

A STUDY TO ESTIMATE THE PREVALENCE OF GESTATIONAL DIABETES MELLITUS IN AN URBAN BLOCK OF KASHMIR VALLEY (NORTH INDIA)

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ABSTRACT

Background: The prevalence of Diabetes is increasing globally and these numbers include women with Gestational diabetes mellitus also. Based on demographic projections made by United Nations Population Division for the year 2025, WHO issued estimates of adults with diabetes in all countries and reported that there will be more women with diabetes than men and we may anticipate a considerable increase in the burden of GDM especially in less prosperous countries. 'Gestational Diabetes Mellitus' (GDM) is defined as any degree of glucose intolerance with onset or first recognition during pregnancy. Worldwide prevalence of GDM varies between 1.4 – 14 %. The prevalence of Gestational diabetes mellitus in India varies from 3.8 to 21% in different parts of the country, depending on the geographical locations and diagnostic methods used. Gestational diabetes mellitus has been found to be more prevalent in urban areas than in rural areas. Women diagnosed to have GDM are at increased risk of future diabetes predominantly type 2 DM as are their children.

Aims & Objective: To estimate the prevalence of Gestational Diabetes mellitus and various socio-demographic factors of the studied subjects.

Material and Methods: A Community based cross sectional study was conducted in the field practice area of Government Medical College Srinagar (Block Hazratbal: District Srinagar). The study was conducted for a period of one year from April 2011 to March 2012. All pregnant women in 24 weeks of gestation and above after undergoing preliminary clinical examination were given a 75 g oral glucose load, without taking in to consideration the time since last meal. Gestational diabetes mellitus was diagnosed if 2 hour plasma glucose was ≥ 140 mg/dl (DIPSI guidelines, a modified version of the WHO criterion). Tests of proportions (Chi square) and unpaired t-test were used to obtain results.

Results: A total of 306 women were registered for the study. The prevalence rate of gestational diabetes mellitus (GDM) was 7.8 % and all the cases were newly diagnosed during the study. Among various risk factors associated significantly with GDM were Gravida status, Parity and History of abortion. Overall, there was a preponderance of illiterate females (52.9%). However, the association between GDM and literacy was found to be non-significant at $p > 0.05$. The majority of females were home makers (96.4%) and occupation did not influence the prevalence of GDM. Majority of the studied population belonged to socioeconomic class III (Modified BG Prasad).

Conclusion: Increasing prevalence of gestational diabetes mellitus and its co-morbidities among females need immediate attention in terms of prevention and health education.

Key-Words: Gestational Diabetes Mellitus; Pregnant Women; Oral Glucose Tolerance Test; Prevalence; Urban Block

Introduction

There has been a remarkable increase in the prevalence of risk factors for Non-Communicable diseases such as Type 2 diabetes, cardiovascular diseases, hypertension and stroke. These diseases have become major contributors to morbidity and mortality along with certain cancers. There is strong evidence that this epidemic has been triggered by social and economic development and urbanization which are associated with general improvement in nutrition and longevity, obesity, reduced physical exercise and growth failure in infancy, increase susceptibility to diabetes etc. The prevalence of Diabetes is increasing globally and these numbers include women with Gestational diabetes mellitus. Based on demographic projections made by United Nations Population Division for the year 2025, WHO issued estimates of adults with diabetes in all countries and reported that there will be more women

with diabetes than men and we may anticipate a considerable increase in the burden of GDM especially in less prosperous countries.^[1] Gestational Diabetes Mellitus (GDM) is defined as any degree of glucose intolerance with onset or first recognition during pregnancy^[1]. Gestational diabetes mellitus affects about 7 percent of all U.S. pregnancies annually, resulting in approximately 200,000 cases a year. After pregnancy 5 to 10 percent of women who had Gestational mellitus continue to have Type 2 diabetes. Worldwide prevalence of GDM varies between 1.4 – 14 percent.^[2] The prevalence of Gestational diabetes mellitus in India varies from 3.8 to 21% in different parts of the country, depending on the geographical locations and diagnostic methods used.^[3] Gestational diabetes mellitus has been found to be more prevalent in urban areas than in rural areas.^[4] For a given population and ethnicity, the prevalence of Gestational diabetes mellitus corresponds to the prevalence of Impaired Glucose

