

## Retraction

The article "Prevalence of gestational diabetes mellitus and associated risk factors amongst antenatal women attending urban health centre of Rajkot City, Gujarat" is retracted by the Editor-in-Chief, due to violation of the policies and practices of International Journal of Community Medicine and Public Health.<sup>1</sup> The article is retracted due to dispute in authorship.

## REFERENCES

1. Nimavat NK, Dadwani RS, Kartha GP. Prevalence of gestational diabetes mellitus and associated risk factors amongst antenatal women attending urban health centre of Rajkot City, Gujarat. Int J Community Med Public Health 2019;6:3033-7. DOI: <http://dx.doi.org/10.18203/2394-6040.ijcmph20192848>.

## Original Research Article

# Prevalence of gestational diabetes mellitus and associated risk factors amongst antenatal women attending urban health centre of Rajkot City, Gujarat

Nirav K. Nimavat, Roma S. Dadwani\*, Girija P. Kartha

Department of Community Medicine, C.U. Shah Medical College, Surendranagar, Gujarat, India

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### \*Correspondence:

Dr. Roma S. Dadwani,

E-mail: [drromasohil@gmail.com](mailto:drromasohil@gmail.com)

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## ABSTRACT

**Background:** Prevalence of gestational diabetes mellitus (GDM) vary widely depending on the region of the country, dietary habits, and socio-economic status. This study was undertaken to determine the prevalence of GDM and risk factors associated with it, in women attending an antenatal care (ANC) clinic at urban health training center in Rajkot city, Gujarat.

**Methods:** This study enrolled women, with estimated gestational age between 24 and 28 week, attending UHC in Rajkot. After informing, women who consented to participate were given a standardized 75 g oral glucose tolerance test (OGTT). A proforma containing general information on demographic characteristics, socio-economic status, education level, parity, family history of diabetes and/or hypertension was filled up. Diabetes in pregnancy study group India (DIPSI) criteria for 75 g 2-h OGTT was used for diagnosing GDM.

**Results:** Total of 366 women participated in the study and GDM was diagnosed in 36 (9.8%) women. Age, parity, BMI, family history of DM and hypertension were accessed and found to be not significant. History of hypertension in previous pregnancy was statistically significant with occurrence of GDM in present pregnancy.

**Conclusions:** The prevalence of GDM was found to be 9.8 per cent in a UHC, Rajkot. Appropriate interventions are required for control of GDM and modifications of risk factors.

**Keywords:** GDM, OGTT, Prevalence, Diabetes

## INTRODUCTION

Non-communicable diseases (NCDs), including heart disease, stroke, cancer, diabetes and chronic lung disease, are responsible for 70% of all deaths worldwide.<sup>1</sup> NCDs contribute 60% of all deaths in India. India shares more than two-third of the total deaths due to NCDs in the South-East Asia Region (SEAR) of WHO.<sup>2</sup> Diabetes is a chronic disease that occurs either when the pancreas does not produce enough insulin or when the body can't effectively use the insulin it produces. Insulin is a hormone that regulates blood sugar. In 2017, 412 million people in the world live with diabetes and it is assumed

that 642 million people will suffer from diabetes in 2040.<sup>3</sup> India is home to the second largest number of adults living with diabetes worldwide, after China. Diabetes prevalence was consistently higher among the urban population than those residing in rural areas.<sup>3</sup> In India, diabetes prevalence in urban areas increased tenfold from 1.2% to 12.1% during 1971–2000, while that in rural areas trebled from 2.2% to 6.4% in just 14 years during 1989–2003.<sup>4</sup>

Gestational diabetes mellitus (GDM) is defined as Impaired Glucose Tolerance (IGT) with onset or first recognition during pregnancy.<sup>5</sup> Worldwide, 1 in 10

pregnancies is associated with diabetes, 90% of which are GDM. Undiagnosed or inadequately treated GDM can lead to significant maternal and fetal complications. It is estimated that 16.2% of women in 2015 had some form of hyperglycemia in pregnancy. An estimated 85.1% of those cases were due to gestational diabetes, 7.4% due to other types of diabetes first detected in pregnancy and 7.5% due to diabetes detected prior to pregnancy.<sup>3</sup> The prevalence of GDM been reported to range from 3.8% in Kashmir, to 6.2% in Mysore, 9.5% in Western India and 17.9% in Tamil Nadu.<sup>6-9</sup> In more recent studies, using different criteria, prevalence rates as high as 35% from Punjab and 41% from Lucknow have been reported.<sup>10,11</sup> There is not much information available regarding the prevalence of GDM in India and Gujarat. Therefore, the present study was undertaken to study the prevalence of GDM and associated risk factors in Rajkot city.

## METHODS

It was a community based cross sectional study conducted in urban health training center (UHC), Nandanvan, field practice area of Community Medicine department, PDUMC, Rajkot during 2015-16. The study participants were pregnant women of 24-28 weeks of gestation registered with urban health training center. The sample size was calculated by using 16.55% prevalence reported previously in various cities of India, with 95% confidence limit, 99% confidence level and design effect of 1 by using Epi Info 7 software – CDC, Atlanta.<sup>12</sup> Total 366 pregnant women registered by link workers at UHC were included in the study.

