Screening of Diabetes in Pregnancy at Nepalgunj Medical College Teaching Hospital Kohalpur

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ABSTRACT

Introduction:Gestational Diabetes Mellitus (GDM) is defined as glucose intolerance of variable severity or hyperglycemia occuring for the first time during pregnancy but the glucose intolerance reverting back to normal after the puerperium. According to American Diabetic Association, approximately 7% of all pregnancy are complicated by Gestational Diabetes Mellitus, resulting in more than two lakhs cases annually and the prevalence may range from 1-14% of all pregnancies.Gestational Diabetes Mellitus usually develop in the second trimester and carries grave prognosis both for mother and fetus. So screening of diabetes is necessary for early detection of diabetes and prevention of further progression. **Aims**: Screening of impaired glucose tolerance and gestational diabetes mellitus by glucose challenge test(GCT) and oral glucose tolerance test (OGTT) at 24-28 weeks of pregnancy. **Methods**: This study was conducted in Nepalgunj Medical College Teaching Hospital over one year period taking 98 pregnant women who came to ANC (Antenatal Check up) out patient department. Screening for diabetes was done giving 50 gm of oral glucose(glucose challenge test) to the pregnant women at 24-28 weeks of gestational age. **Results:** The incidence of Impaired glucose tolerance and gestational diabetes in this study population was 4.1% and 1% respectively. **Conclusion**: Screening of Diabetes mellitus in Second trimester of pregnancy is important investigation to be done to prevent the mother and the fetus from many upcoming complications of diabetes.

Keywords: Gestational Diabetes Mellitus, Glucose intolerance, Screening

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INTRODUCTION

The worldwide prevalence of DM (Diabetes Mellitus) has risen dramatically over past two decades. A recent estimate suggested that diabetes was the fifth leading cause of death worldwide and was responsible for almost 4 million deaths in 2010.[1]Gestational Diabetes Mellitus (GDM) is defined as glucose intolerance of variable severity or hyperglycemia occuring for the first time during pregnancy but the glucose intolerance reverting back to normal after the puerperium. Inability of the insulin secreting cell to meet the increased demand and decreased insulin sensitivity due to placental hormones are the basic abnormalities in the Gestational Diabetes Mellitus.[2]

The prevalence may range from 1-14% of all pregnancies.[3] A study from Nepal found that 3.67% of pregnancies had positive screening test values and 0.66% were diagnosed having Gestational Diabetes.[4]This justifies routine screening for diabetes during pregnancy. The concerns for Gestational Diabetes Mellitus are foetal macrosomia,obstructed labour, shoulder dystocia, birth injuries as well as neonatal hypoglycemia and ketoacidosis etc.[5,6,7] But controversy is, whether screening for diabetes during pregnancy should be routine or limited to patients at risk for diabetes. Studies done by Studd J [8] and Coustan DR, et al [13] emphasized the universal screening of diabetes. A study conducted by A. Mc Elduff and associates concluded that the 50-gram glucose load is better at detecting abnormalities in glucose tolerance.[12] Study done by Cosson E and et al suggested that, universal rather than selective screening for GDM may improve outcomes .[15] Friedman S et al favored a cut off of 130mg/dl.[17]

METHODS

This study is Hospital based observational study conducted in the department of Obs./Gynae, Nepalgunj Medical College Teaching Hospital, Kohalpur over a period of one year from August 2019 to July 2020. Total of 98 pregnant women who came for the antenatal checkup were included in the study

meeting the inclusion criteria.The sampling technique of this screening procedure was purposive sampling. Women coming to antenatal outpatient door, at 24-28 weeks of gestation(calculated on basis of first day of last menstrual period or on basis of early scan available), meeting inclusion criteria were enrolled for study after attaining written consent.

Inclusion Criteria

- Women coming for antenatal checkup between 15-45 yrs of age.
- Patient reported between 24-28 weeks of gestation.

Exclusion Criteria

- Known cases of Diabetes Mellitus.
- Patient on medication that can alter the plasma glucose level (glucocorticoids, thiazide diuretics, beta blockers etc).
- Diagnosed intrauterine fetal death.
- Women who refused to participate in the study.

