Risk Factors Related to Gestational Diabetes Mellitus

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Abstract

Background:*Gestational Diabetes Mellitus (GDM) is a one in the major risk factor of pregnancy. GDM is defined as any degree of glucose intolerance with onset or first recognition during pregnancy. The world-wide 425 million people are suffering from diabetes and 1 in 6 birth is affected by GDM. In Bangladesh prevalence of GDM was 9.7% according to WHO criteria.*

Objectives: *The aim of this study wasto identify the risk factors of gestational diabetes mellitus in Bangladesh.*

Methods:*A descriptive exploratory study design was used, 60 GDM and 60 Non-GDM mother were included by using convenient sampling. Data was collected by face to face interview through structure questionnaire that consists of socio demographic, pregnancy related and life style related characteristics.*

Results:*The mean age of the GDM participants 27.82 (±4.91) was higher than non-GDM participants 25.25 (±4.63). There was significantly difference between GDM and non- GDM group which include heard GDM (13.46, p=.00), history of GDM (5.88, p= .01), family history of DM (10.84, p=.00, history of abortion (11.3, p=.00), history of macrosomic baby (6.17, p= .01) and history of polyhydramnios (6.31, p= .01). Intake of fatty food (9.85, p= .00), exercise (3.68, p= .005), and family smoke (11.36, p=.00) also had significantly factors of GDM than non-GDM.*

Conclusion:*The study finding revealed that there was a more modifiable risk factors among GDM than non-GDM mother. This study will provide information about risk factors that can help to nurse midwife in early screening and disseminate information to increase awareness about risk factors among pregnant mother.*

Keywords:*GDM, Factors, Pregnant Women.*

I. Introduction

1. Background

Gestational diabetes mellitus (GDM) is a one of the major risk factor in pregnancy. GDM is defined as any degree of glucose intolerance with onset or first recognition during pregnancy (American Diabetes Association [ADA], 2014). It leads to serious health effect for mother and children when it is undiagnosed (Mahtab & Bhowmik, 2016). Undiagnosed & poorly managed are the leading causes of type-2 diabetes mellitus and greater risk of heart disease and metabolic syndrome of infants such as obesity hypertension and coronary artery disease (Damm, 2009).

Gestational diabetes mellitus is a major concerning issue for developed as well as developing country. Diabetes is now major health problem in the world(Wannaro, Benthira & Sampurna, 2016). In the world-wide 425 million people are suffering from diabetes and 1 in 6 birth is affected by GDM (International Diabetes Federation [IDF], 2017).In 2017 Australia 28,784 number of life births affected by hyperglycemia during pregnancy (IDF, 2017). In India diabetes affect approximately six million births of which 90% due to GDM (Mahalakshmi, et al., 2016).

The Prevalenceof GDM is high in Sri Lanka (Sudasinghe, Ginige, & Wijeyaratne, 2016).In India a study showed that prevalence of GDMwas17 %(Sreekanthan, Belicita, Rajendran & Vijayakumar, 2014). Another study found that the highest rate of GDM was 18.6% and lowest 0.7%(Sayehmiri, Bakhtiyari, Darvishi & Sayehmiri, 2013).A previous study found inBangladeshthe prevalence of GDM was 9.7% according to WHO criteria and 12.9% as followed by ADA criteria (Jesmin et al, 2014).In Bangladesh 480.86 life birth wasaffected in Diabetes (IDF, 2017).

Numerous studies found that several factors influence the GDM such as family history of diabetes, previous history of GDM, over age, obesity, multigravida, high risk pregnancy, high BMI, unbalance diet, more intake of fruits and sweet food, adverse pregnancy outcome, glycosuria, polyhydramnios and large fetus in pregnancy(Dirar & Doupis, 2017; JZhou, Wang & Zhang, 2015; Teede et al., 2011). Several study conducts in this area however nursing research in Bangladesh have limitation thus investigator would like to investigate in this area in Bangladesh context. The results of this study will be helpful for nurse midwife who play a significant role to detect high risk pregnancy and Bangladeshi pregnant women will be benefited and gathered information from ANC visit.

2. Objectives
General Objective

The aim of this study was to identify the risk factors of gestational diabetes mellitusin Bangladesh.

Specific Objectives

1. To identify the socio-demographic characteristics of the participants.
2. To identify pregnancy related characteristics of the participants.
3. To identify life-style related characteristics of the participants.

