Multidisciplinary Surgical Research Annals
https://msrajournal.com/index.php/Journal/issue/view/15
Volume 3, Issue 3 (2025)
Online ISSN 3007-1941
Print ISSN 3007-1933
https://msrajournal.com/index.php/Journal/issue/view/15

GESTATIONAL DIABETES MELLITUS: EPIDEMIOLOGY, DIAGNOSIS, MANAGEMENT, AND STRATEGIES FOR MATERNAL HEALTH

Saira Ghaffar
University College of Conventional Medicine, Faculty of Medicine and Allied Health Sciences, Khwaja Fareed Campus, The Islamia University of Bahawalpur, Pakistan
Muhammad Ibrahim Khalil
Department of Physiology, College of Basic Medical Sciences, Liaoning Provincial Key Laboratory of Cerebral Diseases, Dalian Medical University, No 9 Western Section, Lvshun South Road, Dalian City, Liaoning 116044, P.R. China
Shafqat Rasool
School of Eastern Medicine, Minhaj University Lahore, Pakistan
Muhammad Sohail
Department of Pharmacy, Faculty of Medical and Health Sciences, University of Poonch Rawalakot, Azad Kashmir, Pakistan
Nargis Rehman
Hajama and Herbal Health Center, Bhimber Azad Kashmir, Pakistan
Muhammad Amjad Chishti
Department of Eastern Medicine, Superior University Lahore, Pakistan
Mudassar Khan
Health Services Academy, Islamabad Pakistan
Fahad Said Khan
Department of Eastern Medicine, Faculty of Medical and Health Sciences, University of Poonch Rawalakot Azad Kashmir Pakistan
Muhammad Imran
Mohi ud Din Islamic Institute of Pharmaceutical Sciences, MIU, Mirpur,AJK,Pakistan
Hamid Hussain Afridi
Department of Pharmacy, Shaheed Benazir Bhutto University Sheringal Dir (Upper), Dir
Salma Rani
Department of Microbiology, University of Lahore, Pakistan
Akif Saeed Ch
Director Medical Services and Research Hope Family Clinic & Rehab Faisalabad Pakistan
Raessa Noor
University College of Conventional Medicine, Islamia University Bahawalpur, Bahawalpur, Pakistan
Shafiq Ur Rahman
Hareem Fatima Polyclinic KLP Road Noor Pur Noornga Bahawalpur, Pakistan
Idrees Khan
University College of Conventional Medicine, Islamia University Bahawalpur, Bahawalpur, Pakistan
Fethi Ahmet Ozdemir
Department of Molecular Biology and Genetics, Faculty of Science and Art, Bingol University, Bingol, 1Türkiye, Pakistan
Gaweł Sołowski
Department of Molecular Biology and Genetics, Faculty of Science and Art, Bingol University, Bingol, Türkiye, Pakistan
Muhammad Akram
Department of Eastern Medicine, Government College University Faisalabad Pakistan
Corresponding Author: muhammadakram@gcuf.edu.pk

Multidisciplinary Surgical Research Annals
https://msrajournal.com/index.php/Journal/issue/view/15
Volume 3, Issue 3 (2025)
Online ISSN 3007-1941
Print ISSN 3007-1933
https://msrajournal.com/index.php/Journal/issue/view/15

