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## Original Research Article

# Frequency and management of gestational diabetes mellitus according to the new diabetes in pregnancy study group of India guidelines among Sikkimese women attending tertiary teaching hospital of East Sikkim

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## ABSTRACT

**Background:** The screening of GDM is important as various pregnancy related complications are associated to it. With early screening and diagnosis, the complications associated with GDM can be reduced. Studies have shown various ethnic groups are at increasing risk of developing GDM with prevalence differing in different ethnicity. No data is available about frequency of GDM in different ethnic women of Sikkim. This study was performed to determine the frequency of GDM and its variation according to different demographic profiles of Sikkimese women.

**Methods:** Pregnant women between 16-34 weeks of gestation, attending antenatal OPD were included for this study. All the patients were subjected to DIPSI recommended 75 gm oral glucose tolerance test. Diagnosis of impaired glucose tolerance was made when plasma glucose of  $\geq 120$ -140 mg/dl and diagnosis of GDM was made when the plasma glucose of  $>140$  mg/dl as per DIPSI guidelines.

**Results:** A total of 202 consenting pregnant women during 16-34 weeks of pregnancy were evaluated with DIPSI recommended 75 g oral glucose tolerance test. Overall frequency of GDM was 11.9% among the Sikkimese women while 10.9% had impaired results in OGTT.

**Conclusions:** Frequency of GDM was high (12%) in pregnant women attending tertiary hospital of Sikkim. This implies Sikkimese women should be universally screened for GDM. There was also high occurrence of GDM among Lepcha and Bhutia women which need further study to find out the contributing factors in these women.

**Keywords:** Diabetes in pregnancy study group of India, Frequency, Gestational diabetes mellitus, Screening

## INTRODUCTION

Gestational diabetes mellitus (GDM) is defined as glucose intolerance that is recognized for the first time during current pregnancy.<sup>1</sup> The prevalence of GDM is increasing in India and with this, the incidences of type II diabetes mellitus is also increasing, making India as world's diabetic capital.<sup>2</sup>

The screening of GDM is important as both the mother and the fetus are at high risk of developing type II

diabetes mellitus in later life.<sup>3</sup> Various pregnancy related complications such as fetal macrosomia, shoulder dystocia, operative delivery and higher incidences of childhood obesity is associated to GDM.<sup>3</sup>

With early screening and diagnosis, the complications associated with GDM can be reduced. The current diabetes in pregnancy study group of India (DIPSI) guidelines recommended an evaluation of plasma glucose after 2 hours of ingestion of 75 gm oral glucose load irrespective of last meal timing.<sup>4,5</sup> This has also been

included in the recent guidelines given by the Ministry of Health and Family Welfare, Government of India for the diagnosis of GDM.<sup>6</sup> To standardize the diagnosis of GDM, WHO recommended that the plasma glucose concentration  $> 140$  mg/dl, after 2 hours of 75 gm OGTT indicates GDM, which has been adopted in new DIPSI guidelines.

The usual recommendation for screening is between 24-28 weeks of pregnancy.<sup>4</sup> But, by this usual recommendation the chance of detecting unrecognized type II diabetes mellitus may be missed.<sup>7</sup> If the plasma glucose level is found to be  $> 200$  mg/dl in the first trimester then the woman is pre-diabetic. Recently a new concept is developed to screen for glucose intolerance in the first trimester itself as the fetal beta cell can recognize and respond to maternal glycemic level as early as 16<sup>th</sup> week of pregnancy. If found negative at this time, the screening test is to be performed again around 24<sup>th</sup>-28<sup>th</sup> weeks and finally around 32<sup>nd</sup>-34<sup>th</sup> weeks of gestation.<sup>4,8</sup>

Studies have shown that various ethnic groups are at increasing risk of developing GDM with prevalence differing in different ethnicity.<sup>9</sup> The prevalence of GDM appears to be high among women of particular ethnic groups such as Hispanic, African-Americans, Native American, South or South East Asian, Pacific Islander or Indigenous Australian.<sup>9</sup> A study conducted in New York showed that the prevalence of GDM in South-Asian women are generally higher than that of South-East Asian women and the East-Asian women.<sup>10</sup> This variation may be due to difference in lifestyle, food habits, etc, that is specific for a particular ethnic group.

Sikkim is the 22<sup>nd</sup> state of India, with different ethnic population like Nepali, Bhutia, Lepcha, Tibetans and others (migrants from different places). Their diet and pattern of lifestyle is also different. Till now, there is no data available about frequency of GDM in different ethnic women of Sikkim. If frequency of GDM is known in different ethnic women appropriate advice, screening and management can be planned to reduce perinatal morbidity and mortality and also maternal morbidity.

