

# Prevalence of Gestational Diabetes in Some Selected Slums of Dhaka City

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**Abstract**— Background: Gestational Diabetes Mellitus (GDM) is common, with a rising prevalence, and is associated with higher maternal and neonatal morbidity. It carries additional long-term health consequences for the mother and her offspring.

**Objective:** To determine the prevalence of gestational diabetes in some selected slums of Dhaka city.

**Materials and Methods:** A cross sectional study was conducted in some selected slums of Dhaka city with a sample size of 236. A semi structured, pre tested, modified, interviewer administrated questionnaires was used to collect the information. All the data were entered and analyzed by using Statistical Packages for Social Science (SPSS) software version 16.0 (Chicago).

**Result:** It was found from the study that 15-20 age group was presented by 39.8% of the respondents with mean age  $23.76 \pm 5.616$ . More than half (53.4%) of the respondents had primary education and majority (79.7%) of the respondents were housewife. Regarding monthly family income highest percentage (54.2%) of the respondents had it as between BDT 2,000-10,000 and 41.5% had in between BDT 10,001-20,000. More than quarters (26.6%) of the respondents were found to have the family history of diabetes. This study result showed that 36.9 % of the respondents had no child since it was their first pregnancy followed by 54.2 % had 2-4 child, 8.9% had >4 children. More than half (57%) of the respondents were presented with history of GDM in their previous issue, among them 50.6% acquired GDM by 28-33 weeks of gestation. Those who had GDM in their previous issue, 43.5% of them managed it only by maintaining diet and exercise and 31.7% got insulin. Miscarriage was reported by majority (66.4%) of the respondent having GDM in their previous issue. It was also seen from the study that 24.2%% of the respondents had GDM, 25.4% was pre-diabetic and rest 50.4% had normal FBG in their current pregnancy.

**Conclusion:** Nevertheless it could be assumed that women with gestational diabetes in early pregnancy could be benefited from metabolic control as well as subsequent complications of GDM.

**Keywords** — GDM, Pregnancy, Miscarriage, Blood sugar.

## 1 INTRODUCTION

Gestational diabetes mellitus (GDM) refers to any degree of glucose intolerance with onset or first recognition during pregnancy.<sup>1</sup> GDM has been seen to be associated with growing pregnancy complication by hospital observation in Bangladesh. Urban prevalence of GDM is predicted even much more while the rural prevalence was found 6.8% and 8.2% according to FBG and 2h BG respectively.<sup>2</sup> Evidences showed that GDM poses a threat to adverse maternal and perinatal outcome as a result of maternal hyperglycemia. The United Nation's Millennium Development Goal (MDG) targets for reduction of child mortality and improvement of maternal health. These are the 4<sup>th</sup> and 5<sup>th</sup> of the 8

goals prioritized by MDG. Women with a history of GDM have a high risk of progression to type 2 diabetes mellitus (T2DM).<sup>3</sup>

Identification of high risk population by identifying the risk factors and pregnancy outcomes of GDM can aid in the implementation of such strategies. Bangladesh has been ranked as 10<sup>th</sup> highest of all the countries in the world according to the number of diabetic population.<sup>4</sup> Over the past few years a growing prevalence of GDM has also been observed in the hospitals of Bangladesh. But information is scanty on risk factors and pregnancy outcome.<sup>5</sup> Though there has been a significant decline of infant and child mortality the maternal death ratio is still high at over 380 per 100,000 live births.<sup>6</sup>

GDM is well known for its disastrous impact on the fetus in terms of perinatal mortality and morbidity and also on the mother for obstetrical complications.<sup>7</sup> In Bangladesh, 7-14% women are the victims of diabetes in their reproductive age.<sup>8</sup> Apart from new and old infectious diseases, such as malaria, tuberculosis and acquired immune deficiency syndrome (AIDS) non communicable

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diseases such as diabetes, hypertension are important threats to health for the years ahead. The nutritional status of adolescent girls and women is a key factor in the persistence of malnutrition in Bangladesh. Low birth weight is estimated to affect 30-50 percent of infants.<sup>9</sup>

