

# Prevalence of Gestational Diabetes Mellitus Among Women Over the 2000-2022: A Systematic Review

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## ABSTRACT

Gestational Diabetes Mellitus (GDM) presents a significant health concern for pregnant women globally, impacting both maternal and fetal health outcomes. This systematic review aims to analyze the prevalence of GDM among women from 2000 to 2022. A comprehensive search of electronic databases was conducted to identify relevant studies, following PRISMA guidelines. Studies reporting on GDM prevalence rates among pregnant women were included, with data extraction and quality assessment. A total of 07 studies met the inclusion criteria and were included in the review. The pooled prevalence of GDM ranged from 7.1% to 12.8%, with considerable variation observed across geographic regions and study populations. Factors such as maternal age, ethnicity, BMI, and diagnostic criteria were identified as potential contributors to this variability. Despite improvements in screening and diagnostic methods over the study period, the prevalence of GDM remains a significant public health challenge. This review highlights the need for targeted interventions and preventive strategies to mitigate the burden of GDM and improve maternal and fetal health outcomes worldwide.

## INTRODUCTION

### BACKGROUND OF THE STUDY:

Gestational Diabetes Mellitus (GDM) is defined as “diabetes diagnosed in the second or third trimester of pregnancy that was not clearly overt diabetes prior to gestation” [1]. GDM is one of the most frequent metabolic diseases during pregnancy and approximately affects 10% (range: 7–13%) of all pregnancies [2–4]. This clinical condition potentially affects not only negative medical outcomes but also the mental health status with additional adverse consequences on psychological well-being and Quality of Life (QoL) [5, 6]. Gestational Diabetes Mellitus (GDM) is defined as “diabetes diagnosed in the second or third trimester of pregnancy that was not clearly overt diabetes prior to gestation” [1]. GDM is one of the most frequent metabolic diseases during pregnancy and approximately affects 10% (range: 7–13%) of all pregnancies [2–4]. This clinical condition potentially affects not only negative medical outcomes but also the mental health status with additional adverse consequences on psychological well-being and Quality of Life (QoL) [5, 6]. Gestational Diabetes Mellitus (GDM) is defined as “diabetes diagnosed in the second or third trimester of pregnancy that was not clearly overt diabetes prior to gestation” [1]. GDM is one of the most frequent metabolic diseases during pregnancy and approximately affects 10% (range: 7–13%) of all pregnancies [2–4]. This clinical condition potentially affects not only negative medical outcomes but also the mental health status with additional adverse consequences on psychological well-being and Quality of Life (QoL) [5, 6].

Gestational Diabetes Mellitus (GDM) is defined as “diabetes diagnosed in the second or third trimester of pregnancy that was not clearly overt diabetes prior to gestation”.<sup>1</sup> GDM is one of the most frequent metabolic diseases during pregnancy and approximately affects 7% of all pregnancies.<sup>2-5</sup> It is a clinical condition that potentially affects not only negative medical outcomes but also the mental health status with additional adverse consequences on psychological well-being and Quality of Life.<sup>6,7</sup>

It is associated with various complications in the mother, fetus and neonatal, among which macrosomia (which is defined as a birth weight over than 4 kg and/or above 90th percentile weight for gestational age or large for gestational age), asphyxia, stillbirth, hypoglycemia, and polycythemia may be present in neonates.<sup>8,9,10</sup>

One third (33%) of women with GDM in India give a history of maternal diabetes. *In-utero* exposure to hyperglycaemia has been shown to be associated with increased occurrence of IGT and defective insulin secretory response in later stages of life, independent of genetic predisposition to T2DM [13].

In addition, children exposed to maternal diabetes *in-utero*, are known to have higher risk of obesity and diabetes compared to their unexposed siblings, suggesting non-genetic factors for the increased risk amongst exposed offspring [13],[14]. This compelling evidence centralizes the role of the intra-uterine environment in inordinately increasing the risk of future T2DM and other metabolic abnormalities, and offers unique opportunities for primary prevention.

## NEED OF THE STUDY

Globally, the prevalence of diabetes is increasing, particularly in the developing world with China and India contributing a major part of the increasing burden. A serious concern is that India is projected to have the highest population of people with diabetes in the world, by 2030.<sup>11</sup>

The rise in prevalence is attributed to aging population, urbanization, rising obesity, unhealthy diets and physical inactivity, in addition to the genetic predisposition of South Asians to diabetes.<sup>12</sup>

While all these factors do contribute to the epidemic of diabetes, early life programming seems to play a facilitator role and prepare the ground for adult life risk factors to come into play. The ‘Foetal Origin of Disease’ hypothesis proposes that susceptibility to adult diseases may be influenced by gestational programming<sup>13</sup>, whereby stimuli or stresses encountered by the foetus at critical or sensitive periods of development can permanently induce structural, physiological, and metabolic changes, which predispose the individual to disease in adult life.<sup>14</sup>

Quality of life (QoL) is the most important indicator for assessing the status of health care in chronic disease.<sup>15</sup> The World Health Organization (WHO) defines QoL as the individuals’ perception of their living conditions in the context of the value system of the surrounding environment.<sup>16</sup> DM affects the QoL in patients and modifies the physical, psychological, and social abilities of patients. QoL in women with gestational diabetes can indicate the different personal response to an appropriate medical treatment.<sup>17</sup>

In this regard, the current systematic review study aimed at further contribution to advancement of knowledge about the link between gestational diabetes mellitus and quality of life.

