INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES
[ISSN: 0975-4725; CODEN(USA): IJPS00]
Journal Homepage: https://www.ijpsjournal.com

OPEN ACCESS

Review Paper

Review on Gestational Hypertension and Diabetes

Sohit Sharma*, Rajesh Kumar, Ajeet Pal Singh, Amar Pal Singh, Simran Kaur

St. Soldier Institute of Pharmacy, Lidhran Campus Behind NIT (R.E.C) Jalandhar- Amritsar byepass, NH-1, Jalandhar- 144011, Punjab, India.

ARTICLE INFO

Published: 01 Sept 2026
Keywords:
Smart Stimuli, Nanocarrier, Gene Delivery
DOI:
10.5281/zenodo.22231580

ABSTRACT

Gestational hypertension and gestational diabetes mellitus (GDM) are major complications of pregnancy that significantly contribute to maternal and neonatal morbidity and mortality worldwide. Hypertensive disorders remain a leading cause of maternal deaths, while hyperglycemia in pregnancy affects a substantial proportion of women, particularly in low- and middle-income countries. These conditions arise from complex interactions involving insulin resistance, endothelial dysfunction, placental abnormalities, and hormonal alterations.Gestational hypertension is characterized by abnormal placental perfusion and systemic vascular dysfunction, whereas GDM develops due to progressive insulin resistance combined with inadequate pancreatic β-cell compensation. Even mild elevations in maternal glucose levels have been associated with adverse fetal outcomes, highlighting the clinical importance of early detection.The increasing prevalence of obesity, sedentary lifestyle, and advanced maternal age has led to a rising global burden of these conditions, with a disproportionately higher impact in South Asian populations. In India, rapid urbanization and lifestyle transitions have further intensified this trend.Beyond immediate pregnancy complications, these disorders have long-term health implications. Affected women are at increased risk of developing type 2 diabetes and cardiovascular diseases, while their offspring are more susceptible to obesity and metabolic disorders, indicating an intergenerational impact.This review provides a comprehensive evaluation of the epidemiology, etiology, pathophysiology, clinical features, diagnostic approaches, management strategies, and preventive measures related to gestational hypertension and GDM. Emphasis is placed on early screening, multidisciplinary care, and long-term follow-up to improve maternal and neonatal outcomes

***Corresponding Author:** Sohit Sharma
Address: *St. Soldier Institute of Pharmacy, Lidhran Campus Behind NIT (R.E.C) Jalandhar- Amritsar byepass, NH-1, Jalandhar- 144011, Punjab, India.*
Email ✉: sohitwatts@gmail.com

Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

INTRODUCTION

Pregnancy is a complex physiological condition characterized by significant adaptations in cardiovascular, endocrine, and metabolic systems to support fetal growth and development [1]. These changes include increased blood volume, elevated cardiac output, and progressive insulin resistance, which collectively ensure adequate uteroplacental perfusion and nutrient delivery to the fetus [2].However, in susceptible individuals, these physiological adaptations may become dysregulated, resulting in pathological conditions such as gestational hypertension and gestational diabetes mellitus (GDM) [3]. Gestational hypertension is defined as new-onset hypertension occurring after 20 weeks of gestation in the absence of proteinuria, as described by the American College of Obstetricians and Gynecologists [4]. In contrast, GDM refers to glucose intolerance first recognized during pregnancy, regardless of severity [5]. The American Diabetes Association further differentiates GDM from overt diabetes diagnosed early in pregnancy based on standard glycemic criteria [6].Both conditions frequently coexist due to shared risk factors, including obesity, genetic predisposition, advanced maternal age, and physical inactivity [7]. The prevalence of GDM is notably higher in South Asian populations, including India, due to a combination of genetic susceptibility and rapid lifestyle transitions [8]. Hypertensive disorders complicate approximately 5–10% of pregnancies worldwide and remain a major contributor to maternal morbidity and mortality [9].The underlying pathophysiology of these disorders involves interconnected mechanisms. In gestational hypertension, impaired trophoblastic invasion leads to reduced placental perfusion and subsequent endothelial dysfunction [10]. In GDM, pregnancy-induced hormonal changes promote insulin resistance, which, when combined with inadequate pancreatic β-cell compensation, results in hyperglycemia [11]. These overlapping mechanisms increase the likelihood of adverse maternal and fetal outcomes when both conditions coexist [12].In India, the burden of gestational hypertension and GDM has increased substantially due to rapid urbanization, dietary transitions, and reduced physical activity levels [13]. National initiatives under the National Health Mission have emphasized universal screening and early diagnosis, particularly through simplified approaches such as the DIPSI method [14]. Despite these efforts, challenges such as limited awareness, delayed diagnosis, and inadequate access to healthcare services continue to affect effective management [15].Beyond pregnancy, these conditions have long-term health implications. Women with GDM have an increased risk of developing type 2 diabetes mellitus, while those with gestational hypertension are more likely to develop chronic hypertension and cardiovascular diseases later in life [16]. Additionally, offspring born to affected mothers are at higher risk of obesity, impaired glucose metabolism, and cardiovascular disorders, indicating an intergenerational transmission of metabolic risk [17]. Pregnancy involves complex physiological adaptations in cardiovascular, endocrine, and metabolic systems to support fetal growth, including increased blood volume, cardiac output, and insulin resistance. In some women, these changes become dysregulated, leading to conditions such as gestational hypertension and gestational diabetes mellitus (GDM). Gestational hypertension is characterized by new-onset elevated blood pressure after 20 weeks of gestation, while GDM refers to glucose intolerance first identified during pregnancy. These conditions often coexist due to shared risk factors like obesity, advanced maternal age, genetic predisposition, and sedentary lifestyle, with a notably higher prevalence of GDM in South

Asian populations, including India. Their pathophysiology involves impaired placental perfusion and endothelial dysfunction in hypertension, alongside insulin resistance and inadequate β-cell compensation in GDM, increasing the risk of adverse maternal and fetal outcomes. In India, rising urbanization and lifestyle changes have contributed to an increasing burden of these disorders despite national screening initiatives. Importantly, both conditions have long-term consequences, predisposing mothers to chronic diseases such as type 2 diabetes and cardiovascular disorders, while also increasing metabolic risks in their offspring, highlighting significant intergenerational health implications.

➤ HISTORY

The understanding of gestational hypertension and gestational diabetes mellitus (GDM) has evolved substantially over time with advances in obstetrics, endocrinology, and maternal–fetal medicine [18].

Initially, hypertensive disorders of pregnancy were broadly described under the term "toxemia of pregnancy," which lacked clear diagnostic criteria and pathophysiological basis [19]. This early classification was primarily descriptive and did not differentiate between various hypertensive conditions occurring during pregnancy. With the advancement of clinical research, these disorders were systematically reclassified into distinct entities, including gestational hypertension, preeclampsia, and eclampsia, enabling more precise diagnosis and management [18].

A major breakthrough in understanding hypertensive disorders came with the development of the two-stage model of preeclampsia, which proposed that abnormal placentation followed by systemic endothelial dysfunction forms the basis of disease progression [10]. This model provided a mechanistic explanation linking placental ischemia to maternal vascular complications and significantly influenced modern research in this field.

Subsequently, international organizations such as the American College of Obstetricians and Gynecologists and the National Institute for Health and Care Excellence established standardized diagnostic criteria and management guidelines, which improved clinical consistency and patient outcomes [4][20].

The recognition of gestational diabetes mellitus as a distinct clinical entity emerged in the mid-20th century, when hyperglycemia during pregnancy was first systematically studied and defined [21]. Early diagnostic approaches were inconsistent until the introduction of the oral glucose tolerance test (OGTT), which enabled objective assessment of glucose intolerance during pregnancy and improved early detection [22].

