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Original Research Article

Prevalence and commonest predictors of gestational diabetes mellitus: a cross-sectional study

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ABSTRACT

Background: Babies born to mothers with GDM are at increased risk of complications, primarily growth abnormalities and chemical imbalances such as hypoglycemia, GDM is a reversible condition and women who have adequate control of glucose level scan effectively decrease the associated risks and give birth to healthy babies. The objective was to estimate the prevalence and the predictors of gestational diabetes mellitus.
Methods: This study was conducted as a cross sectional study among the antenatal mothers at the outpatient department of the rural and urban health centers of the KG hospital and PG institute and its affiliated centers in Coimbatore. The study period was one year and during which 150 antenatal mothers participated in the study.
Results: The prevalence of GDM was 76 (9%) and 74 (11%) in rural and urban health centers respectively. The maximum number of GDM Mothers to be 26-30years of age with a peak indicating 42% and 39% of GDM mothers were found to be in primigravida, 48% of GDM mothers were primipara. About 65% of GDM pre-pregnant mothers were overweight according to BMI, 53% of GDM mothers had positive family history of DM. Majority of the study population 100 (67%) had HBA1C less than 6% and the remaining 50 (33%) had more than 6% value. The variables like age, gravida, parity, family history of diabetes, pre-pregnant BMI, history of PCOS, history of hypertension, history of hypothyroidism was compared with the glycaemic status (HBA1C values) and it was found to be statistically significant at $P<0.05$.
Conclusions: The commonest risk factors which increases the incidence of GDM were family history of diabetes mellitus, overweight pre-pregnant BMI, history of PCOS, hypothyroidism, increasing gravidity and parity respectively.

Keywords: Antenatal, BMI, Gestational Diabetes, HBA1c

INTRODUCTION

The international diabetes federation estimated that currently there are 100 million people with diabetes worldwide representing about 6% of all adults.[1] Indeed, the number of people with diabetes in India is likely to double in less than 2 decades, from 39.9 million (in 2007) to 69.9 million by 2025. The Indian council of medical research study done in the 1970s reported a prevalence of 2.3% in urban areas, which has risen to 12-19% in 2000. These numbers also include gestational diabetes mellitus (GDM) and should alert the physicians to direct special attention to this population, especially in developing countries like India.

Babies born to mothers with GDM are at increased risk of complications, primarily growth abnormalities and chemical imbalances such as hypoglycemia, GDM is a reversible condition and women who have adequate control of glucose level scan effectively decrease the associated risks and give birth to healthy babies.[2] Through improved understanding of pathophysiology of

diabetes in pregnancy, as well as implementation of care programs emphasizing normalization of maternal glucose levels, fetal and neonatal mortality have been reduced from 65% before the discovery of insulin to 2-5% at the present time.[3] If optimal care is delivered to the diabetic mothers, the perinatal mortality rate, excluding major congenital anomalies, is nearly equivalent to that observed in normal pregnancy.[4] As opposed to GDM, there are studies which confirm poorer maternal and fetal outcome like abortions and congenital anomalies in pre-gestational diabetes mellitus.[5] Moreover, the prevalence of GDM is the highest in Tamilnadu and there are no much studies on GDM mothers. This study is useful to estimate the associated risk factors of GDM and implement early screening for GDM in pregnant women visiting antenatal clinic in KG Hospital. The aim and objective of this study was to estimate the prevalence of GDM among the antenatal mothers, to assess the predictors of gestational diabetes mellitus, to find out the role of HbA1C as a screening tool in GDM and to assess the glycemic status of the study population.