Tolerance within that given population. Women diagnosed to have GDM are at increased risk of future diabetes predominantly type 2 DM as are their children.^[5,6] Thus GDM offers an important opportunity for the development, testing and implementation of clinical strategies for diabetes prevention. 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. The exact mechanism of development of Gestational diabetes mellitus is unknown. However the main feature of Gestational diabetes mellitus is increased insulin resistance. 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. The cause of familial aggregation of Gestational diabetes mellitus with a first-degree relative who have or has previously had Gestational diabetes mellitus or another type of diabetes is likely to have both genetic and (non-genetic) environmental components, especially given that in females both low and high birth weights are associated with the future development of Gestational diabetes mellitus in their own pregnancies. This suggests that a pregnant woman with poorly controlled, pre-existing Type 1 diabetes is at increased risk of giving birth to a macrosomic baby who, if female, is subsequently at increased risk of developing Gestational diabetes mellitus and/or Type 2 diabetes in her own pregnancies and beyond. As well as such metabolic programming effects, genetic variation also plays its part in regulating size at birth and therefore risk of GDM in women with low or high birth weight.^[7]

Materials and Methods

The present study was conducted in an urban block of Kashmir valley attached with the Department of Community Medicine, Govt. Medical College Srinagar. The study was conducted in Block Hazratbal, one of the urban block with some semi-urban areas in the field practice area of the department. The study was a community based, cross sectional study and was carried out from April 2011 to March 2012.

Selection of Study Participants: A list of all pregnant females was obtained from each Health center and Anganwadi center in block Hazratbal. Each eligible pregnant female was visited and informed consent for participation in study was obtained from those with

gestation age of 24 weeks and above. Only 306 pregnant fulfilled the inclusion criteria and were taken for the study.

Inclusion Criteria: women who were Permanent residents of the block with gestation age of 24 weeks and above.

Exclusion Criteria: Women who had already been diagnosed with Diabetes mellitus.

The information was collected from the study subjects on basis of pretested semi-structured questionnaire. The information was collected regarding age, literacy, residence, income, parity, history of gestational diabetes mellitus in previous pregnancy, family history of Gestational diabetes or diabetes mellitus, outcome of previous pregnancy etc. Besides this blood samples were taken from the subjects to confirm the diagnosis of gestational mellitus. All pregnant women in 24 weeks of gestation and above after undergoing preliminary clinical examination were given a 75 g oral glucose load, without taking in to consideration the time since last meal. Under all aseptic precautions a venous blood sample of 2 ml was collected in sodium fluoridated tubes at 2 hours using 3ml sterile syringes for estimating glucose by GOD-POD method. Tubes were carried to the nearest laboratory (PHC Hazratbal) in a vaccine carrier to maintain the cold chain. The blood samples were centrifuged in the laboratory for estimation of serum levels of glucose. Gestational diabetes mellitus was diagnosed if 2 hour plasma glucose was ≥ 140 mg/dl (DIPSI guidelines, a modified version of the WHO criterion.^[2,8] The data so collected was entered into Microsoft Excel and analyzed using Statistical software. Frequencies were obtained using descriptive statistics. Tests of proportions (Chi square) and unpaired t-test were used to obtain results. A p-value of less than 0.05 was considered statistically significant.