Bangladesh has been experiencing an epidemiological transition from communicable diseases to non-communicable diseases (NCD). Tertiary level hospital data indicates that cardiovascular diseases have already appeared as one of the leading causes of mortality. NCDs are important cause of disease burden, morbidity and mortality. At least 25% of the deaths in primary and secondary government health facilities are caused by these diseases. Presently, Bangladesh does not have a community based public health program for NCDs. Only hospital based service, although poor, is available.<sup>10</sup> The Health, Nutrition, Population Sector Program (HNPS) has identified three NCDs-cancer, cardiovascular diseases and diabetes mellitus-as major public health problems. Looking at the surveillance finding worldwide WHO has recommended to list prevalence of diabetes as one of the basic health indicator for its member states.<sup>11</sup> Diabetes mellitus is a chronic disease caused by inherited and/or acquired deficiency in production of insulin by the pancreas, or by the ineffectiveness of the insulin produced.<sup>12</sup>

According to WHO in 2004 at least 171 million people worldwide had diabetes; this figure is likely to be more than double by 2030. WHO predicts 170% increase in the number of people with diabetes for the developing countries. The greatest increase is projected in India (195%).<sup>13</sup> Diabetes mellitus particularly type 2 diabetes is now recognized as a major chronic public health problem in Bangladesh. The magnitude of diabetes remains unknown due to lack of countrywide survey. Some studies showed that the prevalence is higher in urban areas. In a recent study in Bangladesh a higher prevalence of diabetes was found in urban (8.1%) compared with rural populations (2.3%).<sup>14</sup>

GDM as mentioned is any form of diabetes mellitus or impaired glucose tolerance (IGT) or impaired fasting glucose with first onset or first recognition during the index pregnancy. Thus the diagnosis of GDM is independent of possibility that diabetes or glucose intolerance may have antedated the pregnancy. As diabetes or glucose intolerance in women is more frequently discovered during

pregnancy WHO has recommended including such cases under the definition of GDM. Such a broad definition has a great practical value and has boosted research on GDM.<sup>15</sup>

Pregnancy is normally attended by progressive insulin resistance that begins near mid-pregnancy and progresses through the third trimester. The fact that insulin resistance rapidly abates following delivery suggests that the major contributors to this state of resistance are placental hormones. Moreover pancreatic cells normally increase their insulin secretion to compensate for the insulin resistance of pregnancy. As a result, changes in circulating glucose levels over the course of pregnancy are quite small compared with the large changes in insulin sensitive

## 2 MATERIALS AND METHODS

The study was a descriptive type of cross sectional study. The study population was pregnant women with gestational diabetes in Bangladesh. 236 samples were taken by non randomized purposive sampling technique. All the pregnant women who gave consent was included in the study and who did not give consent and were found to be handicapped were excluded from the study. Data was collected by using a semi structured, pre-tested modified & interviewer administered questionnaire by face to face interview and checking the prescriptions or pathological reports. Statistical Package for Social Science (SPSS) version 16.0 (Chicago) a computer program was used to entry and analyzes the collected data. Proportion was presented by frequency and cross tabulation analysis. The association was find out by using Pearson's chi-square ( $\chi^2$ ) test.

It was mention worthy as limitation of the study that the times allocated for this study was not enough to cope with the real picture. Fund was very limited for this study and finds the whole data appropriately. As the sample collected purposively so it may differ from the actual parameter of the population.

## 3 RESULTS

Results are presented here in three sections, section 1 contains socio-demographic variables (Table 1), section 2 contains GDM history related variables and then in section 3 all other outcome related variables.



**Table no 1: Distribution of the respondents by socio-demographic variables: (n=236)**

	Socio-demographic variables	Frequency	Percent
Age	15-20	94	39.8
	21-26	73	30.9
	27-32	53	22.5
	33-40	16	6.8
	Total	236	100.0
<b>Mean <math>\pm</math> SD= 23.76 <math>\pm</math> 5.616</b>			
Education	No formal education	67	28.4
	Primary	126	53.4
	Secondary	28	11.9
	Higher secondary	9	3.8
	Graduate & Above	6	2.5
	Total	236	100.0
Occupation	House Wife	188	79.7
	Service	23	9.7
	Business	14	5.9
	Day laborer	11	4.7
	Total	236	100.0
Monthly family income	2000-10000	128	54.2
	10001-20000	98	41.5
	20001-30000	10	4.2
	Total	236	100.0

In table no 1 it has been seen that 39.8% and 30.9% of the respondents were in age group 15-20 years and 21-26 years, among them more than half of the respondents (53.4%) had primary education. Majority of the respondents (79.7%) were housewife and 54.2% had a monthly family income as BDT 2000-10000 which is considered to be as poor category.

