Article
Prevalence of gestational diabetes and associated risk factors

Jayati Debnath[1], SumonTalukder[2], Md. Shajadul Islam[3], Md. Shafiqul Islam Khan[3]*, Sadman Sakib Sabuj[2] and Dilruba Easmin Jhorna[1]

[1]Department of Human Nutrition and Dietetics, Faculty of Nutrition and Food Science, Patuakhali Science and Technology University, Bangladesh
[2]Department of Community Health and Hygiene, Faculty of Nutrition and Food Science, Patuakhali Science and Technology University, Bangladesh
[3]Department of Food Microbiology, Faculty of Nutrition and Food Science, Patuakhali Science and Technology University, Bangladesh

*Corresponding author: Md. Shafiqul Islam Khan, Associate professor, Department of Food Microbiology, Faculty of Nutrition and Food Science, Patuakhali Science and Technology University, Bangladesh. Phone: +8801712115973; E-mail: msikhan312@yahoo.com

Abstract: This study was conducted to know prevalence of gestational diabetes and associated factors. A cross sectional data was collected from the pregnant mothers from a hospital of Barisal city, Bangladesh. It was revealed that 5% of the interviewed mothers suffer from diabetes. Among 100 participants, 58% were in 20-30 years age group and 68% patients married within 21-25 years old. Near about half (51%) of mothers had more than 60 Kg body weight. Maximum (48%) patients passed their secondary education and 78% were jobless. More than half (56%) of the patient's family monthly earned 10000-20000 BD Tk. Among the mothers, 15% had the family history of diabetes. Correlation matrix revealed that, body weight, and blood pressure were positively associated with sugar level. Gestational age (P=0.04261) and diastolic blood pressure (P=0.018764) were significantly associated with the RBS of pregnant mothers. More study should be conducted to explore the accurate prevalence and practices of diabetic patients in the study area.

1. Introduction
Gestational diabetes mellitus (GDM) has been increasing globally (Leng, 2015). It has negative short-term and long-term outcomes both for mothers and their future offspring (Metzger, 2008). The prevalence varies widely according to location, diets and socio-economic status (Begum *et al*., 2017). In a recent study in Bangladesh a higher prevalence of diabetes was found in urban (8.1%) compared with rural populations (2.3%) (Hussain, 2005). But, according to World Health Organization (WHO) 1999 and WHO 2013 diagnostic criteria respectively, it was alarmingly high (36.6% and 40.9% respectively) in Bangladeshi population (Hasanat, 2016). More research should be conducted due to inconsistency of previous results in different areas of Bangladesh. Like other diseases GDM associated with some risk factors. Hasanat (2016) found its association with age and body mass index (BMI). Also, the highest risk factors for GDM are high maternal age, family history of T2DM, being overweight prior to pregnancy (Abrams, 1988), excessive gestational weight gain, and a past history of GDM/glucose intolerance (Cianni, 2003). There are limited studies conducted about GDM in the study area. Moreover, widely dissimilar rates observed in studies in different places necessitated for quantifying prevalence as well as risk factors associated with it. Varying socio economic condition and food habit in this area may influence the prevalence and risk factors. The study was, therefore conducted to know the actual prevalence and risk factors diabetes during pregnancy in the study area.

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2. Materials and Methods

2.1. Study design

We conducted the study among the mothers came for antenatal care at St's Annes Medical Center in Barisal city, Barisal. We collected a cross sectional data from July 2017 to December 2017 to know prevalence of gestational diabetes. We also assessed the associated factors related to diabetes in the study area. We considered all those mothers who were pregnant at our study time. We enrolled total 100 persons who met our case definition. We used a pre- structured questionnaire to collect data. We also measured the Random Blood Sugar (RBS) and weight of patients. We interviewed patients directly for collecting data. We obtained written consent from the study participants to participate in this study.

2.2. Measurement of BMI and RBS

We measured Height with a portable Harpendenstadiometer (Holtain Ltd, London, UK). We recorded parameters while the participant stood, without shoes, on a horizontal flat plate attached to the base of the stadiometer with heels together and fully stretched upward with the head in the Frankfurt plane as described by Kitange (1994). BMI was calculated using the formula weight/height^2. It was categorized according per Yazdani (2012): underweight (< 20 kg/m^2), normal (20–24.9 kg/m^2), and overweight (≥ 25 kg/m^2). We analyzed RBS with Glucolidder, China and categorized as diabetic patient who had greater than 7.8 mmole/L RBS according to Dutta (2009).

2.3. Ethics approval

The research was conducted in accordance with the declaration of Helsinki. Written consent was obtained from the participants before collecting data. Participants were informed of their rights to withdraw from the study at any stage.

2.4. Statistical analysis

We performed descriptive analysis to summarize the demographic characteristics of studied participants and their socioeconomic factors. Correlation matrix was done to know the association of GDM outcome with other dependent variables. We used SPSS version 16 to analyze the data and considered 5% level of significance.

3. Results

Table 1 represents the demographic characteristic of gestational diabetic patients. Among 100 participants, maximum 58% were in 20-30 years age group and around 40% were more than 30 years old. Highest parts of mothers (68%) married within 21-25 years old. More than 50% mothers had over 60 kg body weight. 88% patients followed Muslim religion and 12% patients followed Hindu religion. Maximum (48%) patients passed their secondary education. Only 22% patients had employment where 78% were jobless. More than half (56%) of the patient's family income was 10000-20000 BD Tk. Patients with family history of diabetes were 15%.