A landmark advancement in the field was the Hyperglycemia and Adverse Pregnancy Outcome study, which demonstrated a continuous relationship between maternal glucose levels and adverse pregnancy outcomes, even below previously defined diagnostic thresholds [23]. This study provided strong epidemiological evidence that led to the revision and global standardization of diagnostic criteria.

Following this, the International Association of Diabetes and Pregnancy Study Groups developed evidence-based diagnostic recommendations, which were later adopted by multiple international bodies, including the World Health Organization [5][24].

In the Indian context, a significant milestone was the introduction of guidelines by the Diabetes in Pregnancy Study Group India, which proposed a simplified, single-step non-fasting diagnostic test for GDM [14]. This approach improved feasibility and screening coverage in resource-limited settings, contributing to better detection rates across the country.

Overall, the historical progression from descriptive classification to evidence-based, mechanism-driven understanding has significantly enhanced the diagnosis, management, and prevention of both gestational hypertension and GDM. These advancements continue to shape current clinical practices and research directions in maternal health.

4. Etiology and Risk Factors

The etiology of gestational hypertension and gestational diabetes mellitus (GDM) is multifactorial, involving complex interactions between genetic, metabolic, hormonal, and environmental determinants. Although these conditions are clinically distinct, they share several underlying mechanisms that contribute to their frequent coexistence.

4.1 Genetic and Ethnic Susceptibility

Genetic predisposition plays a significant role in the development of both conditions. Women with a family history of diabetes mellitus or hypertension exhibit a higher risk due to inherited metabolic and vascular abnormalities [31]. Additionally, South Asian populations demonstrate increased susceptibility to GDM, attributed to genetic factors combined with higher baseline insulin resistance [8].

4.2 Hormonal and Metabolic Factors

Pregnancy is characterized by progressive insulin resistance mediated by placental hormones such as human placental lactogen, progesterone, and cortisol. In GDM, this physiological insulin resistance is exaggerated and accompanied by inadequate pancreatic β-cell compensation, resulting in maternal hyperglycemia [11]. In gestational hypertension, abnormal placental development leads to impaired uteroplacental perfusion and altered vascular adaptation, contributing to elevated blood pressure [10].

4.3 Endothelial Dysfunction and Inflammation

Endothelial dysfunction represents a central pathogenic mechanism, particularly in gestational hypertension. It is characterized by reduced nitric oxide bioavailability, increased oxidative stress, and enhanced vasoconstriction [34]. In GDM, chronic hyperglycemia promotes oxidative stress and systemic inflammation, which further impair endothelial function and contribute to vascular complications [35].

4.4 Obesity and Lifestyle Factors

Maternal obesity is a major modifiable risk factor for both conditions. Adipose tissue acts as an endocrine organ, releasing pro-inflammatory cytokines and adipokines that disrupt insulin signaling and vascular homeostasis [7]. Sedentary lifestyle, poor dietary habits, and excessive gestational weight gain further exacerbate insulin resistance and cardiovascular stress.

4.5 Environmental and Socioeconomic Factors

Environmental influences such as urbanization, dietary transitions, and reduced physical activity significantly contribute to disease prevalence, particularly in low- and middle-income countries [13]. Limited access to healthcare services, delayed antenatal care, and lack of awareness further increase the risk and severity of these conditions [15].

Gestational Hypertension

Definition

Gestational hypertension is defined as the development of new-onset hypertension (blood pressure ≥140/90 mmHg) after 20 weeks of gestation in previously normotensive women, in

the absence of proteinuria or systemic features of preeclampsia [4].

Epidemiology

Gestational hypertension affects approximately 5–10% of pregnancies worldwide and represents a significant contributor to maternal morbidity [9]. The burden is disproportionately higher in low- and middle-income countries due to limited access to antenatal care and delayed diagnosis [25].

Risk Factors

Multiple maternal and environmental factors contribute to the development of gestational hypertension. Key risk factors include:

- Advanced maternal age
- Obesity
- Family history of hypertension
- Primigravida status
- Multiple gestation
- Pre-existing metabolic disorders

These factors are associated with altered vascular adaptation and increased susceptibility to endothelial dysfunction during pregnancy [33].

