ORIGINAL RESEARCH

Prevalence of gestational diabetes mellitus and associated risk factors in tertiary care centre at Amritsar

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ABSTRACT
Aim: To determine the prevalence of GDM and associated risk factors in antenatal women in tertiary care centre at Amritsar. Women of GDM are at increased risk of developing diabetes in future so it becomes a major public health issue. **Materials and Methods:** The present study was conducted in obstetrics and gynae OPD of BNMCCC, GMC Amritsar. A tertiary hospital based cross-sectional study was done in 500 pregnant women with gestational age between 24 to 28 weeks coming in OPD for antenatal care with DIPSI criteria after taking their written informed consent. Patient was interviewed for detailed history and risk factors like age, parity, height, weight, socio- economic status, urban/rural residency, detailed past obstetric history, family history of GDM, past history of GDM & macrosomia. **Results:** A total of 500 women were enrolled during the study period. GDM was diagnosed in 56(11.20%) women based on DIPSI criteria. Most of the participants belonged to 20-25 years of age 311(62.20%) followed by 26-30 years 139(27.80%), above 30 years 28(5.60%) and below 20 years of age 22(4.40%). The prevalence of GDM was found to be higher in women belonging to rural area (20/61, 32.7%) and less in urban area (36/435, 8.2%). The prevalence of GDM was found to be higher in women with multiparity (12/50, 24%) and less in low parity(44/450, 9.78%). Women having BMI >27.5 kg/m^2 had GDM 10/12 (83.37%) as compared to 46/448 (9.42%) in women with BMI (18.5-22.9)kg/m^2. **Conclusion:** This study showed a Prevalence of 11.20% and Risk factors seen are Age> 25 years, Multiparity and BMI > 27.5.

Keywords: Blood glucose, GDM, Amritsar, OGTT, BMI

INTRODUCTION

Gestational diabetes mellitus (GDM) is defined as any degree of glucose intolerance with the onset or first recognition during pregnancy with or without remission after the end of pregnancy.[1] GDM is important in that it poses a risk to both the pregnant woman and her baby. GDM is associated with higher incidence of maternal diabetes mellitus in future.[2].Women with a history of GDM are at increased risk of future diabetes, predominantly type 2 diabetes, as are their children and the following subsequent generations i.e "Trans generation Transmission Occurs".[3]

The major morbidities associated with infants of diabetic mothers include respiratory distress, growth restriction, polycythemia, hypoglycemia, hypocalcemia, and hypomagnesemia, and congenital malformations.[4]

GDM is thought to arise as the result of insulin resistance due to pregnancy hormones, which is not adequately compensated for by the pancreatic β-cells through increased proliferation and insulin secretion.[5] 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[6]. Nongenetic factors, include maternal age,[7] obesity,[8] diet, and lifestyle.[9]

The prevalence of gestational diabetes has been reported to range from 3.8% in Kashmir,[10] to 6.2% in Mysore,[11] 9.5% in Western India[12] and 17.9% in Tamil Nadu.[13] In more recent studies, using different criteria, prevalence rates as high as 35% from Punjab[14]and 41% from Lucknow have been reported.[15]The geographical differences in prevalence have been attributed to differences in age and/or socioeconomic status of pregnant women in

these regions. It is estimated that about 4 million women are affected by GDM in India, at any given time point.[16]

In 2019 the global prevalence of Hyperglycemia in Pregnancy (HIP) in the age group 20-49 years was estimated to be 20.4 million or 15.8% of live births. They had some form of hyperglycemia in pregnancy, of which 83.6% were due to GDM .Hence, all women should be screened for Gestational Diabetes Mellitus, even if they have no symptoms[17].

Universal early testing in population with high prevalence of type 2 DM is recommended. Indian women have 11-fold increased risk of developing glucose intolerance during pregnancy compared to Caucasian women[18]. Among ethnic groups in South Asian countries, Indian women have the highest frequency of GDM[19]. Hence, the current recommendation is, all pregnant women should be screened for Gestational Diabetes Mellitus, even if they have no symptoms[17]. The present concept is to screen for GDM in the early weeks of pregnancy, if negative to be repeated in the subsequent weeks of pregnancy as GDM manifests in all the trimesters of pregnancy[19]. In early pregnancy, insulin secretion increases, while insulin sensitivity is unchanged, decreased, or may even increase. At mid pregnancy, insulin sensitivity starts to decline progressively, and became worse during the rest of the pregnancy, being worst in the late third trimester. It rebounds with the delivery of the placenta. Therefore, GDM usually develops in the late second trimester and disappears, instantly, post delivery. Several risk factors are associated with the development of GDM. The most common risk factors are; obesity, older maternal age, past history of GDM, strong family history of diabetes, member of an ethnic group with a high prevalence of T2DM, polycystic ovary syndrome, and persistent glucosuria. A history of delivering big baby (birth weight ≥4000 g), history of recurrent abortions, and history of unexplained stillbirths, and history of essential hypertension, or pregnancy-related hypertension are other risk factors for GDM.[20]

MATERIALS AND METHODS

The present study was conducted in obstetrics and gynae OPD of BNMCCC, GMC Amritsar. Study population was all pregnant women coming to OPD at BNMCCC between 24 to 28 weeks of gestation.

