

Original Research Article

# To study risk factors associated with gestational diabetes mellitus.

**Dr. Prof Kavita N Singh<sup>1</sup> (Professor and Head of the Department), Dr. Azra Parveen Khan<sup>2</sup> (Senior Resident), Dr. Mohd Ashafaq<sup>3</sup> (Resident Doctor) & Dr. Vineeta Ghanghoriya<sup>4</sup> (Associate Professor)**

Department of OBGY, Netaji Subhash Chandra Bose Medical College, Jabalpur<sup>1,2&4</sup>  
Dept. of General Medicine, Jaiprakash Hospital and Research Centre Pvt. Limited, Rourkela<sup>3</sup>

Corresponding Author: Vineeta Ghanghoriya

## Abstract

**Background & Methods:** The aim of the study is to study risk factors associated with gestational diabetes mellitus. Simple random sampling was done to do OGTT for antenatal women coming to OPD. Before doing OGTT, women were briefed about the study and those who given consent regarding study were included.

**Results:** Association of GDM cases with highrisk factors. Most common risk factor associated with GDM is obesity, followed by family history of diabetes and then age >30 years and overall association of GDM with above mentioned risk factors was found to be significant.

**Conclusion:** In India, thinking that only elderly and obese women will develop GDM has become a myth. The startling fact was that GDM was seen mostly in women between 25-29 years of age group and even in women with normal or decreased BMI. This is probably the result of urbanization and its associated poor lifestyle and lack of exercise. Our study has shown the incidence of GDM of 9.4% in antenatal women. But with the global epidemic of diabetes mellitus involving specially our country, the trends will show a rise only.

However, in present scenario most important is to screen all antenatal women for GDM for early diagnosis and better management. This should be a routine practice or investigation along with other investigations done during antenatal period.

**Keywords:** risk, gestational & diabetes mellitus.

**Study Design:** Observational Study.

## 1. Introduction

Gestational diabetes mellitus (GDM) is considered a major pregnancy complication<sup>[1]</sup>. It has been defined as glucose intolerance in the second or third trimester of pregnancy in women who have had not clearly overt diabetes prior to gestation<sup>[2]</sup>.

The etiology of GDM is multifactorial and has not been completely understood. In most patients with GDM, gestational hyperglycemia is the result of impaired glucose tolerance due to pancreatic  $\beta$ -cell dysfunction and post-receptor defects in the insulin signaling cascade, as the background of chronic insulin resistance<sup>[3]</sup>. It is followed by progressive insulin resistance due to the increased placental production of diabetogenic hormones including estrogen, progesterone, and human placental lactogen during the second trimester of pregnancy. However, GDM carries a serious risk of fetomaternal, neonatal mortality and

morbidity<sup>[4]</sup>, and the lifelong risk of obesity, type 2 diabetes mellitus and cardiovascular diseases in the mother and child later in life.

During the last 20 years, the prevalence of GDM has increased worldwide and it is expected to continue to rise along with an increase in advanced maternal age, preconception obesity and impaired glucose tolerance among women<sup>[5]</sup>. Moreover, the use of the universal screening strategy and the more stringent diagnostic criteria for GDM lead to a higher prevalence of GDM among pregnant women and potentially increase the costs of health care<sup>[6]</sup>. Nordic countries as well have shown a similar trend in increasing the aforementioned risk factors<sup>[7]</sup>.

The most important risk factors are maternal overweight and obesity, age greater than or equal to 35 years at delivery, hypertension, metabolic syndrome, nonwhite ethnicity, family history of diabetes mellitus, prior unexplained stillbirth, prior infant with congenital anomaly (if not screened during that pregnancy), prior macrosomic infant, history of gestational diabetes, chronic use of steroids, glycosuria, and known impaired glucose metabolism.<sup>[8]</sup>

## 2. Material and Methods

Study was conducted in the OPD of Obstetrics and Gynaecology Dept. at NSCB mch Jabalpur. All antenatal women coming to OPD at 24-28 weeks of gestation were taken for testing, met inclusion criterias.

Simple random sampling was done to do OGTT for antenatal women coming to OPD. Before doing OGTT, women were briefed about the study and those who given consent regarding study were included. Single step testing using 75 gm anhydrous glucose and measuring blood sugar 2 hours after ingestion was used by DIPSI criteria. 75 gm of anhydrous glucose was to be given orally after dissolving in approximately 300 ml water whether the pregnant women comes in fasting or nonfasting state, irrespective of last meal. The intake of solution ensured to be completed within 5-10 minutes.

Venous sample had been taken after 2 hours of OGTT and sent for blood sugar testing. The threshold blood sugar level > 140 mg/dl (more than or equ to 140) as taken as cutoff for diagnosis of gestational diabetes mellitus.