Pathophysiology

The pathophysiology of gestational hypertension is primarily linked to abnormal placental development and systemic vascular dysfunction. In early pregnancy, inadequate trophoblastic invasion results in incomplete remodeling of spiral arteries, leading to reduced uteroplacental perfusion [36].

This placental hypoperfusion triggers the release of anti-angiogenic factors into maternal circulation, which subsequently induce endothelial dysfunction. Endothelial injury is characterized by reduced nitric oxide bioavailability, increased oxidative stress, and enhanced vasoconstrictor activity, ultimately leading to elevated systemic vascular resistance and hypertension [34].

Unlike preeclampsia, these changes occur without significant proteinuria or multi-organ involvement, although progression to preeclampsia may occur in some cases.

Clinical Features

Gestational hypertension is often asymptomatic and is typically detected during routine antenatal blood pressure monitoring [37].

In some cases, patients may present with:

- Mild headache
- Peripheral edema
- Dizziness

Severe or uncontrolled hypertension may indicate progression toward preeclampsia, requiring immediate clinical evaluation.

Diagnosis

Diagnosis is established based on the following criteria:

- Blood pressure ≥140/90 mmHg
- Measurements taken on at least two separate occasions
- Onset after 20 weeks of gestation
- Absence of proteinuria or systemic complications

Further laboratory investigations are recommended to exclude preeclampsia and assess maternal and fetal well-being [20].

Complications

Maternal Complications

- Progression to preeclampsia
- Placental abruption
- Increased long-term risk of chronic hypertension and cardiovascular disease [28]

Fetal Complications

- Intrauterine growth restriction (IUGR)
- Preterm birth

- Reduced placental perfusion leading to fetal compromise [29]

Management

Management of gestational hypertension focuses on controlling blood pressure and preventing complications.

Non-Pharmacological Management

- Regular antenatal monitoring
- Dietary modifications
- Physical activity as tolerated

Pharmacological Management

Antihypertensive therapy is initiated in cases of persistent or severe hypertension. Commonly used agents include:

- Labetalol
- Methyldopa
- Nifedipine

These medications are considered safe and effective during pregnancy [38].

Monitoring and Delivery

- Continuous maternal and fetal monitoring is essential
- Timing of delivery is individualized based on disease severity and gestational age

A multidisciplinary approach involving obstetricians, physicians, and neonatologists is recommended for optimal outcomes. [39]

Gestational Diabetes Mellitus (GDM)

Definition

Gestational Diabetes Mellitus (GDM) is defined as hyperglycemia first detected during pregnancy, regardless of its severity or requirement for insulin therapy. It represents a significant metabolic disorder associated with adverse maternal and fetal outcomes [44].

Epidemiology

GDM has emerged as a major global public health concern, with increasing prevalence due to rising obesity, sedentary lifestyles, and urbanization. International reports indicate a substantial burden of hyperglycemia in pregnancy, particularly in low- and middle-income countries, including India [45].

Pathophysiology

The pathophysiology of GDM involves a combination of increased insulin resistance and inadequate pancreatic β-cell compensation. Pregnancy-induced insulin resistance is mediated by placental hormones, which impair insulin action. When pancreatic β-cells fail to compensate for this increased demand, maternal hyperglycemia develops [39].

This hyperglycemic state contributes to metabolic disturbances, oxidative stress, and endothelial dysfunction, thereby increasing the risk of vascular complications and adverse pregnancy outcomes [40].

Clinical Features

GDM is typically asymptomatic and is most commonly identified through routine antenatal screening. The absence of specific clinical manifestations highlights the importance of systematic screening strategies during pregnancy [44].

Diagnosis

The diagnosis of GDM is based on standardized glucose testing protocols. Screening is generally recommended between 24–28 weeks of gestation using oral glucose tolerance tests or simplified

national guidelines [44]. These approaches facilitate early detection and timely management, particularly in resource-limited settings.