There were altogether 98 patients meeting the inclusion criteria during the study period of one year. Patient particulars, age, LMP(Last menstrual period), EDD(Expected date of delivery), gestational age, detailed obstetric history including gravida, parity, abortion and previous live pregnancies,previous pregnancy complications, total no of ANC visit, signs and symptoms of Diabetes Mellitus, Family history of DM, height and weight of patients, BP, fundal height and results of tests were entered in a predesigned proforma.

In the proposed study the patient meeting inclusion criteria were screened for gestational diabetes by administrating 50 gram glucose and measuring the venous plasma glucose 1 hr later. Patient with more than or equal to 140 mg/dl plasma glucose level were followed by 3 hr Glucose Tolerance Test except those whose 1 hr screening test demonstrated plasma glucose values more than 200 mg/dl because patient with this markedly abnormal response to the sugar load are diabetic and need treatment without further testing. The 3 hr Glucose Tolerance Test were performed by measuring fasting plasma glucose level; and then orally administrating 100 gram glucose and measuring the venous plasma glucose 1 hr, 2 hr, 3 hr later. The normal values for Glucose Tolerance Test are as described by Carpenter and Coustan [11] i.e.

- Fasting   95 mg/dl
- One hour   180 mg/dl
- Two hour   155 mg/dl
- Three hour   140 mg/dl
- If two or more of these values are abnormal , the patient has diabetes.

There were 4 patients with abnormal GCT and one of them were positive for Oral GTT. Data analysis was done by Statistical Package for Social Sciences (SPSS- version16) Software. Categorical variables were compared by Chi-square test.

Fischer exact test was used for categorical variables when the expected frequency in 2x2 tables was < 5; numerical variables were compared by t-test. Pearson's correlation coefficient was used to assess correlation.

RESULTS

Age(years)	Total (n=98)	Parity			
		0	%	1-4	%
15-19	14 (14.2%)	14	100	0	0
20-24	42 (42.8%)	20	47	22	53
25-29	32 (32.6%)	18	56	14	44
30-34	8 (8.1%)	0	0	8	100
35-40	2 (2%)	0	0	2	100
Total	98	52	-	46	-

Table I: Age and Parity distribution of patients screened for GCT

The proportion of women who did not have children were maximum about 100% among age group of 15-19 years and who had 1-4 children its was 100% in age group of 30-34 and 35-40 years. There were no women without any children from the age group of 30-40 years. Similarly there were no women from the age group of 15-19 years with 1-4 children. Maximum number of women who were pregnant was of the age group 20-29 years. Similarly there were more women from the same age group with no children and women who had 1-4 children. (Table I)
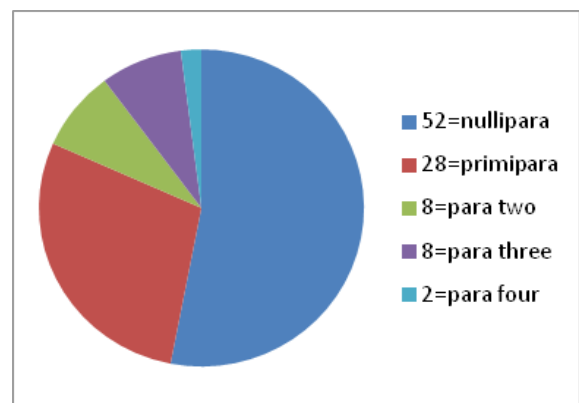

Figure 1: Pie diagram showing number of women according to different parity.

The maximum number of women were nulliparous (n=52) and minimum number of women had parity fours (n=2). Similarly the women with primipara (n=28) was in second majority whilst the women who were Para two and three were same in number (n=8). (Figure 1).
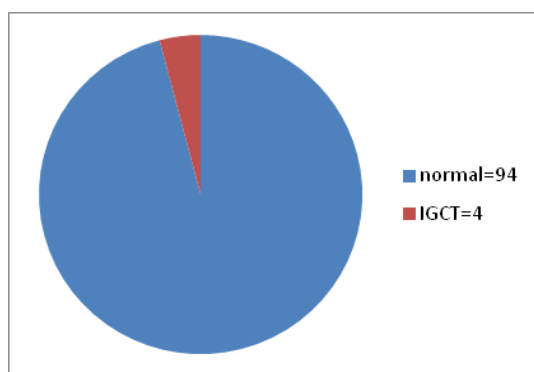
Figure 2: Pie diagram showing cases with normal and abnormal GCT values.