Abstract
Gestational diabetes mellitus (GDM) represents a condition characterized by impaired glucose tolerance that emerges or is first recognized during pregnancy. This comprehensive review examines the epidemiological patterns, underlying causes, clinical manifestations, diagnostic approaches, complications, and therapeutic strategies associated with GDM. A systematic literature search was performed using databases including PubMed, Cochrane Library, and specialized repositories to compile accurate data and pertinent research findings. The global incidence of GDM continues to rise, particularly within developing nations, driven by factors including sedentary behavior patterns, increasing rates of overweight and obesity, and limited health literacy among women in their childbearing years. Key risk determinants contributing to GDM development include older maternal age, genetic predisposition to diabetes, and prior GDM episodes. Clinical complications encompass maternal conditions such as preeclampsia and hypertension, alongside adverse fetal outcomes including excessive birth weight and neonatal hypoglycemia. Critical diagnostic approaches involve oral glucose tolerance testing (OGTT) and hemoglobin A1c measurements. Comprehensive management encompasses nutritional modifications, physical activity programs, glucose level surveillance, and pharmacological treatment when indicated. Targeted nutritional interventions demonstrate particular effectiveness in optimizing blood sugar control among pregnant women diagnosed with GDM. Prevention strategies focus on patient education, weight management, and pre-pregnancy counseling. This analysis underscores the critical need for behavioral modifications, timely screening protocols, and enhanced awareness campaigns to address the growing public health impact of GDM while promoting optimal maternal and fetal health outcomes.
Keywords: Gestational Diabetes Mellitus, Pregnancy, Risk Factors, Glycemic Control, Maternal and Neonatal Health

Introduction

Effective planning, resource allocation, and preventive strategies for future epidemiological challenges in gestational diabetes mellitus (GDM) depend on data related to the prevalence of the condition and the number of affected women. Women diagnosed with GDM are at risk of complications such as hypertension, while their offspring face increased risks of high birth weight and mortality rates. (Crowther; 2005, Dodd *et al.*, 2007). Different population studies, diagnostic tools, and varying criteria across regions suggest that the prevalence rate of gestational diabetes mellitus (GDM) ranges from 1% to 14% in all pregnancies (Schdmit *et al.*, 2004). In adults, the oral glucose tolerance test (OGTT) is the internationally recognized standard for diagnosing diabetes. According to Schmid et al. (2001), the American Diabetes Association (ADA) and the World Health Organization (WHO) have different diagnostic criteria for diabetes mellitus. The WHO characterizes gestational diabetes mellitus (GDM) as a combination of diabetes and glucose intolerance, which differs from the ADA's definition of diabetes.

Women who meet the diagnostic criteria for diabetes mellitus established by the American Diabetes Association (ADA) or the World Health Organization (WHO) experience higher rates of complications compared with those who do not meet either standard. Globally, all pregnant women are screened for diabetes mellitus as part of routine risk assessment;

Multidisciplinary Surgical Research Annals
https://msrajournal.com/index.php/Journal/issue/view/15
Volume 3, Issue 3 (2025)
Online ISSN 3007-1941
Print ISSN 3007-1933
https://msrajournal.com/index.php/Journal/issue/view/15

however, no comparable screening data exist for non-pregnant women. In low- and middle-income countries such as India and Pakistan, high parity (≥5 live births) is common, and multiple studies have reported a strong association between multiparity and the development of diabetes mellitus. Multiparity is linked to both maternal and fetal complications, underscoring the need for targeted screening and preventive strategies in this population. (Zargar, 2004, Sesiah et al., 2004). In previous studies, it was believed that women diagnosed with gestational diabetes mellitus (GDM) experienced elevated perinatal mortality rates. Several factors, including advanced maternal age, elevated body mass index (BMI), and a positive family history of diabetes, have been identified as contributors to an increased risk of postnatal mortality. Research conducted by Metzger et al. (2008) indicates that GDM is associated with a heightened risk of pre-eclampsia among Chinese women and other populations, which can subsequently lead to maternal complications such as cardiovascular diseases. Furthermore, offspring of mothers with diabetes are at risk of developing complications, including elevated BMI, diabetes mellitus, and cardiovascular issues during childhood and into adulthood (Hiller *et al.*, 2007).