Results

Majority (50 %) of the studied population belonged to age group of 26 – 30 years and only 1.3 % of the study population was 36 years and above [Table 1]. 45.8 % of the females were in the gestational age of 24 – 26 weeks and only 1 % of the females were in 36 – 38 weeks of gestation [Table 2]. Thus the number of participants were less as the gestation age increased. The reason for this was cultural factors in the area, as the gestation age increases the pregnant mothers start migrating to their maternal places and also in the inclusion criteria we took only those pregnant females who were permanent residents of the

block. Overall, there was a preponderance of illiterate females (52.9%). 96.4% of females were home makers. Majority of the studied population belonged to socioeconomic class III (45.4), only 1% belonged to class I [Table 3]. 46.4 % of the females were gravida 1 and only 1.6 % females have conceived for the fourth time [Table 4]. Majority of the females (47.7 %) were nulliparous and only 0.7 % were Para 3. 9.5% of pregnant females were hypertensive having blood pressure of $\geq 140/90$. 3.9 % of females were having history of abortion in the past. Only 1.3 % of females were having history of still birth in the past. Out of all the women screened, 10.8 % of females were having family history of Diabetes mellitus. Out of 306 females studied, 24 (7.8%) were having Gestational Diabetes Mellitus (Blood sugar level ≥ 140 mg/dl) [Table 5]. The mean age of mothers having gestational diabetes mellitus was 29.29 ± 3.5 years. The association was statistically non-significant [Table 6]. Prevalence of Gestational diabetes mellitus in women of rural area was 6.7% while as in urban it was 9.2%. However statistically it was non-significant [Table 7]. Among all 306 females, 162 were illiterate, 90 were educated less than high school and 54 received education high school and above. Of the diabetics, 17 were illiterate, 4 were educated less than high school and 3 were educated high school and above. However, the association was found statistically non-significant at $p > 0.05$ [Table 8]. Only 3 subjects were having monthly income in the range of 3288 and above and out of them 1 (33.3%) was having gestational diabetes mellitus followed by 15 (13.8%) in the range of 493 – 985 and above. The association between high income groups and Gestational diabetes mellitus was found statistically significant ($p < 0.05$) [Table 9]. It was observed that out of 306 women, 142 were primigravidas, 93 were gravida 2 and 71 were gravida 3 or more. 2.8% of primigravida, 10.8% of gravida 2 and 14% gravida ≥ 3 had Gestational diabetes mellitus. The association was found statistically significant ($p < 0.05$) as shown above [Table 10]. Out of 146 nulliparous women 141 were non diabetic and 5 were diabetic. While as among 160 parous women, 141 were non diabetic and 19 were diabetic. Association between Gestational diabetes mellitus and parity was found statistically significant [Table 11]. Similarly out of 12 women having past history of abortion, 8 (66%) were non diabetic and 4 (33.3%) were diabetic. While among those having no history of abortion (294) only 20 (6.8%) were having Gestational diabetes mellitus. Thus past history of abortion and Gestational diabetes mellitus were associated significantly ($p < 0.05$) [Table 12]. In present study 33 females were having family history of diabetes, out of which only 15% had GDM which was statistically non-significant [Table 13]. Out of 306 women, 29 were

hypertensive. Out of them 3 (10.3%) were having Gestational diabetes mellitus and 26 (89.7%) were non diabetic. While as among non-hypertensive females 21 were diabetic. The association between chronic hypertension and gestational diabetes mellitus was statistically non-significant ($p > 0.05$). Although all cardinal symptoms were present in diabetic mothers however polyphagia and Gestational diabetes mellitus were associated significantly at p value of 0.001 [Table 14].

Table-1: Age distribution of the studied population

Age (Years)	Frequency	Percentage
≤ 20	0	0
21 - 25	89	29.1
26 - 30	153	50.0
31 - 35	60	19.6
36 -40	4	1.3
Total	306	100

Table-2: Gestational age (weeks)

Weeks	Frequency	Percentage
24 - 26	140	45.8
27 - 29	80	26.1
30 - 32	77	25.1
33 - 35	6	2.0
36 - 38	3	1.0
Total	306	100

Table-3: Socio economic class of the studied population (in rupees per capita per month)

Socio Economic Class	Frequency	Percentage
I (3288 and above)	3	1
II (1644 to 3287)	55	18
III (986 to 1643)	139	45.4
IV (493 to 985)	109	35.6
Total	306	100

Table-4: Gravida status

Gravida	Frequency	Percentage
1	142	46.4
2	93	30.4
3	66	21.6
4	5	1.6
Total	306	100