II. Methods

1. Study design

Descriptive exploratory study design was used to identify the risk factors related to gestational diabetes mellitus in Bangladesh.

2. Study Participants

The target population was woman who was attended antenatal outpatient department at Ad-din Medical College Hospital, Dhaka. Sample size was 120 mother in 60 GDM and 60 non-GDM mother was selected who were clinically diagnosed GDM or non-GDM. Convenience sampling technique was used to recruit eligible subjects.Sample has determined by using G power analysis. The estimated sample size has calculated for an accepted minimum level of significant alpha (α) of 0.05, an expected power of 0.80(1-β) and accepted medium effect size of 0.30 (γ) calculated sample size is 120. Due to potential dropout, 20% attrition rate will be added and the total sample size is 140.

Inclusion criteria

1. The pregnant women of 6 weeks gestational age up to delivery
2. Physically healthy pregnant women.

The participants was excluded who are severe illness.

3. Instruments

Instruments in this study is modified by investigator according to literature review (Erem, Kuzu, & Can, 2015, Jones et al., 2017). Face to face interview was taken by using structured questionnaire .Questionnaire has consist of a total 31 items divided into three parts.

Socio- demographic questionnaire were consisted of ten (10) items. To identify the socio-demographic characteristics of participants including age, religion, marital status, level of education, occupation, monthly family income, residence, height, weight, BMI.

Pregnancy related questionnaires were consisted of fourteen (14) items. To assess factors of GDM like comorbidity, information during pregnancy, complication during and previous pregnancy, family history.

Lifestyle related questionnaires were consisted of seven (7) items. To assess dietary pattern, exercise, family history of alcohol and smoke. The validity of the instruments was examined by a panel of three experts. Then the investigator was modified the instruments based on expert's recommendation then the instrument was translated from English to Bengali version by two bilingual translators.

4. Data collection

Data were collected after obtaining permission from Institute Review Board (IRB) at NIANER and BSMMU IRB NO: Exp.NIA-S-2018-20. The investigator submitted the application form for seeking permission from the director of the hospital. The researcher explained the purpose and benefits of the study to the director and head nurse of the antenatal care unit. Written consent was taken from participants. The data were collected by using the structured questionnaire, and the investigator read these for the participants who were unable to read and write. They were informed that they had freedom to ask for explanations regarding the instruments or to withdraw from the study at any time without any reason or penalty. All information and responses in connection with this study would remain confidential. Data were collected by the investigator through face to face interview in period of December 2018 to January 2019.

5. Data Analysis

Data was analyzed by using SPSS version 23. Descriptive and inferential statistics was used. In descriptive statistics, frequency, percentage, mean and standard deviation was used to describe the characteristics of the study participants. In inferential statistics, chi-square and two sample t-test were used to analyze the study variables.

III. Results

1. Socio-Demographic Characteristics of Participants

The sample were consists of 120 pregnant mother who attended the antenatal care unit of Ad-Din Medical College Hospital in Dhaka. Who met inclusion criteria were recruited for this study, 60 GDM and 60 Non-GDM mothers. The mean age of the GDM participants was 27.82 (±4.91) (range from 17 to 41 years) and the non-GDM participants was 25.25 (±4.63) (range from 17 to 38 years) which is significant relationship between GDM and non-GDM (t= -2.94, p= .00).

The most of the participants were Islam, 49.1% GDMand 50.9%in non-GDM group. In this study half of the participants were lived in urban area (50.5%) GDM and (49.5%) in non-GDM. Mother while belonged to rural area in (55.6%) in GDM and in non- GDM (44.4%). Among the around two third participants (62.5%) were complete higher secondary certificate whilearound one third participants (37.5%) completed secondary school certificate in non-GDM mother. The mean score of BMI in GDM 30.42 (± 5.31) was higher than non-GDM group 27.90 (± 4.52) (Table 1).

Table 1. Distribution of Socio Demographic Characteristics between GDM and non-GDM Participants (N=120).

