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Original Research Article

Proportion and associated sociodemographic characteristics of gestational diabetes mellitus among antenatal women

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ABSTRACT

Background: Gestational diabetes mellitus (GDM) is defined as any degree of glucose intolerance with onset or first recognition during pregnancy. Undiagnosed or inadequately treated GDM can lead to significant maternal and foetal complications. Identification of GDM and understanding the contributing factors of GDM in pregnant women are crucial to ensure better health outcomes for both mother and baby.
Methods: A cross-sectional research design was used, involving 200 antenatal women attending antenatal OPD at Ramaiah Medical college and hospital in Bangalore. Antenatal women were first screened for GDM by using a structured screening tool then the sociodemographic, lifestyle and obstetric profile tool was administered to the study participants, to assess the contributing factors of GDM among antenatal women.
Results: Out of 200 antenatal women screened for GDM, the proportion of gestational diabetes mellitus was found to be 38 (19%); and there was a significant association between GDM and age, body mass index (BMI) at first visit, residence, religion, educational status, occupational status, frequency of foods/snacks eaten outside, level of physical activity, perceived stress level, number of pregnancy, number of deliveries, history of GDM in previous pregnancy, medical/obstetrical conditions complicating pregnancy.
Conclusions: Immediate and long-term clinical effects of GDM are important contributors to the burden of non-communicable diseases in India. Understanding these associated factors is crucial for researchers as it can be helpful to identify the risk populations, Additionally, these insights can guide healthcare providers in delivering personalised care and improving maternal and foetal outcomes.

Keywords: Proportion, GDM, Sociodemographic characteristics, Antenatal women

INTRODUCTION

The World Health Organization (WHO) states that severe bleeding, infections, high blood pressure (pre-eclampsia and eclampsia), difficulties during delivery, and gestational diabetes mellitus are major complications that account for about 75% of all maternal deaths worldwide.[1] Gestational diabetes mellitus (GDM) is defined as any degree of glucose intolerance with onset or first recognition during pregnancy.[2] Diagnosis of GDM is based on a 2- hour oral glucose tolerance test (OGTT) after administering 75g of oral glucose recommended by Diabetes in Pregnancy Study Group in India (DIPSI) guidelines. The value of 2-hour blood sugar (BS) >140 mg/dl being diagnostic of GDM. GDM can lead to significant maternal complications, such as polyhydramnios, pre- eclampsia, prolonged labour, obstructed labour, risk of caesarean section, uterine atony, postpartum haemorrhage, infection, type 2 diabetes in later life (40% in 10 subsequent years), and GDM in successive pregnancies (35%). Foetal risk includes spontaneous abortion, macrosomia (big baby), intrauterine death, stillbirth, congenital malformation, shoulder dystocia, birth injuries, neonatal hypoglycaemia after birth.[3] The

development of diabetes during pregnancy is associated with several predisposing factors, which can be classified into lifestyle such as diet, physical activity, smoking, and alcohol consumption. Obstetric risk factors such as previous abortion, parity, and stillbirth are linked to GDM, socio-demographic factors like age, ethnicity, and family history of diabetes, and clinical risk factors include obesity and hypertension also contribute to the risk of GDM.[4] According to the International Diabetes Federation (IDF) Atlas report in 2021, the estimated global prevalence of GDM was 14.0%. and the regional prevalence of GDM was 7.1%.[5] The prevalence of GDM has increased significantly over the past two decades, especially in developing countries like India.[6] Indian women have an estimated 11 times higher risk of developing GDM than women in other parts of the world because of lack of awareness, sedentary lifestyle and malnutrition.[7,8]

GDM is a growing public health concern globally and in India, where diabetic women are projected to reach 313.3 million by 2040.[9] These figures are a wake-up call to place GDM at the highest priority in our public health system. In view of the high prevalence of gestational diabetes mellitus in the Indian population and the maternal and foetal risks associated with inappropriately managed GDM, the researcher found there are very few studies conducted in India to find out the associated sociodemographic factors that influence GDM which become a major reason to conduct this study.[10] The study aim to assess proportion and to find the associated sociodemographic characteristics of GDM among antenatal women.