Out of 98 patients enrolled for the study 94 patients (95.9%) had normal GCT while 4 patients (4.1%) had abnormal GCT test values. (Figure 2)

GCT values (mg %)	No of patients with GDM	
<140	94(95.9%)	-
>140	4(4.1%)	1(1%)

Table II: Result of GCT and GDM patients according to glucose level

Out of 98 patients, 94(95.9%) had normal GCT value. Only 4(4.1%) had abnormal GCT value i.e. blood glucose level more than 140mg%. Out of which one (1%) of them was diagnosed as a case of GDM. (Table II)

GCT values (mg %)	Gestational age (weeks)		
	24-25	26-27	28
<140	14	46	34
>140	2	2	-
Total	16	48	34

Table III: Result of GCT according to gestational age of patients.

Out of 4 cases with abnormal GCT value, 2(50%) were of gestational age 24-25 weeks and 2(50%) were of gestational age 26-27 weeks. Out of 2 women with abnormal GCT values of gestational age 24-25 weeks one had GDM. The women with GDM were of gestational age 24 weeks. Women with gestational age 28 weeks did not have any abnormal GCT value. (Table III)

GCT values	Total	Parity				
		0	1	2	3	4
<140	94	52	28	8	6	0
>140	4	0	0	0	2	2
Total	98	52	28	8	8	2

Table IV: GCT values according to different parity.

Out of total 98 women, 94 patients had normal GCT values. Among them 52 were nulliparous, 28 were primipara, 8 were Para two, 6 were Para three and none were Para four. Four women had abnormal GCT values. Out of which 2 were Para three and 2 were Para four. So, all the four cases with abnormal

GCT were multiparous women. Among them the women who was diagnosed of having GDM was of Para three. (Table IV)

Age(years)	N	Gestational weeks		
		24-25	26-27	28
15-19	14	-	-	-
20-24	42	-	-	-
25-29	32	-	-	-
30-34	8	2 (100%)	-	-
35	2	-	2 (100%)	-
Total		2	2	-

Table V: Abnormal GCT according to age and gestational age of patients.

Out of 4 cases of abnormal GCT values, 2(50%) were of age group 30-34 years between 24-25 weeks of gestational age. Similarly the other 2 cases were of age group 35 years between 26-27 weeks of gestational age. There were no abnormal GCT values in the women with gestational age of 28 weeks.

So the abnormal GCT values were seen in patients with elderly age group but in the early gestational age as compared to nil value in younger age groups with late gestational age. (Table V) In this study the mean height was 152 cm with the SD of 3.61. Similarly mean weight was56 kg with the SD of 6.25. The mean age was 23 years with the SD of 4.16. Mean BMI of the women was 24.3 with a SD of 2.82. Analyzing different variables with GCT values, there was a significant correlation of age with higher GCT value (P value 0.017). Whereas other variables: weight in kg, Family history of diabetes and BMI had non-significant P values.

DISCUSSION

The present study was conducted on 98 women of gestational age 24-28 weeks for impaired glucose tolerance and diagnosis GDM if any. The women were screened for gestational glucose intolerance by ingestion of 50-gram glucose without any dietary preparation and were done along with the other routine antenatal investigations. In 1973, O' Sullivan et al in Boston, proposed that a single sample of glucose tolerance done without dietary preparation could provide an acceptable screening method. Thus came out about the 50 gram glucose challenge test. The threshold value was taken 130mg/dl (7.2mmol/l). Women having positive screening value were subjected to oral glucose tolerance test. In our study the threshold value was taken as 140mg/dl so that the sensitivity of the test could be more precise because values below 140mg/dl were seen to be non-diabetic when confirmed by oral glucose tolerance test. The 1990 Chicago Workshop Conference on gestational diabetes mellitus also recommended that all pregnant women should be universally screened using a 50-gram glucose challenge test between

24-28 weeks.[4] There is substantial evidence in the medical literature for indication that screening should be universal. One study found that if only high risk patients are screened, approximately 35% of gestational diabetes patients will not be discovered.[9,14] The best screening test for gestational diabetes is the measurement of plasma glucose 1 hour after ingesting 50 gram of glucose. It is not necessary to follow any special diet before test.[15] The Carpenter and Coustan criteria cut offs were lower than the previously recommended National Diabetes Data Group(NDDG) values and resulted in higher prevalence of gestational diabetes mellitus. The prevalence of gestational diabetes mellitus on average is increased by 50% with the use of Carpenter and Coustan thresholds.[16]