Inclusion criteria

- All pregnant women coming to OPD between 24 to 28 weeks of gestation.

Exclusion criteria

- Patients with history of diabetes mellitus prior to onset.
- Patients with chronic diseases like renal, liver and cardiac diseases.

A tertiary hospital based cross-sectional study was conducted on 500 pregnant women for a period of six months from April 2023 to September 2023 with DIPSI criteria. Consecutive sample was taken for study.

Semi structural tool where all details of history and risk factors were taken after written informed consent.

Screening for GDM was done in 500 pregnant women with gestational age between 24 to 28 weeks coming in OPD for antenatal care after taking their written informed consent. Patient was interviewed for detailed history and risk factors like age, parity, height and weight of patient, socio economic status, urban/rural residency, detailed past obstetric history, family history of GDM, past history of GDM & macrosomia.

The data informed by the patient was recorded and once the patient fits into the inclusion criteria, the patient was given 75 gm of oral glucose by DIPSI criteria irrespective of meals. 75 gm glucose is to be given orally after dissolving in approximately 300 ml water whether the pregnant woman comes in fasting or non-fasting state, irrespective of the last meal. The intake of the solution has to be completed within 5-10 minutes. A plasma standardized glucometer was used to evaluate blood sugar 2 hours after the oral glucose load. If vomiting occurs within 30 minutes of oral glucose intake, the test has to be repeated the next day. If vomiting occurs after 30 minutes, the test continues. Diagnosis of GDM was made if 2 hr glucose >= 140 mg/dl by DIPSI criteria.

Ethical approval. All information will be confidential.(GMC/IEC/23/SS/97) and were in accordance with ethical standards of the institutional committee.

Outcome measures. Prevalence of GDM and associated risk factors.

STATISTICAL ANALYSIS

For categorical and nominal variables, proportions and frequencies were calculated. For assessing strength of association between various risk factors in GDM, appropriate tests of significance were applied.

RESULTS

A total of 500 women were enrolled during the study period. GDM was diagnosed in 56(11.20%) women based on DIPSI criteria. Most of the participants belonged to 20-25 years of age 311(62.20%) followed by 26-30 years 139(27.80%), above 30 years 28(5.60%) and below 20 years 22(4.40%) (Table 1). The prevalence of GDM was found to be higher in women belonging to rural areas (20/61, 32.7%) and less in urban areas (36/435, 8.2%). (Table 2) The prevalence of GDM was found to be higher in women who were Multiparous (12/50, 24% and less in low parity 44/450, 9.78%. (Table 3) A significant association was found between prevalence of GDM and increasing BMI of participants (P<0.001). Women having BMI >27.5 kg/m^2 had GDM 10/12 (83.37%) compared to 46/448 (9.42%) in women with BMI (18.5-22.9)kg/m^2.(Table 4) The prevalence of GDM was found to be higher in women belonging to

lower class and middle class (12/70, 17.14% and 14/141 9.93%, respectively). The mean age and BMI of women in the upper class were significantly higher as compared to other socio-economic classes. (Table 5)

Table 1- Age of participants

Age of participants (in years)	Number of participants (n=500)	%age
Below 20 years	22	4.4%
20-25 years	311	62.2%
26-30 years	139	27.8%
Above 30 years	28	5.6%

Table 2- Residential area of participants

Residential area	Number of participants (n=500)	GDM patients	%age
Rural	61	20	32.7%
Urban	435	36	8.2%

Table 3- According to parity of the participants

	Not GDM	GDM
Primipara	450	44
Multipara	50	12

Table 4- BMI (body mass index) of participants

Weight	Not GDM	GDM	%age
Normal weight (18.5-22.9)	488	46	9.42%
Obese (>27.5)	12	10	83.37%

Table 5- Socio-economic status of the participants

Class	Not GDM	GDM
Upper class	00	0
Upper middle class	36	5
Middle class	141	14
Lower middle class	253	25
Lower class	70	12

