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A Study of Epidemiological Correlates in Relation to Gestational Diabetes Mellitus

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Abstract
Objectives *1- To study the some of the ecological correlates of gestational diabetes mellitus among pregnant women attending Nehru Hospital, Gorakhpur.*
Study Design: *A cross-sectional study*
Study Settings: *Department of Obstetrics and Gynaecology, Nehru Hospital, Gorakhpur.*
Study subject- *All pregnant women of 24weeks and above gestational age having OGTT report attending Nehru hospital during*
Study Period: *August 2017 to July 2018*
Result: *In the present study proportion of GDM done by using "WHO" criteria was 8.0 % .The proportion of GDM was higher among pregnant women who were in the age group of 20-30 years, literate, housewife by occupation, living in nuclear family, belong to social class IV+ Class V but the differences were not significant. In present study Family history of diabetes was significantly associated with GDM (p-value 0.029). In relation to dietary factor, there was significant association in proportion of GDM seen, among those who were consuming less calories than the recommended calories.*
Keywords: *Gestational Diabetes Mellitus.*

Introduction

India having the largest number of diabetic patients, India leads the world with earning the dubious distinction of being termed the **"Diabetes Capital of the World"**. Pregnancy induces progressive changes in maternal carbohydrate metabolism. As pregnancy advances insulin resistance and diabetogenic stress due to placental hormones necessitate compensatory increase in insulin secretion. When this compensation is inadequate gestational diabetes develops.

'Gestational Diabetes Mellitus' [GDM] is defined as carbohydrate intolerance with onset or is first recognized during pregnancy. Women diagnosed to have GDM are at increased risk of future diabetes predominantly type 2 DM as are their children[1]. Timely action taken now in screening all pregnant women for glucose intolerance, achieving euglycemia in them and ensuring adequate nutrition may prevent in all probability, the vicious cycle of transmitting glucose intolerance from one generation to

another[2,3]. In several studies, it was found that the prevalence of GDM has weak but significant relation with socio-economic status including education level, maternal age, dietary intake of pregnant mother and family history of diabetes mellitus. This association between GDM and epidemiological factors is not well recognized as a risk factor in developing countries, because of lesser number of studies done till now.

Gorakhpur is one of the major and largest district of Uttar Pradesh and is now the fastest developing city of the state. With the on growing development there is also a rise in the burden of non-communicable diseases in the area and it may be that GDM is one of the most important health care concern in this region and there is no data available regarding the prevalence of GDM in Gorakhpur, so this study is being conducted to know the prevalence and risk factors of GDM.

Objectives

To study the some of the ecological correlates of gestational diabetes mellitus among pregnant women attending Nehru Hospital, Gorakhpur.

Material and Method

The study was conducted in the outdoor setting in Department of Obstetrics and Gynaecology, Nehru Hospital, Gorakhpur. Patients from district Gorakhpur and nearby Gorakhpur such as Sant Kabir Nagar, Siddharthnagar, Basti, Deoria, Maharajganj and some districts of Bihar State being referred to BRD Medical College as this is the nearest tertiary care centre approachable. In view of the cross-sectional study design chosen, no sampling was done, as the intention was to cover all the pregnant women of gestational age ≥24 weeks with their OGTT report. As per pilot study done it was found that on average 35-40 new pregnant women visits to the ANC OPD per day. Among them pregnant women with gestational age ≥24 weeks was about 10-15 in number and in them 8-12 ante-natal women had their OGTT reports at the time of consultation.

OPD visit day had been fixed Wednesday and Friday for data collection.

A total of 1161 participants were interviewed for their duration of pregnancy and history of diabetes. Among these 570 pregnant women were of gestational age ≥ 24 weeks. The study aimed to cover the entire 570 pregnant women but 186 pregnant women were excluded as they did not have OGTT report at the time of data collection. However inspite of best efforts the coverage of pregnant women of gestational age ≥ 24 weeks in the study was 67.4 %. However case was taken to ensure that total intake of study subject should not be less than 384. This sample size estimate is based on the assumption that approximate proportion of GDM is 50% as by this proportion largest sample size is calculated. Allowable error taken as 5% for present study.

Finally 384 pregnant women were included in present study. A pre designed & pre-tested questionnaire was used for interviewing the study subjects. The interview questionnaire included information regarding the educational status in term of illiterate and literate, Occupation (Based on Udai Parikh's Classification), Type of Family, Income of the family (Revised BG Prasad's Classification 2018), Dietary habits, Adequate Calorie Intake (Consumption of 2400kcal per day is defined as adequate calorie intake), Adequate Protein Intake (Consumption of 1.1gm/kg body weight per day is defined as adequate protein intake). Approximate calorific value of daily food intake was calculated on the basis of 24 hours recall method.[4]

Criteria for diagnosis of GDM: WHO diagnostic criteria of OGTT using 75 gms of anhydrous oral glucose was considered as the diagnostic tool to diagnose GDM. Recent consensus statement of Diabetes in Pregnancy Study Group of India calls for a uniform screening test with 75 g of post glucose test as the diagnosis enabling uniformity in diagnosis and comparative studies.[5] OGTT report greater than 140 mg/dl were chosen as a case of GDM.