METHODS

The study design used was a descriptive cross-sectional research design and was conducted at the antenatal OPD of Ramaiah Medical College and Hospital, Bangalore, between January 2024 to February 2024. A structured tool was prepared after reviewing relevant literature and consultation with the subject experts. The tool consisted of two parts; first part was a screening tool intended to screen antenatal women with GDM then the other part was Sociodemographic profile which were intended to elicit socio-demographic information of the antenatal women. The validity and reliability of the tool was established with (α=0.89) for English version and (α=0.88) for the Kannada version. The ethical clearance for the study was obtained from the ethical committee of Ramaiah University of Applied Sciences Bangalore. The study included 200 antenatal women beyond 24 weeks of gestation, attending antenatal OPD of Ramaiah Medical College and Hospital, Bangalore, were selected through a non- probability convenient sampling technique ensuring that they can read as well as understand either English or Kannada. After obtaining a formal permission from the concerned Authority of Ramaiah Medical college and hospital, the researcher first screened antenatal women for GDM by screening tool, the antenatal records were collected from the mothers and screening data was recorded. Then the structured sociodemographic profile was administered to the study participants to assess the contributing factors of GDM among antenatal women and subjects were requested to respond to the given questions.

Data analysis was done using statistical package software for social sciences (SPSS) version 20.0. Proportion and socio-demographic characteristics of GDM among antenatal women were described using frequency and percentage distribution and the association between gestational diabetes mellitus and selected socio demographic variables among antenatal women was determined using a Chi-square test. The set confidence interval was at 95% and $p<0.05$ was considered to be statistically significant.

RESULTS

Proportion of GDM among antenatal women

Study findings showed that out of 200 antenatal women screened for GDM, the proportion of GDM was found to be 38 (19%). Majority of the subjects with GDM, 29 (76.3%), were beyond 27 weeks of gestation. All the subjects, 38 (100%), were diagnosed with GDM between the 24-28 weeks of gestation with a standardised WHO 75 g oral glucose tolerance test (OGTT), having blood sugar level after 2 hours > 140 mg/dl was taken as a diagnostic value for GDM (Figure 1).

Sociodemographic characteristics of antenatal women (n=200)

Among 200 antenatal women, majority of the subjects 69.5% were in between the age group of 25-29 years (Figure 2), with regard to BMI at first visit, 71% of the subjects was between 18.5-24.9 kg/m^2, whereas the BMI at first visit of 4% of the subjects, was between 30.0 and above in kg/m^2. More than half of the subjects, 76%, resided in urban areas. Majority of the subjects, 80.5%, were Hindus, all the subjects, 100% were married. Whereas, more than half of the subjects, 56.5% had completed school education. majority of the subjects, 80.5%, were Hindus, all the subjects, 100% were married. Whereas, more than half of the subjects, 56.5% had completed school education. Most of the subjects, 81% were homemakers, 81% belonged to nuclear families, 39.5% had family income per/month was between Rs. 30,001 - Rs. 40,000, and 69% of the subjects followed a mixed diet. Half of the subjects 50% had reported eating outside food once a week (Figure 3). Majority of the subjects, 62% engaged in moderate physical activity. 80% of the subjects had low perceived stress level, 34.5% of the subjects were multigravida with conception for the third time. Majority of the subjects 42.5% delivered once. 65% of the subjects, had no history of abortions, and 45.5% of the subjects, had one live child. More than half of the subjects, 61% had no family history of close relatives suffering from diabetes (Figure 4). 94% of the subjects had no family history of GDM, whereas 7.5% of the subjects

had history of GDM in previous pregnancy among which 73.3% of the subject's received insulin. 27.5% of the subjects had complicated pregnancy, among which 43.6% of the subjects had hyperthyroidism and hypothyroidism and with regard to treatment received currently for gestational diabetes mellitus 21.1% of the subjects were on insulin.

Sociodemographic risk factors associated with GDM

The study finding shows that there was a significant association between GDM and age (p=0.000), BMI at first visit (p=0.000), residence (p=0.025), religion (p=0.000) educational status (p=0.002), occupational status (p=0.009) and type of family (p=0.008), frequency of food/snacks eaten outside (p=0.000), level of physical activity (p=0.000), perceived stress level (p=0.000), number of pregnancies (p=0.008), number of deliveries (p=0.007), GDM in previous pregnancy (p=0.000) , other medical /obstetrical conditions complicating pregnancy (p=0.006) of the antenatal mother with GDM. However, the result shows no association between GDM with other variables such as variables family income per month, type of diet, number of abortions, number of living children and family history of GDM (Table 1).

