Original Research Article

Frequency of gestational diabetes mellitus and associated risk factors amongst women attending antenatal clinic at a tertiary care hospital of West Bengal, India

Tousif Rabi*, Kausik Bandyopadhyay, Shiuli Roy Adak

Department of Biochemistry, Murshidabad Medical College and Hospital, Murshidabad, West Bengal, India

*Correspondence:
Dr. Tousif Rabi,
E-mail: tousif.rabi544@gmail.com

ABSTRACT

Background: Women with gestational diabetes are associated with adverse pregnancy outcomes. This study was conducted to evaluate prevalence of gestational diabetes mellitus and associated risk factors amongst women attending antenatal clinic of a tertiary care hospital of west Bengal, India.

Methods: Universal screening for gestational diabetes mellitus was done in 215 women with estimated gestational age between 24 weeks to 28 weeks. They were requested to drink 75 gram of glucose dissolved 300 ml of water irrespective of their last meal. Gestational diabetes mellitus was diagnosed if 2 hour plasma glucose value was ≥ 140 mg/dl. Relevant history was taken and associations with risk factors like age, parity, pregnancy body-mass index, bad obstetric history, family history of diabetes and history of previous macrosomia were analysed statistically.

Results: This study found that prevalence of gestational diabetes mellitus was 14.9%.Statistically significant association was found between glucose tolerance in pregnancy and maternal age, pregnancy body-mass-index, bad obstetric history, family history of diabetes and history of previous macrosomia.

Conclusions: Prevalence of gestational diabetes mellitus was 14.9% which can be considered alarming and its associations with risk factors were statistically significant.

Keywords: Gestational diabetes mellitus, Pregnancy diabetes, Prevalence of GDM, Risk factors of GDM

INTRODUCTION

Gestational diabetes mellitus (GDM) is defined as any degree of glucose intolerance that occurs for the first time or is first detected during pregnancy.[1,2] In the second or third trimester of pregnancy placental hormones play an important role in the development of glucose intolerance in pregnant women and Gestational diabetes Mellitus commonly identified during this time.[3] Gestational diabetes mellitus (GDM) is a very a common problem complicating pregnancy and GDM can have both short-term and long-term fetal and maternal complications. [4,5] From last one or two decades the prevalence of diabetes in pregnancy has been increasing worldwide and it has contributed significantly to global public health burden.[6,2] Universal screening is done in many countries and it has increased the prevalence of disease and the prevalence varies between 1 and 45% of pregnancies worldwide.[7] Different prevalence has been reported by different studies conducted at different part of India on different times and it varies from 7% to nearly 16%.[8] This difference in prevalence might be multifactorial. Differences in ethnicity, diagnostic criteria, screening strategies, and population characteristics might be responsible for this difference in prevalence. There are lots of controversies surrounding screening and diagnosis of GDM.[9] In Indian

setting, gestational diabetes mellitus is defined as 2-hour Oral Glucose Tolerance Test [OGTT] >140 mg/dL by the Diabetes in Pregnancy Study Group, India [DIPSI].[8] Age >25 years, obesity, high parity, family history of diabetes mellitus, past history of GDM or macrosomic infant are most significant risk factors associated with GDM.[4] As the burden of gestational diabetes appears to be increasing in India, we conducted this study to estimate prevalence of GDM amongst women attending antenatal care unit of Murshidabad Medical College and evaluated associated risk factors.[8]

METHODS

The present study was carried out in Murshidabad medical college from Jun 2021 to October 2022. Patients between 24 to 28 weeks of gestation who came to the ANC clinic were selected for the study. A total of 215 women were selected. Approval of Institutional Ethical Committee and written informed consent from all women were taken before starting the study. The women of gestational age above 28 weeks and those below 24 weeks, women whose LMP was not known or gestational age not determined by a ultrasonography, women already diagnosed with diabetes and women who had any co-morbidity were excluded from the study. Screening for gestational diabetes were done to all the selected women according to DIPSI guidelines. A relevant history was taken and routine general examination was done. 75 mg glucose was dissolved in approximately 300 ml water and given to all selected women irrespective of their last meal and blood

glucose estimation was done 2 hours after 75gm oral glucose ingestion by glucose oxidase - peroxidase method. Women whose plasma glucose level reached 140mg/dl or more were diagnosed as women with gestational diabetes mellitus. Data was analysed by IBM SPSS Statistics 20.

RESULTS

Demographic characteristics of study population

The mean age of study population was 22.96 years with a standard deviation of 4.59 years. The 20% of study population was in the age group less than 20 years. 56.7% of study population was in age group 20-30 years. 23.3% of study population was in age group more than 30 years. 33% of study population was Primigravida and 67% was Multigravida. A 79.5% of study population was house-wife, 20.5% was other than house-wife. 74% of pregnant women were from nuclear family and 26% were from joint family. There were 11.2% of the study population had BMI less than 18.5 and 55.3% of the study population had BMI in between 18.6 to 25. Another 20.5% of the study population had BMI in between 25.1 to 30 and remaining 13% of the study population had BMI more than 30.1.

