences and main risk factors were identified via descriptive and bivariate analysis. It was discovered that prevalence of GDM is 45 percent. Among the interrelated risks, there were such characteristics as physical inactivity, lack of professional training programs, fast food and even sugary drinks ingestion and the history of diabetes in their families. The common risk factors of maternal age and BMI that is considered as proximate predictors were found to be statistically insignificant risk factors of GDM in the identified sample. The results of the study indicate high prevalence of gestational diabetes mellitus (GDM), and modifiable lifestyle factors have been found to play major role in the development of the disease. The ANC services should entail early screening, encourage planned activity, and provide dietary advice to ensure reduced risks and enhanced birth outcomes associated with GDM among women.

### INTRODUCTION

Gestational Diabetes Mellitus (GDM) is an emerging public health risk all over the world, which is the testosterone-insensitive glucose intolerance that is identified or diagnosed as part of pregnancy (Kautzky-Willer *et al.*, 2023). The rising rates are indicative of a broader epidemic of type 2 diabetes that includes an immediate and a long-term threat to both the mother and child (Boyd & Conway, 2024). The GDM complications include preeclampsia, therapeutic cesarean section, macrosomia in the fetus, and predisposition to metabolic diseases of the mother and children later in life (Avilez *et al.*, 2025).

The percentages of GDM in areas are quite different than in other parts due to the ordeal of genetic and lifestyle elements, and sociodemographic explanations (Avilez *et al.*, 2025). The incidence of gestational diabetes mellitus (GDM) is rising in South Asia, with Bangladesh being no exception due to rapid urbanization, nutritional change, sedentary lifestyles, and limited awareness of maternal health. In Bangladesh, the previous research reported the prevalence of GDM between 6 percent and more than 13 percent and higher in urban locations like Dhaka and Chattogram (Mazumder *et al.*, 2022). Nevertheless, data on subjects are not generalized, and there are few hospital-based studies, particularly those which employ standardized diagnostic criteria and those using strong

statistical designs (Gică & Hultuță, 2023).

It is necessary to recognize the main risk factors that lead to GDM so as to discover, prevent, and intervene early in the disease (Meye *et al.*, 2025). In the literature, mother age, pre-pregnancy BMI, familial diabetes history, dietary habits, and patterns of physical inactivity are frequently cited. Nonetheless, little is known about interactions between these factors within the context of Bangladesh, particularly, in various geographic and socioeconomic communities (Singhania, 2025).

This study seeks to determine the prevalence of gestational diabetes mellitus (GDM) and its associated risk factors among pregnant women attending a prenatal clinic at a tertiary hospital in Bangladesh. Having used quantitative approach and analyzing the data in terms of R statistical software, the study can be of great use in providing epidemiological evidence, which will inform national screening as well as maternal health policies.

### LITERATURE REVIEW

Gestational Diabetes Mellitus (GDM) refers to glucose intolerance identified for the first-time during pregnancy and has become a significant maternal health issue worldwide, particularly in low- and middle-income countries (LMICs) like Bangladesh. The occurrence rate of gestational diabetes mellitus (GDM) is rising

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worldwide and in South Asia is becoming an area of concern because of rapid urbanization, sedentary lifestyle, and diet adjustments (Ahmed, 2025).

According to a complete research conducted by Mazumder *et al.* (2022), Gestational Diabetes Mellitus (GDM) occurs at the prevalence rate of 11.4 percentage in Bangladesh, which is also one of the highest in South Asia. The same results by Jesmin *et al.* (2014) were explained by the increasing tendency of gestational diabetes mellitus (GDM) in Bangladesh that could be caused by the increasing obesity in women alongside other factors the growing maternal age or urban lifestyle. The prevalence of 13 per cent in a local hospital-based study in Chattogram was also found (Shah *et al.*, 2021), and the prevalence in tertiary urban hospitals was higher still, which indicates it is possible that GDM is grossly underreported in rural or under-resourced facilities (Shivashri *et al.*, 2022). Among the countries in the South Asia region, the occurrence of GDM is rather diverse because of the heterogeneity of investigative measures and accessibility of healthcare services: the results of South Asian countries vary between 8-18% in India depending on the diagnostic criteria used (Boyd & Conway, 2024), Pakistan mentions the magnitude of 12.8% in antenatal clinics in urban settings (Pletneva *et al.*, 2023), and Sri Lanka is about 10.3 percent by WHO standards (Sweeting *et al.*, 2022). The analysis of these studies indicates that, although different problems of GDM is spread in South Asia, the Bangladeshi population seems to be especially susceptible, perhaps under the influence of metabolic risk, nutrition transition, and lack of standardized/antenatal screening tests.

