

ORIGINAL RESEARCH

Prevalence of Gestational diabetes mellitus in NCR, India

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ABSTRACT

The study was conducted over a period of one year from January 2021 to January 2022, among 275 antenatal mother having gestation between 24-28 weeks. Data was analyzed for DIPSI criteria using plasma blood glucose. We found 6 patients who met diagnostic criteria for GDM. The Prevalence of GDM was observed in 2.18 % patients. Our study have shown that prevalence of GDM in NCR area is quite low as compared to other study .It may be because our study participants is mainly belong to rural area having low socio-economic status with healthy life style. Our study is confined to small number, a larger study with screening program for GDM is required in this area.

Keywords: Body mass index (BMI), Gestational diabetes mellitus (GDM), Medical nutrition therapy (MNT).

INTRODUCTION

Gestational diabetes mellitus (GDM) is defined as glucose intolerance with onset or first recognition during pregnancy,¹ It was first recognized in 1823.²GDM is thought to arise as the result of insulin resistance due to pregnancy hormones, which is not adequately compensated by the pancreatic beta-cells through increased proliferation and insulin secretion³. The entire pathogenesis of the disease remains unknown, although a genetic predisposition is likely due to familial clustering and the identification of several candidate genes associated with increased risk.⁴ Non-genetic risk factors are advanced maternal age⁵, obesity,⁶ high carbohydrate diet, and unhealthy lifestyle.²

The prevalence of gestational diabetes mellitus (GDM) has remarkably increased in India in the past few years.^{7,8}. Maternal complications such as pre-eclampsia, macrosomia and need for caesarean section and adverse neonatal outcomes such as hypoglycemia and respiratory distress, stillbirths are few of them.^{9,10} Indian women have 11 times more risk of developing GDM as compared to women in other part of world.¹¹ Prevalence in India varies from 4% to 18% .^{12,13}

The prevalence statewide is 3.8% in Kashmir¹², 9.5% in Western India¹⁴, 6.2% in Mysore¹⁵ and 22% in Tamil Nadu¹⁶. Differences in the prevalence rates across India could be attributed to differences in age, body mass index (BMI), socioeconomic status and cultural differences. Different screening and diagnostic criteria could also be responsible for difference in prevalence rates. Despite government mandate to screen all pregnant women for GDM, to date there has been incomplete implementation and uptake of screening programs.

The objective of this study is to estimate the prevalence of GDM among women attending a tertiary care center of NCR Institute of Medical Sciences in Meerut, UP, India.

MATERIAL AND METHOD

The study was conducted over a period of one year from January 2021 to January 2022 in department of Obstetrics and Gynaecology with collaboration of Biochemistry department in NCR Institute of Medical Science, Meerut, UP, India. A total of 275 antenatal mother having gestation between 24-28 weeks pregnant women without any medical and endocrinological disorder were included in study from urban and rural area of NCR for diagnosis & prevalence of GDM. Data was analyzed for DIPSI criteria using plasma blood glucose.

DIAGNOSTIC CRITERIA OF GDM

Study participants underwent a non-fasting 75g oral glucose tolerance test (OGTT) between 24-- 28 weeks gestation. Using Diabetes in Pregnancy Study Group of India (DIPSI) criteria, a 2-hour post-OGTT glucose ≥ 140 mg/dl was used to diagnose GDM. 2 ml of venous blood was obtained 2 hours after 75 g oral glucose. Blood samples were transferred into tube, allowed to stand for 15 minutes at room temperature, centrifuged at 3500 rpm for 10 minutes.

DETERMINATION OF PLASMA GLUCOSE

Plasma glucose concentration was measured by the enzymatic colorimetric method (GOD-POD).

ETHICS APPROVAL

This study was approved by the Scientific and Institutional Ethics Committees of Mulayam Singh Yadav medical college Meerut now called NCRIMS .Written informed consent was taken and women fulfilling the criteria were enrolled.

RESULT

Table-1 General characteristics of study population

Parameters	Number	Percentage
Age (years)		
<20	18	6.54 %
21-25	116	42.18 %
26-30	82	29.81 %
31-35	31	11.27 %
>35	28	10.18 %
Total	275	100 %
Parity		
Nullipara	48	17.45 %
Para1	104	37.81 %
Para2	82	29.81 %
Multipara	41	14.90 %
Total	275	100 %
BMI (kg/m ²)		
<20	42	15.25 %
21-25	124	45.05 %
26-30	87	31.63 %

>30	22	8.00 %
Total	275	100 %
Residence		
Urban	38	13.81 %
rural	237	86.18 %
Total	275	100 %
Literacy		
Illiterate	148	53.81 %
Literate	127	46.18 %
Total	275	100 %

Table 2: GDM prevalence according to age, BMI, parity, family history, past obstetric history

Parameters	Number = 6	Percentage
BMI > 25	5	83.33 %
Age >25	5	83.33 %
Multiparity	3	50.00 %
Family history of diabetes mellitus	3	50.00 %
Bad obstetrical history (>3 abortion in 1 st or 2 ^{ed} trimester)	1	16.66 %

DISCUSSION

The present study was conducted to evaluate the prevalence of GDM in our society. The routine testing of plasma glucose by OGTT at first antenatal visit can detect GDM early and thus help in decreasing the adverse maternal and fetal outcome.