#### **Objectives of this study were**

- To determine the frequency of GDM in Sikkimese population attending for antenatal care in a tertiary hospital of Sikkim.
- To analyze the frequency of GDM according to various demographic profile.
- To study the immediate management plan in diagnosed GDM patients.

#### **METHODS**

This was an observational study conducted in the outpatient department of gynecology and obstetrics, central referral hospital, teaching hospital of Sikkim Manipal Institute of Medical Sciences. Pregnant women

who attended antenatal OPD between 16-34 weeks of gestation during January 2019 to June 2019 of central referral hospital were included.

Antenatal women who were pre-gestational diabetic, those diagnosed as diabetic (OGTT value  $> 200$  gm/dl) and those denying consent were excluded from the study.

**Table 1: DIPSI guideline for diagnosis of GDM.**

Criteria	In pregnancy	Outside pregnancy
2 hours $\geq 200$ mg/dl	Diabetes	Diabetes
2 hours $\geq 140$ mg/dl	GDM	IGT
2 hours $\geq 120$ mg/dl	DGGT	-

\*GDM: Gestational diabetes mellitus; DGGT: Decreased gestational glucose tolerance; IGT: Impaired glucose tolerance.

#### **Data collection**

The study was conducted in the antenatal clinic of department of gynecology and obstetrics of central referral hospital after obtaining requisite permission from the department head and clearance from institutional ethics committee of Sikkim Manipal Institute of Medical Sciences. The procedure of the study was explained to the subjects and an informed written consent of the participating individuals was obtained. The proforma was filled after enquiring details from the subjects.

All the patients were given 75 gm of glucose irrespective of the meal and after 2-hour venous blood sample were collected. Blood glucose was tested by GOD-POD (glucose oxidase-peroxidase) method in the central laboratory of CRH. Diagnosis of GDM was made when the plasma glucose level is  $\geq 140$  mg/dl as per DIPSI guidelines (Table 1).

#### **Statistical analysis**

The data was thoroughly screened and entered into MS-Excel for analysis. Descriptive statistical analyses were used to evaluate whether there is any difference in frequency of GDM on the basis of ethnicity.

#### **RESULTS**

A total of 202 antenatal women were studied. Sixty percent patients were below 30 years of age while 70% lived in joint families. Two third of the patient were normal BMI while one third were overweight or obese (Table 2).

Among the women subjected to DIPSI recommended 75 gm of OGTT, 77.2% had normal result, while 10.6% had impaired result. Of the studied women 24 had abnormal OGTT result, thus the frequency of GDM was 11.9% (Table 3).

**Table 2: Demographic profile of studied population.**

Category	Number of subjects (N = 202)	%
<b>Age</b>		
18-30	120	59.4
31-40	82	40.6
> 40	0	0.0
<b>Family type</b>		
Nuclear	60	29.7
Joint	142	70.3
<b>Religion</b>		
Hindu	125	61.9
Muslim	3	1.5
Christian	16	7.9
Buddhist	55	27.2
Others	6	1.5
<b>Ethnicity</b>		
Nepali	130	64.4
Bhutia	30	14.9
Lepcha	10	5.0
Tibetans	1	0.5
Others	31	15.3
<b>Residence</b>		
Urbans	111	55.0
Rural	91	45.0
<b>Education</b>		
Illiterate	1	0.5
Primary	5	2.5
< 12 <sup>th</sup> standard	49	24.3
≥ 12	147	72.8
<b>Occupation</b>		
Housewife	96	47.5
Working	106	52.5
<b>SES</b>		
Upper lower	15	7.4
Lower middle	165	81.7
Upper middle	22	10.9
<b>BMI</b>		
Underweight	13	6.4
Normal	138	68.3
Overweight	51	25.2
<b>POG (at the time of OGTT)</b>		
< 24 weeks	18	8.9
24-28 weeks	99	49.0
> 28 weeks	85	42.1
<b>Blood pressure</b>		
Normal	184	91.1
Hypertension	18	8.9

Frequency of GDM among 18-30 years of age was 8.3%, while 17.1% prevalence was observed in women of 31-40 years of age. The frequency of GDM was 10.8% in Nepali, 13.3% in Bhutia and 20% in Lepcha and 12.5% in other categories. The frequency of GDM was found to be more among women residing in nuclear family rather than joint family. Hindu and Christian community had high frequency of GDM with 13.6% and 12.5% compared to others.