Numerous studies have consistently identified many potential risk factors that may contribute to the increased prevalence of Gestational Diabetes Mellitus (GDM) among women in Bangladesh. Advanced age, particularly beyond 30 years, is significantly associated with the risk of gestational diabetes mellitus, as noted by Jesmin *et al.* (2014). It was also noted that obesity and a Body Mass Index (BMI) score of 25 before pregnancy and above are a crucial factor and Shah Alam *et al.* (2024) have found out that there is a close relationship between overweight status of mother and glucose intolerance in pregnancy. The diet pattern is also a critical factor, and the increased intake of fast food and sugar-sweetened beverages is associated with an increased prevalence of gestational diabetes mellitus in accordance with the influence of nutritional transition in urban areas (Zannat *et al.*, 2025). Furthermore, genetic predisposition is also an essential consideration, since Modzelewski *et al.* (2022) established that familial history of type 2 diabetes nearly triples the risk of developing gestational diabetes mellitus (GDM). Also, sedentary habits especially in the urban pregnant women have also been closely linked with GDM as Begum *et al.* (2022) illustrate. Collectively, this interconnection has stressed that GDM in Bangladesh is multifactorial, and thus there is an immediate requirement to focus on prevention interventions and early antenatal screening efforts.

The probability of negative outcomes, such as preeclampsia, fetal macrosomia, and cesarean delivery, is increased in women with gestational diabetes mellitus (Mou *et al.*, 2021). Furthermore, Gestational Diabetes Mellitus (GDM) is linked to an extended risk of acquiring Type 2 Diabetes Mellitus (T2DM), especially in women displaying insulin resistance characteristics, notably those of South Asian origin (Gică & Hultă, 2023).

The absence of a standardized screening and diagnostic protocols is also one of the significant problems in Bangladesh. Jesmin *et al.* (2014) noted that 53.5 percent of the cases were underdiagnosed because of varying application of WHO vs. IADPSG criteria. This is reinforced by the fact that there are minimal antenatal screening facilities in rural settings.

Even greater prevalence is found on the studies of the Bangladesh immigrant women in high-income countries. A prevalence rate of 25.30 percent among Bangladesh women in the UK was identified by Mora-Ortiz & Rivas-García, (2024) and was described by the authors as the result of genetic predisposition and behavioral shifts.

Despite existing evidence on the prevalence of Gestational Diabetes Mellitus (GDM) in Bangladesh, the current study underscores a notable evidence gap due to a lack of standardized, region-specific data utilizing rigorous statistical methods that include both prevalence and associated risk factors. Most prior research investigations are limited to metropolitan areas or are incomplete and not conducted with verified instruments. This study seeks to fill this gap by (1) assessing the prevalence of gestational diabetes mellitus (GDM) among pregnant women at a tertiary hospital in Bangladesh and (2) identifying significant sociodemographic, clinical, and lifestyle-related risk factors linked to its occurrence using a quantitative methodology with R software.

### Problems of the Research

Although Gestational Diabetes Mellitus (GDM) has already been recognized as an important maternal health concern in Bangladesh, there are still some important gaps in the existing research portfolio and treatment approaches to its detection, measurement, and alleviation. To begin with, the available literature on GDM is generally geographically constrained; hence they do not cover rural and peri-urban communities where there are minimal health provision services and promotion. The implication of this geographical bias is that findings cannot be generalized in the country. Second, the national statistics on epidemiology do not provide any aggregates of both prevalence and multidimensional risk factors with similar diagnostic instruments based on universal criteria (like those suggested by WHO or IADPSG). Critical differences in study cut-offs and criteria in most studies have made it quite hard to compare outcomes or develop policies on the screening. Thirdly, risk factor study in most local studies is descriptive but not analytical, and the lack

of good models of statistical forecasting is not conducted to find out independent predictors. Moreover, difficulties in training, in projects to help interested medical professionals know more about GDM, lack of antenatal visitations with GDM screening plans, and availability of laboratory work during resource-scarce medical scenarios may also become a problem associated with healthcare providers. In addition, early diagnosis and intervention is even more complicated by patient level factors such as low literacy levels, low nutritional awareness, and cultural taboos. These clinical problems coupled with systemic and methodological issues have thus worsened the late identification, under reporting and inefficient handling of GDM in Bangladesh and thereby abased the possibility of maternal and neonatal complications. The effective approach in solving these problems is one that is statistically rigorous, regionally representative, and aimed at guiding effective public health interventions.