Table-5: Gestational Diabetes Mellitus

Gestational Diabetes Mellitus	Frequency	Percentage
Present	24	7.8
Absent	282	92.2
Total	306	100

Table-6: Relation of age with Gestational diabetes mellitus

Gestational Diabetes Mellitus	Frequency	Mean Age (Years)	SD
Present	24	29.29	3.520
Absent	282	28.01	3.471

Table-7: Dwelling status and Gestational diabetes mellitus

Gestational Diabetes Mellitus	Rural	Urban	Total
Present	11 (6.7%)	13 (9.2%)	24 (7.8%)
Absent	154 (93.3%)	128 (90.8%)	282 (92.2%)
Total	165 (100%)	141 (100%)	306 (100%)

Table-8: Literacy and Gestational diabetes mellitus

Gestational Diabetes Mellitus	Literacy			Total
	Illiterate	< High School	\geq High School	
Absent	145 (89.5%)	86 (95.5%)	51 (94.5%)	282 (92.2%)
Present	17 (10.5%)	4 (4.5%)	3 (5.5%)	24 (7.8%)
Total	162 (100%)	90 (100%)	54 (100%)	306 (100%)

Table-9: Socioeconomic status and Gestational diabetes mellitus

Gestational Diabetes Mellitus	Socioeconomic Class				Total
	I	II	III	IV	
Present	1 (33.3%)	2(3.6%)	6 (4.3%)	15 (13.8%)	24 (7.8%)
Absent	2 (66.7%)	53 (96.4%)	133 (95.7%)	94 (86.2%)	282 (92.8)
Total	3 (100%)	55 (100%)	139 (100%)	109 (100%)	306 (100%)

Table-10: Gravida and Gestational diabetes mellitus

Gestational Diabetes Mellitus	Gravida			Total
	1	2	≥ 3	
Present	4 (2.8%)	10 (10.8%)	10 (14%)	24 (7.8%)
Absent	138 (97.2%)	83 (89.2%)	61 (86%)	282 (92.2%)
Total	142 (100%)	93 (100%)	71 (100%)	306 (100%)

Table-11: Parity and Gestational diabetes mellitus

Gestational Diabetes Mellitus	Parity		Total
	Nulliparous	Parous	
Present	5 (3.4%)	19 (11.9%)	24 (7.8%)
Absent	141 (96.6%)	141 (88.1%)	282 (92.2%)
Total	146 (100%)	160 (100%)	306 (100%)

Table-12: Past history of abortion and Gestational diabetes mellitus

Gestational Diabetes Mellitus	Past History of Abortion		Total
	Present	Absent	
Present	4 (33.3%)	20 (6.8%)	24 (7.8%)
Absent	8 (66.7%)	274 (93.2%)	282 (92.2%)
Total	12 (100%)	294 (100%)	306 (100%)

Table-13: Gestational diabetes mellitus and family history of diabetes mellitus (DM)

Gestational Diabetes Mellitus	Family History of DM		Total
	Present	Absent	
Present	5 (15%)	19 (7%)	24 (7.8%)
Absent	28 (85%)	254 (93%)	282 (92.2%)
Total	33 (100%)	273 (100%)	306 (100%)

Table-14: Cardinal symptoms

Gestational Diabetes Mellitus	Polyphagia		Polydipsia		Polyuria	
	Present	Absent	Present	Absent	Present	Absent
Present	10 (10%)	14 (6.8%)	14 (14.9%)	10 (4.7%)	7 (12.3%)	17 (6.8%)
Absent	90 (90%)	192 (93.2%)	80 (85.1%)	202 (95.3%)	50 (87.3%)	232 (93.2%)
Total	100 (100%)	206 (100%)	94 (100%)	212 (100%)	57 (100%)	249 (100%)

Discussion

Moderate to severe maternal hyperglycemia in pregnancy has unique diabetes-related risks in that there are potential long-term consequences for two individuals rather than just one: the mother and her unborn baby. Gestational diabetes mellitus (GDM) has been defined as any degree of glucose intolerance with onset or first recognition during pregnancy, to differentiate it from pre-diagnosed type 1 or type 2 diabetes or maturity-onset diabetes of the young (MODY) in women that get pregnant.^[8]