In table no 2 it is seen that highest percentage of the respondents were having 2-4 child. GDM was diagnosed between 28-33 weeks by more than half (50.6%) of the respondents. Among them 43.5% managed their GDM only by diet and exercise. (Table 3).

Number of children	Frequency	Percent
No child	87	36.9
2-4 child	128	54.2

>4 child	21	8.9
Total	236	100.0

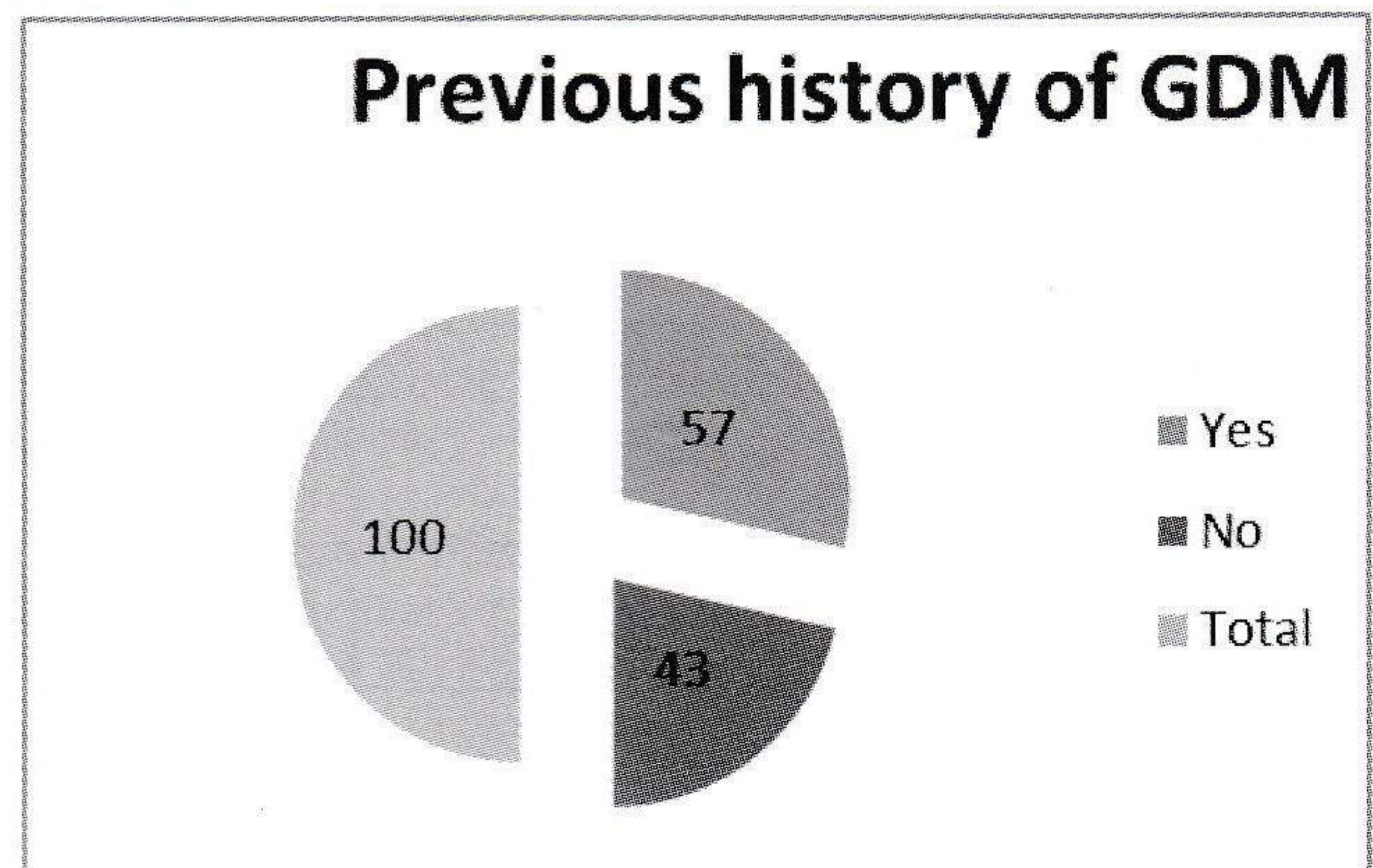


Fig. 1 represent the status of GDM in respondents previous issue, where it is observed that more than half (57%) were suffering from it.