METHODS

This study was conducted as a cross sectional study among the antenatal mothers at the outpatient department of the rural and urban health centers of the KG Hospital and PG Institute and its affiliated centers in Coimbatore. The study period was one year and during which 150 antenatal mothers participated in the study. Women with blood glucose levels >140mg/dl on a 2hours 75gm OGTT were included for the study. On the first ANC visit all mothers were tested for random blood sugar and whose values >100mg/dl were asked to perform OGTT (after 2hours of 75gm glucose). When the blood sugar after 2hours was >=to 140mg/dl then the mother was labeled as GDM (according to DIPSI guidelines). HbA1c levels were tested in all GDM mothers (OGTT >140mg/dl) on the same visit. Women with diagnosis of diabetes before pregnancy, pre-existing hypertension, autoimmune conditions such as SLE and other chronic conditions such as chronic renal failure, congestive heart failure and active tuberculosis were excluded. This was only an observational study and did not require any new intervention to the patient. All patients enrolled in this study received standard care and close follow up as per the hospital mission statement. No additional antenatal investigations were required for the patient during the study period and hence no extra cost was involved for the patient. The patients were enrolled in this study only after getting appropriate consent and those who refused to consent also received the standard care and the data in this study were kept confidential. All quantitative variables were estimated using measures of central location (mean, median and mode) and measures of dispersion (standard deviation, standard error and inter quartile range). Their 95% confidence intervals were also calculated. Qualitative or categorical variables were described as frequencies and proportions. Normality of data was checked using graphs (histograms, box and pie chart). The data are reported as the mean +/- SD or the median, depending on their distribution. The differences in quantitative variables between groups were assessed by means of the unpaired t-test. Comparison between groups was made by the nonparametric Mann-Whitney test. ANOVA was used to assess the quantitative variables. Odds ratio was calculated to assign the variables. The chi-square test was used to assess differences in categorical variables between groups. A p value of <0.05 using a two-tailed test was taken as significant for all statistical tests. All data were analysed with a statistical software package for social services (SPSS, version 16.0 for windows).

RESULTS

Table 1: Frequency distribution of the GDM population in relation to other variables.

Variable		Number (150)	Percentage
Health center	Rural	76	51%
	Urban	74	49%
Age group			
16 - 20		8	5%
21 - 25		48	32%
26 - 30		63	42%
31 - 35		26	17%
>35		5	3%
Gravida	1	58	39%
	2	53	35%
	3	27	18%
	4	8	5%
	5	1	1%
	6	2	1%
	7	1	1%
Parity	0	67	45%
	1	72	48%
	2	10	7%
	3	1	1%
Pre-pregnant BMI			
Normal weight		36	24%
Overweight		98	65%
Obese		16	11%
Family history of DM			
No		70	47%
Yes		80	53%
PCOS	No	76	51%
	Yes	74	49%
Hypothyroidism			
No		137	91%
Yes		13	9%
GHT	No	138	92%
	Yes	12	8%
HBA1C			
≤6.0		100	67%
>6.0		50	33%

Table 2: Mean difference of HbA1c levels.

HbA1c	Mean HbA1c	SD	95% CI for Mean		Minimum	Maximum	P value
			Lower	Upper			
≤6.0	5.68	0.29	5.62	5.73	4.8	6	
>6.0	6.48	0.37	6.37	6.58	6.1	7.8	<0.001
Total	5.94	0.49	5.86	6.02	4.8	7.8	

Table 3: Analysis of the variables in relation to glycemic status (HBA1C) (1).

	Total	HbA1c		Significance	Odds ratio
		≤6.0(n=100)	>6.0(n=50)		
HbA1c	5.94+/-0.49	5.68+/-0.29	6.48+/-0.37	<0.001	
Age	25.35+/-4.4	24.21+/-3.70	27.64+/-4.85	<0.001	
	≤25	61%	34%	<0.01	3.036 (95%CI:1.493-6.175)
	>25	39%	66%		
Gravida	1	46%	24%	<0.001	
	2	40%	26%		
	3	11%	32%		
	4	1%	14%		
	5	1%	0%		
	6	1%	2%		
	7	0%	2%		
Parity	0	53%	28%	<0.05	
	1	43%	58%		
	2	4%	12%		
	3	0%	2%		

Table 4: Analysis of the variables in relation to glycemic status (HBA1C) (2).

		HbA1c		Significance	Odds ratio
		≤6.0(n=100)	>6.0(n=50)		
Living	0	55%	36%	>0.05	
	1	41%	54%		
	2	4%	8%		
	3	0%	2%		
BMI	Normal weight	30%	12%		
	Overweight	64%	68%	<0.01	
	Obese	6%	20%		
History of DM	No	61%	38%		2.552 [95%CI :1.269 - 5.130]
	Yes	39%	62%	<0.01	
History of PCOS	No	66%	20%		7.765[95%CI:3.464 - 17.404]
	Yes	34%	80%	<0.01	
History of IUD	No	100%	94%		
	Yes	0%	6%	<0.05	
History of still birth	No	100%	100%		
	Yes	0%	0%		

The total number of deliveries conducted during the study period of one year was 803 from rural and 650 from urban health center. The prevalence of GDM was 76 (9%) and 74 (11%) in rural and urban health centers respectively. Table 1 shows maximum number of GDM mothers to be 26-30years of age with a peak indicating 42% and 39% of GDM mothers were found to be in primigravida, 48% of GDM mothers were Primipara (Table 1).