The prevalence of GDM is increasing at an alarming rate in India, with a reported prevalence of 2% in the 1980s and 16.55% in 2000.^{17,13} The prevalence has been shown to be higher in urban India as compared to the rural parts¹⁸. There is a large regional disparity in the prevalence of diabetes in India, and it is similar for GDM as well.^{19,20} Varying degree of prevalence rates has been reported in different parts of the country such as 3.8% in Kashmir²¹, 17.8% in Tamil Nadu²² and 7.7% in Maharashtra.²³ This variation could be attributed to the difference in geographical conditions, dietary habits and socio-economical status. It is also largely influenced by the criteria used for screening and diagnosis.

According to our study 6 women (2.18%) were found to have GDM. None of these females were a known case of diabetes. They were diagnosed of GDM by OGTT measurements in OPD clinics. This is much similar to some studies done in India¹³. They also used 75gm OGTT for screening antenatal mothers coming to OPD. In a study conducted in Services Hospital Lahore the prevalence of GDM was found to be about 1%, Zargar et al reported GDM as 3.8%²¹ and Metzger BE et al 4.2%.¹

We also observed a strong association of GDM with increasing age of females in our study. 5 (83.3%) pregnant women of GDM group were seen in age group of above 25 years. A similar association (65.1%) has been seen in study conducted by Sharmila Kumar Gopalan et al²². A similar association has been seen in earlier study.^{23,24}

Obesity is a common factor for GDM between high parity and age. The adjustments of BMI, could diminish the strength of disease²⁵. In our study, 5 (83.33%) pregnant females with GDM were found overweight and obese out of 6 cases.

Another important risk factor includes a family history of diabetes. Many clinical studies have reported an increased risk of developing GDM in females with a family history of

diabetes. Similarly, a high percentage of GDM females (50%) in our study had a positive family history of diabetes. Family history of diabetes is reported to be correlated with increased incidence of GDM.²⁶ In present study too, a significant association was found between cases with GDM and family history of diabetes mellitus. GDM increases the risk of fetal Macrosomia and thereby a greater potential risk for shoulder dystocia during delivery. Clinical recognition of GDM is important for management. M.N.T, Pharmacological treatment and ante partum fetal surveillance can reduce the perinatal morbidity and mortality associated with it²⁵. However, there are few limitations of this study. Since this study was conducted at a tertiary care center of Meerut U.P. India, we could get a fraction of the population only. More large-scale population studies are required to be conducted in this region of India to estimate the actual prevalence rate.

CONCLUSION

In present study, the prevalence of GDM is found to be 2.18 %.we concluded that different geographical area of India might have different prevalence rate depending on the different geographical variation, different screening and diagnostic criteria used. our study have shown that prevalence of GDM in NCR area is quite low as compared to other study. It may be because our study participants is mainly belong to rural area having low socio-economic status having healthy life style. Our study is confined to short number, a larger study with uniform screening criteria for GDM is required in this area.

REFERENCE

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 (Suppl 2) B161–B167.
2. Hadden DR & Hillebrand B. The first recorded case of diabetic pregnancy (Bennowitz HG, 1824, University of Berlin). *Diabetologia* 1989 32 625.
3. Devlieger R, Casteels K, Van Assche FA. Reduced adaptation of the pancreatic B cells during pregnancy is the major causal factor for gestational diabetes: current knowledge and metabolic effects on the offspring. *Acta Obstet Gynecol Scand.* 2008;87(12):1266-1270.
4. Lambrinouadaki I, Vlachou SA, Creatsas G. Genetics in gestational diabetes mellitus: association with incidence, severity, pregnancy outcome and response to treatment. *Curr Diabetes Rev.* 2010;6(6):393-399.
5. Lao TT, Ho LF, Chan BC, Leung WC. Maternal age and prevalence of gestational diabetes mellitus. *Diabetes Care.* 2006;29(4):948-949.
6. Chu SY, Callaghan WM, Kim SY, et al. Maternal obesity and risk of gestational diabetes mellitus. *Diabetes Care.* 2007;30(8):2070-2076.
7. International Diabetes Federation. *IDF Diabetes Atlas.* 7 th ed. Brussels, Belgium: International Diabetes Federation; 2017.
8. Anjana RM, Pradeepa R, Deepa M, Datta M, Sudha V, Unnikrishnan R, et al. Prevalence of diabetes and prediabetes (impaired fasting glucose and/or impaired glucose tolerance) in urban and rural India: Phase I results of the Indian council of medical research-INDIA DIABetes (ICMR-INDIAB) study. *Diabetologia* 2011;54:3022-7.
9. Mithal A, Bansal B, Kalra S. Gestational diabetes in India: Science and society. *Indian J Endocrinol Metab* 2015;19:701-4.
10. Choudhary N, Rasheed M, Aggarwal V. Prevalence of gestational diabetes mellitus, maternal and neonatal outcomes in a peripheral hospital in North India. *Int J Res Med Sci* 2017;5:2343-5.

