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Original Research Article

PREVALENCE AND RISK FACTORS OF GESTATIONAL DIABETES MELLITUS: AN EMERGING PUBLIC HEALTH CHALLENGE

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ABSTRACT

Background: Diabetes is one of the most important metabolic dysfunctions which is often asymptomatic in the early stages. One of the main forms of diabetes which is of concern during pregnancy is Gestational Diabetes Mellitus. The aim of present study was to study the prevalence of GDM and its associated risk factors in women attending a tertiary care hospital.

Materials and Methods: A cross sectional study was conducted in department of community medicine, Deccan College of medical sciences, Hyderabad,Telangana, India, among 225 eligible pregnant women as per inclusion & exclusion criteria. The data analysis and write up of report was from January 2016 to May 2016.

Results: out of 225 most of the pregnant women were in the age group 21-26 years (54.7%), and followed by 27-32 (27.5%), 17.8% are in the age group of 15-20years. Prevalence of GDM was 18.7%. A significant correlation was found between GDM and higher BMI, with prevalence of 13.4% among overweight and 37.5% among obese women (p=0.001). GDM was significantly more prevalent in multigravida compared to primigravida women (p=0.04). Consanguinity showed a strong association, with 56.4% of such women developing GDM (p=0.00001). Other significant risk factors included history of abortion (p=0.04), PCOS/infertility (33.3%; p=0.012), and family history of diabetes (30.0% vs. 15.4%; p=0.019).

Conclusion: The present study highlights a significant prevalence of Gestational Diabetes Mellitus (GDM) at 18.7% among antenatal women. In the present study, Age more than 26 years, higher educational level, Body Mass Index (BMI) more than 25 kg/m^2, excess calories intake, sedentary life style, history of abortion, parity, consanguinity, history of PCOS/infertility, family history of diabetes, past history of GDM, history of macrosomic babies was found to be statistically significant. Whereas religion and occupation not found to be significant.

Keywords: Pregnant women, Gestational diabetes, Prevalence, GDM Risk factors

INTRODUCTION

Chronic diseases are major global health challenges, with diabetes being a significant metabolic disorder. It is often asymptomatic in early stages and has a global prevalence of 8.5% in adults over 18 years.[1] A key concern during pregnancy is Gestational Diabetes Mellitus (GDM).

Pregnancy induces insulin resistance and hyperinsulinemia, which may lead to GDM when pancreatic function is insufficient to counteract the diabetogenic state.[2] GDM is defined as glucose intolerance first detected during pregnancy.[3] It

usually develops between the 24th and 28th weeks due to increased insulin resistance.[4] Its prevalence ranges from 1.4% to 14% of pregnancies 2 and varies based on ethnicity, diagnostic criteria, and regional factors—especially in developing countries like India.

Urbanization, reduced physical activity, changing diets, and rising obesity contribute to the increasing GDM burden. Alejandra D et al. (2014) reported that the IADPSG criteria led to a 3.5-fold rise in GDM diagnosis.[5] Schmidt MI et al. (2001) found a GDM prevalence of 2.4% by ADA and 7.2% by WHO criteria in a study of 4,977 women.[6] Depending on the population and test used, prevalence may range from 2.4% to 21%.[7] In India, predicting uniform rates is difficult due to wide socio-economic and lifestyle differences. Ethnically, Indians have a higher predisposition to diabetes.[8]

GDM increases the risk of pre-eclampsia, cesarean delivery, cardiovascular complications, neonatal macrosomia, and hypoglycemia.[4] It may triple cesarean deliveries, quadruple NICU admissions, and double birth injuries.[4] These risks can be mitigated by early detection and treatment.[8]

Women with GDM face a 20–50% risk of developing type 2 diabetes within five years postpartum.[7] Their children are also at higher long-term risk.[6] Indian women are 11 times more likely to develop glucose intolerance in pregnancy than Caucasians.[5]Zargar et al. reported a 3.8% prevalence in Kashmiri women.[9] A 2002–2003 national survey found an overall prevalence of 16.55%.[10] A Tamil Nadu study showed GDM in 17.8% of urban, 13.8% of semi-urban, and 9.9% of rural women.[11]

Given the associated maternal and neonatal complications, universal screening between 24–28 weeks (as per WHO) is vital. However, due to financial barriers, especially in low-resource settings, public health systems must allocate resources for screening and neonatal care.