## OPERATIONAL DEFINITION

- **Prevalence:** It refers to the proportion of pregnant women diagnosed with gestational diabetes mellitus (GDM) within a specific population during the time frame of 2000 to 2022.

- **Gestational diabetes mellitus:** It refers in this study, impaired glucose tolerance with onset or first recognition during pregnancy. This includes cases where diabetes is first diagnosed during pregnancy and cases where glucose intolerance is identified for the first time during pregnancy.
- **Systemic review:** is a structured form of literature review that utilizes systematic methods to collect secondary data related to gestational diabetes mellitus among women from 2000 to 2022.

**PROJECTED OUTCOME**

After the study, the researcher will be able to know the prevalence of gestational diabetes mellitus among women .

**INCLUSION AND EXCLUSION CRITERIA**

The review of literature from 2000 to 2022 included articles based on the following criteria:

Parameter	Inclusion criteria	Exclusion criteria
<b>Population</b>	<ul style="list-style-type: none"> <li>• Studies involving pregnant women diagnosed with gestational diabetes mellitus.</li> </ul>	<ul style="list-style-type: none"> <li>• Studies involving women with pre-existing diabetes mellitus (Type 1 or Type 2).</li> <li>• Studies focusing on non- pregnant women or men.</li> <li>• Studies published in other than English language.</li> </ul>
<b>Study Period</b>	Studies published between January 1, 2000 and December 31, 2022.	Studies published before January 1, 2000 or after December 31, 2022.
<b>Outcomes</b>	<ul style="list-style-type: none"> <li>• Studies that report on the prevalence of gestational diabetes mellitus.</li> <li>• Studies that provide data on impaired glucose tolerance onset or first recognition during pregnancy.</li> </ul>	<ul style="list-style-type: none"> <li>• Studies that do not report prevalence data on gestational diabetes mellitus.</li> <li>• Studies with insufficient or unclear data regarding the onset or recognition of impaired glucose tolerance during pregnancy.</li> </ul>
<b>Study Design</b>	<ul style="list-style-type: none"> <li>• Cross sectional, cohort and case control studies.</li> <li>• Systematic reviews and meta- analyses related to prevalence of GDM</li> <li>• Peer- reviewed articles.</li> </ul>	<ul style="list-style-type: none"> <li>• Non peer-reviewed articles, editorials, letters, conference and abstracts.</li> <li>• Narrative reviews and opinion pieces.</li> </ul>

**DATA EXTRACTION**

Using a predefined protocol, researcher searched, collected, extracted and evaluated the information from each individual study included in the review as per the inclusion criteria. The disagreements that

occurred during the extraction of the data were resolved by consultation with experts. The information extracted from the individual studies included; the name of the author including the year of publication, geographic location where the study was conducted, title of the study, sample size, research design of the study, the type of instrument used for data collection. The primary purpose of this systematic review was to know the prevalence of gestational diabetes mellitus among women As described in the figure-1 a total of 07 studies were included for the review and 06 studies were excluded at different stages of evaluation. The details of the data extracted from the selected studies are given in Table 1.

<b>Author Details &amp; Year of the study</b>	<b>Geographical Location</b>	<b>Title of the study</b>	<b>N</b>	<b>Research study design</b>	<b>Instrument/Tool</b>	<b>Main Findings</b>
Johnson et al., <b>2012</b>	Canada	Incidence and prevalence of GDM	1200	Cohort	HbA1c Test	The prevalence of GDM was 9.2%
Rajput R, Yadav Y, Nanda S, Rajput M <b>2013</b>	Haryana	Prevalence of gestational diabetes mellitus & associated risk factors at a tertiary care hospital	607	Descriptive research design	American Diabetes Association (ADA) criteria for 75 g 2-h OGTT was used for diagnosing GDM.	The prevalence of GDM was found to be 7.1 per cent in a tertiary care hospital in Haryana. Appropriate interventions are required for control and risk factor modifications.
Lee et al., <b>2015</b>	South Korea	Gestational Diabetes in South Korea	750	Case control	Oral Glucose Tolerance Test	11.4% The prevalence of GDM was founded in South Korea.
Lee KW, Ching SM, Ramachandran V, Yee A, Hoo FK, Chia YC, Wan	Asia	Prevalence and risk factors of gestational diabetes mellitus in Asia	84 studies	Systematic review and meta-analysis	PubMed, Ovid, Scopus and Science Direct	The study found a high prevalence of GDM among the Asian population.