**Table No 3: Distribution of the respondents by GDM related variables (n=85)**

	GDM related Variables	Frequency	Percent
Onset of GDM	22-27 weeks	40	47.1
	28-33 weeks	43	50.6
	34-39 weeks	2	2.4
	Total	85	100.0
Management of GDM	Diet and exercise	37	43.5
	Insulin	27	31.7
	No treatment	21	24.7
	Total	85	100.0

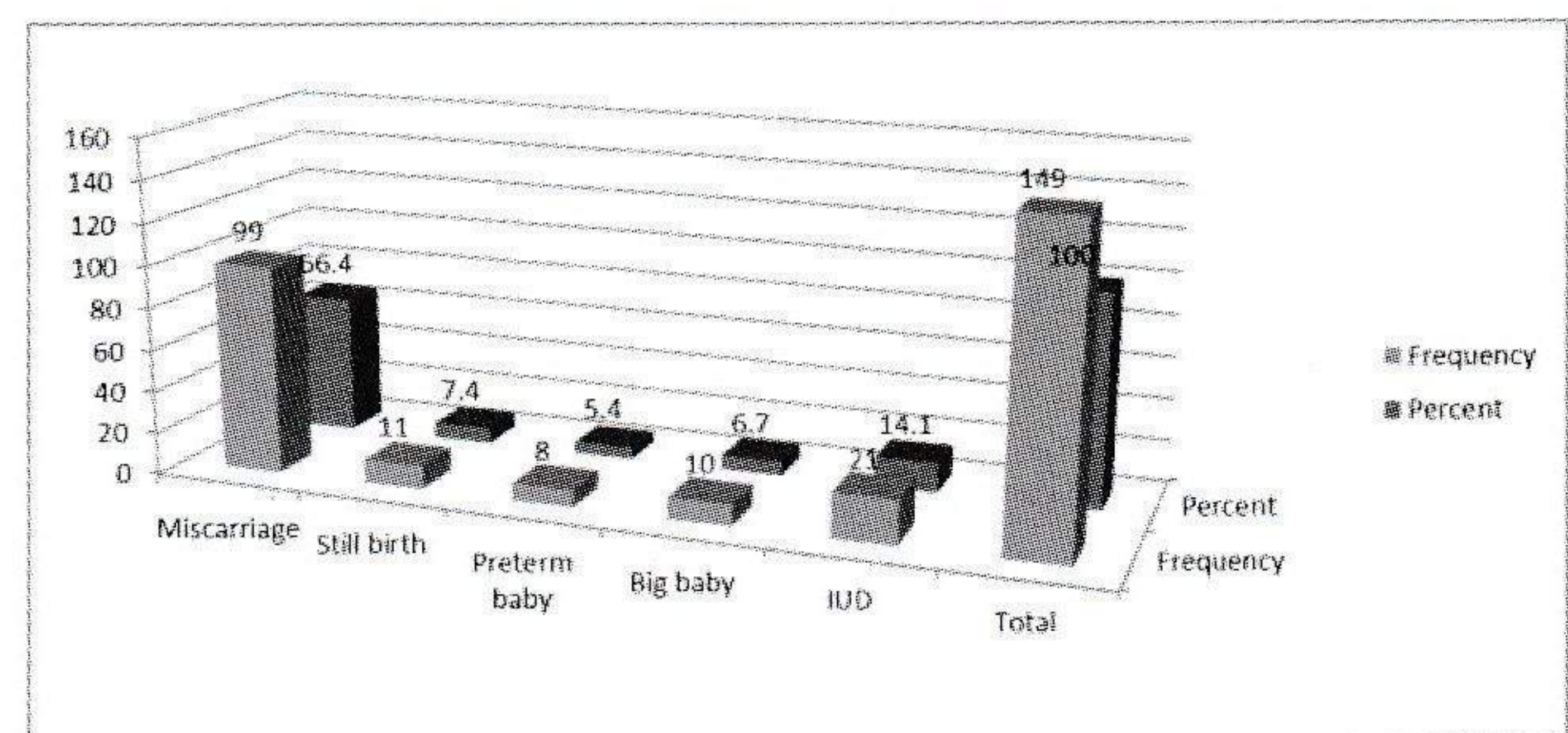


Fig. 2 Distribution of the respondents by obstetric history of previous issue

It is seen in figure no 2 that most of the respondents (66.4%) having GDM faced miscarriage in their previous issue.