### **INCLUSION CRITERIA**

1. Gestational age at enrollment 24-28 weeks size.

### **EXCLUSION CRITERIA**

1. Known cases of overt diabetes

## 3. Result

TABLE NO.-1: ASSOCIATION OF RISK FACTORS WITH GDM

RISK FACTORS	GDM		NONGDM		TOTAL		P VALUE
	F	%	F	%	F	%	
Age>30 years	29	42.64%	39	57.35%	68	100%	0.02
Obesity or overweight	45	64.28%	25	35.71%	70	100%	
Family history of diabetes	35	43.75%	45	56.25%	80	100%	
Previous history of baby weighing more than 4 kg	02	12.5%	14	87.5%	16	100%	
Family history of hypertension	00	00%	24	100%	24	100%	
Past history of hypertension	02	15.38%	11	84.61%	13	100%	
PCOS	01	3.44%	28	96.55%	29	100%	
Bad obstetrics history	05	12.82%	34	87.17%	39	100%	
Repeated infections	01	7.14%	13	92.85%	14	100%	
polyhydramnios	08	20%	32	80%	40	100%	

The above table shows association of GDM cases with highrisk factors. Most common risk factor associated with GDM is obesity, followed by family history of diabetes and then age >30 years and overall association of GDM with above mentioned risk factors was found to be significant.

**TABLE NO.-2: DISTRIBUTION OF SUBJECTS ACCORDING TO DELIVERY OUTCOME**

DELIVERY OUTCOME	GDM CASES		NONGDM CASES		TOTAL		P VALUE
	F	%	F	%	F	%	
VAGINAL DELIVERY WITH EPISIOTOMY	27	32.14%	494	69.09%	521	65.20%	0.015
VAGINAL DELIVERY WITHOUT EPISIOTOMY	30	35.71%	30	4.19%	60	7.50%	
ASSITED VAGINAL DELIVERY	3	3.57%	11	1.53%	14	1.75%	
CESAREAN SECTION	24	28.57%	180	25.17%	204	25.53%	
TOTAL	84 (N=84)	100%	715 (N=715)	100 %	799 (N=799)	100%	

Among all subjects vaginal mode of delivery was the most common mode of delivery. Cesarean section rate was almost similar in GDM and NON-GDM group.

**TABLE NO.- 3: DISTRIBUTION OF SUBJECTS ACCORDING TO BIRTH WEIGHT OF NEWBORN**

BIRTH WEIGHT	GDM CASES		NON GDM SUBJECTS		TOTAL	%	P VALUE
	F	%	F	%			
<1.5 KG	0	0.0%	28	100%	28	100%	0.001
1.5-2.5 KG	48	7.76%	570	92.23%	618	100%	
2.5-4 KG	25	17.60%	117	82.39%	142	100%	
>4 KG	11	100%	0	00%	11	100%	
TOTAL	84	10.51%	715	89.49%	799	100%	

All the babies with birth weight >4 kg (n=11) were of gdm mothers. None of the gdm mother had baby weight <1.5 kg, which was statistically significant.

**TABLE NO.-4: DISTRIBUTION OF SUBJECTS ACCORDING TO THEIR GESTATIONAL AGE AT DELIVERY**

GESTATI ON	GDM CASES		NONGDM CASES		TOTAL		P VALUE
	F	%	F	%	F	%	
TERM	84	100.0%	679	94.96%	763	95.49%	0.039
PRETERM	0	0.0%	36	5.03%	36	4.51%	
TOTAL	84 (N=84)	100%	715 (N=715)	100%	799 (N=799)	100%	

Out of 84 Cases of GDM 100% delivered at term gestation and none of them was preterm. Whereas among NON-GDM 94.63 % subjects delivered at term and 5.03% delivered preterm. This finding was found to be significant.

#### 4. Discussion

In present study, 45 cases of gdm had obesity or overweight, 35 cases of gdm had family history of diabetes, 29 cases had age >30 years, 08 cases had polyhydramnios, 05 cases had bad obstetric history, 02 cases had past history of hypertension and 2 cases had macrosomia in previous pregnancy, 1 case had PCOS and 1 case had history of repeated vaginal candidiasis<sup>[9]</sup>. It shows that most common risk factor associated in our study was obesity or overweight and second most common risk factor is family history of diabetes<sup>[10]</sup>.

Manju A. Mohan, Abin Chandrakumar, conducted a prospective observational study in a tertiary referral hospital kerala and concluded that over an eight-month period, 201 patients who met the inclusion criteria were enrolled for study from which prevalence of GDM was estimated at 15.9%. The study revealed higher prevalence of risk factors and complications such as age >25 years, BMI >26 kg/m<sup>2</sup>, family history of DM, past history GDM, history of big baby, gestational hypertension, vaginal candidiasis, premature rupture of membranes and hyperbilirubinemia in GDM group as compared to non-GDM group. The study also demonstrated that modern life-style was a major influencing factor for development of diabetes in the study population.<sup>[11]</sup>