Variable	Categories	GDM (n=60)	Non-GDM(n=60)	χ^2 / t(p)
		n (%)M±SD	n (%) M±SD	
Age		27.82±4.911	25.25±4.638	-2.94 (**.00**)
Marital status	Married	59 (49.6)	60 (50.4)	1.00 (.31)
	Separated	1 (100)	0 (0)	
Religion	Islam	54 (49.1)	56 (50.9)	.43 (.51)
	Hindu	6 (60)	4 (40)	
Residence	Rural	5 (55.6)	4 (44.4)	.12 (.73)
	Urban	55 (50.5)	56 (49.5)	
Level of education	Primary school	7 (50)	7 (50)	1.87 (.60)
	Secondary School Certificate (SSC)	20 (43.5)	26 (56.5)	
	Higher Secondary Certificate (HSC)	10 (62.5)	6 (37.5)	
	Others	23 (52.3)	21 (47.7)	
Occupation	Housewife	52 (50)	52 (50)	2.33 (.50)
	Government employee	2 (100)	0 (0)	
	Private employee	5 (41.7)	7 (58.3)	

	Others	1 (50)	1 (50)	
Weight(kg)		71.34 ± 14.60	64.65 ± 11.45	-2.79 (**.00**)
Height(cm)		152.85 ± 5.44	152.12 ± 5.91	-.70 (.48)
BMI		30.42 ± 5.31	27.90 ± 4.52	-2.80 (**.00**)

2. Pregnancy Related Characteristics of Participants

Pregnancy related characteristics were 14 items. Two third of participants (63.4%) were one child in GDM and (62.8%) were nalipara in non GDM. In GDM group around one third of participants (31.5%) known regarding GDM while respondents (68.5%) in non GDM. There was significant difference in the GDM than non-GDM who heard about this term ($\chi 2$= 13.46, p=.00). The most of the participants (88.9) have history of GDM in previous pregnancy in GDM mother while only (11.1%) in non-GDM. This finding demonstrated that GDM mother had higher history of GDM compare to non-GDM($\chi 2$= 5.88, p= .01).

In GDM participants had history of IUD (88.9%), abortion (76.7%), over birth weight (80%), polyhydramnios (100%) and preeclampsia (100%) in GDM group compared to non-GDM. The result showed that among the participants had associated complication previous pregnancy in GDM significantly higher than non-GDM group which were history of IUD ($\chi 2$= 5.88, p= .01), abortion ($\chi 2$= 11.3, p=.00), Macrosomic baby ($\chi 2$= 6.17, p= .01), polyhydramnios ($\chi 2$= 6.31, p= .01) and preeclampsia ($\chi 2$= 9.73, p= .00).

Among around of two third of participants (65.4%) were visited ANC one- two times and participants (65%) were attended three - four times at ANC in non-GDM group ($\chi 2$= 7.53, p= .05). The mean score of weight gain was8.65 (±5.68) kg in GDM group higher than non-GDM6.20 (± 4.70) kg. In GDM group had more comorbidity diseases and complications during pregnancy than non-GDM group. In this study hundred percent's (100%) of participants were pregnancy induced hypertension, polihydramnios and bleeding during pregnancy. The majority of the participant's fetal weight were (93.3%) respectively had higher than non-GDM group. The hundred percent of the participant had family history of GDM andtwo third had DM 64.1%. Almost of the participant had (100%) liver disease.There were statistically significant difference between GDM and non-GDM group regarding family history of GDM($\chi 2$= 8.57, p= .00), family history DM ($\chi 2$= 10.84, p= .00) and family history of liver disease ($\chi 2$= 6.31, p= .01) (Table 2).

Table.2. Distribution of Pregnancy related Characteristics between GDM and non-GDM Participants(N=120).

Variable	Categories	GDM (n=60) n (%)M±SD	Non-GDM (n=60) n (%)M±SD	χ^2 / t(p)
Gravida	First	12 (36.4)	21(63.6)	4.27(.23)
	Second	15 (48.4)	16 (26.7)	
	Third	20 (58.8)	14(41.2)	
	Fourth or more	13 (59.1)	9(40.9)	
Para	None	16(37.2)	27(62.8)	5.76 (.12)
	First	26 (63.4)	15 (36.6)	
	Second	13(50)	13 (50)	
	Third	5(50)	5(50)	
Heard about GDM	Yes	17 (31.5)	37 (68.5)	13.46 (**.00**)
	No	43 (65.2)	23 (34.8)	
History of GDM	Yes	8 (88.9)	1 (11.1)	5.89 (**.01**)
	No	52 (46.8)	59 (53.2)	
History of IUD	Yes	8 (88.9)	1 (11.1)	5.89 (**.01**)
	No	52 (46.8)	59 (53.2)	
History of Still birth				.21 (.65)
	Yes	3 (60)	2 (40)	
	No	57(49.6)	58 (50.4)	
History of Abortion				11.3 (**.00**)
	Yes	23(76.7)	7 (23.3)	
	No	37(41.1)	53 (58.9)	
History of Preterm Birth				.43 (.51)
	Yes	6 (60)	4 (40)	
	No	54 (49.1)	56 (50.9)	
History of Macrosomia baby				6.17 (**.01**)
	Yes	12 (80)	3 (20)	
	No	48 (45.7)	57 (54.3)	