Maternal and fetal complications can be highly reduced if GDM is properly treated (Innes *et al.*, 2002). Research conducted by Ferrara and colleagues (2002) identified several complications associated with gestational diabetes mellitus, including hypocalcemia, polycythemia, fetal macrosomia, birth defects, and elevated bilirubin concentrations. Women diagnosed with GDM face heightened susceptibility to developing diabetes in later years; particularly type 2 diabetes mellitus, along with an elevated risk of cardiovascular complications. Additionally, offspring of mothers with GDM demonstrate an increased predisposition to both obesity and diabetes mellitus. Within developing nations, this population subgroup requires focused healthcare attention and targeted interventions. Maternal and fetal morbidity can be reduced by early diagnosis of GDM (Kim *et al.*, 2002). Mothers with gestational diabetes mellitus (GDM) and their newborns are often admitted to hospitals due to complications such as preterm birth, neonatal macrosomia, hypoglycemia, and respiratory distress syndrome.

Numerous studies indicate that lifestyle modifications, including the adoption of a balanced diet and regular physical activity, significantly reduce the risk of developing gestational diabetes mellitus (GDM) (Poprzeczny et al., 2025). Behavioral interventions are often more effective than pharmacological treatments in managing insulin levels in women diagnosed with GDM. It is essential to implement awareness programs aimed at educating pregnant women and those planning to conceive about the importance of early detection, diagnosis, and management of gestational diabetes. Early diagnosis and appropriate management are critical to mitigating the complications associated with GDM.

Globally, medicinal plants are widely utilized for the treatment of various ailments. Herbal medicines are often considered more effective and associated with fewer side effects compared to synthetic pharmaceuticals. The therapeutic applications of herbal drugs are well-documented within traditional medicine systems. A systematic approach to the therapeutic use of medicinal plants is increasingly being adopted, reflecting a growing trend to evaluate their ethnobotanical applications. According to the World Health Organization (WHO),

Multidisciplinary Surgical Research Annals
https://msrajournal.com/index.php/Journal/issue/view/15
Volume 3, Issue 3 (2025)
Online ISSN 3007-1941
Print ISSN 3007-1933
https://msrajournal.com/index.php/Journal/issue/view/15

approximately 80% of the global population relies on herbal medicines to meet their daily health needs.
(Shinwari *et al.*, 2007). Herbal medicines and traditional foods are never neglected (Pieroni *et al.*, 2002).

GDM Symptoms

- Vision disturbance
- Hands or feet numbness
- Increased thirst
- Increased frequency of urination
- Slow healing of sores
- Excessive fatigue

Causes of Gestational Diabetes Mellitus

Gestational diabetes mellitus develops through two primary mechanisms. The first involves inadequate insulin secretion by the pancreatic beta cells to meet the increased metabolic demands of pregnancy (Yameny, 2025). The second mechanism occurs when the mother's tissues become resistant to insulin action, preventing effective glucose utilization despite normal or even elevated insulin levels. These pathophysiological processes both lead to maternal hyperglycemia.

Several factors increase the likelihood of developing gestational diabetes:

- Maternal age exceeding 30 years
- Family history of type 2 diabetes
- Prior gestational diabetes in previous pregnancies
- History of delivering macrosomic infants (birth weight >4.3 kg or 9.5 lbs)
- Previous unexplained fetal loss or stillbirth
- Elevated pre-pregnancy body mass index or obesity
- Ethnicity, with higher prevalence among Native American, Hispanic, Asian, Pacific Islander, and African American populations

These risk factors help healthcare providers identify women who may benefit from enhanced screening and monitoring during pregnancy.

Diagnosis of GDM

Healthcare providers typically rely on blood glucose assessments to diagnose gestational diabetes. The timing of these evaluations varies based on clinical judgment and the presence of pregnancy-related complications. For routine pregnancies, screening commonly occurs between 24-28 weeks of gestation. However, women with established risk factors should undergo earlier testing rather than waiting until the standard screening window.

Multidisciplinary Surgical Research Annals
https://msrajournal.com/index.php/Journal/issue/view/15
Volume 3, Issue 3 (2025)
Online ISSN 3007-1941
Print ISSN 3007-1933
https://msrajournal.com/index.php/Journal/issue/view/15

Blood glucose measurement serves as the cornerstone for confirming gestational diabetes. The Glucose Tolerance Test (GTT) represents a key diagnostic tool, involving blood sample collection 30 minutes following consumption of a glucose solution.