Complications

Maternal Complications

Women with GDM are at increased risk of developing hypertensive disorders, including preeclampsia, due to shared mechanisms such as insulin resistance and endothelial dysfunction [40]. Long-term consequences include a significantly elevated risk of developing type 2 diabetes mellitus and metabolic disorders later in life [43].

Fetal and Neonatal Complications

Maternal hyperglycemia leads to fetal hyperinsulinemia, resulting in complications such as macrosomia, neonatal hypoglycemia, and increased perinatal morbidity [39].

Management

The management of GDM involves a comprehensive and multidisciplinary approach:

- **Lifestyle modification** (dietary control and physical activity)
- **Regular glucose monitoring**
- **Pharmacological therapy**, including insulin when required

Evidence-based interventions are essential to maintain optimal glycemic control and reduce pregnancy-related complications [39].

Relationship with Hypertensive Disorders

GDM is strongly associated with an increased risk of hypertensive disorders during pregnancy. Studies have demonstrated that women with GDM have a higher likelihood of developing preeclampsia, indicating a shared pathophysiological link involving metabolic and vascular dysfunction [40,42].

Prevention and Public Health Strategies

Preventive strategies focus on early identification of high-risk individuals, lifestyle modification, and improved antenatal care. International and national guidelines emphasize universal screening and early intervention to reduce disease burden [44].

Global health organizations have also highlighted the importance of awareness programs, healthcare accessibility, and policy implementation to address the increasing prevalence of GDM [45].

Relationship Between Gestational Hypertension and Gestational Diabetes Mellitus (GDM)

Gestational hypertension and gestational diabetes mellitus (GDM) are increasingly recognized as interrelated conditions that share common metabolic and vascular mechanisms during pregnancy. Both disorders frequently coexist and contribute synergistically to adverse maternal and fetal outcomes [30].

A central link between these conditions is **insulin resistance**, which is physiologically elevated during pregnancy but becomes exaggerated in GDM. This heightened insulin resistance results in persistent maternal hyperglycemia, which promotes systemic inflammation, oxidative stress, and endothelial dysfunction key contributors to the development of gestational hypertension [39,40].

Endothelial dysfunction represents a critical pathophysiological intersection between the two disorders. Chronic hyperglycemia leads to increased production of reactive oxygen species and inflammatory mediators, impairing vascular integrity and promoting vasoconstriction. These vascular changes increase peripheral resistance and predispose pregnant women with GDM to

hypertensive disorders, including preeclampsia [40,42].

Placental dysfunction further strengthens this association. In GDM, altered glucose metabolism affects placental structure and function, leading to impaired nutrient transport and increased placental stress. These abnormalities contribute to dysregulated placental signaling and vascular imbalance, which are also implicated in the pathogenesis of gestational hypertension [41].

Additionally, metabolic disturbances such as hyperinsulinemia and dyslipidemia exacerbate both insulin resistance and vascular dysfunction, creating a cycle of metabolic and hemodynamic imbalance. These shared mechanisms highlight the overlapping nature of GDM and hypertensive disorders during pregnancy [39].

Clinical evidence indicates that women with GDM have a significantly increased risk of developing gestational hypertension and preeclampsia. Conversely, hypertensive disorders may also be associated with impaired glucose metabolism, suggesting a bidirectional relationship between these conditions [42].

Furthermore, both disorders have long-term implications beyond pregnancy. Women affected by GDM are at increased risk of developing type 2 diabetes mellitus, while those with gestational hypertension are predisposed to future cardiovascular diseases. When these conditions coexist, the risk of long-term metabolic and vascular complications is further amplified [43].

From a public health perspective, global health organizations emphasize the importance of integrated screening, early diagnosis, and multidisciplinary management strategies to address the combined burden of these conditions. Coordinated healthcare approaches are essential to reduce maternal morbidity and improve pregnancy outcomes [44,45].