History of Polyhydramnios				6.31 (**.01**)
	Yes	6 (100)	0 (0)	
	No	54 (47.4)	60 (52.6)	
History of Oligohydramnios				.28 (.59)
	Yes	9 (56.3)	7 (43.8)	
	No	51(49)	53 (51)	
History of Anemia				
	Yes	9 (69.2)	4(30.8)	2.15 (.14)
	No	51(47.7)	56 (52.3)	
History of Preeclampsia				
	Yes	9(100)	0 (0)	9.73 (**.00**)
	No	51 (45.9)	60 (54.1)	
First ANC visit		3.50 ± 1.98	3.38 ± 2.05	-.31 (.75)
Times of ANC visit	Never	0 (0)	1 (100)	7.53 (**.05**)
	One-Two times	17 (65.4)	9 (34.6)	
	Three-Four times	14 (35)	26 (65)	
	More than four times	29 (54.7)	24 (45.3)	
Weight Gain in pregnancy		8.65 ± 5.68	6.20 ± 4.70	-2.57 (**.01**)
HTN in pregnancy	Yes	13 (100)	0 (0)	14.57 (**.00**)
	No	47 (43.9)	60 (56.1)	
HD in pregnancy	Yes	1(100)	0 (0)	1.00 (.31)
	No	59 (49.6)	60 (50.4)	
KD in pregnancy	Yes	1(100)	0 (0)	1.00 (.31)
	No	59 (49.6)	60 (50.4)	
Anemia in pregnancy				.37 (.54)
	Yes	7 (58.3)	5 (41.7)	
	No	53 (49.1)	55 (50.9)	
Hypothyroidism in pregnancy				.10 (.75)
	Yes	6 (54.5)	5 (45.5)	
	No	54(49.5)	55 (50.5)	
Polyhydramnios in pregnancy				9.73 (**.00**)
	Yes	9 (100)	0 (0)	
	No	51 (54.9)	60 (54.1)	
Oligohydramnios in pregnancy				.20 (.64)
	Yes	3 (60)	2 (40)	
	No	57 (49.6)	58 (50.4)	

Table 2.con…

		GDM(n=60)	Non-GDM(n=60)	
Variable	Categories	n (%)M±SD	n (%)M±SD	χ^2 / t(p)
Bleeding in pregnancy				7.43 (**.00**)
	Yes	7 (100)	0 (0)	
	No	53 (46.9)	60 (53.1)	
Macrosomia in pregnancy				12.87 (**.00**)
	Yes	14 (93.3)	1 (6.7)	
	No	46(43.8)	59 (56.2)	
Family H/O GDM	Yes	8 (100)	0 (0)	8.57 (**.00**)
	No	52 (46.4)	60 (53.6)	
Family H/O DM	Yes	41 (64.1)	23 (35.9)	10.84 (**.00**)
	No	19 (33.9)	37 (66.1)	
Family H/O HD	Yes	5 (50)	5 (50)	.00 (1.0)
	No	55 (50)	55 (50)	
Family H/O KD	Yes	5 (62.5)	3 (37.5)	.53 (.46)
	No	55 (49.1)	57 (50.9)	
Family H/O HTN	Yes	21(63.6)	12 (36.4)	3.38 (.06)
	No	39 (44.8)	48(55.2)	
Family H/O LD	Yes	6 (100)	0 (0)	6.31 (**.01**)
	No	54 (47.4)	60 (52.6)	

3. Life-Style Related Characteristic of Participants

Two third of the participants (66.7%) were eaten fatty food in GDM group compared to (33.3%) in non-GDM. There were significant difference regarding intake of fatty food in GDM than non-GDM ($\chi2$= 9.85, p= .00). Nearly two third (65.5%) and around one third 34.4% were performed exercise in non-GDM group .There was significant difference between GDM and non-GDM group (x^2=3.68, p=.05) regarding exercise. The mean score of exercise time was 6.75 ($\pm$ 11.23) in GDM while 3.17 ($\pm$ 7.81) in non-GDM group, maximum range 30 minutes in both group. The most of the participants (80%) had family history of smoking compared to (20%) in non-GDM group, which is significant difference than non-GDM group (Table 3).