When GTT results indicate elevated glucose levels, clinicians may proceed with the Oral Glucose Tolerance Test (OGTT). This comprehensive assessment begins with baseline blood glucose measurement, followed by glucose solution administration and subsequent blood draws at one or multiple intervals to evaluate glucose metabolism.

Hemoglobin A1c (HbA1c) testing provides valuable insight into average blood glucose control over the preceding 2-3 months. This test offers a broader perspective on glucose management and can complement other diagnostic measures in evaluating maternal glucose homeostasis during pregnancy. Sha *et al.*, (2025) developed a tongue test using automatic tongue image recognition that could facilitate GDM diagnosis.

The selection and timing of these diagnostic approaches allow healthcare providers to identify gestational diabetes effectively and implement appropriate management strategies.

.

Consequences of GDM

Infants born to mothers with diabetes can develop normally if the mother receives appropriate treatment and prenatal care throughout pregnancy. In contrast, untreated or poorly controlled diabetes during gestation can result in serious fetal complications. Elevated maternal blood glucose levels may cause fetal hyperglycemia, leading to macrosomia and an increased risk of delivery-related complications. Postnatally, such infants are at risk of hypoglycemia due to persistent insulin secretion. Uncontrolled gestational diabetes mellitus (GDM) is also associated with other neonatal complications, including neonatal jaundice, respiratory distress, and, in severe cases, intrauterine or perinatal death. Furthermore, these children have a higher lifetime risk of developing type 2 diabetes mellitus in adulthood (Pallv *et al.*, 2014). Women with gestational diabetes mellitus (GDM) during their first trimester are more likely to experience fetal anatomical and physiological defects compared to non-diabetic mothers. Additionally, there is a higher rate of abortions in diabetic women.

Management of Gestational Diabetes Mellitus

Appropriate management of gestational diabetes significantly reduces the risk of maternal and fetal complications (Hannah et al. 2025). Effective treatment strategies encompass several key approaches that work synergistically to maintain optimal glucose control throughout pregnancy**.**

Dietary Management

Nutritional intervention forms the foundation of gestational diabetes treatment. A well-balanced meal plan helps regulate blood sugar levels while ensuring adequate nutrition for both mother and developing baby. This typically involves controlling carbohydrate intake, emphasizing complex carbohydrates, and maintaining consistent meal timing**.**

Physical Activity

Multidisciplinary Surgical Research Annals
https://msrajournal.com/index.php/Journal/issue/view/15
Volume 3, Issue 3 (2025)
Online ISSN 3007-1941
Print ISSN 3007-1933
https://msrajournal.com/index.php/Journal/issue/view/15

Regular physical exercise plays a crucial role in glucose regulation by improving insulin sensitivity and promoting glucose uptake by muscles. Safe, pregnancy-appropriate activities should be incorporated into the daily routine under medical supervision.

Pharmacological Intervention

When lifestyle modifications prove insufficient to achieve target glucose levels, insulin therapy becomes necessary. Insulin remains the preferred medication during pregnancy due to its safety profile and inability to cross the placental barrier.

Ongoing Monitoring

Home blood glucose monitoring allows for real-time assessment of glycemic control, enabling timely adjustments to treatment plans. Regular self-monitoring helps identify patterns and guides therapeutic decisions.

Treatment Optimization

As pregnancy progresses and insulin resistance typically increases, medication dosages require periodic adjustment to maintain appropriate glucose targets. This individualized approach ensures optimal outcomes for both mother and baby throughout the gestational period.

Nutritional Guidelines for Women with Gestational Diabetes

General Dietary Approach

While no universal meal plan exists for gestational diabetes, maintaining well-balanced nutrition is essential for achieving stable blood glucose levels. The key lies in creating an individualized approach that meets both maternal nutritional needs and glucose management goals.