Collected data through questionnaire was entered in the MS Excel spreadsheet and coded appropriately. Analysis was carried out using SPSS; all tests were performed at a 5% level significance. Ethical Clearance had been taken from the ethical committee of B.R.D. Medical College.

Result & Discussion

Table-1 Age-wise distribution of GDM & Non GDM subjects

Age Group	GDM		Non GDM		chi sq	p-value
	No.	%	No.	%		
< 20 years	1	3.3	5	1.4		
20 - 30 years	23	76.7	317	89.5	4.53	0.104
> 30 years	6	20	32	9.1		
Total	30	100	354	100		

Table-1shows the relation of GDM and non-GDM subjects in relation to their age–group. Among the GDM group majority (76.7%) of the cases were in the age group of 20-30 years and 89.5% among non-GDM belonged to the same age group as in GDM. No significant association seen between age distribution & GDM. (p-value =0.104). In study conducted by ***Rajput et al,*** (2014) majority of subjects (68.8%) belonged to age group 20-24 years.[5] In another study by ***Kalra et al*** (2013) the mean age of the patient was 25.33+ 3.17 years and Age > 25years were significantly associated with GDM group.[6]

Table-2 Association of Educational Status with GDM

Education	GDM		Non GDM		chi sq	p-value
	No.	%	No.	%		
Illiterate	10	33.3	179	50.5		
Literate	20	66.7	175	49.5	3.29	0.070
Total	30	100	354	100		

Table-2   shows the distribution of GDM &Non GDM subjects in relation to their educational status. Among GDM group, majority of the patients were literate while in Non-GDM group proportion of literate as well as illiterate was almost similar (ie; 50.5% & 49.5%). The association of GDM with educational status was found to be non-significant (p-value=0.070). Similarly in a study by ***Verma et al***, (2008) reported that there was no significant relationship between education & prevalence of GDM.[7] In accordance with the ***Rajput et al,*** (2013) reported that GDM rate increased with increasing educational qualification of the participants and it was found statistically significant.[8] Another study by ***Raja et al,*** (2013) observed preponderance of illiterate female (52.9%) and there was no significant association between GDM and literacy (p>0.05).[9]

Table -3 Association of occupational status with GDM

Occupation	GDM		Non GDM		chi sq	p-value
	No.	%	No.	%		
Labourer	0	0	2	0.5		
Caste Occupation	3	10	11	3.2		
Cultivation	0	0	8	2.2	4.82	0.307
Service (Office Job)	0	0	4	1.1		
Housewife (none)	27	90	329	93		
Total	30	100	354	100		

Table-3 shows the distribution of GDM &Non GDM subjects in relation to their occupational status. In the present study majority of the studied participants were housewives in both GDM and non- GDM groups i.e; 90% and 93% respectively. Maximum prevalence of GDM (90%) was found in women doing household works followed by those engaged in caste occupation (10%), and no case of GDM was found from cultivation, labourer and office job class (0%). No significant association was found between type of occupation and GDM, (P value = 0.307).

Similar finding were present in study by **Rajput et al,** (2014) majority (78.4%) of the participants were housewives.[5] Similarly **Keshavarz et al**, (2005) also found no association between GDM and occupation.[10] In contrary to our study, **Verma et al**, (2008) found occupation as significant variable.[7]

Table-4 Association of type of family with GDM

Type of family	GDM		Non GDM		chi sq	p-value
	No.	%	No.	%		
Nuclear	19	63.3	179	50.5		
Joint	11	36.7	175	49.5	1.81	0.179
Total	30	100	354	100		

Table-4 shows the distribution of GDM &Non GDM subjects in relation to their type of family In present study 63.3% of study participants diagnosed with GDM belonged to nuclear family type and 36.7 to the joint type. Amongst the Non- GDM group proportion was almost equal in the respective types ie; 50.5 & 49.5 There was no significant association found between type of family and GDM (P value=0.179)

Table- 5 Association of Socio-economic status with GDM

SES	GDM		Non GDM		chi sq	p-value
	No.	%	No.	%		
Class I + Class II	8	26.6	75	21.1		
Class III	11	36.7	131	37.0	0.56	0.755
Class IV+ Class V	11	36.7	148	41.9		
Total	30	100	354	100		

