Original article

Factors associated with Gestational Diabetes Mellitus: A Hospital based Cross-sectional Study in Dhaka

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Abstract

Background: Gestational Diabetes Mellitus is an emerging global health problem. It carries long-term health consequences for the mother and her offspring. Early diagnosis and treatment decrease indispositions for the mother and offspring in the index pregnancy.

Methods: A hospital-based cross-sectional study was carried out to assess the factors associated with gestational diabetes mellitus among the 330 pregnant women in the Central Hospital, Dhaka, Bangladesh

Results: The GDM woman's age, nulliparity, duration of sleep and existence of diabetes or HTN poses risk factors for GDM during the 2nd and 3rd trimesters of pregnancy. In all cases, p-value was found <0.05. Odds ratio with 95% confidence interval suggests that women who had slept less than 8 hours had 3.17 times higher odds (95% CI: 1.48-7.23) of developing GDM. For women aged over 30 years, the chances are 4.7 times higher and may vary between 2.16 to 10.84 to develop GDM. Unemployed status was a protective factor as these groups of women had 91% less likely to have GDM. The existence of hypertension or diabetes had about 7.5 times higher odds of developing GDM in women (95% CI: 3.42-18.31). Women who had weight gain during their pregnancy were found to be at 1.29 times more risk of GDM and may vary between 1.16-1.45 as the measure of odds.

Conclusion: During pregnancy, GDM is a problem that many women endure. Enhancing pregnant women's health and reducing risk factors both during and after pregnancy are essential.

Keywords: GDM, Pregnant women, Risk factors, Bangladesh.

Introduction

The prevalence of gestational diabetes mellitus (GDM), a metabolic condition caused on by glucose intolerance during pregnancy, has been rising globally over the past few decades.[1] The main factor leading to GDM is insufficient insulin in the presence of insulin resistance. Other risk factors include obesity, a history of gestational diabetes, a family history of type 2 diabetes mellitus (T2DM), polycystic ovarian syndrome (PCOS), and others. Blood tests are used to diagnose GDM, and screening is recommended between 24 and 28 weeks of gestation.[2] However, for the high-risk individual, screening is recommended in the 1st antenatal visits to diagnose.

Globally about 5-7% of all pregnancies are complicated and the prevalence of GDM is high in high-income countries. In recent decades, the prevalence of GDM has intensely increased in low- and middle-income countries. In India, the prevalence of GDM is high as 14%.[3] The most common signs and symptoms include severe thirst, nausea, frequent urination, impaired vision, and weariness etc. If GDM is not properly treated, there is a

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high chance of the birth of a big baby. The parents may experience low blood sugar and jaundice in their baby. It happens to cause stillbirth when issues go undiscovered or neglected. These young people could eventually become obese and have a greater chance of acquiring T2DM.[4] Typically GDM develops in the last 3rd trimester of pregnancy. The prevalence is about 1% among the aged less than 20 years mothers and 13% among the aged more than 44 years.[5] In 90% of cases GDM usually recovered and resolved after childbirth. But both mother and child are always at risk due to high blood pressure and glucose level.[6] All these conditions lead to a caesarian section delivery for reducing birth complications.[7]

Gestational diabetes is also increasing in Bangladesh, even in the younger age groups which can be prevented and treated with early diagnosis and treatment.[8] It's crucial to identify the mothers' co-morbidities and risk factors for prevention. To reduce mother and infant morbidity and mortality, lifestyle modification, proper evaluation, and appropriate management are crucial.

Methods

Study design and settings

This hospital-based cross-sectional study was conducted to assess the factors associated with gestational diabetes mellitus among pregnant women in the purposively selected a hospital named Central Hospital located in Dhaka, Bangladesh.

Participant's selection

Patients were selected conveniently from the outpatient department (OPD), who received health services from Gynae and Obstetric department. The selection criteria were all 2nd and 3rd trimesters' pregnant women who attended the OPD and aged ≥18 years. Total of 330 women were interviewed after matching the selection criteria.