In view of the rising risk of GDM in subsequent pregnancies and future diabetes in both mother and child, preventive strategies and regional prevalence studies are essential. Hence, the present study was undertaken to evaluate the prevalence and associated risk factors of GDM in women attending a tertiary care hospital in Hyderabad.

MATERIALS AND METHODS

Study Design: Cross sectional study. **Study Area:** The study was conducted in a tertiary care hospital of a medical college. **Study Setting:** Antenatal Care clinic in a tertiary care hospital, Hyderabad. **Study Duration:** The study was conducted from 1stJuly 2015 - 31st may 2016. **Sample Size:** The sample size was 225 eligible pregnant women calculated by taking reference prevalence of GDM as 17% with 5% absolute error.[7] The subjects were selected from all pregnant women attending ante natal clinic at tertiary care hospital with gestational age of 24th – 28th weeks according to inclusion and exclusion criteria. $n = 4pq/d^{2,}$ where, p = prevalence of gestational diabetes = 17%, q = constant (100-p) = 83%, d = absolute error considered at 5%.Therefore, $n = 4 \times 17 \times 83 / 5^2$,n = 225. Hence the study comprised of 225 pregnant women in study area who fulfilled the selection criteria. **Inclusion Criteria:** Pregnant women with gestational age of 24th – 28th Weeks attending ANC clinic during the study period were included in the study. **Exclusion criteria:** 1.Pregnant women with previous history of diabetes 2. Women in 1st trimester. 3. Those who do not give consent. **Ethical consideration:** The study was approved by the institutional Ethical committee. **Data collection:** The study was carried out during July 2015-Dec 2015 in ANC care clinic at tertiary hospital Hyderabad. Women attended the antenatal care clinic during the study period 225 subjects were included in the study.All women were informed about the nature of the study and those who consented for the study after ensuring inclusion and exclusion criteria were selected. **The study comprised the following components:** Data collection regarding general demographics characteristic, socio demographic characteristics of the study participants. Assessment of nutritional status and diet history. Assessment of life style. Diagnosis of GDM by oral glucose tolerance test. **Data collection of socio demographic characteristics:** Data was collected using a predesigned and pretested questionnaire. Age was recorded in completed years. Parity, gestational age (was primarily based on the date of the last menstrual period and was substituted by the result of first trimester ultrasound examination), family history of diabetes, history of consanguinity, history of GDM in previous pregnancies, past medical history (PCOS, Infertility treatment).The educational level and occupation of both participant and head of the family and family income were recorded, to calculate the socio- economic status of the family by using Kuppuswamy's Socio economic status scale modified for the year 2014.[12] The scoring for each variable was given and the socio-economic classification was given as follows.

Table 1: Socio-economic class

Total Scoring	Socio-economic Class
26 - 29	Upper
16 - 25	Upper middle
11 - 15	Lower middle
< 5	Lower

Assessment of nutritional status and diet history: Nutritional status of the participants was assessed by anthropometric measurements -height and weight. A portable weighing machine was used to record the weight." Zero" adjustment was ensured every time before recording the weight of the participants. Body weight at the registration was taken as pre-pregnancy weight due to small weight gain during the first 12 week of gestation. Weight gain from pre-pregnancy to 24th – 28th gestational weight was taken. For measuring the height an accurately calibrated scale stuck to the wall was used. After recording the weight and height, Body Mass Index was calculated and they were categorized into four groups based on BMI according to Asian criteria given by WHO.[13]

Table 2: BMI according to Asian criteria by WHO,[13]