## Research Questions

### RQ1

What is the prevalence of Gestational Diabetes Mellitus among pregnant women receiving prenatal care at a tertiary hospital in Bangladesh?

### RQ2

What sociodemographic factors (such as age, education, income, and residency) are associated with the risk of developing gestational diabetes mellitus in the studied population?

### RQ3

How do clinical characteristics, including pre-pregnancy BMI, family history of diabetes, and parity, influence the likelihood of developing gestational diabetes mellitus (GDM)?

### RQ4

What is the correlation between lifestyle behaviors and the prevalence of gestational diabetes mellitus (GDM)?

### RQ5

To what extent can a logistic regression model predict the likelihood of gestational diabetes mellitus based on the identified variables?

## Research Objectives

Consistent with the research questions and theoretical framework of the study, the subsequent research objectives were formulated.

### RO1

To determine the prevalence of Gestational Diabetes Mellitus (GDM) in pregnant women undergoing prenatal care at a specified tertiary hospital in Bangladesh.

### RO2

To ascertain notable sociodemographic determinants, such as maternal age, education, income, and residence,

that correlate with the risk of developing gestational diabetes mellitus (GDM) in the examined population.

### RO3

To investigate the clinical risk factors, namely pre-pregnancy body mass index (BMI), familial history of diabetes and hypertension, and obstetric history in relation to gestational diabetes mellitus (GDM).

### RO4

To evaluate the impact of lifestyle factors, including physical activity and the intake of snacks and fast food, on the incidence of gestational diabetes mellitus (GDM).

### RO5

Using the quantitative statistical analysis on the R software to make a model prediction in identifying the risky pregnant women using the relevant criteria.

## Hypothesis Development

Several researchers have linked a strong correlation between advanced maternal age and Gestational Diabetes Mellitus. Jesmin *et al.* (2014) recently stated that women aged 30 years or more in Bangladesh were much more likely to have gestational diabetes mellitus (GDM) than younger women. A research study conducted by Begum *et al.* (2022) revealed that, compared to the women younger than 35 years, the prevalence of gestational diabetes mellitus (GDM) had significantly increased in women aged over 35 years, thus, age has been revealed as a persistent risk factor.

### H1: Material age and Prevalence of Gestational Diabetes Mellitus (GDM) is Significantly Associated in Pregnant Women in Bangladesh

Embarked BMI has had a lot of literature regarding predicting gestational diabetes mellitus (GDM). In a study conducted Ahmed, (2025) the author found out that the BMI of 25 and above female participants had a much higher probability of having gestational diabetes mellitus as compared to their counterparts. In another meta-analysis conducted by Mazumder *et al.* (2022), the risk of gestational diabetes mellitus (GDM) was not only doubled in the overweight and obese women as compared to the normal body mass index (BMI) women in Bangladesh.

### H2: The Higher the Body Mass Index (BMI) Pre Pregnancy, the More Significantly the Risk of Developing Gestational Diabetes Mellitus (GDM) Increases

One of the causes of the occurrence of gestational diabetes mellitus (GDM) is the food habits. This research on Zannat *et al.* (2025) was an illustration of a close correlation among the consumption of fast food and sugar-sweetened beverages and the chances of catching gestational diabetes mellitus (GDM) amidst Bangladesh women. The paper showed that a female who eats fast food over three times every week demonstrated about 1.8 times more risk of developing gestational diabetes mellitus (GDM).



### H3: The High Frequency of Fast Food and Sugar-Sweetened Beverages Intake is Strongly Associated with a Great Risk of GDM

Lack of physical activity is observed as a known risk factor to gestational diabetes mellitus (GDM) in lifestyle. Shah *et al.* (2021) offer statistics according to which women with minimal physical exercise in the course of pregnancy in Bangladesh had a increase rate of gestational diabetes mellitus (GDM). Mou *et al.* (2021) reached a conclusion according to which the lack of physical exercise has a direct impact on enhancing insulin resistance and glucose intolerance during pregnancy.

### H4: The Insignificant amount of Exercise in Gestation Stage is a Big Contributor to the Occurrence of Gestational Diabetes Mellitus

It has also been revealed that there is some genetic predisposition which predisposes the occurrence of gestational diabetes mellitus (GDM). According to Pletneva *et al.* (2023), women, especially those with the family history of type 2 diabetes, are at a threefold increased risk of having gestational diabetes mellitus (GDM). Keeping pace with Begum *et al.* (2022) and Jesmin *et al.* (2014), who conducted research on the prevalence of gestational diabetes mellitus (GDM) in Bangladesh, the authors also concluded that a family history of diabetes goes hand in hand with the medical condition.