Table 3. Life Style related Characteristics between GDM and non-GDM participants (N= 120).

Variable	Categories	GDM(n=60) n (%) M±SD	Non-GDM(n=60) n (%) M±SD	χ^2 / t (p)
Fatty Food	Yes	34 (66.7)	17 (33.3)	9.85(**.00**)
	No	26 (37.7)	43 (62.3)	
	Almost never	3(75)	1 (25)	7.82 (.09)
Eat fruits per weeks	1~2 servings	13 (76.5)	4 (23.5)	
	3~4 servings	8 (47.1)	9 (52.9)	
	> 5 servings	36 (44.4)	45 (55.6)	
Vegetables eat per weeks				1.73 (6.29)
	Almost never	1 (100)	0 (0)	
	1~2 servings	2(40)	3(60)	
	3~4 servings	5 (62.5)	3 (37.5)	
	> 5 servings	52 (49.1)	54 (50.9)	
Eat salty food	Very less salty	15 (41.7)	21 (58.3)	4.18 (.38)
	Less salty	10 (52.6)	9 (47.4)	
	Moderate	18 (46.2)	21 (53.8)	
	A little salty	7 (58.3)	5 (41.7)	
	Very salty	10 (71.4)	4 (28.6)	
Exercise	Yes	19 (65.5)	10 (34.4)	3.68 (.**05**)
	No	41(45.1)	50 (54.9)	
Exercise time per day (max- 30 min		6.75 ± 11.23	3.17 ± 7.81	
Family H/O currently smoke	Yes	20 (80)	5 (20)	11.36 (**.00**)
	No	40 (42.1)	55 (57.9)	

IX. Discussion

1 Socio-Demographic Characteristics

The finding of this study was found that increasing maternal age as a risk for GDM. The mean age of GDM was 27.82 ($\pm$4.91) years that were significant characteristics. Similarly numerous study found that advancing age the risk of getting GDM(Mustaniemi et al., 2018; JZhou, Wang, & Zhang, 2015; Wannaro, Benthir & Sampurna, 2016). This study revealed that age wassignificant risk factors for gestational diabetes mellitus. The present study found that high BMI influence the GDM mother from non- GDM. The worldwide found that high BMI was the most important leading causes for developing gestational diabetes mellitus (Araya, 2013; Khan, Khalique, Ali & Khan, 2013).

2. Pregnancy Related Characteristics

In this study revealed that following risk factors were included previous history of GDM, IUD, abortion, macrosomia baby, polyhydramnios, preeclampsia and during pregnancy were HTN, Polyhydramnios, bleeding in pregnancy, macrosomia baby. Also found that family history of GDM, DM, HTN, and LD. All are the significant risk factors leading to GDM in current pregnancy.

The current study revealed that mother had history of GDM which was significantly different from non-GDM group. Consistently previous studies found that history of GDM can lead to gestational diabetes mellitus in the subsequent pregnancy (Alfadhli et al., 2015;Lee et al., 2018; Sivakumar, Rajasekeran, & Arummugam, 2014). Mother with history of diabetes were one of the most common clinical risk factors for GDM.

This study revealed that significant risk factors were history of macrosomia baby, IUD, polyhydramnios, abortion and preeclampsia from non-GDM group. Smilarly one study found that significant relationship between macrosomia baby, hypertension, miscarriage and preeclampsia with GDM mother (Bouzarian et al., 2013). Another similar studyfound that history of miscarriage, stillbirth, abortion (Liu, Zhang & Li, 2017).In contrast previousstudies found that no significant relationship between fetal weight gain and miscarriage (Jesmin et al., 2014;Vakili, Modaressi, Zahabi & Aghakoochak, 2016). Another two similar study found that which was significant risk factors which are leading to GDM (Karajibani, Montazerifar & Abdolahi, 2015;Niyibizi et al., 2016).

These study participants reported that they had history of macrosomia baby, which were consistent with previous history. The previous study found that prevalence of macrosomia is higher than non-GDM mother (Campbell, 2014). The macrosomia baby was one of the most important complications due to gestational GDM. The recent study revealed that GDM mother known about GDM was significantly difference than non-GDM group. A previous study found that most of the women were familiar that risk of GDM (Dimka, 2015).The current study found that two third of participants were visited ANC one- two times and attended three - four times at ANC in non-GDM group. A previous study revealed that women who had fewer attended at hospital were more likely latediagnosed than women who had regularly attendedat hospital for check-up (Xuanping et al., 2012).