Table 1: Association between gestational diabetes mellitus with age, body mass index (BMI) at first visit, perceived stress level, frequency of food/ snacks eaten outside, and level of physical activity (n=200).

S. no.	Socio demographic variables	GDM		Non-GDM		Chi square value (χ^2)	P value
		N	%	N	%		
1	**Age in years**						
	20-24	0	0	14	100	124.9 df=3	0.000 S*
	25-29	4	2.9	135	97.1		
	30-34	24	88.9	3	11.1		
	35-40	10	50	10	50		
2	**BMI at first visit in kg/m^2**						
	Below 18.5	0	0	30	100	139.60 df=3	0.000 S*
	18.5-24.9	10	70	132	93		
	25.0-29.9	20	100	0	0		
	30.0 and above	8	100	0	0		
3	**Perceived stress level**						
	Low	12	7.5	148	92.5	87.85 df=2	0.000 S*
	Moderate	15	100	0	0		
	High	11	44	14	56		
4	**Frequency of food/ snacks eaten outside**						
	Never	8	11	65	89	42.63 df=3	0.000 S*
	Once a week	15	15	85	85		
	2-3 times a week	5	31.2	11	68.8		
	More than 3 times a week	10	90.9	1	9.1		
5	**Level of physical activity**						
	Low (exercise lasting less than 15 minutes)	24	63.2	14	36.8	61.85 df=2	0.000 S*
	Moderate (exercise lasting 30 minutes)	14	11.3	110	88.7		
	High (exercise lasting more than 1 hour)	0	0	38	100		

S*=Significant, at p<0.05, df=degree of freedom, body mass index and level of physical activity (as per CDC guidelines, 2000)

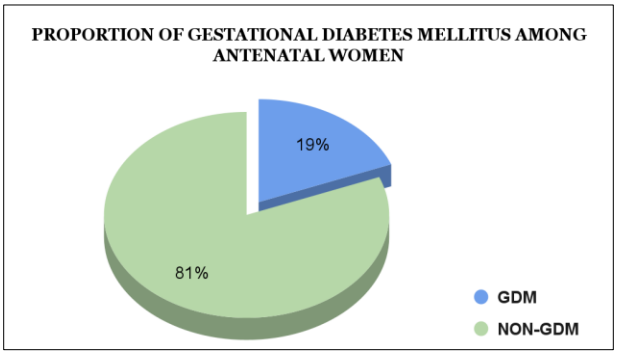

Figure 1: Showing proportion of GDM among antenatal women (n=200).

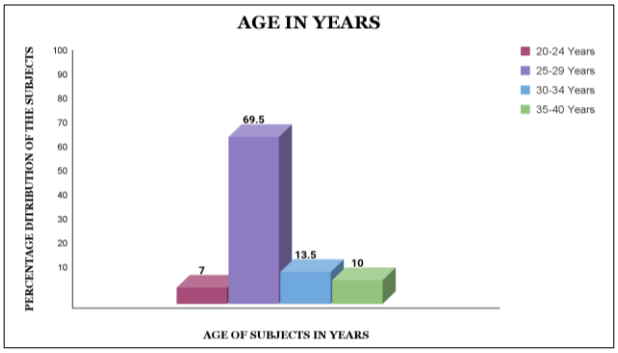

Figure 2: Frequency and percentage distribution of subjects regarding age in years (n=200).

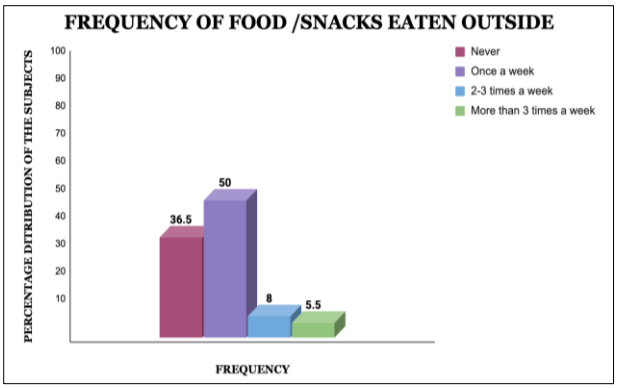

Figure 3: Frequency and percentage distribution of subjects regarding frequency of food/snacks eaten outside (n=200).