Blood test was performed among all the samples and random blood sugar was tested to detect the



GDM status. It was seen that half of the respondent had a normal sugar test report followed by another half having pre-diabetic condition and diabetic respectively. (Table 4)

**Table no 4: Distribution of the respondents by blood sugar level (n=236)**

Blood sugar level	Frequency	Percent
Normal (<95mmol/l)	119	50.4
Pre-diabetic (95-120mmol/l)	60	25.4
Diabetic (>120mmol/l)	57	24.2
Total	236	100.0

It is seen in the above figure that majority of the respondents did not have diabetes in their family whereas 26.6% had positive family history.

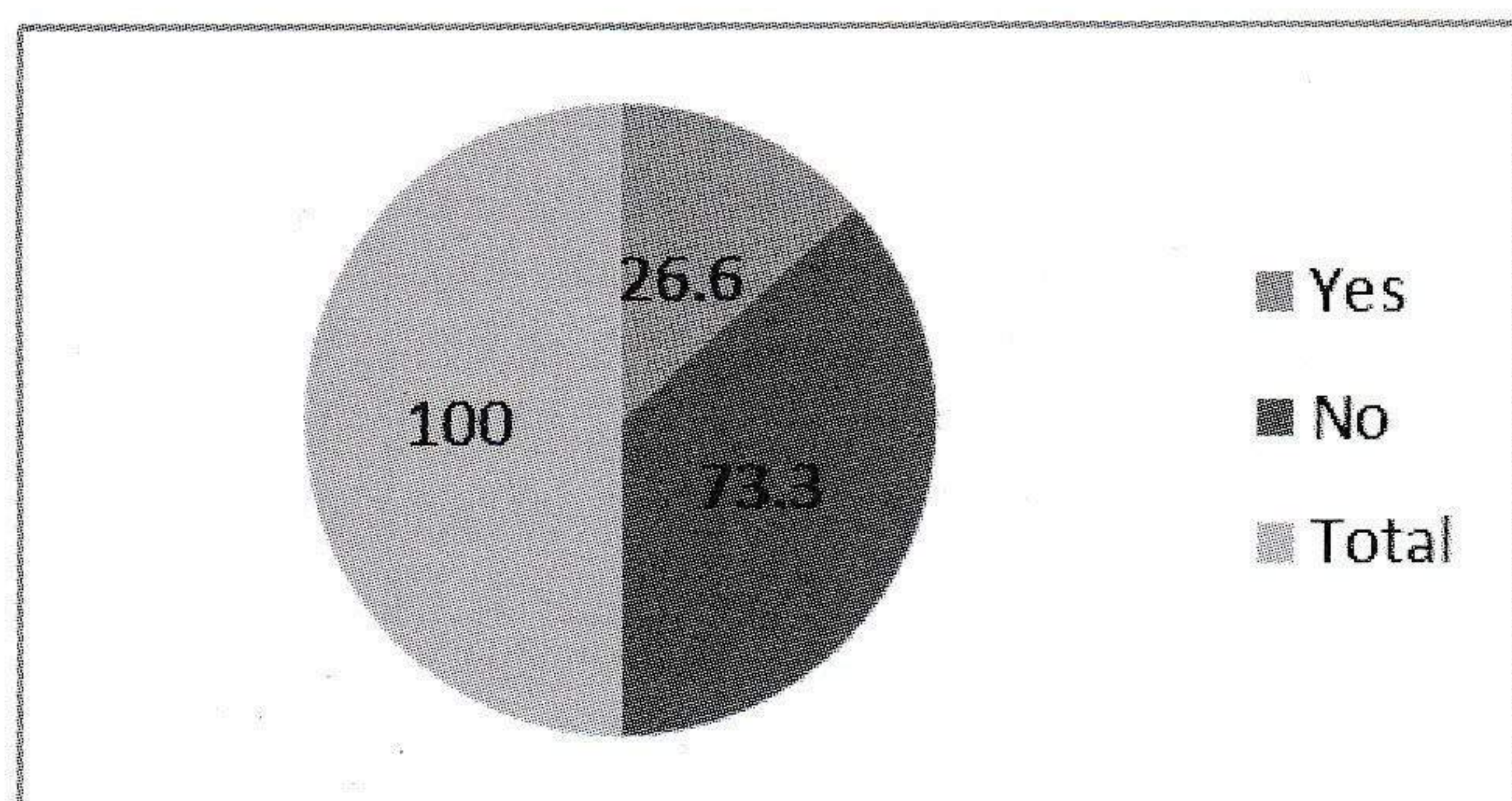


Fig. 3 Distribution of the respondents by family history of Diabetes

#### 4 DISCUSSION

This descriptive type of cross sectional study was conducted to assess the prevalence of gestational diabetes in some selected slums of Dhaka city with a sample size of 236. It was found from the study that 39.8% of the respondent were in the age group 15-20 years followed by 30.9%, 22.5% and 6.8% were 21-26 years, 27-32 years and 33-40 years respectively with mean age  $23.76 \pm 5.616$ . The mean age of this study slightly differs from the study conducted on Prevalence of gestational diabetes mellitus in urban and rural Tanzania by Akwilina W et al,<sup>17</sup> where the mean age was  $30.2 \pm 5.2$  years and this is possibly due to cultural variation of these to country.

Among the respondents 53.4% had primary education followed by 11.9% SSC, 3.8% HSC, 2.5% graduation & above and rest 28.4% respondents

were found to be illiterate. This study result showed that 36.9 % of the respondents had first issue followed by 54.2 % had 2-4 child, 8.9% had >4 children. It was also seen from the study that majority of the respondents did not have diabetes in their family whereas 26.6% had positive family history. These findings are dissimilar to the study conducted on Socio-demographic Risk Factors of Gestational Diabetes Mellitus by Radhia Khan et al. in Pakistan. The study showed that 60.2% GDM women were illiterate, multiparty was 54.4% with mean parity was >5 and positive family history of diabetes was 84.5. These differences are may be Due to different life style pattern of two countries as history of GDM varies to some extent.<sup>18</sup>