Frequency of GDM in study population

Amongst 215 participants 183 had normal glucose tolerance whereas 32 had gestational diabetes mellitus. So Frequency of gestational diabetes mellitus in the study population was 14.9%.

Table 1: Association between GDM and its risk factors.

Risk factor	Pearson chi-square value	Degree of freedom	p-value
Age	19.38	2	<0.05
Parity	0.34	1	>0.05
B.O.H	34.99	1	<0.05
Family h/o DM	29.82	1	<0.05
BMI	42.28 (Likelihood ratio)	3	<0.05
H/O previous macrosomia	25.009 (Likelihood ratio)	1	<0.05

Table 2: Age and GDM (odd ratio).

		Glucose tolerance		Total (count)	Odd Ratio,95%CI, p-value
		Gestational diabetes mellitus (count)	Normal glucose tolerance (count)		
Age	<20 yrs	0	43	43	
	20-30 yrs	16	106	122	1 (Ref)
	>30 yrs	16	34	50	3.11, 1.41 to 6.89, 0.005
Total		32	183	215	

Table 3: Bad obstetrics history and GDM (odd ratio).

		Glucose tolerance		Total	Odd Ratio,95%CI, p-value
		Gestational diabetes mellitus (count)	Normal glucose tolerance (count)		
B.O.H	Present	20	28	48	9.22,4.05 to 20.97,0.0001

| | | Glucose tolerance | | | |
		Gestational diabetes mellitus (count)	Normal glucose tolerance (count)	Total	Odd Ratio,95%CI, p-value
	Absent	12	155	167	1 (Ref)
Total		32	183	215	

Table 4: Family history of diabetes And GDM (odd ratio).

| | | Glucose tolerance | | | |
		Gestational diabetes mellitus (count)	Normal glucose tolerance (count)	Total	Odd Ratio, 95%CI, p-value
Family history of diabetes	Present	16	20	36	8.15,3.53 to 18.76,0.0001
	Absent	16	163	179	1 (Ref)
Total		32	183	215	

Table 5: Pregnancy body mass index and GDM (odd ratio).

| | | Glucose tolerance | | | |
		Gestational diabetes mellitus (count)	Normal glucose tolerance (count)	Total	Odd Ratio,95%CI, p-value
Body mass index	<18.5	0	24	24	
	18.6 to 25	8	111	119	1 (Ref)
	25.1 to 30	8	36	44	3.08,1.07 to 8.80,0.035
	30.1 to 34.9	16	12	28	18.50,6.55 to 52.17,0.0001
Total		32	183	215	

Table 6: History of previous macrosomia and GDM (Odd ratio).

| | | Glucose tolerance | | | |
		Gestational diabetes mellitus (count)	Normal glucose tolerance (count)	Total	Odd Ratio,95%CI, P-value
History of previous macrosomia	Present	12	8	20	13.12,4.79 to 35.93, P-value<0.0001
	Absent	20	175	195	1 (Ref)
Total		32	183	215	

DISCUSSION

GDM is a major health problem in pregnancy that can affect both mother and fetus with short-term or long-term effects. In our study we found that prevalence of GDM was 14.9%. Chatterjee et al found prevalence of GDM was around 34.19% in a hospital-based cross sectional study conducted at West Bengal.[10] It found a higher prevalence of GDM when compared to our study. But Sharma et al found prevalence of GDM was 11% in a study conducted at tertiary care hospital of West Bengal.[11] Both of these studies used DIPSI criteria to diagnose GDM. Prevalence reported by studies conducted at other part of Indian varies considerably. A study conducted in Punjab state of India, Arora et al found overall prevalence of GDM was 9.0% when they used WHO 1999 diagnostic criteria. However the prevalence increased to 34.9% when they used WHO 2013 criteria.[12] Rajput et al in a study conducted in Haryana found 7.1% women to have GDM.[13] In this study

we found a significant association between GDM and maternal age. Li et al in a meta-analysis demonstrates that the risk of GDM increases linearly with successive age-groups.[14] Han et al also found that the incidence of GDM increased with maternal age.[15] In this study we found no statistically significant association between parity and GDM which is supported by a study conducted by Duman.[16] Though Al-Rowaily et al found multiparous women were more likely to have GDM than nulliparous women.[17] Like Duman, this study also found high body-mass index and positive family history of diabetes as associated risk factors. In our study we found bad obstetric history and history of macrosomia in previous pregnancy as associated risk factors which is supported by a study done in Karnataka by Shridevi et al.[18] The study by Shridevi et al also found a greater prevalence of GDM in women with advanced age, obesity, family h/o DM and past h/o GDM.[19]

Limitation of this study were that it was conducted in a single centre and DIPSI criteria is less sensitive to diagnose GDM.