Under weight	**<18.5**
Normal	18.5 – 22.9
Over weight	23 – 24.99
Obese	>25

Maternal dietary assessment: Maternal dietary intake was assessed using a 24 hours' dietary recall collected at the time of OGTT. The food intake pattern, frequency of food consumption, and energy intake was calculated. **Assessment of life style:** Data regarding the life style was collected by using a predesigned proforma. It includes habit of smoking, alcohol and exercise type. **Diagnosis by oral glucose tolerance test**: The women were advised to take their regular diet for three days and asked to come to ANC clinic after observing overnight fast (at least 8 hr.) for oral glucose tolerance test (OGTT). After the collection of fasting blood samples, women were asked to drink 75 g of anhydrous glucose powder dissolved in 250-300ml of water. Blood samples, also taken 2-h after the glucose load, were collected into fluoride containing tubes. Venous plasma glucose was measured in the central laboratory of the hospital using a glucose-oxidase- based method. Gestational diabetes mellitus was diagnosed if either the fasting venous plasma glucose was more than or equal (≥6.10mmol/lor110mg/dl)or the 2 -h post load venous plasma glucose was more than or equal (≥ 7.8mmol/l or 140mg/dl). **Data analysis and write up of report:** The data analysis and write up of report was from January 2016 to May 2016. **Statistical Analysis:** Analysis was carried out using statistical package for social studies (SPSS) (version 20). General characteristics of the study participants were presented as a mean ± standard error of the mean or percentage (%). Chi -square test was used to test the difference between two proportions.

RESULTS

The present study was conducted among 225 of pregnant women to evaluate the prevalence and associated risk factors of GDM in women attending a tertiary care hospital. In present study most of the pregnant women were in the age group 21-26 years (54.7%), and followed by 27-32 (27.5%), 17.8% are in the age group of 15-20years. The mean age was found to be 24.53 + 3.85 yrs. Majority of the participants were Muslim 74.2% (167) followed by Hindu 22.2%. Maximum number of women were house wives 96%(216) followed by working women 4.0% (9).Nearly half (43.1%) pregnant women had completed secondary schooling and very less number of women are illiterate (6.2%). Majority 73.3% of them were in the middle class (II & III) (36.9%+36.4%) followed by lower Class (16. 9%).Very few were from upper class (9.8%). Body Mass Index (BMI) wise distribution of total pregnant women shows half of them 52.0 % (117) were normal followed by 28.4% who are obese and 13.4%(30) are overweight, and very few 6.2% (14) were underweight. The mean BMI was found to be 22.65 + 4.20. According to their order of pregnancy 35.1% (79) were primigravida, 8.9 %(65) were 2nd gravida, 36.0% were 3rd gravida and above. There is a positive history of consanguinity in 17.3% 0f the study participants. Very few 14 (6.2%) participants had history of oral contraception use before present pregnancy. Only 78 (34.6%) pregnant women had a history of abortion in their obstetric history. Only 50(22.2%) out of 225 pregnant women were having a positive family history of Diabetes Mellitus. very few (2.7%) women had history of regular exercise before the present pregnancy. Majority pregnant women 186 (84.0%) were having sedentary Life style, and 36 (16.0%) were having moderate life style. (Table-3)

Table 3: Socio Demographic Characteristics

VARIABLE	Frequency	Percent
Age Group (Years)		
15-20	40	17.8
21-26	123	54.7
27-32	62	27.5
Religion		
Muslim	167	74.2

Hindu	50	22.2
Christian	8	3.6
Occupation		
Non-working	216	96.0
working	9	4.0%
Education		
Illiterate	14	6.2
Primary schooling	56	24.9
Secondary schooling	97	43.1
Graduation	38	16.9
Post -graduation	20	8.9
Socio-economic status		
upper class		9.8
Upper middle Class		36.9
Middle Class		36.4
Lower Class		16.9
BMI(kg/m^2)		
<18.5	14	6.2
18.5-22.99	117	52.0
23-24.99	30	13.4
>25	64	28.4
Gravida		
1	79	35.1
2	65	28.9
≥3	50	36.0
Type of Life style in women		
Sedentary	189	84.0
Moderate	36	16.0
Heavy	00	00
Consanguinity	39	17.3
Oral contraception	14	6.2
History of Abortion	78	34.6
Family history of DM	50	22.2
Exercise	6	2.7

The mean weight gainupto 24th -28th week's gestational age is found to be 5.04 + 1.15 kgs. Calorie intake among study participants revealed that 55.1% were taking less calories where as 44.0% were taking more and very negligible percent (0.9%) were taking required calories. Only 6.2% of women had Hypertension in the present pregnancy. Only 15.1% of the women have the history of hypothyroidism in either previous and present pregnancy. Very few (2.7%) had the history of gestational diabetes in previous pregnancy. (Table-4)

Table 4: Intra & Post Natal Characterestics

Characteristics	Frequency	Percent
Weight gain (kgs)		
2	3	1.3
3	16	7.1
4	54	24.0
5	71	31.6
6	57	25.3
7	24	10.7
Calorie intake		
Excess	99	44.0
Deficient	124	55.1
Normal (Required)	2	0.9
CO-MORBIDITIES		
Hypertension	14	6.2
Hypothyroidism	34	15.1
GDM in previous pregnancy	6	2.7

Table 5: Incidence of GDM

OGTT	Frequency	Percent
GDM	42	18.7%
Normal	183	81.3%
Total	225	100.0%

As shows in table-5, out of the total women (225) attending ANC at 24th -28th weeks of gestation 42 of them were diagnosed to have GDM (either fasting or 2nd hr PPG) according to WHO criteria with the prevalence of 18.7% that is 42 women are with GDM out of 225 pregnant women.