### H5: The Predisposition to Diabetes in Family Member Increases the Risk of Diabetes in Pregnancy Women Significantly

## MATERIALS AND METHODS

In this research, quantitative cross-sectional research was used to determine the prevalence of Gestational Diabetes Mellitus (GDM) and also its risk factors among expectant women. The research was carried out at an antenatal (ANC) care facility in one of the leading hospitals in the capital city (Dhaka), which covers a wide and diverse population both in the urban and peri-urban centers of Bangladesh. All pregnant women who attended the designated hospital during the study period were deemed the target population, as their participation in routine antenatal care facilitated accurate identification of this group. The sampling frame comprised women at a gestational age of 24-28 weeks, as this period is the preferred timeframe for screening gestational diabetes mellitus according to international standards. In this study, sample size was determined using the single population proportion formula:

$$n = (z^2 \cdot P(1-P)) / d^2$$

With a prevalence (p) of 11.4 percent (Mazumder *et al.*, 2022; Mora-Ortiz & Rivas-García, 2024), and a confidence level (Z) of 95 percent (=1.96) the minimum sample size at a margin of error (d) of 5 percent was 156. A total of 180 ANC registry participants were recruited through the systematic random sampling technique in order to balance the non-response or incomplete data.

The data were assessed with the help of a structured pre-tested questionnaire formulated based on the available literature and recommendations of clinical guidelines. The questionnaire comprised five sections: Sociodemographic data (age, education, occupation, income), Obstetric and medical history (parity, previous history of gestational diabetes mellitus, hypertension, family history of the patients regarding diabetes). Anthropometric assessments (mass, stature, body mass index), Dietary intake (frequency of fast food and sweetened beverage consumption), physical activity (light, moderate, and sedentary), and blood glucose levels were extracted from hospital records based on the 75g Oral Glucose Tolerance Test (OGTT). The investigation utilized Microsoft Excel and R software version 4.3.2. The data were summarized using descriptive statistics (frequencies, means, standard deviations). Inferential analysis: The utilization of Chi-square testing to ascertain relationships among categorical data. Binary logistic regression was utilized to evaluate the relationship between gestational diabetes mellitus (GDM) and independent variables such as age, body mass index, food, and physical activity. Variables exhibiting a p-value < 0.05 were included in the multivariate model, employing odds ratios (ORs) and 95% confidence intervals (CIs) to assess the magnitude of the risk. This was considered ethical following the ethical permission obtained by the Institutional Review Board (IRB) of the hospital. Each participant completed an informed consent form prior to data collection. The anonymity and identity of respondents were preserved throughout the research.

## RESULTS AND DISCUSSION

The primary aim of the study was to determine the prevalence rate and identify key risk variables linked to Gestational Diabetes Mellitus (GDM) in pregnant women in Bangladesh. An exhaustive analysis was conducted on 180 participants. The data was analyzed using R software, employing descriptive statistics and crosstabulations to ascertain the relationships between various demographic, clinical, and behavioral factors, and the onset of GDM. The evaluation was identified as the 75g Oral Glucose Tolerance Test (OGTT), with a result of 140 mg/dL or above categorized as GDM-positive according to WHO 2013 criteria.

### Demographic Profile of the Respondents

It is crucial to define the demographic attributes of the research population to contextualize the risk factors linked to Gestational Diabetes Mellitus (GDM). The notable sociodemographic and obstetrical attributes of the 180 pregnant women involved in the study are summarized in the following table:

Table 1, elaborately represent the demographic representative of the respondents. The average age of respondents was around 28.9 years indicating young reproductive population. This goes in line with the national trends of childbearing in Bangladesh with majority of the women getting conceived in their twenties. The mean gestational age was approximately 26

**Table 1:** Demographic Profile of the Respondents

Variables	Summary	Frequency
Age (years)	28.91±6.94	
Gestation Age (weeks)	25.95± 1.43	
Gravida (pregnancies)	2.46±1.13	
Parity (live births)	1.48±1.08	
Education	No formal	47
	Primary	30
	Secondary	40
	Higher Secondary	38
	Graduate plus	25
Occupation	Housewife	35
	Service sector	38
	Business sector	27
	Laborer	39
	Other	41
Monthly Income (BDT)	<10,000	55
	10,000-20,000	40
	20,001-30,000	38
	>30,000	47
Residence	Urban	63
	Semi-urban	62
	Rural	55