Data collection methods

A pre-tested semi-structured questionnaire was used for data collection participants during the study period March, 2021 to August, 2021 through face-to-face interviews after obtaining informed written consent from each participant.

Data analysis

Data were checked, edited and entered into R analysis program. Chi-square (χ^2) test was done between categorical variables to show the association between dependent and independent variables. Logistic regression was done for multi-variants analysis to control the potential confounding factors. The results were presented in tables and chart.

Ethical approval

The study was approved by the department of the ethical committee of North-South University. All ethical principles and norms were followed during data collection.

Results

Table 1 represents the association between the socio-economic variables and factors related to the development of GDM. For this, variables were the age of the women, education, occupation, monthly family income, nulliparity, sleep duration, duration of TV watching in a day, exercise habits and previous history of pre-diabetes or HTN assessed. The woman's age (p=0.001), nulliparity (p=0.001), duration of sleep (p=0.021) and the existence of diabetes or HTN (p=0.001) were associated with the development of GDM during the pregnancies. In all cases, the p-value was considered <0.05. Age, nulliparity, duration of sleep and the existence of diabetes or HTN poses risk factors for GDM during 2nd and 3rd trimester of pregnancy.

Figure 1 illuminates the distribution of weight gain status during 2nd and 3rd trimesters of pregnancy.

Table 2 denotes the results from the logistic regression where the development of GDM was the binary outcome variable. Odds ratio with 95% confidence interval suggests that women who had slept less than 8 hours had 3.17 times higher odds (95% CI: 1.48-7.23) of developing GDM. For women aged over 30 years, the chances are 4.7 times higher and may vary between 2.16 to 10.84 to develop GDM. Unemployed status was a protective factor as these groups of women had 91% less likely to have GDM. The existence of hypertension or diabetes had about 7.5 times higher odds of developing GDM in women (95% CI: 3.42-18.31). Women who had weight gain during their pregnancy were found to be at 1.29 times more risk of GDM and may vary between 1.16-1.45 as the measure of odds.

Table 1: Characteristics of GDM patients and associated factor's unadjusted analysis (n=330)

Variables	Categories	GDM		χ2 value	p-value
		Yes	No		
Age (Years)	≤30	87	176	50.340	*0.001
	>30	55	12		
Education	HSC and above	37	55	0.268	0.605
	SSC and below	105	133		
Occupation	Employed	25	24	1.140	0.286
	Unemployed	117	164		
Monthly family income (Taka)	<25,000	58	65	1.106	0.293
	≥25,000	84	123		
Nulliparity	No	123	104	35.470	*0.001
	Yes	19	84		
Duration of sleep	≤8	31	64	5.303	*0.021
	>8	111	124		
Duration of watching TV (Hours)	1-2	31	38	0.049	0.825
	≥3	111	150		
Exercise habits	No	52	70	0.000	1.000
	Yes	90	118		
Existence of diabetes or HTN	No	91	176	43.786	*0.001
	Yes	51	12		

*Statistically significant value
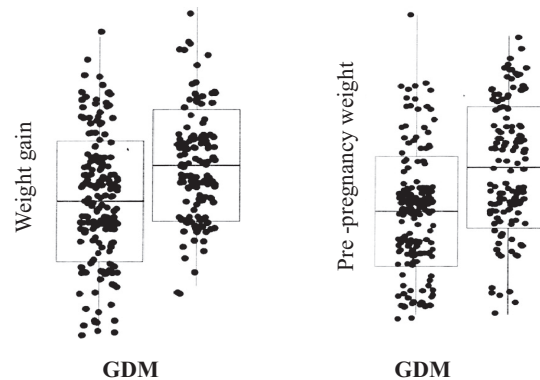
Figure 1: Weight gain during 2ⁿᵈ and 3ʳᵈ trimester of GDM women (n=330)

Table 2: Adjusted analysis between associated factors and GDM state (n=330)