11. Srekanthan K, Belicita A, Rajendran K, Vijayakumar A. Prevalence of gestational diabetes mellitus in a medical college in South India : A pilot study. *Indian J Clin Pract* 2014;25:342-7. 9
12. Raja MW, Baba TA, Hanga AJ, et al. . A study to estimate the prevalence of gestational diabetes mellitus in an urban block of Kashmir valley (North India). *International Journal of Medical Science and Public Health*. 2014;3(2):191-196.
13. Seshiah V, Balaji V, Balaji MS, Sanjeevi CB, Green A. Gestational diabetes mellitus in India. *J Assoc Physicians India*. 2004;52:707-711.
14. Bhatt AA, Dhore PB, Purandare VB, Sayyad MG, Mandal MK, Unnikrishnan AG, et al. Gestational diabetes mellitus in rural population of Western India – Results of a community survey. *Indian J Endocrinol Metab* 2015;19:507-10.
15. Swami SR, Mehetre R, Shivane V, Bandgar TR, Menon PS, Shah NS, et al. Prevalence of carbohydrate intolerance of varying degrees in pregnant females in Western India (Maharashtra) – a hospital-based study. *J Indian Med Assoc* 2008;106:712-4, 735.
16. Mahalakshmi MM, Bhavadharini B, Maheswari K, Kalaiyarasi G, Anjana RM, Ranjit U, et al. Comparison of maternal and fetal outcomes among Asian Indian pregnant women with or without gestational diabetes mellitus: A situational analysis study (WINGS-3). *Indian J Endocrinol Metab* 2016;20:491-6.
17. Agarwal S, Gupta AN. Gestational diabetes. *J Assoc Physicians India* 1982;30:203-5.
18. Seshiah V, Balaji V, Balaji MS, Paneerselvam A, Kapur A. Pregnancy and diabetes scenario around the World: India. *Int J Gynaecol Obstet* 2009;104 Suppl 1:S35-8.
19. Gupta R, Misra A. Review: Type 2 diabetes in India: Regional disparities. *Br J Diabetes Vasc Dis* 2007;7:12-6.
20. Mohan V, Pradeepa R. Epidemiology of diabetes in different regions of India. *Health Adm* 2009;22:1-18.
21. Zargar AH, Sheikh MI, Bashir MI, Masoodi SR, Laway BA, Wani AI, et al. Prevalence of gestational diabetes mellitus in Kashmiri women from the Indian subcontinent. *Diabetes Res Clin Pract* 2004;66:139-45.
22. American Diabetes Association, Report of the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, *Diabet Care*. 2003;26:5-20.
23. Seshiah V, Balaji V, Balaji MS, Paneerselvam A, Arthi T, Thamizharasi M, et al. Prevalence of gestational diabetes mellitus in South India (Tamil nadu) – a community based study. *J Assoc Physicians India* 2008;56:329-33.
24. Swami SR, Mehetre R, Shivane V, Bandgar TR, Menon PS, Shah NS, et al. Prevalence of carbohydrate intolerance of varying degrees in pregnant females in Western India (Maharashtra) – A hospital-based study. *J Indian Med Assoc* 2008;106:712-4, 735.
25. Tolorani MR, Betran AP, Horta BL, Nakamura MU, Atallah AN, Moron AF, et al. Pregnancy BMI and the risk of gestational diabetes: a systematic review of the literature with meta-analysis. *Obes Rev*. 2009;10:194-203.
26. Kim C, Liu T, Valdez R, Beckles GL. Does frank diabetes in first-degree relatives of a pregnant woman affect the likelihood of her developing gestational diabetes mellitus or nongestational diabetes? *Am J ObstetGynecol* 2009;201:576.e1-6.