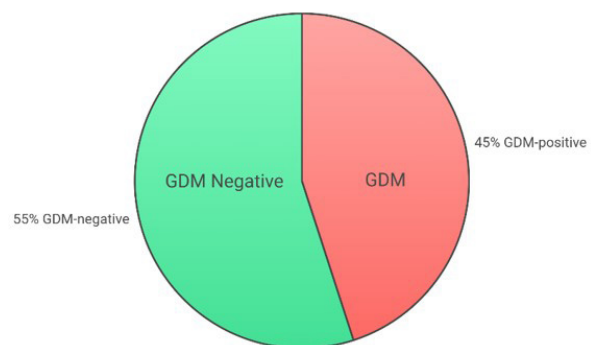
weeks, so the screening of GDM took place at the right time. In terms of education, 25 participants (14%) were graduates and 26 percent did not receive any form of education, which implies that there is a broad gap in the educated groups within the antenatal populations. With regard to occupation, out of the total of 337 responses (19%), were housewives, but a considerable number of them (41 participants, 23%) were of the category Other, as it might be related to an informal job or to unpaid work. Nevertheless, there is evident income distribution where 31 percent of women lived in households with an income of less than 10,000 BDT, and 26 percent had received an income that was more than 30,000 BDT, and this segment covers a low to high economic group. The household characteristics were quite equalized: Urban (35%), Semi-urban (34%), and Rural (31%) population, making it more generalizable among different population zones. This is a demographic picture that signifies a high range of population populace in regard to income, education, and residence. It indicates the rising healthcare-seeking tendency of both rural and semi-urban people approaching the urban tertiary centers, which is significantly important to the GDM screening outreach.

#### GDM Prevalence of Pregnant Women

Gestational Diabetes Mellitus (GDM) has become a very crucial issue of public health and maternal care all around the world and in low and middle-income nations, including Bangladesh (Zannat *et al.*, 2025). Gestational

diabetes mellitus (GDM) has become widespread with urbanization, dietary modifications, and more sedentary lifestyles at high-income Euro-American income levels, and it has aroused serious threats to maternal and infant health (Zannat *et al.*, 2025). Evaluations of the distribution of GDM in the study subjects play an important role in the identification of the burden of the illness and the evaluation of its effects in the pre-natal population. The second part will outline the rates of gestational diabetes mellitus (GDM) in 180 respondents included in the current study using WHO 2013 diagnosis standard according to a 75g Oral Glucose Tolerance Test (OGTT) (Kautzky-Willer *et al.*, 2023).

#### GDM Prevalence Among Bangladeshi Pregnant Women

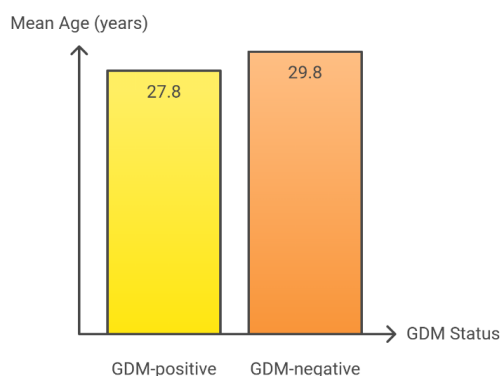


**Figure 1:** GDM Prevalence Among Bangladeshi Pregnant Women

The 180 study participants comprised 45 and 55 percent women (81 and 99, respectively) on the GDM prone state and GDM-negative state (Figure 1). It has a very high prevalence rate which thus means that the problem of GDM has been becoming a primary health problem to Bangladesh pregnant women who attend tertiary level antenatal care. Other urban based studies in South Asia support these results that point out an upsurge of the prevalence of GDM that exceeds 30% in high-risk groups.

#### Relationship between Maternal Age and Gestational Diabetes Mellitus (GDM)

Maternal age can be seen as a significant determinant of pregnancy outcomes, with one of the element of Gestational Diabetes Mellitus (GDM) being one such consequence (Zhang *et al.*, 2021). Various research has indicated that an older age of maternal women especially after the age of 30 years is linked to poorer insulin functionality and consequently higher risk of glucose taking during pregnancy (Zhang *et al.*, 2021). The lifestyles and the urbanization, however, soon started putting the younger women also at the risk of metabolic problems (Han *et al.*, 2021). In this section, the interaction between maternal age and GDM status among the participants of the study was checked with the view to understanding whether age remains a critical determinant of GDM in the Bangladeshi context.