Variables	Reference	Estimate	OR	LCI	UCI	p- value
Age (>30)	≤30	1.55	4.7	2.166	10.848	*0.001
Education level (SSC and below)	HSC and above	0.24	1.27	0.658	2.466	0.480
Occupation (Unemployed)	Employed	2.33	0.09	0.032	0.283	*0.001
Monthly family income (≥25,000)	<25,000	0.15	1.16	0.625	2.174	0.630
Nulliparity (Yes)	No	-1.15	0.32	0.159	0.616	*0.000
Duration of sleep (>8 hours)	≤8	1.15	3.17	1.480	7.236	*0.004
Duration of watching TV (≥3 hours)	1-2	-0.26	0.77	0.363	1.658	0.510
Exercise habits (No)	Yes	0.69	2.01	0.963	4.320	*0.050
Existence of diabetes or HTN (Yes)	No	2.04	7.66	3.420	18.309	*0.001
Weight gain (Yes)	No	0.26	1.29	1.169	1.445	*0.001

*Statistically significant value

Discussion

The aim of this study was to identify the GDM risk factors in pregnant women in their second and third trimesters. Risk factors can be any quality, trait, or circumstance in a person that raises their risk of developing an illness or suffering a catastrophic event. It is crucial to recognize that while risk factors may be related to a disease, they do not really cause it.

In this study, age was found to be a significant risk factor for the development of GDM during pregnancy in Bangladesh. The study findings show that the odds of developing GDM increase with age among the participants. Those who are more than 30 years old are 4.5 times more likely to develop GDM than those who are below 30 years. The relationship has been found statistically significant in this study. Terence TL et. al indicated from one of their study findings that the risk of GDM becomes progressively increased when women become 25 years and above. The relationship was significant among the study participants.[9]

This study found that maternal education level had a major impact on the development of GDM during the 1st trimester of pregnant women. Pregnant women with HSC and above level education are 1.3 times more prone to develop GDM than those who are educated up to SSC and below level. Occupation plays an important role in developing GDM during 2nd and 3rd trimesters of pregnancy. It can be seen that unemployed women were developing had 90% less occurrence of GDM than those who were involved in any kind of employment. The relationship was found to be significant among the study participants.

Monthly family income is also associated with developing GDM. Women with a monthly family income of more than 25,000 taka are 1.6 times more likely to develop GDM than those whose monthly income was less than 25,000 taka. Khan R et. al identified no significant relationship between socioeconomic status and GDM. In LMIC settings, lower socioeconomic status is already considered a mediating factor for the development of chronic diseases.[10]

This study also found nulliparity as a risk factor in developing GDM. The findings proved that nulliparous women had 68% less possibility to develop GDM than the women who were not nulliparous during 3rd trimester of pregnancy. According to this study, women those who sleep >8 hours are 3 times more likely to develop GDM than who sleep less than 8 hours. In addition, women who watch television for more than 3 hours were 23% less likely to develop GDM than those who watch 1-2 hours.

In this study, the existence of diabetes or HTN has important in developing GDM. It is evident that those who have the previous history of the above mentioned illness are 1.3 times more likely to develop GDM than women who do not have it. This finding is statistically significant as p<0.001. It appears that women's weight before pregnancy may pose a threat to developing GDM as women who were below 50kg weight during pre-pregnancy developed less occurrence of GDM than the woman whose weight was above 50kg. Weight gain over time was a significant contributor to the model and was found significant during 3rd trimester of pregnancy.

According to this study, women who gained weight more than 15kg weight during pregnancy were 1.3 times more prone to develop GDM. This group was compared to women who weighted of less than 15kg.

Conclusion

The development of GDM in women in their second and third trimesters was found to be at risk due to socioeconomic status, clinical features, and sedentary factors. Existing evidence suggests that individuals with these factors remain at high risk for developing GDM. As it is a multi-factorial disease, it is crucial to ensure that it is well managed, which necessitates an awareness of all the contributing components.

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