Table 6: Association Between GDM & Socio-Demographic Characters

Characters	GDM	Normal	P value
Age in groups(years)			
15-20	2(5.0%)	38(95.0%)	0.001*
21-26	16(13.0%)	107(86.9%)	
27-32	24(38.7%)	38(61.3%)	
Education Status			
Illiterate	0(00%)	14(100%)	0.013
Primary school	9(16.1%)	47(83.9%)	
Secondary school	17(17.5%)	80(82.5%)	
Graduation	7(18.4%)	31(81.6%)	
Post-graduation	9(45.0%)	11(55.0%)	
Religion			
Muslim	31(18.6%)	136(81.4%)	0.893
Hindu	9(18.0%)	41(82.0%)	
Christian	2(25.0%)	6(75.0%)	
Occupation			
Non-working	40(18.5%)	176(81.5%)	0.7
Working	1(11.11%)	6(66.66%)	
BMI			
<18.5	0(00%)	14(100%)	<0.001*
18.5-22.99	14(11.9%)	103(88.1%)	
23-24.99	4(13.4%)	26(86.6%)	
>25	24(37.5%)	40(62.5%)	
Order of Pregnancy			
Primigravida	9(11.4%)	70(88.6%)	0.04*
Others gravida	33(22.6%)	113(77.4%)	
Consanguinity	22(56.4%)	17(43.6%)	<0.001*
History of abortion	22(28.2%)	56(71.8%)	0.04*
PCOD/infertility	11(33.3%)	22(66.6%)	0.012*
Life style			
Sedentary	40 (21.1%)	149 (78.9%)	0.04*
Moderate	2(5.5%)	34 (94.5%)	
Calories intake			
Normal	0(00%)	2(100%)	0.003*
Deficient	12(9.7%)	112(90.3%)	
Excess	30(43.4%)	69(69.6%)	
Macrosomia	15 (30%)	35 (15.4%)	0.019*

statistically significant (P<0.05)

The prevalence of GDM increased significantly with maternal age—5.0% in the 15–20 years group, 13.0% in 21–26 years, and 38.7% in 27–32 years (p=0.001). Higher educational status was also associated with increased GDM prevalence: 45.0% in postgraduates and 18.4% in graduates (p=0.013). No significant associations were observed with religion (p=0.893) or occupational status (p=0.7). (Table-6)

A significant correlation was found between GDM and higher BMI, with prevalence of 13.4% among overweight and 37.5% among obese women (p=0.001). GDM was significantly more prevalent in multigravida compared to primigravida women (p=0.04). Consanguinity showed a strong association, with 56.4% of such women developing GDM (p=0.00001). Other significant risk factors included history of abortion (p=0.04), PCOS/infertility (33.3%; p=0.012), and family history of diabetes (30.0% vs. 15.4%; p=0.019). (Table-6)

DISCUSSION

The present study is carried out to find out the prevalence of Gestational Diabetes Mellitus (GDM) and distribution of various socio -demographic variables in the 225 women attending antenatal clinic in tertiary care hospital. All the women are subjected to OGTT at 24th -28th weeks of gestation to diagnose GDM (according to WHO criteria).