In the present study positive screening value i.e. impaired glucose tolerance was found in four cases (4%). Gestational diabetes mellitus was found in only one case (1%).Low incidence of diabetes mellitus among the women coming for antenatal checkup in this hospital could be due to younger age group. Low incidence of diabetes mellitus in pregnancy in Nepal has also been reported in a study done in TUTH. In this study screening test value was positive i.e. impaired glucose tolerance in 3.67% and gestational diabetes mellitus was in 0.66% of total women of gestational age group 24-28 weeks(n=300). Similarly in a study performed by Shrestha A, Chawla CD among 1598 patients coming for antenatal checkup in Dhulikhel Hospital, Obstetric OPD also detected the incidence of gestational diabetes as 0.75%.[18] Regarding the sample structure related to gestational age 16.3% were of gestational age 24-25 weeks, 48.9% were of 26-27 weeks and 34.7% of 28 weeks. The impaired glucose tolerance test was seen in the gestational age group 24-25 weeks (50%) and 26-27 weeks (50%). So from these results impaired glucose tolerance were seen in early gestational age group as compared to late age groups. Out of 4 abnormal glucose challenge test two were of gestational age 24-25 weeks and two were 26-27 weeks. All of them had values more than 140 mg% but one who was diagnosed as GDM was of gestational age 24 weeks. In respect to parity, population structure consisted of nulliparous 53.1% and Para 1-4 of 46.9%. Among the nulliparous 26.9% of women were of 15-19 age groups, 38.4% were of 20-24 age groups, 34.6% were of 25-29 age group and none were from 30-35 age group.

Similarly among women with parity 1-4, 47.8% were of age group 20-24yrs, 30% were of age group 25-29 years and 21% were of age group 30-35 years and nil from age group 15-19 years. So there were no women with nulliparity in higher age group and highest number of age group was 20-24 and 25-29 years. Likewise in women with multiparity it was nil in youngest age group i.e. 15-19 years but not highest in older age group as expected. In contrary women with high parity were from age group 20-24 years. The incidence of impaired

glucose tolerance among nulliparous was 0% and between para1-4 was 4%. So there was significant difference in impaired glucose tolerance among nulliparous and parity 1-4. Among the parity 1-4 impaired glucose tolerance was positive among the women with higher parity as was nil in lower parity. Observing the sample structure of study group, age group 15-19 years were 14.2%, 20-24 years were 42.8%, 25-29 years were 32.6%, 30-34 years were 8.1%, and 35 years were 2%. So the bulk of the study sample was of age group 20-24 years. Most of the women with positive GCT belonged to the age group 30-34 and 35 years age group. There were 2 cases positive in age group 30-34 years and 2 cases in 35 years age group. The only one diagnosed case of GDM was of age 32 years which belonged to the age group of 30-32 years. There was significant correlation between the age group and higher values of GCT. Emmanuel Odar, Julius Wandabwa and Paul Kiondo studied ninety mothers to determine the maternal and fetal outcomes in mothers with gestational diabetes mellitus attending antenatal clinics in Mulago Hospital Kampala Uganda. The study was done among women of gestational age between 24-32 weeks from April to September 2001. The age group at risk of getting gestational diabetes mellitus in this study was between 20-39 years being 96.8% of cases.[19] These results can be compared with the present study. In the present study out of 4 cases of impaired glucose tolerance, 50% belonged to the age group 30-34 years and 50% of cases belonged to the age group 35 years, out of which one had gestational diabetes. There were total of 34 obese women and among them 4(4%) women had BMI>30. Out of the other 30 women none of them had abnormal glucose challenge test values. Out of the four women who were obese two were having abnormal glucose challenge test values but the remaining two patients with abnormal GCT were having normal BMI. However, there was no significant correlation with the BMI and abnormal GCT values.

LIMITATION

Due to the smaller sample size the sensitivity of test was very low.

CONCLUSION

The incidence of impaired glucose tolerance and gestational diabetes in our study population was very low i.e. 4.1% and 1% respectively, since the sample size was very small the result may not be the same for larger population. Hence we can conclude that GCT is a good screening test for gestational diabetes when performed in a larger population.

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