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Original Research Article

Prevalence Study of Gestational Diabetes Mellitus and Its Associated Factors in Rural Community of Haryana, India

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ABSTRACT

Objective: To find out the prevalence of gestational diabetes mellitus and its associated factors in a rural community of Haryana, India.
Methods: The Study was a cross-sectional, population based and it was conducted in rural areas over a period of one year. The pregnant women with gestational age ≥24 weeks were included in the study. Blood pressure was recorded thrice at an interval of 5 min in seating position in non-dominant arm to the nearest 2 mmHg using a standard adult mercury sphygmomanometer. All participants were subjected to oral glucose tolerance test (OGTT) with 75 g anhydrous glucose powder dissolved in 250-300 ml water and consumed over 5 min, counting from the start of the drink. Fasting and 2-h post glucose capillary whole blood glucose (PGCWBG) was estimated by glucose oxidase method.
Results: A total 746 women were interviewed. The mean age of all the women was 26.48 (±6.12) years. Overall prevalence of gestational diabetes mellitus (GDM) was 15%. Significant factors associated with the prevalence of GDM were entered in the backward multiple binary logistic regression model. The model revealed that the education of women, smoking habit of women, period of gestation, gravid status and family history of diabetes were found to be significantly associated with the prevalence of GDM.
Conclusion: High prevalence of GDM in this study might be because of the proximity of the study area to the national capital, resulting in adoption of dietary habits & lifestyle by study population akin to urban area. There is need to conduct multi-centric community based study to delineate the exact prevalence of GDM in the country.

Key words: Gestational diabetes mellitus, Community, Rural, Prevalence

INTRODUCTION

Emerging trend of diabetes mellitus (DM) is observed worldwide. By 2025, its prevalence is projected to be 6.3%, which is a 24.0% increase as compared to that of 2003. There will be 333 million (a 72.0% increase) diabetics by 2030 in age group of 20 to 79 years. The developing world (mainly central Asia and Sub-Saharan Africa) accounted for 141 million diabetics

(72.5% of the world total) in 2003. [1] Environmental factors like obesity (central or general), physical inactivity, and diet (saturated fats and transfatty acids) and socioeconomic factors are responsible for development of DM. [2,3]

Gestational diabetes mellitus (GDM) is defined as glucose intolerance of varying degree with onset or first recognition during pregnancy. [4] Prevalence of gestational diabetes mellitus varies widely. Depending on the population studied and the diagnostic test employed, prevalence may range from 2.4 to 21 per cent of all pregnancies. [5,6] In India, it is difficult to predict any uniform prevalence levels because of wide differences in living conditions, socio-economic levels and dietary habits. Approximately, 80% of people with diabetes live in poor and developing countries without any access to basic healthcare. [7] Gestational diabetes mellitus (GDM) is a condition which affects 7% of all pregnancies worldwide affecting 60 million women. [8] Prevalence of GDM is high in the Indian population as compared to other populations of Southeast Asia. [9] In a community-based study (2005-2007) by Seshiah et al, [6] prevalence of GDM in south India was found to be 13.0% using oral glucose tolerance test (OGTT) World Health Organization (WHO). [10] The prevalence in the urban, semiurban, and rural area was 17.8, 13.8, and 9.9%, respectively. In another multi-centric random survey, conducted in 3,674 women all over India, prevalence of GDM was 16.2% Chennai, 17.5% Ludhiana, 15% Trivandrum, 12% Bengluru, 21% Alwaye, and 18.8% Erode. Overall, prevalence of GDM was 16.55% among urban women using WHO criteria. This study documented a definite increasing trend in prevalence of GDM. [11]

The present study was conducted to assess the prevalence of gestational diabetes mellitus and its associated factors in a rural community of Haryana, India.

MATERIALS AND METHODS

This was a cross-sectional population based study conducted in the rural field practice area of the Department of Community Medicine, Gold Field Institute of Medical Science & Research, Chhainsa, Ballabgarh, Faridabad, Haryana, India over a period of one year. Pregnant women with gestational age ≥24 weeks were included in the study. The women who had chronic illnesses were excluded from the study. Informed consent was taken from each woman after explaining the objective of the study. Sample size was calculated by using the prevalence of GDM being 13.9% in a community based study in Haryana [12] with 5% significant level and 80% power which came to be 535. A total of 746 pregnant women were included in the study to increase the power of the study.

The households with pregnant women were selected by systematic random sampling method. In case, there was no eligible woman in the selected household, next household was taken in the sample. Survey was carried out till the desired number of study units was completed. Interview was started with general discussion to gain confidence and it slowly extended to the specific points related to socio-demographic characteristics, clinical evaluation and specific tests.