Prevalence: Gestational diabetes mellitus is a common health problem and its prevalence is increasing globally. GDM worldwide varies from 1 to 14% of all pregnancies. Asian women have a relatively high risk of GDM compared to Caucasians.[14] The prevalence of GDM in the present study is 18.7% which is similar to study done in developed countries in Asian born pregnant women. A community- based survey performed in the U.S, reported that the prevalence of GDM in Asian women was twice that of non-Hispanic white women.[15] In another study carried in Australia reported high prevalence rates in Indian born (15%), Chinese born (13.9%.) women.16 The prevalence of GDM in the present study is 18.7%, which was found to be similar to the study done in Chennai by Seshiah et al,[11] 17.8% and Krishnan GV et al 17(2015) who found the prevalence of GDM in India as 16.7%, Neilsen KK et al,[18] (2016) also found the prevalence of GDM as18.9%.But it is more when compared study done in Kashmiri women by Zegar et al,[9] (2004) which was found to be 3.8% where as it is less compared to the study by

Arora GP et al,[19] (2015) in Punjab showed the prevalence of GDM i.e 34.9%, and by Swami et al20 (2008) in Maharashtra reported the prevalence of GDM as 21.6%. Increasing trend in prevalence of GDM has been shown in various studies conducted in different regions of the country. In another community, based study done by Seshiah et al,[11] (2008) found prevalence of GDM in urban was found to be 17.8%, semi urban showed prevalence as 13.8% and rural area of south India as 9.8% respectively. In a random survey performed in various cities in India in 2002-2003, the overall prevalence of GDM was 16.55%, showing 21% in Alwaye, 17.5% in Ludhiana, 16.2% in Chennai, 15% Thiruvananthapuram, 12% in Bangalore, 8.8% in Erode.[10] This difference in prevalence rate may be due to the use of different criteria for diagnosis and different socio-cultural back grounds in which the studies are under taken. In a study done by Krishnan G.V et al,[17] (2015) used both IADPPSG criteria and WHO criteria and found the prevalence of GDM to be 36.6% and 17.5% respectively. Whereas the Brazilian gestational diabetes study evaluated the WHO and ADA diagnostic criteria against pregnancy outcomes in an observational study of nearly, 5000 women and found that WHO criteria identified more cases of GDM than ADA criteria (7.2%VS 2.4%).6

Socio-demographic variables:

Age: In the present study, all the participants were between the ages of 15- 32 years with mean age of 24.5+3.8 years. In a study done at Haryana by Rajput et al,[7] (2013), the mean age was 23.6+3.5 years which is in concordance with our study. But it was less when compared to the study done by Benner A et al,[21] (2011) i.e (33.4+6.5 years) and compared to study done in developed country that is a study done by Kreneyi Z et al,[22] (2009) found mean age was 30+4 years. In present study, prevalence of GDM after 21 years of age was 51.7% and was found to be increasing with increase in age (table 5.2.4) which coincides with study done by Rajput R et al7 (58.2%). Zargar et al,[9] (2004). Also found that GDM prevalence increased steadily with increasing age (from 1.7% in women below 25 years to 18% in women 35 years or older. But in a study, by Anzaku A.S et al,[23] (2012) 76.2% women above 26 years had GDM. Gandadhara G.T et al24 (2014) in a study, found that women conceiving after 30 years of age developed GDM. It may infer that there is an association between age and development of GDM in pregnant women. This association was statistically significant. Religion: In the present study, 74.2% women were Muslims because in the tertiary care hospital where the study was carried out, maximum number of Muslims were availing the health services. But there is no association between GDM and religion which is in accordance to study done by Anzaku A.S et al,[23] (2012). Educational status: In our study, 6.2% pregnant women were illiterate. This was in accordance with the study done by Benner et al29 (2011) which was 5.3%. But it was very high in a study by Anzaku S.A et al,[23] (2012) where 14.3% were illiterate. A significant increase prevalence of GDM was observed with increasing educational level. Which is similar to study done by Rajput R et al,[7] (2013).Nielsen KK et al,[18] (2016) also found the significant association between the educational level of the pregnant women and gestational diabetes mellitus. But Innes et al,[25] (2002) had found an inverse association between the educational level of pregnant and GDM. Whereas Yang et al,[26] (2002) did not find an association between GDM and education status in Chinese pregnant women. The association between GDM and education status is could be because of higher age at marriage, improved nutrition status. Occupation: In our study, maximum number of study participants were non- working (house wives) i.e 96%. This is in accordance with the study done by Erem et al,[27] (2014) 95.3%. In the present study, only 18.5% women with GDM were non-working and there is no association between occupation and GDM, which is similar to the study done by Benner et al,[21] (2011) which also showed no association between occupation and development of GDM. Socio-economic status: In the present study majority of study participants are in the middle class (73.3%) and followed by lower class (16.9%) very few from upper class (9.8%). In the present study women with GDM belonged to either upper class or upper middle class (22.7%, 31.3% respectively) which is similar to with the study done by Rajput Ret al7 (2013) where the prevalence of GDM was higher in upper class and upper middle class (25%, 16.8%) respectively, but in a study carried by Sneha et al,[28] found 47.8% women belonging to upper middle class to have GDM. A statistically significant association with socioeconomic status is seen among women with the gestational diabetes. This difference may be due to Epidemiological transition this association could be related to multiple factors as higher maternal age, higher pre-pregnancy weight as reflected in the BMI, increased calories intake, more sedentary life style in women of higher socio economic status. Yang et al,[26] (2002) did not find such an association in Chinese pregnant women. Body Mass Index (BMI): In this study mean BMI was 22.6+ 4.2 which is similar to study done by Kereny Z et al,[22] (2009) with mean BMI of 22.6+4 and also in study by Seshiah V et al,[11] (2008) mean BMI of 21.9+3.9, but it is less when compared to Velusamy et al,[29] (2014) with mean BMI 27.71+3.61. In our study 50.9% of women with GDM are overweight and Obese. This is in accordance with study done by Saxena P et al30 (52%) and Velusamy S et al,[29] (51%) women with GDM were overweight and obese but in a study by Imoh LC et al,[31] (2015), only 24.1% women with GDM were obese and overweight.Obesity is the important risk factor in the development of GDM. Many studies have reported that pre-pregnancy BMI and obesity are associated with a high prevalence of GDM. In a population based cohort study of about