The above figure 49 % of GDM mothers having prevalence of 50% were Primigravida and 65% OF GDM pre-pregnant mothers were overweight according to BMI, 53% OF GDM mothers had positive family history of

DM, 67% OF GDM mothers did not have history of abortion, 49% had prevalence of PCOS IN GDM, 9% of GDM mothers had history of hypothyroidism. 8% had GHT and the mode of delivery (59%) observed in GDM mothers were delivered normally. Majority of the study population 100 (67%) had HBA1C less than 6% and the remaining 50 (33%) had more than 6% value. The study population was grouped based on the HBA1C values and the means were compared between two groups with the overall mean value 5.94. The mean difference was compared between two groups less than 6 and more than 6 and it was found to be statistically significant (P <0.001) (Table 2). The variables like age, gravida, parity, family history of diabetes, pre-pregnant BMI, history of PCOS, history of hypertension, history of hypothyroidism was compared with the glycemic status (HBA1C values) and it was found to be statistically significant at P<0.05 (Table 3 and Table 4).

DISCUSSION

According to a community-based study done by Seshiah V, Balaji V on the prevalence of GDM in south India (Tamilnadu) it was found that urban population had prevalence of (17.8%), semi urban (13.8%) and rural (9.9%).[6] According to another study done by Fujimoto W et al, that Asian Indians have overall prevalence of 11.6%.[7]

Prevalence of GDM in this study was 9% in rural population (76 out of 803) and prevalence in urban population was 11.3% (74 out of 649). Hence, the observations of this study were almost in agreement with the study referred above. The mean age of the GDM patients was 25.3years (p value <0.001). It was subsequently observed that as and when age was >25 years then there was 3 times the risk of developing GDM. Most of the GDM mothers were in overweight category [25-29.9] (p<0.01) may be due to ethnic factor and types of diet consumed.

According to the study done by Seshiah V, Balaji V et al, the age >25years, BMI >25 and family history of diabetes were found to be risk factors for GDM6. Hence in the present study, classification of age >25 and <25 was taken according to the above review of literature. The observation of this study showed the same results with the study referred above. As the parity increases the HbA1c was >6 (p value 0.05), increasing GDM prevalence and morbidity of pregnant mothers. When the gravida increases, its noted that the HbA1c value increase >6. In this study, 80 out of 150 (53%) patients of GDM had family history of diabetes, the risk of GDM increases by 2.5 times (p value 0.01) (95% CI:1.269-5.130) with family history of DM. 98 out of 150 (65%) patients was under overweight category (p value <0.01). 74 out of 150 (49%) patients had history of PCOS (p value <0.001). 3 out of 150 (2%) patients had history of IUD. 12 out of 150 (8%) patients had history of GHTN and 57 out of 150 (38%) patients had hypothyroidism. The commonest risk factor is the same in the present study. In the study done in Haryana to know the associated risk factor in a tertiary care centre on bivariant analysis risk factors found to be significantly associated with GDM were age, educational level, pre-pregnant weight and BMI, family history of diabetes and hypertension.[8]

In this study the commonest risk factor was the same. In a cohort study done in tertiary care center in North India 3 IUD patients were noticed in the study group. Similar results were noted in this study as well. Most of the GDM mothers had 88 NVD (59%) it was high compared to LSCS 60 (40%). Since the study took place in a tertiary care centre where most of the mothers were encouraged for vaginal delivery as a part of ANC leading to strict glycemic control and availability of resuscitation facilities and this may have attributed to lesser number of IUD and still births.

CONCLUSION

In this study the commonest risk factors which increases the incidence of GDM were family history of diabetes mellitus, overweight pre-pregnant BMI, history of PCOS, hypothyroidism, increasing gravidity and parity respectively. When an HbA1C of more than 6 was reported it was associated with a history of IUD, abortion, hypothyroidism and PCOS. HbA1c does not play a significant role as a predictor of GDM as per this study.

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