CONCLUSION

High prevalence of GDM was found. GDM was significantly associated with maternal age, body-mass index, family h/o diabetes, bad obstetric history and h/o macrosomia in previous pregnancy whereas no significant association was found between GDM and parity.

REFERENCES

1. Wendland EM, Torloni MR, Falavigna M, Trujillo J, Dode MA, Campos MA, et al. Gestational diabetes and pregnancy outcomes--a systematic review of the World Health Organization (WHO) and the International Association of Diabetes in Pregnancy Study Groups (IADPSG) diagnostic criteria. BMC Pregnancy Childbirth. 2012;12:23.
2. Lee KW, Ching SM, Ramachandran V, Yee A, Hoo FK, Chia YC, et al. Prevalence and risk factors of gestational diabetes mellitus in Asia: a systematic review and meta-analysis. BMC Pregnancy Childbirth. 2018;18(1):494.
3. 3.Muche AA, Olayemi OO, Gete YK. Prevalence of gestational diabetes mellitus and associated factors among women attending antenatal care at Gondar town public health facilities, Northwest Ethiopia. BMC Pregnancy Childbirth. 2019;19(1):334.
4. Buchanan TA, Xiang AH, Page KA. Gestational diabetes mellitus: risks and management during and after pregnancy. Nat Rev Endocrinol. 2012;8(11):639-49.
5. Flavius Marcau - Academia.edu. Maternal and fetal complications of gestational diabetes-review. Available from: https://www.academia.edu. Accessed 21 Jan 2023.
6. Capobianco G, Gulotta A, Tupponi G, Dessole F, Pola M, Virdis G, et al. Materno-Fetal and Neonatal Complications of Diabetes in Pregnancy: A Retrospective Study. J Clin Med. 2020;9(9):2707.
7. Lawrence RL, Wall CR, Bloomfield FH. Prevalence of gestational diabetes according to commonly used data sources: an observational study. BMC Pregnancy Childbirth. 2019;19(1):1-9.
8. Bahl S, Dhabhai N, Taneja S, Mittal P, Dewan R, Kaur J, et al. Burden, risk factors and outcomes associated with gestational diabetes in a population-based cohort of pregnant women from North India. BMC Pregnancy and Childbirth. 2022;22(1):32.
9. Huhn EA, Rossi SW, Hoesli I, Göbl CS. Controversies in screening and diagnostic criteria for gestational diabetes in early and late pregnancy. Frontiers Endocrinol. 2018;9:696.
10. Chatterjee DA, Bhattacharya DSM, Roy DN, Bhattacharjee K. Prevalence of gestational diabetes in women attending ante-natal clinic in West Bengal: a hospital-based cross-sectional study from Eastern India. JCD. 2018;5(1):5-11.
11. Sharma NK, Mahto SK, Sharma R, Sheoran A, Suman SK, Gupta PK, et al. Prevalence of gestational diabetes mellitus and its relationship with various risk factors in a tertiary care hospital in West Bengal with special reference to tribal population, India. Inter J Res Med Sci. 2019;7(4):1098-103.
12. Arora GP, Thaman RG, Prasad RB, Almgren P, Brøns C, Groop LC, Vaag AA. Prevalence and risk factors of gestational diabetes in Punjab, North India: results from a population screening program. Euro J Endocrinol. 2015;173(2):257-67.
13. Rajput R, Yadav Y, Nanda S, Rajput M. Prevalence of gestational diabetes mellitus & associated risk factors at a tertiary care hospital in Haryana. Indian J Med Res. 2013;137(4):728–33.
14. Li Y, Ren X, He L, Li J, Zhang S, Chen W. Maternal age and the risk of gestational diabetes mellitus: A systematic review and meta-analysis of over 120 million participants. Diabetes Res Clin Pract. 2020;162:108044. Han Y, Tong M, Jin L, Yu J, Meng W, Ren A, et al. Maternal age at pregnancy and risk for gestational diabetes mellitus among Chinese women with singleton pregnancies. Int J Diabetes Dev Ctries. 2021;41(1):114–20.
15. Duman NB. Frequency of gestational diabetes mellitus and the associated risk factors. Pak J Med Sci. 2015;31(1):194-7.
16. Al-Rowaily MA, Abolfotouh MA. Predictors of gestational diabetes mellitus in a high-parity community in Saudi Arabia. East Mediterr Health J. 2010;16(6):636-41.
17. S SA, Prabhudev P, Bhovi MR. A clinical study of prevalence of gestational diabetes mellitus and associated risk factors at a tertiary care centre in Karnataka, India. Int J Reprod Contracept Obstet Gynecol. 2015;4(6):1840-5.
18. Gupta A, Daga P. Diabetes in pregnancy study group of India, the answer for gestational diabetes mellitus diagnosis dilemma: May be not!!!! J Family Med Prim Care. 2022;11(8):4545-8.