97000 single ton births. Obese women had a threefold higher risk of developing GDM than non-obese women.[32] There is a misconception in the community that over nourishment is essential during pregnancy. Normal weight gain during pregnancy is 6 kg by the end of second trimester. In our study 36% women with GDM had a weight gain of 6kg an above. But Saldana et al,[33] (2006) observed that weight gain was significantly higher in women with gestational diabetes than in those with normal blood glucose. Cho EH et al,[34] (Korean) examined the relationship between rate of gestational weight gain are (RGWG) at early, mid and late pregnancy and adverse pregnancy outcomes have demonstrated the RGWG at early and late pregnancy but no mid pregnancy, is significantly associated with developing GDM. Bo et al,[35] (2003) had observed that excess weight gain was risk factor for development of GDM. Oral contraception: In our study, only few (6.2%) women had a history of contraception before Index pregnancy. Which is to national family health survey (NFHS) statistics in India in India i.e. 4%.36 Hypertension in present pregnancy: In our study among the total subjects (225) 6.2 % women had Hypertension, This is similar to study done by Mehta B et al,[37] found the prevalence of Hypertension in pregnant women as 6.9%. But it is less in when compared to study done by Sachdeva et al,[38]i.e 15.0%. Hypothyroidism: In this study, out of the total participants15.1% women have the hypothyroidism. This is similar to the study done by Dhanwal DK et al,[39] (14.3%). But it is more when compared to study done by Bandela et al,[40](10.0%). prevalence of hypothyroidism in India is variable. Gayathri et al,[41] reported 2.8% prevalence Possible reason for such variability could be the different upper limit cut-offs used for TSH. History of exercise: In our study, only 2.7% women had history of regular exercise. This is less when compared to study done by Sreekanthan K et al,[42] (2014) reported 16.6% pregnant women had a history of regular exercise. Parity: In our study out of total subjects (225) 35.1% were primigravida, 64.9% were gravida 2and above (table no-5) which is similar to study done by Gangadhara et al,[24] (2014) primigravida 37.7% and 73.3% gravida 2 and above and Shehiah et al,[11] (2004) primigravida41.3% and multi gravida 52.1%.