In present study, all the babies with birth weight >4 kg were of GDM mother (n=11) and none of the gdm mother had baby weight <1.5 kg. 7.76% babies of GDM mother (n=25) had birth weight between 1.5-2.5 kg and 17.06% babies of gdm mother (n=32) had birth weight between 2.5-4 kg. Significant correlation with GDM and birth weight of new born was found. A case control study was conducted in 2012 and 2013 and included 136 caucasian women in which 106 women with GDM were studied for birth weight of infants born to GDM mothers and it concludes that macrosomia was most commonly associated with GDM and high fasting glucose.<sup>[12]</sup>

NICU admission of newborn of GDM mother: In present study, 39.3% babies of GDM mother require NICU admission as compared to nongdm mother (8.31%). This was statistically highly significant<sup>[13]</sup>.

Out of 84 cases of GDM, 6% babies born to GDM mother had congenital anomaly, whereas among NON-GDM subjects, only 1.4% had congenital anomaly. Hence congenital anomaly had significant association with GDM.

A meta-analysis was conducted between 2011 to 2018 in US and it conclude prepregnancy diabetes and to a lesser extent GDM were associated with several subtypes of congenital anomalies of newborn.<sup>[14]</sup>

## 5. Conclusion

In India, thinking that only elderly and obese women will develop GDM has become a myth. The startling fact was that GDM was seen mostly in women between 25-29 years of age group and even in women with normal or decreased BMI. This is probably the result of urbanization and its associated poor lifestyle and lack of exercise. Our study has shown the incidence of GDM of 9.4% in antenatal women. But with the global epidemic of diabetes mellitus involving specially our country, the trends will show a rise only.

However, in present scenario most important is to screen all antenatal women for GDM for early diagnosis and better management. This should be a routine practice or investigation along with other investigations done during antenatal period.

## 6. References

1. Plows, J.F.; Stanley, J.L.; Baker, P.; Reynolds, C.M.; Vickers, M.H. The Pathophysiology of Gestational Diabetes Mellitus. *Int. J. Mol. Sci.* 2018, 19, 3342.
2. Catalano, P.M. Trying to understand gestational diabetes. *Diabet. Med.* 2014, 31, 273–281.
3. Barbour, L.A.; McCurdy, C.E.; Hernandez, T.L.; Kirwan, J.P.; Catalano, P.M.; Friedman, J.E. Cellular Mechanisms for Insulin Resistance in Normal Pregnancy and Gestational Diabetes. *Diabetes Care* 2007, 30, S112–S119.
4. Sonagra, A.D.; Biradar, S.M.; Dattatreya, K.; DS, J.M. Normal Pregnancy— A State of Insulin Resistance. *J. Clin. Diagn. Res.* 2014, 8, CC01–3.
5. Domanski, G.; Lange, A.E.; Ittermann, T.; Allenberg, H.; Spoo, R.A.; Zygmunt, M.; Heckmann, M. Evaluation of neonatal and maternal morbidity in mothers with gestational diabetes: A population-based study. *BMC Pregnancy Childbirth* 2018, 18, 1–11.
6. McMahan, L.E.; O'Malley, E.G.; Reynolds, C.M.E.; Turner, M.J. The impact of revised diagnostic criteria on hospital trends in gestational diabetes mellitus rates in a high income country. *BMC Health Serv. Res.* 2020, 20, 1–11.
7. Ferrara, A. Increasing Prevalence of Gestational Diabetes Mellitus: A public health perspective. *Diabetes Care* 2007, 30, S141–S146.
8. Brown, F.M.; Wyckoff, J. Application of One-Step IADPSG Versus Two-Step Diagnostic Criteria for Gestational Diabetes in the Real World: Impact
9. Fadl, H.E.; Simmons, D. Trends in diabetes in pregnancy in Sweden 1998– 2012. *BMJ Open Diabetes Res. Care* 2016, 4, e000221.
10. Jeppesen, C.; Maindal, H.T.; Kristensen, J.K.; Ovesen, P.G.; Witte, D.R. National study of the prevalence of gestational diabetes mellitus among Danish women from 2004 to 2012. *Scand. J. Public Health* 2017, 45, 811– 817.
11. A. D. Mackeen and M. Lott, —Gestational diabetes, in *MaternalFetal Evidence Based Guidelines*, V. Berghella, Ed., chapter 5, CRC Press, 3rd edition, 2017.
12. Bas-Lando M, Srebnik N, Farkash R, et al. Elective induction of labor in women with gestational diabetes mellitus: an intervention that modifies the risk of cesarean section. *Arch Gynecol Obstet.* 2014; 290(5): 905–912.

13. Heiskanen N, Raatikainen K, Heinonen S. Fetal macrosomia--a continuing obstetric challenge. *Biol Neonate*. 2006, 90, 98-103.
14. Admanabhan S, Zen M, Lee V, Cheung NW. Pre-existing diabetes in pregnancy. *Minerva Endocrinol* 2016;41:122–137