We followed DIPSI (Diabetes In Pregnancy Study group India) guidelines, 2006 which recommended screening of every pregnant woman with 75gm of glucose load and measurement of blood sugar level after 2 hours.<sup>13</sup> As per the guideline, if blood sugar level was (1)  $\geq 120$ -139 mg/dl, was classified as decreased gestational glucose tolerance (DGGT) (2) If it was  $\geq 140$ -199 mg/dl, it was classified as GDM (3) If it was  $\geq 200$  mg/dl, it was classified as Diabetes. Packets were prepared containing 75 gm anhydrous glucose. Accucheck active glucometer from Roche diagnostics was used for measurement of blood sugar. It was auto calibrated with each new test strip. At first the pregnant woman was informed about the purpose of the study and after obtaining written consent, the mother was given 75 gm of anhydrous glucose by dissolving it in 200-250 ml of water. Pre-defined and pre-structured proforma was used for data collection. Two hours later, the capillary blood sample was taken by pricking with lancet and blood glucose level was measured by glucometer on the spot and communicated also. As per DIPSI guidelines, pregnant women between 24 to 28 weeks of gestational age were included while pregnant women below 24 weeks and above 28 weeks of gestational age, known case of diabetes, any other pregnant women with severe systemic illness and who refused to participate in the study were excluded.

The data entry was done in Microsoft Office Excel 2007 and analysis was done in Epi Info 7 software. This study was approved by Institutional Ethics Committees of P.D.U Medical College and Hospital, Rajkot.

## RESULTS

Table 1 shows that out of 366 study participants, 204 (55.7%) were from the age group of 21-25 years, followed by 98 (26.8%) from the age group of 26-30 years, 41 (11.2%) were below 20 yrs age and 23 (6.3%) were more than 31 years. Almost one third i.e. 121 (33.1%) women were educated up to primary level, followed by secondary 90 (24.6%), higher secondary 28 (7.6%). There were 36 (9.8%) graduate and post graduate pregnant women and 91 (24.9%) illiterate women. Out of total participants, more than half 198 (54.1%) were belonging to socio-economic class III, 116 (31.7%) participants belonged to socio-economic class IV, 42 (11.5%) in class II, 8 (2.2%) in class I and 2 (0.5%) in class V.

**Table 1: Socio economic characteristics of women (n=366).**

	Frequency	Percentage
<b>Age wise distribution of women</b>		
<b>Age group (in years)</b>		
$\leq 20$	41	11.2
21-25	204	55.7
26-30	98	26.8
31-35	20	5.5
> 35	3	0.8
<b>Distribution of women as per education</b>		
<b>Education</b>		
Illiterate	91	24.9
Primary	121	33.1
Secondary	90	24.6
Higher Secondary	28	7.6
Graduate	28	7.6
Post graduate	8	2.2
<b>Distribution of study participants as per socio-economic class</b>		
<b>Socioeconomic class</b>		
Class I	8	2.2
Class II	42	11.5
Class III	198	54.1
Class IV	116	31.7
Class V	2	0.5

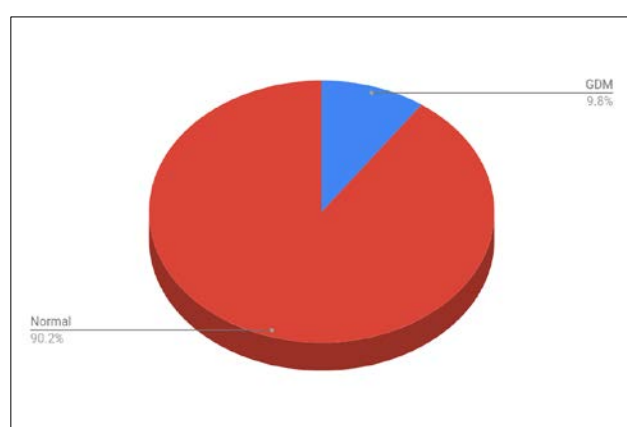
Total 366 participants were tested for blood glucose level after 2 hrs of glucose load, 36 (9.8%) participants had blood glucose level  $>140$  mg/dl diagnosed as having gestational diabetes mellitus. Remaining 330 (90.2%) participants had normal ( $<140$  mg/dl) blood glucose level (Figure 1).

The Table 2 describe risk factors associated with GDM. age >25, parity >1 and BMI>25 associated with GDM but in our study it was not significant ( $p>0.05$ ). Similarly, family history of HTN and DM associated with

occurrence of GDM, but it was not significant in our study. Hypertension in previous pregnancy and occurrence of GDM in present pregnancy association was significant in the study ( $p<0.05$ ).