Professional Guidance

Consulting with a registered dietitian or certified nutrition specialist is highly recommended when developing a personalized meal strategy. These professionals can create tailored plans that consider individual preferences, cultural factors, and specific glucose response patterns.

Meal Timing and Portion Control

Rather than consuming large meals, women should adopt a pattern of smaller, more frequent meals throughout the day and evening. This approach helps prevent significant glucose spikes and maintains more consistent blood sugar levels.

Carbohydrate Considerations

Simple sugars should be minimized or eliminated from the diet. Individual tolerance to carbohydrates varies significantly among women with gestational diabetes. Some may handle moderate amounts of carbohydrates well, while others benefit from emphasizing complex carbohydrates rich in dietary fiber.

Recommended Food Choices

High-fiber foods provide excellent glucose control benefits. Fresh leafy green vegetables, whole fruits, natural fruit juices (in moderation), and whole grain products are particularly valuable

Multidisciplinary Surgical Research Annals
https://msrajournal.com/index.php/Journal/issue/view/15
Volume 3, Issue 3 (2025)
Online ISSN 3007-1941
Print ISSN 3007-1933
https://msrajournal.com/index.php/Journal/issue/view/15

for maintaining stable blood glucose levels. These nutrient-dense options provide essential vitamins and minerals while supporting optimal glycemic management throughout pregnancy.

Prevention of GDM

Obesity is a primary risk factor for developing gestational diabetes mellitus (GDM). Prevention can be achieved through maintaining a normal body weight, a balanced diet, and adequate physical activity during and after pregnancy. The ideal reproductive age range of 20-30 years represents the period when women typically experience optimal fertility and lowest pregnancy-related complications (Dong *et al.* 2025). Advanced maternal age, generally defined as 35 years or older at delivery, serves as a significant risk factor for numerous pregnancy complications and adverse outcomes.

Maternal age beyond 35 years substantially elevates the likelihood of chromosomal disorders, particularly Down syndrome and other trisomy conditions. The risk of these genetic abnormalities increases exponentially with advancing age due to declining oocyte quality and increased susceptibility to meiotic errors during cell division.

Older mothers face heightened risks for gestational diabetes mellitus, pregnancy-induced hypertension, preeclampsia, and placental complications such as placenta previa and placental abruption (Xiang *et al.*, 2025). These conditions can significantly impact both maternal and fetal health outcomes.

Prognosis of GDM

Women with gestational diabetes mellitus (GDM) can deliver healthy infants if they receive appropriate treatment and care during pregnancy. However, uncontrolled blood glucose levels increase the risk of complications, such as the development of type 2 diabetes postpartum. Maintaining a healthy body mass index (BMI), a balanced diet, and adequate physical activity can reduce the risk of complications. Timely diagnosis through routine screening allows healthcare providers to establish appropriate treatment protocols before complications develop. Early intervention significantly improves the likelihood of maintaining optimal blood glucose levels throughout the remainder of pregnancy. With adequate glucose control, most women with gestational diabetes experience normal fetal growth patterns, reduced risk of macrosomia, and decreased likelihood of delivery complications. Proper management also minimizes the risk of neonatal hypoglycemia and other metabolic complications in newborns (Shafiq *et al.* 2025). According to Wu et al. (2025) effective gestational diabetes management not only ensures immediate pregnancy success but also provides valuable education and lifestyle strategies that can reduce the mother's future risk of developing type 2 diabetes mellitus.

Risk factors

Following are some risk factors

- Obesity
- History of GDM in previous pregnancies
- History of delivering a high birth weight baby more than 9 pounds.
- History of type II diabetes
- History of polycystic ovary syndrome
- Advance maternal age

Multidisciplinary Surgical Research Annals
https://msrajournal.com/index.php/Journal/issue/view/15
Volume 3, Issue 3 (2025)
Online ISSN 3007-1941
Print ISSN 3007-1933
https://msrajournal.com/index.php/Journal/issue/view/15

- Family history of diabetes in first degree relatives
- Previous history of still births

Some studies show that some women with GDM don't have these risk factors while some have these risk factors but they are non-diabetics. Thus, it is observed that only presence of risk factors is inefficient for screening of GDM because a significant population don't have these risk factors.