The study revealed a prevalence of 7.8 % for Gestational Diabetes Mellitus among pregnant women in the study population. A similar study conducted by Seyom B et al (1999)^[9] in rural villages of Northern Ethiopia in which a total of 890 pregnant women with gestational age of 24

week and above were examined for gestational diabetes mellitus based on WHO criteria. The prevalence rate of Gestational diabetes mellitus was found to be 3.7%. Another similar study conducted in rural area of Jammu by Verma AK et al.^[10] in 2008, showed the prevalence of to be 6.7%. The reason for this increase in prevalence in our study was due to the fact that the study was conducted in an area comprising of both rural and urban population and also the diagnostic method used. In the present study mean age in pregnant diabetics was 29.29 ± 3.5 which is almost in accordance with the study conducted by S. S et al.^[4] The association of age and gestational diabetes mellitus was found statistically non –significant in present study, similar results were found by Verma AK et al.^[10] in a rural health block under the Government Medical College Jammu in 2008. In present study the prevalence of Gestational diabetes mellitus in rural area was 6.7% while as in urban area it was 9.2%. However statistically it was non-significant. V Seshiah et al.^[11] (2008) also noticed the similar trend in his community based study in Tamil Nadu. Also the block Hazratbal is divided into rural and urban area by Srinagar Municipal Corporation. However the life style, occupation and literacy of the block is almost similar. In present study parity wise association between Gestational diabetes mellitus was found statistically significant. Out of 24 diabetics, 5 diabetics were nulliparous and 19 diabetics were parous having 1 or more living children. Abdulbari Bener et al (2010)^[12] concluded that increased parity was a risk factor for GDM. Similar results were found by Hung CT et al (1991)^[13] the subjects having parity 0 and 1 were compared for impaired glucose tolerance and Gestational diabetes mellitus after 75 g OGTT. It was observed that subjects having parity 1 had significant higher blood glucose levels than their counterparts even after adjusting BMI. In the present study 33 females were having family history of diabetes, out of which only 15% had GDM which is statistically non-significant. Similar results were shown by Swami SR et al (2005-2007)^[4] that there was a non-significant trend of increased Gestational diabetes mellitus and IGGT in patients with family history of diabetes.

Among 306 women, 29 were hypertensive. Out of 29 females 3 (10.3%) were having Gestational diabetes mellitus and 26 (89.7%) were non diabetic. The association was non- significant (p>0.05). Our findings were in contrast to those of Ahia Garshasbi et al.^[14] The probable cause could be that the present study was a community based and not hospital based because hospitals are the iceberg of disease. Presence of clinical symptoms like polyphagia, polyuria and polydipsia were present in pregnant diabetic mothers. Association of polyphagia with

GDM was statistically significant. These findings were supported by Dass Anusuya et al.^[15]

Conclusion

The study detected 7.8 % cases of GDM .All of these cases were newly diagnosed and the blood glucose was ≥ 140 mg/dl. Mean age of diabetic mothers was 29 ± 3.5 yrs. Study population comprised of Muslims only. Majority of women were home makers belonging to low socioeconomic class. More than half of the women were illiterate and were residing in rural areas.The study was able to diagnose previously undiagnosed subclinical cases in pregnant women having comparatively low socioeconomic status based on per capita income.Among various risk factors associated significantly with GDM were Gravida status, Parity, History of abortion, polyphagia. Although other cardinal symptoms of diabetes, viz. Polyuria and polydipsia were also seen among diabetic mothers.

RECOMMENDATIONS

Increasing prevalence of gestational diabetes mellitus and its co-morbidities among females need immediate attention in terms of prevention and health education. Life style modifications like increase in physical activity decrease in consumption of sweetened beverages and high energy dense foods should be started early in life and continued throughout the life. Universal screening for GDM should be followed, as women of Asian origin and especially Indians are at a higher risk of developing GDM and subsequent Type 2 diabetes. Thus 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 and will also reduce the complications in mother as well as in child in postpartum.

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