Among the respondents 79.7% were housewife, 9.7% and 5.9% were engaged in service and business and rest 4.7% were day labour. 54.2% of the respondents had monthly family income between BDT 2,000-10,000 and 41.5% had in between BDT 10,001-20,000, This finding shows differences to the study conducted on Screening for gestational diabetes mellitus and its prevalence in Bangladesh by Akter S. This difference is may be due to socio-economic variation of two different area of Bangladesh.<sup>19</sup>

More than quarters (26.6%) of the respondents were found to have the family history of diabetes. This study result showed that 36.9 % of the respondents had no child since it was their first pregnancy followed by 54.2 % had 2-4 child, 8.9% had >4 children. More than half (57%) of the respondents were presented with history of GDM in their previous issue, among them 50.6% acquired GDM by 28-33 weeks of gestation. Those who had GDM in their previous issue, 43.5% of them managed it only by maintaining diet and exercise and 31.7% got insulin. Miscarriage was reported by majority (66.4%) of the respondent having GDM in their previous issue. It was also seen from the study that 24.2%% of the respondents had GDM, 25.4% was pre-diabetic and rest 50.4% had normal FBG in their current pregnancy. These finding shows differences to the study conducted on diabetes and hypertension in pregnancy in a rural community of Bangladesh: a population-based study by Sayeed MA et al. and it was probably due to variation in life style pattern and cultural differences between urban and rural people of Bangladesh.<sup>2</sup>



## 5 CONCLUSION

Gestational diabetes mellitus (GDM) refers to any degree of glucose intolerance with onset or first recognition during pregnancy. Women with GDM are more likely to develop various complications in pregnancy such as give birth to macro-somic infants, obstructed labour, birth injury and death of the mother and the baby. GDM also has long-term health impact, more than 50% of women with GDM undergo develop type 2 diabetes later in life. Commonly recognized risk factors for GDM are prevalent in the study population. The occurrence of macrosomia was very low in the treated cases of GDM but the likelihood of birth weight more than 3.5 kg which is greater compared to the women without diabetes. Maternal and neonatal complications did not vary among those either treated with insulin or diet. Selective screening for GDM for all the pregnant women of Bangladesh bears significant importance as women with GDM are at high risk of pregnancy and delivery outcome.