ASSOCIATED RISK FACTORS

Parity: In our study prevalence of GDM is found in mother with higher parity 22.6% (table no-6)Velusamy S et al,[29](2014) reported that parity influence the early development of GDM as independent risk factor (< 0.05), as 77% multi gravida and 44% of primigravida women develop GDM early in their gestation. In our study the association between parity and GDM was statistically significant.But on contrary Gangadhara et al,[24] (2014) and Nielsen KK et al,[18] (2016) showed no association between GDM and parity. Consanguinity: In our study, in women with GDM 56.4% has a history of consanguinity which is similar to study done by Bener A et al,[21] (2011) 52.7%. History of consanguinity and occurrence of GDM. History of abortion and GDM: In the present study 28.6% pregnant women with GDM had a history of abortion. This association was statistically significant. Similar findings were found in study by Bener A et al,[21] (2011) where 24% women with GDM had history of abortion and y Nielsen KK et al,[18] (2016) reported as 22.4%women with GDM had a history of abortion and association was statistically significant. But Sreekanthan K et al,[42] (2014) reported higher 66.66% pregnant women with GDM had a history of abortion, where as it is less in study done by Imoh LC et al,[31] (2015) who reported as10.7%. History of PCOS & Infertility. History of PCOS and infertility reported to be associated with development of GDM. In the present study 33.3 % of women with history of PCOS and infertility developed GDM, and association was found to be statistically significant. which is in accordance with the study carried by Pan LM et al,[43] where 20.46% women with history of PCOS had developed GDM. They also found history of PCOS women had more than 2-fold increase risk of GDM compared to women without PCOS. But Wang et al,[44] (2013) found that 54.9% incidence of GDM was significantly found among women with PCOS compared to 14.3% of those in the control group. They also showed that, PCOS may be predisposing factor for GDM. Family History of Diabetics and GDM: In our study a significant percent (30%) of women with GDM had positive history of Diabetic Mellitus. Similar findings were observed in a study of Seshiah et al,[11] where 32.3% of women with GDM had positive family history of diabetics. In another study done by Velusamy S et al,[29] (2014) observed women with a positive history of Diabeties was 58.7% and shows influence on the development of the GDM(P>0.05). But in a study by Anzaku et al,[23] (2012) found that there is no association between GDM and family history of Diabeties. Yang et al,[26] reported that pregnant women with a family history of Diabetes in first-degree relatives had an approximately 2-fold increased risk for GDM as compared with women without family history of Diabetes in first-degree relatives. There is a positive relationship between family history of Diabetes (in first degree relatives) and prevalence of GDM. Family history of Diabetes Mellitus has been reported to be associated with higher chance of developing GDM in many studies. Gestational Diabeties in previous in previous pregnancies and GDM: In the present study, it has been observed that prevalence of GDM is 2.7% in women with past history of GDM. This is in accordance with study carried by Eram C et al,[27] (2014). In another study by Saxena P et al30 it was found to be higher 11.9%.But in general a woman with a previous history of GDM have increased risk of developing GDM in subsequent pregnancy. Life style: In the present study 21.1% women with sedentary life

style developed GDM. This association was statistically significant. In a study done by Nielsen KK et al,[18] (2016) 12.5% women with sedentary life style developed GDM. Calorie intake: In the present study 43.4% women taking excess calories develop GDM. This association was found to be statistically significant. Similarly, Saldan et al,[33] (2006) stated that both GDM and type 2 diabetic groups, found to be taking higher carbohydrates. History of Macrosomia and GDM: This study shows 58.3% of pregnant women with GDM had a history of Macrosomia in previous pregnancies. This is in accordance with study done by Sreekanthan K et al,[42] (2014) found the 58.3% women with GDM had a history of previous large birth weight babies and also Anzaku AS et al,[23] (2012) in Nigeria found 50% pregnant women with GDM had a history of large babies and is the only independent risk factor for GDM and found significant association between GDM and history of macrosomia. But it is less when compared to study done by Eram C et al,[45] (2014) found that 88.9% women with GDM had a history of Macrosomia. In a study done by Ali AD et al,[46] (2016) found the prevalence of GDM with a previous history of macrosomic baby, is 12.2% which is very less and association was not found to be statistically significant. There is a statistically significant association with GDM and history of Macrosomia in previous pregnancies.

CONCLUSION

The present study highlights a significant prevalence of Gestational Diabetes Mellitus (GDM) at 18.7% among antenatal women attending a tertiary care hospital, which is notably higher than earlier national estimates. This finding emphasizes the growing burden of GDM in India and the need for routine screening during pregnancy. The study also identifies several socio-demographic and clinical risk factors significantly associated with GDM, including maternal age over 26 years, higher BMI, increased caloric intake, sedentary lifestyle, history of abortion, consanguineous marriage, PCOS/infertility, family history of diabetes, and previous GDM or macrosomic births. In contrast, religion and occupation did not show any significant association. These findings underscore the importance of early identification and targeted intervention strategies focusing on modifiable risk factors to prevent adverse maternal and fetal outcomes related to GDM.

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