Blood pressure was recorded thrice at an interval of 5 min in seating position in non-dominant arm to the nearest 2 mmHg using a standard adult mercury sphygmomanometer. Mean of three readings was taken as blood pressure. All participants were subjected to oral glucose tolerance test (OGTT) with 75 g anhydrous glucose powder dissolved in 250-300 ml water and consumed over 5 min, counting from the start of the drink. Fasting and 2-h post

glucose capillary whole blood glucose (PGCWBG) was estimated by glucose oxidase method. WHO criteria were used to categorize the subjects with GDM and normoglycemia. [10]

Statistical analysis

The results are presented in mean±SD and percentages. The Chi-square/Fisher exact test was used to compare the dichotomous variables. The relative risk with is 95% confidence interval (CI) was calculated to find the strength of association between the prevalence of gestational diabetes with study variables. The Unpaired t-test was used to compare the continuous variables between women with GDM and without GDM. The multivatiate binary logistic regression analysis was carried out to find the significant factors associated with the prevalence of GDM. The p-value<0.05 was considered significant. All the analysis was carried out by using SPSS 16.0 version (Chicago, Inc., USA).

RESULTS

Mean age of all the women was 26.48 (±6.12) years. More than one third (40.3%) of the women were literate and were housewives (55%). Smoking habit was found among 23.9% of the women. The prevalence of GDM was observed to be 15% (Fig.1). Prevalence of GDM was significantly lower among literate women (11.3%) than illiterates (17.5%). It (prevalence of GDM) was 77% lower among literates compared with illiterates (RR=0.64, 95%CI=0.44-0.94, p=0.0001). There was no significant (p>0.05) association between prevalence of GDM with occupation of women, height and weight. Husband's education and occupation was significantly (p=0.0001) associated with the prevalence of GDM. The prevalence of GDM was significantly higher among the women who had habit of smoking (RR=1.64, 95%CI=1.11-2.43, p=0.01) and tobacco chewing (RR=1.64, 95%CI=1.08-2.48, p=0.02). There was significant (p=0.001) effect of BMI on prevalence of GDM (Table-1).

Table-1: Demographic factors associated with prevalence of GDM

	No. of women		Women with GDM (n=112)		Women without GDM (n=634)		RR (95%CI), p-value[1]
	No.	%	No.	%	No.	%	
Age	26.48±6.12		23.45±6.78		29.56±7.67		0.0001*[a]
Education							
Literate	301	40.3	34	11.3	267	88.7	0.64 (0.44-0.94), 0.0001*
Illiterate	445	59.7	78	17.5	367	82.5	1.00 (Ref.)
Occupation							
House-wife	410	55.0	63	15.4	347	84.6	1.05 (0.75-1.49), 0.76
Others	336	45.0	49	14.6	287	85.4	1.00 (Ref.)
Husband's education							
Literate	379	50.8	34	9.0	345	91.0	0.42 (0.29-0.61), 0.0001*
Illiterate	367	49.2	78	21.3	289	78.7	1.00 (Ref.)
Husband's occupation							
Working	386	51.7	30	7.8	356	92.2	0.34 (0.23-0.51), 0.0001*
Non-working	360	48.3	82	22.8	278	77.2	1.00 (Ref.)
Smoking							
Yes	116	15.5	26	22.4	90	77.6	1.64 (1.11-2.43), 0.01*
No	630	84.5	86	13.7	544	86.3	1.00 (Ref.)
Chewing tobacco							
Yes	97	13.0	22	22.7	75	77.3	1.64 (1.08-2.48), 0.02*
No	649	87.0	90	13.9	559	86.1	1.00 (Ref.)
Height	149.32±21.34		148.23±22.45		152.41±21.35		0.06[a]
Weight	55.01±12.45		55.67±11.17		56.34±12.45		0.59[a]
BMI	25.16±5.67		26.25±4.56		24.11±6.78		0.001[a]

RR-Relative risk, CI-Confidence interval, [1]Chi-square test, [a]Unpaired t-test, Ref.-Reference category, *Significant

The DBP was significantly (p=0.04) higher among the women with GDM (75.56±10.23) than without GDM (73.46±11.24). Prevalence of GDM was higher among gestational period ≥3 weeks (RR=0.51, 95%CI=0.37-0.72, p=0.0001). The prevalence of GDM was also significantly (p=0.003) higher among the gravid ≥3 (22.9%) than <3 (14%). There was no significant (p>0.05) association between hypertension and prevalence of GDM. The family history of diabetes was significantly (p=0.0001) associated with the prevalence of diabetes (Table-2).

Table-2: Clinical factors associated with prevalence of GDM

	No. of women		Women with GDM (n=112)		Women without GDM (n=634)		RR (95%CI), p-value[1]
	No.	%	No.	%	No.	%	
SBP	117.22±20.23		118.24±22.12		116.45±19.34		0.37[a]
DBP	74.46±10.11		75.56±10.23		73.46±11.24		0.04*[a]
2h PGCWBG (mg/dl)	147.24±21.34		172.35±24.55		123.26±22.25		0.0001*[a]
Period of gestation (weeks)							
<30	462	61.9	51	11.0	411	89.0	0.51 (0.37-0.72), 0.0001*
≥30	284	38.1	61	21.5	223	78.5	1.00 (Ref.)
Gravida							
<3	401	53.8	56	14.0	345	86.0	0.61 (0.44-0.85), 0.003*
≥3	245	32.8	56	22.9	189	77.1	1.00 (Ref.)
Hypertension							
Yes	438	58.7	71	16.2	367	83.8	1.22 (0.85-1.74), 0.27
No	308	41.3	41	13.3	267	86.7	1.00 (Ref.)
Family history of diabetes							
Yes	435	58.3	89	20.5	346	79.5	2.77 (1.79-4.27), 0.0001*
No	311	41.7	23	7.4	288	92.6	1.00 (Ref.)
Dyslipidemia							
Yes	152	20.4	26	17.1	126	82.9	1.18 (0.79-1.76), 0.41
No	594	79.6	86	14.5	508	85.5	1.00 (Ref.)