REVIEW OF LITERATURE

A state of health which is first diagnosed during pregnancy in which there is increased blood glucose level is called gestational mellitus. It makes pregnancy complicated and increases morbidity and fetal mortality rates (Metzger *et al.*, 2007). To decrease the ratio of maternal and fetal morbidity and mortality, there should be early diagnosis of GDM (Kim *et al.*, 2002). Gestational diabetes is the most common factor of maternal and neonatal complications (Crowther *et al.*, 2005*)*. Positive family history of diabetes mellitus, overweight, increased maternal age or giving birth to a macrosomic baby are the important risk factors for GDM (Setji *et al.*, 2005). According to Schmidt *et al*, (2001); Sesiah *et al.*, (2008), the prevalence rate of GDM is 2.1 to 21% of all pregnancies depending on the diagnostic test employed and various populations studied. Hypertension during pregnancy, metabolic disorders of neonates, increased fetal BMI, increased ratio of caesarian sections during delivery, later complications of GDM, included high BMI and development of DM in mother and off springs.

Early screening and diagnosis of GDM is necessary for a satisfactory pregnancy (Ferrera *et al.*, 2002). According to Innes *et al.*, (2002) due to increased secretion of diabetogenic hormones from placenta during pregnancy, there is resistance of insulin in mothers. Gestational diabetes occurs due to abnormal function of pancreas resulting in insulin resistance. It is a global health problem and is increasing day by day in under developed countries. Zargar *et al.*, (2004) studied that due to modification in life styles like lack of exercise and other physical activities, increase trend of living in cities, change in dietary habits i.e. increase use of junk foods, more use of canned or packed items, use of soda drinks etc. and high body mass index are the major factors responsible for the occurrence of GDM in developing countries. According to Heddrson *et al.*, (2008), GDM generally subsides itself after delivery. According to Palliv *et al.*, (2014) gestational diabetes occurs when diabetogenic hormones i.e. hormones secreted during pregnancy from placenta interrupt in normal working of insulin. Insulin is an energy providing hormone which is responsible for the transport of glucose from blood to the body cells.

In case of improper functioning of insulin, blood glucose levels will increase. Increased blood glucose levels of mother results in a macrosomic baby. In later life, GDM may be a risk factor both for mother and baby i.e. there may be development of type II diabetes both in mother and baby. Usually during pregnancy, there are a number of fetal and maternal complications, related with intolerance of glucose. Proper diagnosis and management is necessary for the prevention of adverse maternal and fetal complications (Dodd *et al.*, 2007). Preventive strategies for future, suitable and appropriate planning and resources allocation depends on the data provided related to GDM and strength of affected woman. Age above 25 years is a well-

Multidisciplinary Surgical Research Annals
https://msrajournal.com/index.php/Journal/issue/view/15
Volume 3, Issue 3 (2025)
Online ISSN 3007-1941
Print ISSN 3007-1933
https://msrajournal.com/index.php/Journal/issue/view/15

established risk factor for development of GDM. Previous studies suggest that hepatitis and DM are strongly linked together in advanced age individuals. Hepatitis c positive individuals having age more than 40 years have more than three times chances to develop DM than uninfected individuals from HCV. In 2002 to 2003, a survey related to GDM prevalence was held in which it was observed that 16.55% of Indian population has GDM (Mehta *et al.*, 2000). Strong correlation for occurrence of GDM is positive family history of DM. According to study of Khattab *et al.*, (2007)., major risk factor for abnormal blood glucose levels in pregnancy is parity and there is no other important risk factor responsible for increase in plasma levels of glucose. National Diabetes Data Group (NDDG) first defined the gestational diabetes in 1979 as a state of glucose intolerance which is first diagnosed during pregnancy. The term "diabetes or impaired glucose tolerance (IGT)" rather than carbohydrate intolerance was used by that group. Various studies show that a healthy diet plain and regular exercise leads to decrease the progressive diabetes. The awareness programs related to diabetes prevention and many other such studies show that for controlling insulin levels in women with GDM modification in lifestyle is more effective than using medication. Hospital costs 18% more expensive deliveries for GDM women than for normal deliveries and similarly costs 55% more expensive deliveries of preexisting diabetic women than for normal deliveries.