This study found that risk factors of GDM were weight gain in pregnancy, HTN in pregnancy, polyhydramnios, bleeding in pregnancy and macrosomia baby. Mother who had gestational diabetes mellitus; there was a greater risk for type 2 diabetes mellitus. The GDM was a risk of developing hypertension and there was significant link with macrosomia in pregnancy (American Diabetes Association, 2014;Surwade, Sinha & Kachhawa, 2017). Another study found that macrosomia baby, pregnancy induced hypertention, polyhydramnios were risk factors for GDM and mild pregnancy obesity was increased GDM (Lee, 2018).

In this study family history of DM was significantly higher than non-GDM group. Similarly previous studies found that family history of diabetes mellitus were significantly associated with higher changes leading to GDM (Kiani, Naz, Sayehmiri, Sayehmiri & Zali, 2017;Mustaniemi et al., 2018;Lee, 2018; Surwade, Sinha & Kachhawa, 2017). Similarly found that family history of GDM which are consistent with previous study (Liu, Zhang & Li, 2017). This risk factors were more liable leading to GDM.

3. Life Style Related Characteristics

The present study found that high intake of fatty food was significantly difference from non-GDM group. In consistently previous study found that in western dietary pattern was high intake of fatty food such as sweets, soft drinks, salty snacks, solid fat, high-fat dairy products, potatoes, eggs, red meat which were aggravated of GDM (Sedaghat et al., 2017). In chines Women high in intake of unbalance diet like fatty food (Zhou, Wang, & Zhang, 2015).

This study revealed that GDM mother were regular exercise than non-GDM. Consistently previous study indicate that Fifty-five percent of the GDM women followed the recommended exercise protocol of training to prevent future type2 diabetes mellitus (Stafne et al., 2012).A study found that exercise intervention is a suitable non-invasive therapeutic measure that can be manage weight gain and improve pregnancy outcomes in women with GDM compare to non-GDM mother (Wang, 2015).The recent study showed that GDM mother exercise regularly because they under treatment.

The current study found that passive smoker at home which is significantly higher than non-GDM group. A previous study enumerate that passive smoking was independent risk factors associated with GDM (Leng et al., 2017). Another study revealed that pregnant women exposed to passive smoking both at home (1.5 times higher) and workplace (1.7 times higher) were more likely to associated with the risk of GDM from non-GDM mother (Carroll et al., 2018).Thus family history of smocking as influencing risk factors for GDM.

X.Conclusion & Recommendation

1. Conclusion

One hundred twenty pregnant mother which sixty GDM and sixty non-GDM were recruited from Ad-Din Medical College Hospital, in Dhaka, in Bangladesh. A structured questionnaire was used to identify risk factors related to gestational diabetes mellitus among Bangladeshi pregnant mother.This study finding revealed

that there weremore modifiable risk factors among GDM than non-GDM mother. This study will provide information about risk factors that can help to nurse midwife in early screening and disseminate information to increase awareness about risk factors among pregnant mother.

2. Limitation & Recommendation

The present study has some limitations that might have influenced that outcome. Firstly, data were collected by convenient sampling method from one hospital in Bangladesh. This may limit the generalizability of the result. Secondly the sample size of population was low. It is recommended that the study be conducted large sample size.

This study has implication for nursing practice, nursing education, and research. This could also reduce the maternal and infant mortality rates. The important recommendations are as follows:

Nursing practice
1. The finding provides valuable information for nurse in clinical practice to gain better understanding about risk factors of gestational diabetes mellitus. It also helps to nurse's early detection of GDM and early manages.
2. In this study the dietary behavior was at an intake of fatty food. Nurses are the key persons to disseminate knowledge, thus they could nutritional counseling. Nurse should be able to given proper counseling for pregnant mother about the varieties of diet that are essential in pregnancy.

The results of this study will be helpful for nurse midwife who play a significant role to detect high risk pregnancy and Bangladeshi pregnant women will be benefited and gathered information from ANC visit. However it is recommended that this information is effective to formulate new strategies to increase awareness, prevention, and management of GDM among pregnant women in Bangladesh.

XI. Acknowledgements

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