### Mean Age of Pregnant Women by GDM Status

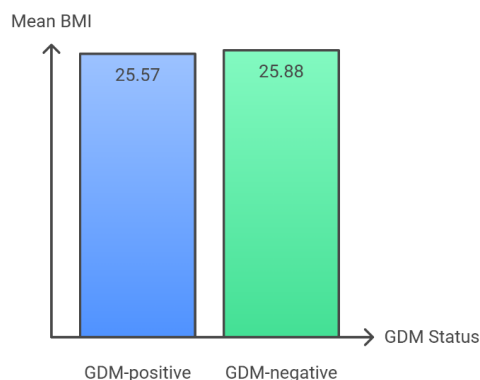
**Figure 2:** Mean Age of Pregnant Women

In this study the mean age of GDM-positive women were 27.8 years and mean age of GDM-negative women were 29.8 years (Figure 2). In contrast to what was supposed to be, younger women in this data had a somewhat higher GDM incidence. This discovery is inconsistent with previous literature (Jesmin *et al.*, 2014) which focused on prioritizing the need of advanced maternal age as a predictor. Nevertheless, the transition is possibly caused by the transformation in diet and lifestyles patterns even in younger urban women.

This drive indicates that we no longer can attribute the advantageous aspects of age to one alone so, even the younger women in the urban setting may still have a high risk of death because of the lifestyle factors.

### The Relationship between Body Mass Index (BMI) and Gestational Diabetes Mellitus (GDM)

Body Mass Index (BMI) is a widely utilized measure for evaluating nutritional status and is strongly linked to metabolic disorders, such as Gestational Diabetes Mellitus (GDM) (Rosinha *et al.*, 2022). Women exhibit elevated levels of insulin resistance who are only overweight or even obese and this may stimulate glucose intolerance among pregnant mothers (Bharatnur & Acharya, 2023).



### Mean BMI Comparison Between GDM Groups

**Figure 3:** Mean BMI Comparison Between GDM Groups

Pre-pregnancy BMI especially is regarded as a severe adjustable risk factor about GDM (Bharatnur & Acharya, 2023). Bangladesh is one of the countries where the overweight and obesity levels are rapidly increasing amongst the women belonging to reproductive population and in particular the urban regions. This part studies the correlation between the BMI and GDM status of the respondents and whether there is one that is significant in predicting GDM in the present sample.

In this study, the average BMI of women with GDM was 25.57, while the average BMI of women without GDM was 25.88 (Figure 3). Unexpectedly, GDM-negative women exhibited a marginally elevated average BMI. This finding contradicts prior research in Bangladesh, which identified preconception overweight and obesity as a risk determinant for gestational diabetes mellitus (Shah Alam *et al.*, 2024). This minor distinction can be ascribed to confounding variables such as physical activity levels and genetic susceptibility.

Although BMI is an established risk factor of GDM, it was not a strong independent risk factor in this sample, and it highlights the importance to take a multi-factorial risk profile into account.

### Correlation between Familial Diabetes History and Gestational Diabetes Mellitus (GDM)

A notable and unchangeable risk factor for Gestational Diabetes Mellitus (GDM) is a positive family history of diabetes mellitus, especially type 2 diabetes (Ortega-Contreras *et al.*, 2022). Insulin secretion, insulin sensitivity, and the general glucose metabolism may all be affected by the genetic predisposition, raising the chances of having hyperglycemia as a pregnancy complication (Mufti *et al.*, 2024). The women who have close relatives with an impaired metabolism due to diabetes are most likely to develop GDM experiencing a very high risk of developing this disease regardless of any other factors connected to the lifestyle and health of these individuals (Mufti *et al.*, 2024). This part of the study considers the correlation between familial diabetes history and GDM status of the study participants to determine the degree to which hereditary factors influence GDM risk in the Bangladeshi antenatal group.

**Table 2:** Relationship Between Family History and GDM

Family History	GDM Negative	GDM Positive
No	65	50
Yes	34	31

Table 2 represented the correlation between familial history and GDM. In this study, it was found that the pregnant women with a familial predisposition to diabetes, GDM was diagnosed in about 48 percent of the persons, whereas almost 43.5 percent did not have such a history. This strengthens the already made genetic aspect of GDM risk (Limbachia *et al.*, 2022). Premature screening and lifestyle counseling should be given the importance to women having the relatives with diabetes.