RR-Relative risk, CI-Confidence interval, [1]Chi-square test, [a]Unpaired t-test, Ref.-Reference category, *Significant

Table-3: Significant factors associated with the prevalence of GDM

	Adjusted Odds ratio	95%CI	p-value[1]
Education			
Literate	0.28	0.23-0.46	0.0001*
Illiterate	1.00 (Ref.)		
Smoking			
Yes	1.11	1.03-2.22	0.03*
No	1.00 (Ref.)		
Period of gestation (weeks)			
<30	0.49	0.25-0.78	0.001*
≥30	1.00 (Ref.)		
Gravida			
<3	0.46	0.32-0.78	0.02*
≥3	1.00 (Ref.)		
Family history of diabetes			
Yes	2.14	1.55-3.56	0.001*
No	1.00 (Ref.)		
2h PGCWBG (mg/dl)	1.78	1.13-3.45	0.001*

CI-Confidence interval, [1]Multivariate binary logistic regression, Ref.-Reference category, *Significant

Significant factors associated with the prevalence of GDM were entered in the backward multiple binary logistic regression model. The model revealed that the education of women, smoking habit of women, period of gestation, gravid status and family history of diabetes were found to be significantly associated with the prevalence of GDM (Table-3).

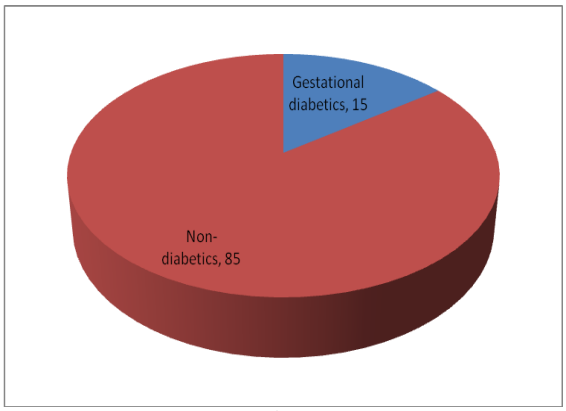

Fig.1: Prevalence of gestational diabetes

DISCUSSION

The increasing trend in the prevalence of GDM has been shown by various authors in different regions of India. Prevalence of GDM has been reported to be 3.8% in Kashmir [13] and 6.7% in rural areas of Jammu. [14] In a community-based study conducted by Seshiah et al [6] reported the prevalence of GDM in urban, semi-urban, and rural areas of south India being 17.8, 13.8, and 9.9, respectively. The present study was conducted in the rural areas of Haryana state and we found the prevalence of gestational diabetes being 15% by using WHO criteria. Possible reason for different rates of in the GDM may be use of different criteria for diagnosis of GDM.

In the community-based studies, WHO criteria is mostly used in comparison to more cumbersome ADA criteria as it serves both as screening and diagnostic test for GDM and also it is simple, economic, and feasible. Pregnant women do not need to be fasting and cause least disturbance in their routine activities, which is very important for a community based study. High prevalence of GDM in vast rural background is because of proximity of study area to National Capital Region (NCR) of Delhi and availability and adoption of all urban amenities viz. vehicles for daily movements and various electric appliances for farming and day-to-day work, leading to more sedentary lifestyle. Proximity to NCR has influenced the rural lifestyle, leading to an increase in prevalence of GDM in the area.

High level of prevalence of GDM in Indian population has been supported by studies conducted in countries of the World. [15,16] Apart from ethnicity, the high prevalence of GDM in Indian population as compared to western countries can be due to trend towards older maternal age, decrease in physical activity and adoption of modern lifestyles and increasing prevalence of obesity and diabetes mellitus. [17]

Prevalence of GDM has been shown to be associated with increasing age, high gravida, family history of diabetes and hypertension in various studies. [6,13,14,18] In this study, the prevalence of GDM was found to be significantly associated with maternal age, high gravida, BMI, family history of diabetes, smoking habit, tobacco chewing habit, education of women & husband and higher period of gestation on bivariate analysis. However, in multiple logistic regression analysis, the education of women, smoking, high period of gestation, high gravida and family history of diabetes were found as independent predictors of GDM. Various other authors also reported similar findings from other parts of this country. [18-20]

CONCLUSION

High prevalence of GDM in this study might be because of the proximity of the study area to the national capital, resulting in adoption of dietary habits & lifestyle by study population akin to urban area. There is need to conduct multi-centric community based study to delineate the exact prevalence of GDM in the country.

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