Table 1. Demographic characteristic of gestational diabetic patient.

Parameter	Category	Frequency	Percentage
Age	<20	3	3%
	20-30	58	58%
	>31	39	39%
Age of marry	16-20	10	10%
	21-25	68	68%
	26-30	22	22%
Body weight	<50	15	15%
	50-60	34	34%
	>60	51	51%
Religion	Muslim	88	88%
	Hindu	12	12%
Education	Illiterate	7	7%
	Primary	10	10%
	Secondary	48	48%
	Higher and Above	35	35%
Employment status	Yes	22	22%
	No	78	78%
Family income	<10000	15	15%
	10000-20000	56	56%
	21000-30000	22	22%
	>30000	7	7%
Family history of diabetes	Yes	15	15%
	No	85	85%

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Table 2. Physiological characteristic of gestational diabetic patient.

Parameter	Category	Frequency	Percentage
Body Mass Index (BMI)	< 18.5	2	2%
	18.5 - 24.9	58	58%
	25 - 29.9	36	36%
	> 30	4	4%
Level of sugar	>7.8 mmol/L	5	5%
	4.4-7.8 mmol/L	73	73%
	<4.4 mmol/L	22	22%
Gestational age	13-26	35	35%
	27-40	65	65%
Hemoglobin	<10.9	48	48%
	≥ 11	51	51%
BP (sysytolic)	≤120	92	92%
	≥120	8	8%
BP (Diastolic)	≤80	98	98%
	≥80	2	2%

Table 3. Correlation between diabetes other variables.

	Correlation coefficient	P value
Age	-0.03547	0.726076
B W	0.209405	0.056531
Systolic pressure	0.019185	0.849739
Diastolic Pressure	0.234676	0.018764**
Gestational age	0.05685	0.04261**
Hb	0.195109	0.052954

**5% level of significance.

Table 2 represents physiological characteristic of gestational diabetic patient. Maximum patients (58%) had normal BMI with range 18.5 - 24.9 and only 2% had the BMI < 18.5. Only 5% patients had random blood sugar more than 7.8 mmol/l where about three fourth (73%) of the patients had normal random blood sugar level. About two third (65%) of women were in third trimester. Almost half (48%) of the mothers were anemic. More than 90% diabetic patients had normal blood pressure.

Table 3 represents correlation between diabetes and other variables. Body weight, Hb and blood pressure were positively associated with sugar level. Age of mothers was inversely associated with level of sugar. Gestational age (P= 0.04261) and diastolic blood pressure (P=0.018764) were significantly associated with the RBS of pregnant mothers.

4. Discussion

Present study was to find out the prevalence of GDM and its risk factors. In this study we found that the prevalence of diabetic patients was 5%. Almost similar result found in Iran (4.8%) and Turkmenistan (6.3%) (Gundogan *et al*., 2013). Another study by Zargar *et al*. (2004) reported the overall prevalence of GDM was lower (3.8%) in Kashmir, India. On the contrary, it was a bit higher 6.94% in Jummu, 7.1% in Haryana, 7.3% in Maharastra, 6.8% in Tehran and 8.3% in Rwanda (Wahi *et al*., 2011; Rajput *et al*., 2013; Begum *et al*., 2017; Garshasbi *et al*., 2008; Niyibizi *et al*., 2016). In Bangladesh, the prevalence of GDM was found 9.7% (Jesmin *et al*., 2014). The variation in the prevalence of GDM could be due to local, cultural context and other factors as ethnicity, education and anthropometry of mothers (Wahi *et al*., 2011 and Rajput *et al*., 2014). In present study, 58% of GDM women were age ranged from 20-30 years old. Gracelyn and Saranya (2016) found similar 62.71% women with GDM were 26-30 years. Sreekanthan *et al*. (2014) found 75% of GDM women were above 25 years of age. Kalyani *et al*. (2014) found 56% of GDM females were more than 25 years of age. Kalra *et al*. (2013) reported pregnant women below 25 years of age are less prone to develop GDM. Significant relationship was noted between age and GDM. It may be due to increasing educational level and working opportunities. We found diabetic patients 20% and 80% in second and third trimester respectively. GDM generally develops during the second and third trimester of the pregnancy, because insulin resistance and diabetogenic effect of pregnancy hormones will be maximum in this period (Gracelyn and Saranya, 2016). In this research diastolic

blood pressure was significantly associated with gestational diabetics. Vembergre *et al.* (2002) noted that pregnancy-induced hypertension appears to be linked to the level of glucose intolerance during pregnancy. Women with hypertension had a twofold increased risk of GDM compared with women with normal BP. Gonsalves *et al.* (2005) had also mentioned that women with gestational hyperglycemia and GDM have higher risk of hypertension.

5. Conclusions

The prevalence of diabetes has been rising worldwide, which adversely affects maternal and fetal outcomes. In this study gestational diabetes was associated with gestational age and diastolic blood pressure. Late pregnancy should be paid more attention to reduce the ill effects of GDM on mother and future child. Because, insulin resistance became maximum in this period. Blood pressure of pregnant mother should be monitored regularly as it is associated with increased prevalence of diabetes. Pregnancy-induced hypertension together with hyperglycemia may lead to bad consequences both mother and child.

Conflict of interest

None to declare.

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