## 6 RECOMMENDATIONS

1. Diagnosis and treatment of GDM should be put into national antenatal check up program. So that, measures can be taken to avoid bad consequences of GDM.
2. Women with GDM should be followed up even after delivery and blood sugar level should be routinely monitored.

## 7 REFERENCES

- [1] Metzger BE, Coustan DR. Summary and recommendations of the Fourth International Workshop-Conference on Gestational Diabetes Mellitus. The Organizing Committee. *Diabetes Care* 1998; 21 (2):161-67.
- [2] Sayeed MA, Mahtab H, Khanam PA, Begum R, Banu A, Azad Khan AK. Diabetes and hypertension in pregnancy in a rural community of Bangladesh: a population-based study. *Diabet Med* 2005; 22(9):1267-71.
- [3] Ben Haroush A, Yogev Y, Hod M. Epidemiology of gestational diabetes mellitus and its association with Type 2 diabetes. *Diabet Med* 2004; 21(2):103-13.
- [4] International diabetic foundation, Diabetic Atlas, second edition. Available at <http://www.idf.org/diabetesatlas/5e/es/prologo2000-idf.org> Accessed on April, 2015.
- [5] The World Bank in Bangladesh, Country brief, July 2005. Available at <http://siteresources.worldbank.org/INTBANGLADESH/Resources/BD06.pdf>. Accessed on February, 2015.
- [6] World Health Organization Statistics, 2005. Part 1.
- [7] Coustan DR. Gestational Diabetes. *Diabetes Care* 1993;10(3): 8-15
- [8] Fuhrmann K, Reiher H, Semmler K. Prevention of congenital malformation in infants of insulin dependent diabetic mothers. *Diabetic Care*. 1983; 6:219-23
- [9] Nutrition, Health and Nutrition, UNICEF Bangladesh. Available at <http://www.unicef.org/bangladesh/healthnutrition406.htm>. Accessed on January, 2015.
- [10] Health Profile of Bangladesh, World Health Organization, Bangladesh. Available at <http://www.who.org/countryhealthprofile.html>, Accessed on March, 2015.
- [11] King H, Aubert RE, Herman WH. Global burden of diabetes, 1995-2025: prevalence, numerical estimates, and projections. *Diabetes Care* 1998; 21(9):1414-31.
- [12] Alberti KG, Zimmet PZ. Definition, diagnosis and classification of diabetes mellitus and its complications. Part 1: diagnosis and classification of diabetes mellitus provisional report of a WHO consultation. *Diabet Med* 1998; 15(7):539- 53.
- [13] Global Burden of diabetes, Press Release WHO /63, 14 September 1998. Available at <http://www.who.int/inf-pr-1998/en/pr98-63.html> Accessed on February, 2015.
- [14] Hussain A, Rahim MA, Azad Khan AK, Ali SM, Vaaler S. Type 2 diabetes in rural and urban population: diverse prevalence and associated risk factors in Bangladesh. *Diabet Med* 2005; 22(7):931-36.
- [15] Abu SM, Ali L, Hussain MZ, Rumi MA, Banu A, Azad Khan AK. Effect of socioeconomic risk factors on the difference in prevalence of diabetes between rural and urban populations in Bangladesh. *Diabetes Care* 1997; 20(4):551- 55.
- [16] Buchanan TA, Xiang AH. Gestational diabetes mellitus. *J Clin Invest* 2005; 115(3):485-91.
- [17] Mwanri AW, Kinabo J, Ramaiya K, Feskens EJ. Prevalence of gestational diabetes mellitus in urban and rural Tanzania. *Diabetes Res Clin Pract*. 2014 Jan; 103(1):71-8 Available on <https://www.ncbi.nlm.nih.gov/pubmed/24367971> Accessed on February, 2015.
- [18] Khan R, Ali K, and Khan Z. Socio-demographic risk factors of gestational diabetes mellitus. *A Pakistan journal of medical science*. 2013 May-Jun; 29(3): 843-846 Available on <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3809300/> Accessed on February, 2015.
- [19] Jesmin S, Akter S, Akashi H, Al-Mamun A, Rahman MA, Islam MM, et al., editors. Screening for gestational diabetes mellitus and its prevalence in Bangladesh. *Diabetes Res Clin Pract*. 2014 Jan;103(1):57-62. doi: 10.1016/j.diabres.2013.11.024 Available from <https://www.ncbi.nlm.nih.gov/pubmed/24369985>