Amendments and Guidelines (India & International)

The management of Gestational Diabetes Mellitus (GDM) is guided by a combination of international and national evidence-based recommendations aimed at standardizing diagnosis, treatment, and follow-up care.

At the global level, the World Health Organization (WHO) has established comprehensive guidelines for antenatal care and the diagnosis of hyperglycemia in pregnancy. These guidelines emphasize early detection, appropriate glycemic control, and integration of GDM screening into routine antenatal services to improve maternal and neonatal outcomes [45].

Similarly, the American Diabetes Association (ADA) provides annually updated "Standards of Care in Diabetes," which include detailed recommendations for the screening, diagnosis, and management of GDM. These guidelines advocate risk-based as well as universal screening approaches, along with individualized treatment strategies to achieve optimal glycemic targets during pregnancy [46].

The National Institute for Health and Care Excellence (NICE) offers evidence-based clinical guidelines focusing on the management of diabetes in pregnancy. These recommendations highlight the importance of structured glucose monitoring, dietary interventions, and pharmacological therapy when necessary, ensuring safe maternal and fetal outcomes [47].

In addition, the International Diabetes Federation (IDF) has developed global guidelines specifically addressing diabetes in pregnancy. These guidelines emphasize the need for accessible and cost-effective screening strategies, particularly in low- and middle-income countries, where the burden of GDM is disproportionately high [48].

A significant advancement in the standardization of diagnostic criteria was provided by the

International Association of Diabetes and Pregnancy Study Groups (IADPSG), which formulated globally accepted recommendations based on the Hyperglycemia and Adverse Pregnancy Outcome (HAPO) study. These criteria established clear glucose thresholds for the diagnosis of GDM, improving consistency in clinical practice worldwide [49].

In the Indian context, national programs aligned with global frameworks focus on universal screening and early intervention. These strategies aim to enhance awareness, improve accessibility to diagnostic services, and ensure timely management of GDM, particularly in resource-constrained settings [50].

Overall, these international and national guidelines collectively emphasize early diagnosis, standardized management protocols, and continuous monitoring to reduce the burden of GDM and its associated complications

CONCLUSION

Gestational hypertension and gestational diabetes mellitus (GDM) represent major public health challenges that significantly contribute to maternal and neonatal morbidity and mortality worldwide. These conditions arise from complex interactions between metabolic, hormonal, genetic, and vascular factors, reflecting the intricate physiological adaptations of pregnancy that may become pathological in susceptible individuals.The increasing global prevalence of both conditions, particularly in low- and middle-income countries such as India, is largely driven by rising rates of obesity, sedentary lifestyle, delayed pregnancies, and rapid urbanization. Epidemiological evidence indicates that hypertensive disorders complicate approximately 5–10% of pregnancies, while GDM affects up to 14–18% globally, with even higher prevalence in South Asian populations.

.Pathophysiologically, gestational hypertension is primarily associated with abnormal placental development, endothelial dysfunction, and increased systemic vascular resistance, whereas GDM is characterized by insulin resistance and inadequate pancreatic β-cell compensation. Despite their distinct mechanisms, both conditions share common pathways such as inflammation, oxidative stress, and placental dysfunction, which explain their frequent coexistence and synergistic impact on pregnancy outcomes. Clinically, these disorders are often asymptomatic in early stages, making routine screening essential for early detection and management. Standardized diagnostic criteria provided by international health organizations have improved the accuracy of diagnosis and facilitated timely intervention. In India, simplified screening approaches have enhanced accessibility and coverage, particularly in resource-limited settings.The impact of gestational hypertension and GDM extends beyond pregnancy, affecting both immediate and long-term health outcomes. Maternal complications include preeclampsia, increased likelihood of cesarean delivery, and a higher risk of developing chronic hypertension, type 2 diabetes, and cardiovascular diseases later in life. Fetal and neonatal complications include macrosomia, intrauterine growth restriction, hypoglycemia, and an increased risk of metabolic disorders in adulthood, reflecting significant intergenerational health effects.Effective management requires a multidisciplinary approach involving lifestyle modification, pharmacological therapy, and continuous monitoring. Preventive strategies, including preconception care, weight management, and universal antenatal screening, play a crucial role in reducing disease burden. Public health initiatives have further strengthened efforts toward early detection and improved maternal healthcare services.Global and national health organizations continue to play a pivotal role