▪Class I and Class II was taken as 1 parameter as only one participant belonged to class -I similarly class- IV and Class -V was taken as one parameter as there were only three participants from class-IV

Table-5 shows the distribution of GDM &Non GDM subjects in relation to their socio-economic status. In the GDM group the proportion was equal in the middle class as well as in low middle class +lower class ie;36.7% while26.6 of the studied subjects belonged to the upper middle + upper class. Amongst the Non-GDM proportion was higher in women belonging to lower middle+ lower class 41.9% followed by 37% in middle class with the least number of cases in upper class+ upper middle class (21.1%). There was no significant association found between socioeconomic status and GDM (P value = 0.755). Similarly, **Verma et al** (2008), revealed no significant association between socioeconomic status and GDM.

Table-6 Association of family history of diabetes & GDM

Family History of GDM	GDM		Non GDM		chi sq	p-value
	No.	%	No.	%		
Yes	10	33	61	17		
No	20	67	293	83	4.758	0.029
Total	30	100	354	100		

Table-6 shows the distribution of study subjects on the basis of family history of diabetes. In the present study, 33 % subjects who had family history of diabetes belong to GDM group and 17% having family history of diabetes belong to Non GDM group. In present study Family history of diabetes was significantly associated with GDM (p-value = 0.029).In the present study, among the participants diagnosed with GDM 33% and 17% of participants with non-GDM had family history of diabetes mellitus. Family history of diabetes mellitus was significantly associated with GDM (p-value =0.029).

In a tertiary care hospital study, by *Rajput et al* (2013), reported significant association between family history of Diabetes and GDM. [8]In another community based study, *Seshiah et al* (2008), reported that family history of diabetes was an independent predictor of GDM (OR: 1.58, 95% CI: 1.39-1.79).[11] Similarly in a study by, *Bhat et al* (2010), in case control study revealed a significant relationship between GDM and family history.[12]

Table-7 Association of Dietary intake with GDM

Dietary History / GDM Status		Dietary Habit		Calorie Intake		Protein intake	
		Vegetarian	Non-vegetarian	Adequate	Inadequate	Adequate	Inadequate
GDM	No.	17	13	10	20	9	21
	%	57	43	33	67	30	70
NON GDM	No.	217	137	46	308	82	272
	%	61	39	13	87	23	77
		$\chi^2=0.249$, p-value 0.618		$\chi^2=9.184$, p-value 0.002		$\chi^2=0.715$ p-value 0.398	

Table-7 shows the distribution of studied subjects on the basis of their dietary Habit, calorie intake and protein intake. among the GDM group 57% of the subjects were vegetarian and 13% were non vegetarian while in the non-GDM group proportion were 61 &39% respectively. Distribution of study subjects on the basis of their caloric intake showed only 33% of the diagnosed GDM women were having adequate calorie intake and only 13% among Non-GDM were consuming adequate calories. On the basis of their protein intake, among the GDM group only 30% of the women were having adequate protein intake while only 23% among Non-GDM were taking adequate protein intake. There was a significant association between calorie-intake and GDM. In a study conducted by *M.V. Jali et al* (2011), found that non-vegetarian pregnant women are more susceptible to develop abnormal glucose tolerance.[13]

In particular, *Saldana et al* (2004), showed that higher intake of fat and lower intake of carbohydrates may be associated with increased risk of GDM and impaired glucose tolerance (IGT).[15]

Conclusion

The present study was undertaken in BRD Medical College, Gorakhpur to identify the epidemiological correlates of GDM. In this study Proportion of GDM cases was 8.0%. Majority of study participants diagnosed with GDM (76.7%) & non-GDM (89.5%) belonged to age group 20-30 years. Though the proportion of GDM were high among literate, housewives, nuclear families, belonging to social class IV + V (lower- middle & lower class), but there was no significant association seen. Family history of diabetes mellitus was significantly associated with GDM (p-value =0.029). Study participants diagnosed with GDM (33%) and among non-GDM (13%) had adequate calorie-intake. There was a significant association between GDM and caloric-intake seen.

Recommendation

Pregnancy is a time when women may become more aware of their health and make positive lifestyle changes. During pregnancy, women frequently engage with the health care system, especially if they develop any complication. Following suggestions are recommended for decreasing the prevalence of gestational diabetes and preventing to develop overt diabetes in mothers as well their children.

The target population should be encouraged for regular screening for diabetes in future. Attention to physical activity and dietary habits during pregnancy and afterwards needs to be a serious and routine component of antenatal care, especially for women who are diagnosed with GDM, for GDM management and Type 2 diabetes prevention. Research focus should be on primary prevention by health education/ behaviour change communication in primary and secondary care settings.

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