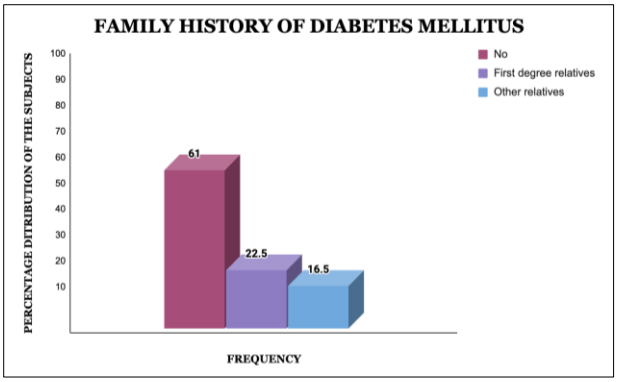

Figure 4: Frequency and percentage distribution of subjects regarding family history of diabetes mellitus (n=200).

DISCUSSION

The present study shows that out of 200 antenatal women screened for GDM, the proportion of GDM was found to be 38 (19%). These findings are supported by a community-based study conducted on prevalence of gestational diabetes mellitus in South India (Tamil Nadu) from 2005-2007 among antenatal mothers. The prevalence of GDM was 17.8% in urban, 13.8% in semi urban and 9.9% in rural areas.[11] The high prevalence of GDM in India is a major concern, because it is associated with substantial risk to maternal health and foetal health, potentially leading to maternal and neonatal complications such as preeclampsia, risk of caesarean delivery, preterm labour, congenital malformation, neonatal hypoglycaemia ,infant respiratory distress syndrome, birth injuries, preterm birth and increased risk of developing type-2 diabetes in later life (mother and baby).[12] The finding of the present study shows that GDM was associated with age >30 years (p=0.000), BMI at first visit >29.9 kg/m^2 (p=0.000), residence (p=0.025), religion (p=0.000), educational status (p=0.002), occupational status (p=0.009), frequency of foods/ snacks eaten outside (p=0.000), level of physical activity (p=0.000), perceived stress level (p=0.000), number of pregnancy (p=0.008), number of deliveries (p=0.007), history of GDM in previous pregnancy (p=0.000), medical /obstetrical conditions complicating pregnancy (p=0.006).

The finding of the study is supported by several studies conducted across India and America where maternal age >30 years, and pre-pregnancy BMI >24.9 kg/m^2/overweight/obesity, high parity, family history of diabetes mellitus, and previous history of GDM is strongly associated with GDM. Many young women nowadays, prefer to marry and have children at a later age as they intend to get settled financially before; this has raised the complications of developing complications during pregnancy like GDM. Lifestyle of a women is also a concern as most women live a sedentary lifestyles and unhealthy dietary pattern which could also contribute to GDM.[13,14] The finding of the present study is contradicted by a study conducted in Saudi Arabia in 2016, where 5000 antenatal women were screened for GDM and the result showed the prevalence of GDM was 12.75% (637/5000), and it was not associated with working status, place of living, hypertension, family history of diabetes and BMI.[15] Several studies revealed that GDM is associated with the previous use of oral contraceptives, history of preeclampsia, intake of soda drinks, substance abuse, anaemia and antenatal depression.[4,16] A meta-analysis report shows that active Smoking during pregnancy is associated with an increased risk of GDM. Although many pregnant women choose to quit smoking during pregnancy, passive smoking during pregnancy is also harmful. Women who quit smoking are less likely to suffer complications during pregnancy.[16,17] However, in present study the history of substance abuse was not a part of study due to the hesitation of Indian women to open about substance abuse. A cohort study among Chinese pregnant women showed the history of spontaneous abortion was significantly associated with increased risk of gestational diabetes.[18] But in our study the history of abortion is not associated with GDM due to the low sample size used for the study.

Limitations

The limitations of the study are authenticity of the information regarding socio-demographic variables is based on the response of the subjects and the limited sample size has restricted the generalisation of the findings.

CONCLUSION

Immediate and long-term clinical effects of GDM are important contributors to the burden of non-communicable diseases in India. Understanding these associated factors is crucial for researchers as it can be helpful to identify the risk populations and develop comprehensive prevention and management strategies for GDM mothers. Additionally, these insights can guide healthcare providers in delivering personalised care and improving maternal and foetal outcomes.

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