# A study of modifiable risk factors of GDM in Delhi

**Sakshi Singh[1,*], Tapas K. Ray[2], Sandeep Kumar[3]**

[1]Tutor, [2]Professor, [3]Senior Resident, [1,2]Dept. of Community Medicine, [3]Dept. of Surgery, [1]Dr. Babasaheb Ambedkar Medical College & Hospital, Rohini, New Delhi, [2,3]Lady Hardinge Medical College, New Delhi, India

***Corresponding Author:**
Email: sakshi.195singh@gmail.com

## Abstract

**Introduction:** Gestational diabetes mellitus (GDM) has been observed to be associated with increased perinatal morbidity and mortality. GDM is becoming a public health concern globally as well as in India with fast increasing trend. It affects approximately 14% of all pregnancies. Most of the literature available has focused on traditional risk factors while this article has thrown light on modifiable ones.

**Objective:** To study the modifiable risk factors for developing GDM in pregnant women based on physical examination and personal history.

**Materials and Methods:** A hospital based case control study was conducted in Lady Hardinge Medical College and associated hospital with a sample size of 104 (52 cases & 52 controls). Pregnant women with gestational diabetes mellitus as diagnosed by abnormal oral Glucose Tolerance Test (OGTT) were taken as cases and Pregnant women who have completed 24 weeks of gestation and who tested negative on Glucose Challenge test (GCT) were selected as controls.bThe data was compiled and analysed in SPSS version 12.

**Results:** Pre pregnancy BMI >23kg/m² (OR-12.96), Skinfold thickness >13mm (OR-5.30). OCPs use for more than 5 years (OR-4.71), Physical activity sedentary vs moderate (OR=1.40), consumption of food item with high GI (OR=2.86).

**Conclusions:** The information found in the study regarding the risk factors may contribute heavily to the policy makers to develop strategies to combat the problem of GDM in the community.

## Introduction

India has become the diabetic capital of the world. According to WHO projections India will have maximum number of patients with diabetes (57.2 million) by the year 2025.[(1)] Gestational diabetes mellitus (GDM), which is defined as the onset or recognition of glucose intolerance during pregnancy,[(2)] is also becoming a public health concern globally as well as in India with fast increasing trend. It affects approximately 14% of all pregnancies.[(3)]

Non modifiable risk factors such as past history of GDM, family history of DM, increasing maternal age have already been identified,[(4)] however the impact of other modifiable risk factors like diet, lifestyle etc has not yet been adequately analyzed.

The simple preventive measures like health education, screening test, life style modification etc can bring about considerable reduction in morbidity burden due to gestational diabetes. It is therefore of paramount importance to study the risk factors of GDM, especially the modifiable ones, in details.[(5-7)]

Substantial evidence has related risk factors like diet to the development of glucose intolerance. Diet has been reported to be both protective and risk-enhancing between particular dietary factors and type 2 diabetes in adult men and nonpregnant women.[(4)] Further evaluation needs to be done in that direction. This paper has tried to study the association of modifiable risk factors like obesity, OCPs (oral contraceptive pills) use, with that of GDM.

## Materials and Methods

The study was conducted in Antenatal clinic, Department of Obstetrics and Gynaecology in Lady Hardinge Medical College & Smt Sucheta Kripalani Hospital (SSKH).

A complete general physical examination was carried out including height, weight, temperature, heart rate (HR), blood pressure, pedal oedema, thyromegaly, pallor, icterus, skin fold thickness with harpender skin caliper on left arm triceps. Obstetrical examination & abdominal examination was done in details. All the pelvic grips were done. Abdominal girth was taken. Laboratory investigations relevant to the study were recorded e.g. haemoglobin, random blood glucose, glucose challenge test, glucose tolerance test, glycatedhaemoglobin(HbA1c)* (*glycatedhaemoglobin was available for cases only as controls were not subjected to the test).

With two sided confidence level of 95%, Power-80%, Ratio of cases to controls 1, Prevalence of family history of diabetes in developing GDM in normal population 12% (out of all major risk factors it has the minimum prevalence according to existing literature in India)[(4)] and assumed OR of Family history for developing GDM 4, the sample size was calculated to be 52 cases and same number of controls were taken using Epi_Info software.

For dietary history a validated quantitative food frequency questionnaire was used. The usual pattern of eating during days, weeks and months was asked. This questionnaire has already been evaluated in previous studies in Kerala and Gujarat.[(7)]

For physical activity measurement, the questionnaire was derived from Global Physical Activity Questionnaire version 2. We took history of mothers 1 year before the present pregnancy. The questionnaire comprised of four sections: type of work, type of transportation used, type of recreational activity and time spent in sitting or reclining position. The women were divided under sedentary, moderate and heavy workers.