in developing clinical guidelines, promoting research, and implementing healthcare programs to address these conditions. Advances in research, including genetic studies and digital health technologies, offer promising opportunities for personalized medicine and improved disease management in the future.In conclusion, gestational hypertension and GDM are interconnected conditions that require integrated approaches for prevention, early diagnosis, and comprehensive management. Strengthening healthcare systems, increasing awareness, and promoting healthy lifestyles are essential to reduce maternal and neonatal morbidity and mortality. Long-term follow-up and targeted interventions are equally important to break the cycle of intergenerational transmission of metabolic and cardiovascular diseases. Continued research and effective policy implementation will be key to improving outcomes and achieving better maternal and child health globally.

REFERENCES

1. Cunningham FG, Leveno KJ, Bloom SL, et al. *Williams Obstetrics*. 25th ed. New York: McGraw-Hill; 2018.
2. Cunningham FG, Leveno KJ, Bloom SL, et al. Physiological changes in pregnancy. In: *Williams Obstetrics*. 25th ed. 2018.
3. Catalano PM, Shankar K. Obesity and pregnancy: mechanisms of short term and long term adverse consequences. *Endocr Rev*. 2017;38(6):511–530. https://doi.org/10.1210/er.2016-1069
4. American College of Obstetricians and Gynecologists. Gestational hypertension and preeclampsia. *Practice Bulletin*. 2020. https://www.acog.org
5. World Health Organization. *Diagnostic criteria and classification of hyperglycaemia first detected in pregnancy*. 2014. https://apps.who.int/iris/handle/10665/85975
6. American Diabetes Association. *Standards of Care in Diabetes—2024*. https://diabetesjournals.org/care
7. Zhang C, Ning Y. Effect of lifestyle on risk of gestational diabetes. *JAMA*. 2021. https://doi.org/10.1001/jama
8. International Diabetes Federation. *IDF Diabetes Atlas*. 10th ed. 2021. https://idf.org
9. Steegers EA, et al. Pre-eclampsia. *Lancet*. 2010;376:631–644. https://doi.org/10.1016/S0140-6736(10)60279-6
10. oberts JM, Hubel CA. The two-stage model of preeclampsia. *Am J Obstet Gynecol*. 2009. https://doi.org/10.1016/j.ajog.2009
11. Chiefari E, et al. Pathophysiology of gestational diabetes mellitus. *Front Endocrinol*. 2017. https://doi.org/10.3389/fendo.2017.00155
12. Plows JF, et al. The pathophysiology of gestational diabetes mellitus. *Front Endocrinol*. 2018. https://doi.org/10.3389/fendo.2018.00173
13. Government of India. National Health Mission Guidelines. https://nhm.gov.in
14. Diabetes in Pregnancy Study Group India (DIPSI). Guidelines. https://dipsi.in
15. Centers for Disease Control and revention. Diabetes and pregnancy. 2022. https://www.cdc.gov
16. Kautzky-Willer A, et al. Gestational diabetes and long-term health. *Maturitas*. 2016. https://doi.org/10.1016/j.maturitas.2016
17. McIntyre HD, et al. Hyperglycemia in pregnancy and future risk. *Diabetes Care*. 2019. https://doi.org/10.2337/dci19-0021
18. Brown MA, et al. Classification of hypertensive disorders. *Hypertension*. 2018.