Government should held awareness programs for women who are pregnant or planning for future pregnancy for early detection, prevention and control of GDM. California diabetes and pregnancy program gained great success in decreasing GDM by arranging programs on diabetes health education i.e. management and care before conception, during pregnancy and postpartum care to women who are at risk for GDM. Gestational diabetes women are more prone to develop DM, cardiovascular ailments and their offspring's are also at risk of developing obesity and DM in future (Yogev *et al.*, 2004). According to Shammsuddin *et al.*, (2000), there are two causes of GDM. Body cannot synthesize enough insulin to meet the increased body requirement of insulin during pregnancy and the other body is not using insulin effectively. To overcome the antagonism of anti-insulin hormones and to meet the increased dietary consumption of both mother and fetus woman beta cell function should be normal. The most important step necessary for prevention of GDM is public awareness i.e. to address woman during antenatal and postpartum period. Therefore, GDM is such a model of disease whose treatment act as prevention for another disease (DM in mother in future) and also as prevention for another person disease (DM in child in future). Changes in dietary habits, lifestyle modifications and adequate physical activity are important for decreasing GDM and maintaining normal body weight. A pregnancy can be successful and normal if small steps are taken to reduce increased glucose levels and when blood sugar levels will be at normal level, it will be same as a pregnancy of a non-diabetic woman (kitzmiller *et al.*, 2007). Gestational diabetes affected women have more than 7 times chances to develop type II diabetes in future 5 to 10 years after delivery. Similarly infants of diabetic mothers are more prone to develop DM in future. Important risk factors for GDM are positive family history of DM, high parity, maternal age more than 25 years, common in non-whites and obese persons (Bellamy *et al.*, 2009). According to Soonthorn (2003) study, GDM badly affect both the baby and the mother and attention should be paid towards its prevention. To decrease the ratio of maternal and fetal

Multidisciplinary Surgical Research Annals
https://msrajournal.com/index.php/Journal/issue/view/15
Volume 3, Issue 3 (2025)
Online ISSN 3007-1941
Print ISSN 3007-1933
https://msrajournal.com/index.php/Journal/issue/view/15

morbidity and mortality, there should be early diagnosis of GDM (Kim *et al.*, 2002). Less consumption of carbohydrates and more intake of fat can increase the risk of impaired glucose tolerance (IGT) and GDM (Saldana *et al.*, 2004). It is proved from studies that in developing countries, GDM is the primary risk factor for women and they develop complications like high blood pressure (Szymanska *et al.*, 2004). Past history of abortion, still birth and previous history of GDM are responsible for increasing in incidence of GDM in future pregnancies (Zargar *et al.*, 2004). Decrease in physical activities, increased BMI and associated risk factors are responsible for increasing the global prevalence rate of GDM (Tobais *et al.*, 2011; Torloni *et al.*, 2009). It is proved from a South Indian study that babies of diabetic mothers are heavier i.e. having head size, abdominal and chest measurements greater than average size of babies of non-diabetic mothers (Hill *et al.*, 2005). It is reported that in Asia Indian women having GDM have up to 8.2% preterm deliveries (Shefali *et al.*, 2006). According to Sattar *et al.*, (2002) women having GDM have complications like pre-eclampsia and have changes in their blood pressure, fasting lipid level and small and large vessel function. Preterm deliveries, caesarian sections, still births and pre-eclampsia are adverse complications of uncontrolled plasma glucose levels (Xiong *et al.*, 2001). 20% -30% of births are complicated and result in macrosomia due to high values of lipid, glucose and amino-acid levels due to GDM (Carpenter *et al.*, 2001). Due to insulin resistance, there is increase in lipid levels resulting in a condition called metabolic syndrome. It is a state of health whose features are central obesity, rise in triglyceride levels or low HDL, hypertension and increased plasma glucose levels and cholesterol reduced HDL cholesterol, high blood pressure and high fasting plasma glucose (Sattar *et al.*, 2002). It is common in females who are obese, multi-parous and having positive family history of DM (Jamshaid *et al.*, 2002)