DISCUSSION

In a study conducted in India in 1982[21], the researchers observed a prevalence rate of 2% for GDM. Subsequently, in another study conducted in 1991[22], the prevalence rate was determined to be 7.62%. The prevalence of gestational diabetes mellitus was shown to be 6.7 percent among mothers residing in rural areas of Jammu district, as reported in a previous study [23]. According to a study conducted in many locations in India over the period of 2002-2003, the prevalence of GDM was found to be 16.2% in Chennai, 15% in Thiruvananthapuram, 21% in Alwaye, 12% in Bangalore, 18.8% in Erode, and 17.5% in Ludhiana [24]. A prevalence rate of 16.55 percent for GDM was identified in the study. In a separate research conducted in Tamil Nadu between 2005 and 2007, a comprehensive screening was conducted on a total of 4151, 3960, and 3945 pregnant women residing in urban, semi-urban, and rural regions, respectively. The study revealed that the prevalence of GDM was found to be 17.8%, 13.8%, and 9.9% among women in urban, semi-urban, and rural areas, respectively [25]. The incidence of GDM was seen to be 7.7% in a research conducted at a tertiary care hospital in Maharashtra. Additionally, it was revealed that 13.9% of women exhibited a solitary aberrant number on the OGTT [26]. The use of varying diagnostic criteria for the diagnosis of gestational diabetes mellitus (GDM) may contribute to the observed discrepancies in the prevalence rates of GDM.

In the study conducted, it was observed that 56 women, accounting for 11.20% of the total sample, had gestational diabetes mellitus. The incidence of GDM seen in our research aligns closely with the findings published by Swami et al[26] in Maharashtra, where a prevalence rate of 7.7% was documented following the criteria established by DIPSI criteria. A study reported by Viswanathan Mohan et al., which included 1,031 PW attending antenatal outpatient department, inferred that DIPSI had poor sensitivity to diagnose GDM when compared to the WHO 1999 criteria and the IADPSG criteria. DIPSI criteria were found to miss more than 70% of PW with GDM who are otherwise diagnosed as suffering from GDM with the WHO criteria and the IADPSG criteria. This study

concluded that the DIPSI non-fasting OGTT criteria cannot be recommended for the diagnosis of GDM [27]. In another Indian study reported from the state of Maharashtra, GDM was identified in only 6.5% of cases. It has been suggested that the lower prevalence rates reported might be influenced by the low sensitivity of DIPSI criteria [28]. A study by Sujoy et al. suggested that DIPSI criteria cannot be implemented as a screening test because more cases were diagnosed with IADPSG criteria than DIPSI criteria [29]. However, there are additional studies that prove the DIPSI method to be a convenient screening and diagnostic test for identifying GDM. These studies have observed that a cutoff value ≥7.8 mmol/L at a 2-hour interval after an OGTT is sufficient to diagnose GDM and positively influence pregnancy outcomes both in terms of the mother's as well child's health. Mixed results were noted by a few other studies which found that the DIPSI criteria were highly sensitive, specific, and have greater diagnostic accuracy compared with the WHO guidelines [30-32].

GDM has been shown to exhibit a correlation with advancing age, greater number of pregnancies, elevated pre-pregnancy weight and BMI, presence of diabetes in immediate family members, and previous occurrence of gestational diabetes in several investigations. The current study revealed that GDM exhibited associations with advancing age, higher socio-economic status, body mass index (BMI), and increased weight gain during pregnancy.

The findings of our research indicate a notable rise in the prevalence of GDM as age increases. Previous investigations have also shown a comparable correlation [25, 28, 29].

In the present investigation, the majority of the participants fell between the ages ranges of 20-25 years (62.20%), followed by those aged 26-30 years (27.80%). There were also participants over 30 years of age and below 20 years of age. Seshiah et al. found an odds ratio of 2.1 for women aged above 25 years[25].

There was a significant correlation seen between the occurrence of gestational diabetes mellitus and the socio-economic level of the individuals involved. This link may be attributed to many variables, including advanced maternal age, elevated pre-pregnancy weight and body mass index (BMI), and a more sedentary lifestyle among women of higher socio-economic level. The study conducted by Yang et al.[33] did not identify any significant relationship between the variables in Chinese pregnant women. However, Keshavarz et al. [34] discovered a significant correlation between GDM and poor socio-economic status in pregnant Iranian women.

Obesity is a significant risk factor associated with the development of GDM [25]. In our research, we observed a statistically significant association between GDM and higherBMI among women. Previous studies have also reported a greater incidence of GDM in women with a higher BMI [26]. Several studies have shown a positive correlation between higher parity and an increased prevalence of GDM [24]. In the present investigation, the observed correlation did not demonstrate statistical significance. Jang et al observed that the proportion of women diagnosed with GDM was higher in the group with a parity larger than two, compared to primiparas. However, when adjusting for confounding factors such as age, pre-pregnancy body mass index (BMI), height, family history of diabetes mellitus, and weight increase during pregnancy, the findings did not reach statistical significance [35].

CONCLUSION

This study showed Age &BMI are high risk factors for the development of diabetes in pregnancy with slight variation in Rural and Urban population. The Prevelance of diabetes in pregnancy in present study is 11.20%. Lifestyle changes to keep BMI at normal value is the key factor for prevention of development of diabetes in pregnancy and in later life. Hence it forms an important public health priority in prevention of diabetes mellitus. These findings underscore the need of conducting prevalence studies in various geographical areas of India in order to accurately determine the prevalence of GDM across the country. We concluded that screening is essential for all pregnant women even in low risk group.

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