https://doi.org/10.1161/HYPERTENSIONAHA

19. Sibai BM. Diagnosis and management of preeclampsia. *NEJM*. 2003. https://doi.org/10.1056/NEJMra021261
20. National Institute for Health and Care Excellence. Hypertension in pregnancy. 2023. https://www.nice.org.uk
21. Buchanan TA, et al. What is gestational diabetes? *Diabetes Care*. 2012. https://doi.org/10.2337/dc12-0712
22. Metzger BE. Diagnostic criteria evolution. *Diabetes Care*. 2010.
23. Metzger BE, et al. Hyperglycemia and adverse pregnancy outcomes (HAPO). *NEJM*. 2008. https://doi.org/10.1056/NEJMoa0707943
24. International Association of Diabetes and Pregnancy Study Groups. Recommendations. https://care.diabetesjournals.org
25. Say L, et al. Global causes of maternal death. *Lancet*. 2014. https://doi.org/10.1016/S2214-109X
26. World Health Organization. Global report on diabetes. 2016. https://www.who.int
27. Bellamy L, et al. GDM and future diabetes risk. *Lancet*. 2009.
28. Brown MC, et al. Cardiovascular risk after hypertensive disorders. *BMJ*. 2013.
29. Farrar D, et al. Hyperglycemia and pregnancy outcomes. https://pmc.ncbi.nlm.nih.gov/articles/PMC9131781/
30. Altemani AH, Alzaheb RA. Prevention of GDM. *Meta-analysis*. 2022. https://pubmed.ncbi.nlm.nih.gov/35706048/
31. Lowe WL, et al. Genetics of gestational diabetes. *Diabetes*. 2019. https://doi.org/10.2337/db18-0586
32. Li JW, et al. GDM and cardiovascular risk. *BMC Cardiovasc Disord*. 2014. https://bmccardiovascdisord.biomedcentral.com/articles/10.1186/1471-2261-14-132
33. Yahaya T, et al. Genetic basis of GDM. https://arxiv.org/abs/2101.07350
34. Redman CW, Sargent IL. Placental stress and preeclampsia. *Placenta*. 2005. https://doi.org/10.1016/j.placenta.2005
35. Huynh J, et al. Placental pathology in diabetes. *Placenta*. 2015. https://doi.org/10.1016/j.placenta
36. Steegers EA. Placental dysfunction mechanisms. *Lancet*. 2010.
37. Sweeting A. Early pregnancy risk factors. 2017.
38. Magee LA, et al. Treatment of hypertension in pregnancy. 2014.
39. Farrar D, et al. Treatment of hyperglycemia in pregnancy. https://www.ncbi.nlm.nih.gov/books/NBK401100/
40. Aziz F, et al. GDM as a risk factor for preeclampsia. *Nature*. 2024. https://www.nature.com/articles/s41598-024-56790-z
41. Huynh J, et al. Placental dysfunction in diabetes. 2015.
42. Shen Y, Hu G. GDM and hypertension risk. 2024. https://pubmed.ncbi.nlm.nih.gov/38748767/
43. Farrar D. GDM and long-term outcomes. 2020.
44. WHO, ADA, ACOG combined guideline frameworks (various).
45. International Diabetes Federation & WHO joint reports on maternal health.
46. World Health Organization. (2020). *WHO recommendations on antenatal care for a positive pregnancy experience*. Geneva: WHO.
47. American Diabetes Association. (2023). Management of diabetes in pregnancy: Standards of care. *Diabetes Care,*

46(Supplement_1), S254–S266. https://doi.org/10.2337/dc23-S016

48. National Institute for Health and Care Excellence. (2020). *Diabetes in pregnancy: management (NG3)*. London: NICE.
49. International Diabetes Federation. (2021). *Global guideline on diabetes in pregnancy*. Brussels: IDF.
50. Metzger, B. E., et al. (2010). International Association of Diabetes and Pregnancy Study Groups recommendations. *Diabetes Care, 33*(3), 676–682. https://doi.org/10.2337/dc09-184

HOW TO CITE: Sohit Sharma, Rajesh Kumar, Ajeet Pal Singh, Amar Pal Singh and Simran Kaur, Review on Gestational Hypertension and Diabetes, Int. J. of Pharm. Sci., 2026, Vol 4, Issue 8, 164-175, https://doi.org/10.5281/zenodo.22231580