**Table 2: Risk factors to be associated with GDM (n=366).**

Risk factors	Number with condition	P value	X <sup>2</sup> value	DF (degree of freedom)	Odds ratio
Age >25 years	19	0.41	0.7	1	1.34
Parity>1	9	0.92	0.009	1	0.96
BMI>25	19	0.46	0.53	1	1.29
Family history of DM	3	0.82	0.052	1	1.06
Family history of HTN	3	0.82	0.052	1	1.06
HTN in Previous pregnancy (n=171)	4	0.001	10.76	1	10.98



**Figure 1: Prevalence of GDM.**

## DISCUSSION

The present study was conducted in Rajkot city of Gujarat state which included total 366 participants. Out of this, 55.7% belonged to 21-25 years of age group. A study done in Rajasthan showed that highest number of participants was belonging to 20-29 years of age group.<sup>14</sup> Majority of the participants were belonging to 20-25 and 21-30 years of age group in similar other studies.<sup>8,15</sup> Study in Italy reported that participants were more in 25-35 years of age group.<sup>16</sup> Participants were high in 29-35 years of age group in a study of USA.<sup>17</sup> In the present study, no association was found between GDM and age. Similar findings also reported from a Pune and Kashmir study.<sup>6,18</sup> But a Haryana and Manipur study found significant association between GDM and age (as age increases, prevalence of GDM also increases).<sup>19,20</sup>

In our study literacy rate was 75.1% but majority of participants studied up to primary level. Main reason for education up to primary level is that girl had to do household work. So she would be engaged in household work and dropped from education. Higher number of participants had education up to secondary level in a study from rural India.<sup>8</sup>

In present study, majority of the participants (54.1%) were belonging to socioeconomic class III and there was no association between GDM and socioeconomic status. In contrast, a study from Haryana reported a significant association of GDM with socioeconomic status of the participants. This association could be related to multiple factors such as higher maternal age, higher pre-pregnancy weight and BMI, more sedentary lifestyle in women of higher socioeconomic status. Yang et al did not find such an association in Chinese pregnant women while Keshavarz et al found an association between GDM with low socioeconomic level in pregnant Iranian women.<sup>21,22</sup>

In our study which was cross sectional study, prevalence rate of GDM was 9.8% (36/366), while similar prevalence rate of 10.87% was seen in a cross sectional study in Rohtak.<sup>23</sup> Other studies from India reported prevalence rate of 7.7%, 8.1% and 7.8% from Maharashtra, Manipur and Kashmir respectively.<sup>7,20,24</sup> In contrast to our study lower prevalence rate (2.4%) was reported from Brazil.<sup>25</sup> Higher prevalence (25%) than present study reported by O'Sullivan et al (IADPSG–12.4% vs. WHO–9.4%).<sup>26</sup>

A study by Thathagari et al from Karnataka reported that 59.5% were Multigravidae and 40.5% were Primigravidae.<sup>27</sup> Another study from Saudi Arabia reported 9.9% participants were Primigravidae while 90.1% were Multigravida.<sup>28</sup> In our study 31.7% participants were primigravidae and 68.3% were Multigravida. Abdulbari et al concluded that increased parity was a risk factor for GDM in Qatar.<sup>29</sup> Similar results were found by Hung C et al. from Taiwan, the subjects having parity 0 and 1 were compared for impaired glucose tolerance and GDM after 75 g OGTT.<sup>30</sup> It was observed that subjects having parity 1 had significant higher blood glucose levels than their counterparts even after adjusting BMI. In present study out of total 36 GDM cases, 9 were Multigravida and 27 were primigravidae, but association between parity and GDM was not significant and this was similar with the study done by Rajput et al in Haryana and Kim et al in Korea.<sup>23,31</sup> However in studies from Kashmir and Taiwan,

higher parity has been found to be associated with higher prevalence of GDM.<sup>32,33</sup>

Das et al and Gomez et al found that 25% and 50% of women with GDM had obesity respectively.<sup>34,35</sup> Balaji et al also reported that women with high BMI had more GDM.<sup>36</sup> This may be due to increased demands on maternal metabolism during pregnancy from excess weight, resulting in imbalances in hormonal carbohydrate regulation mechanisms, and insulin sensitivity. But in present study, majority of patients who had gestational diabetes mellitus had BMI <25 with only 10.9% being obese i.e. having BMI >30 thereby showing an insignificant correlation between BMI and GDM.

In present study family history of DM were found in 7.9% participants. Similar findings were also reported from Maharashtra, Rohtak and Tamilnadu, where participants with family history of DM were 8.2%, 8.4% and 10% respectively.<sup>7,10,37</sup> But association of GDM with family history of diabetes was not significant. A study from Rajasthan observed family history of diabetes mellitus in 33.3% of GDM women and significant association was found.<sup>14</sup>

Out of 171 women with previous live birth history, 15 women diagnosed with GDM. Among these, 4 had history of hypertension in previous pregnancy and 11 had no such history. The association observed between hypertension in previous pregnancy and GDM in present pregnancy was significant ( $p < 0.005$ ).

## CONCLUSION

Gestational Diabetes Mellitus is an emerging health problem, it should be tested among the pregnant women registered with health authorities. National programme for screening of GDM should be implemented at every level health facility. Important high-risk factors like advanced age, hypertension in previous pregnancy, high parity, BMI >25 should be considered during screening of pregnant women. Women with any of these risk factors should not be missed.

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*Ethical approval: The study was approved by the Institutional Ethics Committee of Rajkot Medical College*

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