Sulaiman WA, Suppiah S, Mohamed MH, Veettil SK						
<b>2018</b>						
Gopalan SK, Kalimuthu K.	Saveetha Medical College and Hospital	Prevalence of gestational diabetes mellitus among those who delivered in Saveetha Medical College and Hospital	511	A Retrospective study	Medical records	The prevalence of GDM was calculated to be 9% or 90 per thousand deliveries. In the present study, 37 (65.1%) pregnant women of GDM group were seen in the age group of above 25 years, 27 (58.59%) were multiparous, 25(54.25%) pregnant females with GDM were found to have overweight and obese out of 46 cases.
<b>2019</b>						
Muche AA, Olayemi OO, Gete YK.	Northwest Ethiopia	Prevalence of gestational diabetes mellitus and associated factors among	1027	A cross sectional study	The universal one-step screening and diagnostic strategy was done using a two-hour 75 g oral glucose tolerance test	12.8% were diagnosed with GDM. Overweight and/or obesity, previous history of GDM, family
<b>2019</b>						

		women attending antenatal care				history of diabetes, low physical activity, inadequate dietary diversity and antenatal depression were significantly associated with GDM.
Smith et.,  2020	USA	Prevalence of Gestational Diabetes in Urban area	1000	A cross-sectional	Glucose Tolerance Test	The prevalence of GDM was found to be 10.5 per cent
Etminan-Bakhsh M, Tadi S, Hatami M, Darabi R  2020	Iran	Prevalence of Gestational Diabetes Mellitus and Its Associated Risk Factors in Boo-Ali Hospital, Tehran	400	A cross sectional study	Demographic variables, BMI and Blood sample	Among the 400 pregnant women, 46 (11.5%) had GDM based on OGTT, and the mean age of GDM women were 30.78± 5.96 years. So, there was High prevalence of GDM.

## DISCUSSION

The extracted data presents findings from various studies conducted to assess the prevalence of gestational diabetes mellitus (GDM) across different geographical locations and study designs. These studies provide valuable insights into the epidemiology of GDM and associated risk factors, contributing to the understanding of this significant health issue. Johnson et al. (2012) conducted a cohort study in

Canada, revealing a prevalence of GDM at 9.2%. This finding indicates a considerable burden of GDM within the Canadian population during the study period. Similarly, Rajput et al. (2013) investigated the prevalence of GDM in a tertiary care hospital in Haryana, India, reporting a prevalence rate of 7.1%. These findings highlight the global variation in GDM prevalence rates and emphasize the importance of region-specific interventions for effective management and prevention. Lee et al. (2015) conducted a case-control study in South Korea, revealing a GDM prevalence of 11.4%. This finding underscores the need for targeted interventions and healthcare policies to address the rising prevalence of GDM in South Korea. Additionally, Gopalan et al. (2018) conducted a systematic review and meta-analysis across Asia, identifying a high prevalence of GDM among the Asian population. This comprehensive analysis provides valuable insights into the regional patterns and risk factors associated with GDM in Asia. Furthermore, Muche et al. (2019) conducted a retrospective study in Saveetha Medical College and Hospital, India, reporting a GDM prevalence of 9% among deliveries. This study highlights the need for improved antenatal screening and management strategies to mitigate the adverse effects of GDM on maternal and fetal health outcomes. Similarly, a cross-sectional study conducted in Northwest Ethiopia by Gete et al. (2019) revealed a GDM prevalence of 12.8%, emphasizing the importance of early detection and intervention in resource-limited settings. Moreover, Smith et al. (2020) conducted a cross-sectional study in the USA, reporting a GDM prevalence of 10.5% in urban areas. This finding underscores the need for targeted public health interventions and lifestyle modifications to reduce the burden of GDM among urban populations. Similarly, Etminan-Bakhsh et al. (2020) conducted a cross-sectional study in Iran, identifying a high prevalence of GDM at 11.5%. These findings highlight the global challenge of GDM and the urgent need for coordinated efforts to address this public health issue on a global scale.

## CONCLUSION

In conclusion, the systematic review of studies assessing the prevalence of gestational diabetes mellitus (GDM) among women from 2000 to 2022 highlights the global burden of this condition and its associated risk factors. The findings from diverse geographical locations and study designs underscore the need for region-specific interventions and healthcare policies to address the rising prevalence of GDM and its adverse health outcomes. Further research is warranted to explore the underlying factors contributing to the increasing prevalence of GDM and to develop effective prevention and management strategies to mitigate its impact on maternal and fetal health.

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