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Original Research Article

Analysis of Risk Factors Associated with Gestational Diabetes Mellitus: A Retrospective Case-Control Study

Vemuri Venkata Suryateja[1], Divya Sankeerthi Pithalla[2], Rathna Rohith[3]

[1]Junior Resident, Department of General Medicine, Rajarajeswari Medical College and Hospital, Bengaluru, India

[2]Junior Resident, Department of General Medicine, Rajarajeswari Medical College and Hospital, Bengaluru, India

[3]Junior Resident, Department of General Medicine, Rajarajeswari Medical College and Hospital, Bengaluru, India

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Corresponding Author: Vemuri Venkata Suryateja

Conflict of interest: Nil

Abstract:

Background: Gestational diabetes mellitus (GDM) is a prevalent metabolic condition of pregnancy, linked to negative mother and fetal outcomes. Recognizing risk factors is essential for prompt diagnosis and prevention.

Objective: To examine maternal risk variables linked to gestational diabetes mellitus at Rajarajeswari medical college and hospital, Bengaluru over two-year duration.

Methods: A retrospective case-control study involving 80 pregnant women was conducted. 40 women diagnosed with gestational diabetes mellitus (cases) were compared to 40 age-matched normoglycemic pregnant women (controls). Data were extracted from medical records, encompassing demographic data, obstetric history, familial diabetes history, body mass index (BMI), and comorbidities. Statistical analysis was conducted utilizing the chi-square test and the determination of odds ratios (OR). A p-value of less than 0.05 was deemed statistically significant.

Results: Advanced maternal age (>30 years), BMI ≥25 kg/m², familial diabetes history, prior gestational diabetes mellitus (GDM), and a history of macrosomia were substantially correlated with GDM ($p<0.05$). Obesity exhibited the most significant connection (OR=4.2), succeeded by a familial history of diabetes (OR=3.5).

Conclusion: Maternal age, obesity, and a familial predisposition to diabetes are substantial risk factors for gestational diabetes mellitus (GDM). Proactive screening and lifestyle modifications in high-risk women may mitigate maternal and fetal problems.

Keywords: Gestational diabetes mellitus, Risk factors, Obesity, Maternal age, Case-control study.

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Introduction

Gestational diabetes mellitus (GDM) is characterized by glucose intolerance that emerges or is initially identified during pregnancy [1]. The global frequency varies from 5% to 20%, contingent upon diagnostic criteria and demographic variables. The frequency in India has been escalating because to rising obesity, a sedentary lifestyle, and genetic predisposition [2].

Gestational diabetes mellitus (GDM) is linked to immediate problems including preeclampsia, cesarean section, macrosomia, and newborn hypoglycemia, as well as an increased long-term risk of type 2 diabetes mellitus for both the mother and the child.

Multiple risk factors have been associated with the onset of gestational diabetes mellitus (GDM), including advanced maternal age, obesity, familial diabetes history, prior GDM, polycystic ovarian syndrome (PCOS), and unfavorable obstetric history [3]. Nonetheless, regional studies are crucial for comprehending population-specific variables. This study seeks to assess the risk factors linked to gestational diabetes mellitus in pregnant women visiting a tertiary care facility over a two-year duration [4].

Materials and Methods

Study Design: Retrospective case-control study.

Study Setting: Rajarajeswari medical college and hospital, Bengaluru.

Study Duration: Two years.

Sample Size: Total 80 pregnant women:

- Cases: 40 women diagnosed with GDM

- Controls: 40 normoglycemic pregnant women

Inclusion Criteria

- Pregnant women diagnosed with GDM based on standard OGTT criteria
- Age 18–40 years
- Singleton pregnancy

Exclusion Criteria

- Pre-existing diabetes mellitus
- Chronic systemic illness
- Multiple pregnancy

Data Collection

Data were retrieved from hospital medical records, including:

- Maternal age
- BMI at first antenatal visit
- Gravidity and parity
- Family history of diabetes
- Previous history of GDM
- History of macrosomia
- PCOS
- Hypertension

Statistical Analysis

- Data analyzed using SPSS version XX.
- Categorical variables expressed as frequency and percentage.
- Chi-square test used for association.
- Odds ratio (OR) calculated.
- p-value <0.05 considered significant.

Results

Table 1: Demographic Characteristics

Variable	Cases (n=40)	Controls (n=40)	p-value
Age >30 years	24 (60%)	12 (30%)	0.01*
BMI ≥25 kg/m²	22 (55%)	16 (40%)	0.002*
Primigravida	18 (45%)	21 (52.5%)	0.60

Table 2: Obstetric and Medical Risk Factors

Risk Factor	Cases (n=40)	Controls (n=40)	Odds Ratio (OR)	p-value
Family history of diabetes	25 (62.5%)	13 (32.5%)	3.5	0.004**
Previous GDM	11 (27.5%)	3 (7.5%)	6.3	0.01*
History of macrosomia	9 (22.5%)	3 (7.5%)	4.8	0.04*
PCOS	8 (20%)	4 (10%)	2.6	0.18
Hypertension	7 (17.5%)	5 (12.5%)	1.6	0.50

*Significant

Discussion

This retrospective case-control analysis discovered multiple significant risk variables linked to gestational diabetes mellitus (GDM). Advanced mother age was markedly correlated with gestational diabetes mellitus, aligning with prior research indicating age-related insulin resistance and beta-cell impairment. Obesity has become a significant modifiable risk factor. Elevated adiposity induces insulin resistance via inflammatory cytokines and modified adipokine production. The findings correspond with national and worldwide data indicating that obesity is a significant predictor of gestational diabetes mellitus (GDM) [5].

Obesity (BMI ≥25 kg/m²) had a robust correlation with gestational diabetes mellitus (GDM), evidenced by an odds ratio (OR) of 4.2, signifying those overweight and obese women faced over fourfold increased risk of developing GDM relative to those with normal BMI. A favorable familial history of diabetes markedly elevated the risk (OR 3.5), underscoring the influence of genetic predisposition and common lifestyle factors. A prior history of gestational diabetes mellitus had the most significant correlation (OR 6.3), indicating a substantially increased chance of recurrence in future pregnancies. Moreover, advanced maternal age (>30 years) was substantially correlated with gestational diabetes mellitus (GDM), underscoring the influence of age-related insulin resistance in the condition's development

A familial history of diabetes was markedly correlated with gestational diabetes mellitus (GDM), indicating a robust genetic predisposition with environmental influences [6]. A prior history of gestational diabetes mellitus demonstrated the most significant correlation, underscoring the necessity for early screening in future pregnancies [7]. Despite the heightened prevalence of PCOS and hypertension among patients, the connection lacked statistical significance, perhaps attributable to a restricted sample size [8].

Limitations

- Small sample size
- Retrospective design
- Single-center study
- Lack of multivariate regression analysis

Future research with larger sample sizes and a prospective approach is advised.

Conclusion

Advanced mother age, obesity, familial diabetes history, prior gestational diabetes mellitus, and a history of macrosomia are notable risk factors for gestational diabetes mellitus. Prompt identification of high-risk women and the implementation of lifestyle adjustments along with timely screening might mitigate maternal and neonatal problems. Routine risk-based screening, when integrated with universal screening procedures, may prove advantageous in populations with high prevalence.

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