### Correlation between Fast Food Intake and Gestational Diabetes Mellitus (GDM)

Diet is one among the major areas of gestational diabetes mellitus development and prevention (Alamolhoda *et al.*, 2023). High intake of foods with low nutrient to energy ratio especially the fast foods and a high intake of sugar sweetened drinks has been found to contribute to poor glucose tolerance and insulin resistance in pregnancy (Mavroeidi *et al.*, 2024). Dietary changes expressed via the consumption of processed and convenience foods have increased in urban and semi-urban environments in Bangladesh, a factor that has seen an increase in metabolic stress in women of reproductive age (Mou *et al.*, 2021). In this section, the connotation between the pattern of fast food and sugary beverage intake and the presence of GDM among the respondents will be examined with the view of determining whether these lifestyle variables could contribute to poor glycemic control during pregnancy.

**Table 3:** Relationship Between Family History and GDM

Fast Food Consumption	GDM Negative	GDM Positive
Never	20	20
1-2 times/week	24	21
3-4 times/week	29	22
> 4 times/week	26	18

Table 3 represented the linking between fast food consumption and GDM. In this study, no definite linear growth was found, but the higher proportion of GDM was found in women who consumed fast food more than 3 times per week.

So, intake of fast food also causes insulin resistance though it might not be independently acting. Its effect will be probably a build-up on the other behaviors like sedentary lifestyle and drinking sweet drinks.

### Correlation between Physical Activity and Gestational Diabetes Mellitus

The behavioral determinants of glucose metabolism and insulin sensitivity are critical in affecting these processes throughout pregnancy and are significant issues for women and their infants (Dipla *et al.*, 2021). A sedentary lifestyle is a significant modifiable risk factor associated with Gestational Diabetes Mellitus (GDM), particularly in metropolitan environments where physical activity is often limited (Xie *et al.*, 2024). Physical exercise consistently has been observed to reduce the likelihood of gestational diabetes mellitus by augmenting maternity glucose uptake as well as improving insulin resistance (Molenda *et al.*, 2024). The presented table explores the relationship between the level of physical activity during pregnancy and the prevalence of gestational diabetes mellitus (GDM) in the analyzed cohorts indicating such a positive effect of an active lifestyle on the health of the mother.

**Table 4:** Relationship between Physical Activity and GDM

Activity Level	GDM Negative	GDM Positive
High	30	24
Moderate	18	19
Low	25	16
Sedentary	26	22

Table 4 denoted the relationship between physical activity and GDM. It was noted that a risk of having GDM was more present in sedentary and moderately active women and a protective role in women that were highly physically active was identified.

These findings correspond with the ones found in literature (Siddiqui *et al.*, 2013) and validate the fact that a systematic and periodic activity is connected to the reduction in risks of GDM because it improves glucose metabolism.

### Relationship between Exercise Routine and Gestational Diabetes Mellitus (GDM)

In addition to increased physical activity, specific physical exercise programs in pregnancy have been linked to proper glycemic control and a lowered danger of gestational diabetes mellitus (GDM) (Alaslani *et al.*, 2022). Frequent exercising during pregnancy maintains general metabolism, increases insulin sensitivity, and assists in controlling weight gain in the mother, which are all protective against GDM manifestation (Hassanzadeh Rad *et al.*, 2024). The connection between GDM and exercise patterns is particularly vital especially in the case where a population such as in Bangladesh has many cultural stigmas and a general lack of awareness of the problem due to which the extent of the women indulging in formal exercise may be restricted (Mazumder *et al.*, 2022). In this part, the authors analyze the effects of a regular exercise regime and its absence on pregnant women on the GDM status in the current research sample.

**Table 5:** Relationship between Exercise Routine and GDM

Exercise Routine	GDM Negative	GDM Positive
Yes	38	18
No	61	63

Table 5 displayed the association between exercise routine and GDM. Among the respondents, 63 out of 81 GDM-positive women reported to not do regular exercise the idea which supports the protective nature of scheduled physical exercise.

The evidence supports the existing guidelines issued by WHO that encourage physical activities among pregnancy. The focus of ANC service must give an emphasis on exercise education.

### Findings

This section brings out the overall empirical findings which highlighted the data collection method through 180 women who received antenatal care (ANC) services



in Bangladesh. The study results indicate that GDM is a common problem in the examined population that affected women display significant interconnections with other sociodemographic, clinical, and behavioral risk factors. The findings concur with prior research as well as provides novel context-specific knowledge on the interplay of urbanization, changes in lifestyle, and familial history in increasing the risk of gestational diabetes mellitus in Bangladeshi women. The burden of the GDM according to WHO 2013 OGTT criteria of 81 out of 180 (45%) women represents quite a high prevalence in the study setting.