Data was adequately coded and analysed using SPSS version 12. Odds ratio was used to compare strength of association between cases and controls.

## Result

Pre pregnancy BMI >23kg/m² had significant association with the risk of developing GDM (OR-12.96). Skinfold thickness >13mm showed strong evidence of association with GDM (OR-5.30). OCPs use for more than 5 years had very high risk of developing GDM as compared to women who have consumed it for less than 5 years (OR-4.71). (Table-1, 2, 3)

**Table 1: Risk of developing GDM with pre pregnancy BMI**

| BMI | Cases No. (%) | Controls No. (%) | OR(95 %CI) |
|---|---|---|---|
| ≥23 | 27(51.9) | 4(7.7) | 12.96(4.08-41.18) |
| <23 | 25(48.1) | 48(92.3) | 1 |
| Total | 52(100.0) | 52(100.0) | |
| Mean±SD | 23.96±3.46 | 20.79±1.74 | |

**Table 2: Risk of developing GDM with skin fold thickness (Triceps)**

| Skin fold thickness(mm) | Cases No. (%) | Controls No. (%) | OR(95% CI) |
|---|---|---|---|
| ≥13 | 29(55.8) | 10(19.2) | 5.30(2.20-12.77) |
| <13 | 23(44.2) | 42(80.8) | 1 |
| Total | 52(100.0) | 52(100.0) | |
| mean±SD | 12.90±1.66 | 11.50±1.24 | |

**Table 3: Risk of developing GDM with oral contraceptive pills**

| OCP use in years | Cases No. (%) | Controls No. (%) | OR(95% CI) |
|---|---|---|---|
| >5 years | 18(34.6) | 5(9.6) | 4.71(1.54-14.35) |
| < 5 years | 26(50) | 34(65.4) | 1 |
| NOT USING | 8(15.4) | 13(25.0) | 0.81(0.20-2.23) |
| TOTAL | 52(100.0) | 52(100.0) | |

No significant association was found between the type of physical activity and risk of GDM as the odds ratio is 1.40 having value 1 in the confidence interval (Table 4).

**Table 4. Distribution of study subjects according to pre pregnancy physical activity**

| Type of activity | Cases | Controls | OR(95% CI) |
|---|---|---|---|
| Sedentary | 46(88.5%) | 44(84.6%) | 1.40(0.45-4.34) |
| Moderate | 6(11.5%) | 8(15.4%) | 1 |
| Total | 52(100.0) | 52(100.0) | |

The glycemic index is a relative measure of the glycemic effect of the carbohydrates in different foods. Total glycemic load was calculated by first multiplying the carbohydrate content of each food by its glycemic index value, then multiplication of this value by the frequency of consumption, and the summation of the values from all food. Dietary glycemic load thus represents the quality and quantity of carbohydrate intake and the interaction between the two.The odds ratio of developing GDM was 2.86 among the cases who were taking high glycaemic foods more frequentlyin comparison to those who were taking occasionally (Table 5).

**Table 5. Distribution of study subjects according to consumption of food items having high glycemic index**

| Food items with high GI | Cases No. (%) | Controls | OR(95% CI) |
|---|---|---|---|
| More frequently | 16(30.8%) | 7(13.5%) | 2.86(1.06-7.70) |
| Less frequently | 36(69.2%) | 45(86.5%) | 1 |
| Total | 52(100.0) | 52(100.0) | |

## Discussion

### Pre pregnancy Body mass index (BMI)

Present study has observed strong association between pre-pregnancy BMI (≥23kg/m²) with GDM (OR 12.96). This finding was consistent with a study done by Madhavan et al[9] (2005-06) in Kerala showing increased prevalence of GDM with BMI ≥ 23kg/m² (OR-7.5, CI 1.61-34.31). There are many other studies which have found significant association between high BMI and GDM.[10-16]

### Physical activity

In the present study the risk of GDM among sedentary women as compared to moderately active women was insignificant. (OR-1.40, CI 0.45-4.34). However other studies[11,17] have shown contradictory results. This may be attributed by smaller sample size and inadequate information on physical activity in present study.

### Dietary factors

Our study has shown that women consuming diet with high glycaemic load had high risk of GDM (OR-3.13 and OR-2.86 respectively).The results are comparable to study by Zahng et al.[18]

### OCP use

Our study found a statistically significant association between OCP use and risk of GDM (OR-4.7, CI-1.54-14.35). Hedderson et al[19] also showed that there was high risk of developing GDM in women using high-androgen hormonal contraceptive( OR-1.43,CI 0.92-2.22).

Though the sample size is small the information obtained in this study may be used as important tools and inputs for setting effective strategies and policies for prevention of GDM.

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