**Table 3: Results of OGTT among study population.**

Category	Number of individuals (N = 202)	%
Normal	156	77.2
Impaired	22	10.6
GDM	24	11.9
Total	202	100

**Table 4: Frequency distribution of GDM according to various demographic profiles.**

Category	Number of GDM diagnosed patients	%
<b>Age</b>		
18-30	10	8.3
31-40	14	17.1
<b>Ethnicity</b>		
Nepali	14	10.8
Bhutia	4	13.3
Lepcha	2	20.0
Others	4	12.5
<b>Family type</b>		
Nuclear	10	16.7
Joint	14	9.9
<b>Religion</b>		
Hindu	17	13.6
Christian	2	12.5
Buddhist	5	9.1
Others	0	0.0
<b>Residence</b>		
Urban	15	13.5
Rural	9	9.9
<b>Education</b>		
Illiterate	0	0.0
Primary	0	0.0
< 12	4	8.2
≥ 12	20	13.6
<b>Occupation</b>		
Housewife	11	11.5
Working	13	12.3
<b>SES</b>		
Upper lower	0.0	0.0
lower middle	21	12.7
Upper middle	3	13.6
<b>BMI</b>		
Underweight	1	7.7
Normal	12	8.7
Overweight	11	21.6
<b>POG</b>		
< 24 weeks	1	5.6
24-28 weeks	15	15.2
> 28 weeks	8	9.4
<b>Blood pressure</b>		
Normal	19	10.3
Hypertension	5	27.8

Urban residence was found to be at the higher side of GDM frequency compared to rural which may be due to

variation in lifestyle. Working Women and those with higher educational qualification were also on higher side of GDM frequency compared to home makers, and those with low educational qualification. Similarly, higher socio-economic class had more GDM frequency compared to lower socio-economic classes as per the Kuppuswamy scale.

Frequency of GDM was more in women with higher BMI (overweight) which was 21.6%, indicating obesity as a risk factor for GDM. Also, maximum number of GDM cases, 15 out of 24 cases were diagnosed between 24-28 weeks of gestation making this period the most sensitive period for diagnosis (Table 4).

**Table 5: Immediate management plan in GDM diagnosed patients.**

Management plan	Number of GDM diagnosed patients	%
Diet and exercise	22	91.7
Oral hypoglycemic agents	0	0
Insulin	2	8.3
Total	24	100

Among the GDM diagnosed women 91.7% were managed with diet and exercise, only 8.3% of women were managed with Insulin. Indicating diet and exercise as the most preferred choice of treatment (Table 5).

## DISCUSSION

In this study, the frequency of GDM was 11.9%. The frequency in our study is comparable to studies by Anjali A (9.5%) and Balaji V et al (13.4%), which also incorporated DIPSI guidelines in their studies.<sup>2,11</sup>

The recent data on the prevalence of GDM in our country was 16.55% by WHO criteria of 2 hours PG  $\geq$ 140 mg/dl. There was higher prevalence of GDM among urban women which might be because of their diet and sedentary life style, while higher frequency in nuclear family stress may be a contributing factor.<sup>11</sup>

In a study conducted in Haryana GDM was found to be associated with increasing age, higher educational level and socio-economic status, similar results were found in this study indicating these as a risk factor for GDM.<sup>12</sup>

Obesity is an important risk factor in the development of GDM. In our study GDM was found to be significantly higher in women with higher BMI and higher pre-pregnancy weight. Higher prevalence of GDM in women with higher BMI has also been observed in earlier studies as well.<sup>13,14</sup>

In this study the most common management plan adopted was diet and exercise (91.7%), insulin was used when the

blood glucose level was not controlled with diet and exercise, similar plan of action was adopted in other studies indicating its importance in the management of GDM.<sup>15</sup>

Also, maximum number of diagnosis was made between 24-28 week of gestation which was correlating with other studies.<sup>15</sup>

Limitations of this study were 22 patients diagnosed with impaired glucose tolerance, they might have shown GDM on further test and follow up, which could not be done in this study. Also follow up of the patients and analysis of their outcome was not done.

Despite some limitations in terms of a smaller number of subjects and not being a population-based study, the findings of this study were significant and consistent with other recent studies addressing GDM screening.

## CONCLUSION

Frequency of GDM was high (12%) in pregnant women attending tertiary hospital of Sikkim. This implies Sikkimese women should be universally screened for GDM. There was also high occurrence of GDM among Lepcha and Bhutia women which need further study to find out the contributing factors in these women.

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