- The average age of GDM-positive women was 27.8 years compared with that of negatives GDM (29.8 years) thus implying that the young women are also on the increasing risk though this may be due to urban way of life.

- The mean of BMI among GDM-positive women and that of GDM-negative women was 25.57 and 25.88 respectively with no difference. The variable BMI in isolation was not very significant in the sample.

- The percentage of women who got GDM when they had a history of diabetes in the family (48%) and when they did not have such a history (43.5%) proves a somewhat strong linkage between the hereditary risk of GDM.

- The trend was not highly linear, but more women with GDM reported fast food or sweet drinks consumption = 3 times per week or more, which means the dietary habits along with others are a risk factor not to be disregarded.

- Sedentary or light participants had an increased risk of GDM, and a high level of physical activity worked in a protective way.

- The proportion of GDM-positive women who were not engaging in regular exercise was 63 (77.7%), which confirmed the ability of prenatal structured physical activities to minimize the risk of GDM.

- Semi-urban and urban population and families with income more than 20,000 BDT/month showed greater prevalence of GDM, making an indication towards urban lifestyle effects.

- There was no significant difference in the distribution of GDM across the levels of education or occupation categories, with housewives and workers in labor-intensive activities recording higher cases of GDM than any other occupation group, perhaps because of the sedentary lifestyles or dietary limitations.

## Recommendations

Based on the results of this study it is proposed that the following recommendations can be made to enhance screening, prevention, and treatment of Gestational Diabetes Mellitus in pregnant women in Bangladesh:

- All pregnant women, notably those availing ANC services in the urban and semi-urban regions must be screened universally against GDM between 24-28 weeks of gestation via OGTT.

- Pregnant women having a positive family history of diabetes must be screened at an earlier stage of pregnancy and carefully watched out to notice the symptoms of GDM.

- Make a proper integration of GDM profiling tools (age, activity, dietary habits, family history) into ANC registries to allow early risk stratification and counseling.

- The ANC visits must also incorporate the planned nutrition education on the importance of minimizing consumption of fast food, processed sugar, and sweetened drinks.

- Promotion of light-to-moderate physical activities on a daily basis, based on the stages of pregnancy, and prevention of sedentary lifestyles are some of the ways, which should be deployed by health professionals.

- Propose to the Ministry of health to consider the introduction of prenatal fitness and mobility modules in national ANC protocols and guidelines.

- Campaign in the community and through media networks to make the communities aware of the risks of GDM and the need to screen at an early stage and change their lifestyles.

- Since the rate of GDM is high in the urban and semi-urban areas, health care providers in a locality must focus their intervention programs on these areas.

- Conduct refresher courses of the midwives and ANC nurses on the policies of screening and data collection of GDM screenings and employee communication strategies with patients.

## Limitations

This research provides substantial insights into the prevalence and potential risk factors of Gestational Diabetes Mellitus (GDM) among pregnant women in Bangladesh; nonetheless, some limitations warrant consideration. The utilization of a hospital-based sample will limit the applicability of the research findings to the wider population, particularly in rural or underprivileged communities. Secondly, the cross-sectional design restricts the ability to ascertain causal relationships, and the temporal gap between risk variables and the diagnosis of gestational diabetes mellitus remains indeterminate. Third, lifestyle interventions relying on self-reported data (diet and physical activity) may be susceptible to recollection bias or social desirability bias. Ultimately, although the sample size was adequate, multivariate regression was not conducted at this stage, potentially limiting the identification of confounding and/or interaction variables.

## CONCLUSION

This study sought to examine the prevalence of Gestational Diabetes Mellitus (GDM) and associated risk factors among pregnant women in Bangladesh receiving prenatal care, employing a quantitative research methodology with structured data analysis using R. The prevalence of gestational diabetes mellitus (GDM) was notably high at 45%, posing a significant worry for the general population. Key found risk factors included physical inactivity, absence of a consistent exercise plan, frequent use of fast food and sugary beverages, and a positive familial history of diabetes. Notably, traditional

risk indicators such as maternal age and body mass index failed to exhibit significant discriminative capacity in this cohort, suggesting that the risk profile may be influenced by rapid urbanization and lifestyle changes. These data indicate that early screening, tailored antenatal counseling, and community health promotion interventions are crucial for mitigating the rising incidence of gestational diabetes mellitus (GDM) in Bangladesh. To mitigate the situation, it is essential to address these risk factors through integrated maternal programs that enhance both maternal and fetal outcomes.

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