Conclusion

Gestational diabetes mellitus, or GDM, is a serious metabolic disorder that arises during pregnancy and poses risks to both maternal and fetal health. Effective management hinges on prompt detection, strict glycemic control, lifestyle intervention, and follow-up, aiming to lessen complications such as preeclampsia, fetal macrosomia, and the mother's future risk for type 2 diabetes. Despite improvements from better screening, dietary counselling, and pharmacologic options, ongoing research is needed to tailor management to the individual patient's characteristics. Achieving optimal maternal and fetal outcomes requires a coordinated team that includes obstetricians, endocrinologists, dietitians, and diabetes educators working together. By raising public awareness and implementing targeted prevention programs, the global incidence of GDM and its enduring consequences can be further reduced.

References

Bellamy L, Casas J, Hingorani A, Williams D (2009). Type 2 diabetes mellitus after gestational diabetes a systematic review and meta-analysis, Lancet; 373(9677):1773–1779.

Carpenter M, Canick J, Hogan J, Shellu C, Somers M, Star J (2001). Amniotic fluid insulin at 14-20 weeks gestation association with later maternal glucose intolerance and birth macrosomia, Diabetes Care; 24:1259-1263.

Crowther C, Hiller J, Moss J, McPhee A, Jeffries W, Robinson J (2005). Australian carbohydrate intolerance study in pregnant women (ACHOIS) trial group. Effect of

treatment of gestational diabetes mellitus on pregnancy outcomes, New England Journal of Medicine; 352(24):77-86.

Dodd J, Crowther C, Antoniou G, Baghurst P, Robinson J (2007). Screening for gestational diabetes the effect of varying blood glucose definitions in the prediction of adverse maternal and infant health outcomes, Australian New Zealand Journal of Obstetrics and Gynecology; 47:307–312.

Dong, L., Dong, W., Jin, Y., Jiang, Y., Li, Z., & Yu, D. (2025). The global burden of migraine: A 30-Year trend review and future projections by age, sex, country, and region. *Pain and Therapy*, *14*(1), 297-315.

Ferrara A, Hedderson M, Quesenberry C, Selby J (2002). Prevalence of gestational diabetes mellitus detected by the national diabetes data group or the carpenter and coustan plasma glucose thresholds, Diabetes Care; 25:1625-1630.

Hannah, W., Bhavadharini, B., Baskar, V., Anjana, R. M., Chandrasekaran, S., Uma, R., ... & Mohan, V. (2025). Clustering in gestational diabetes mellitus: A systematic review. *International Journal of Gynecology & Obstetrics*.

Hill J, Krishnaveni G, Annamma I, Leary S, Fall C (2005). Glucose tolerance in pregnancy in South India relationships to neonatal anthropometry, Acta Obstetricia et Gynecologica Scandinavica; 84:159-165.

Hillier T, Pedula K, Schmidt M, Mullen J, Charles M, Pettitt D (2007). Childhood obesity and metabolic imprinting the ongoing effects of maternal hyperglycemia, Diabetes Care; 30:2287–2292.

Innes K, Byers T, Marshall J, Baron A, Orleans M, Hamman R (2002). Association of a woman's own birth weight with subsequent risk for gestational diabetes, Journal of American Medical Association; 287:2534–2541.

Jamshaid T, Qureshi A, Shahzad A, Siddique A, Rahman K (2002). Correlation of GDM with risk factors, Pakistan Postgraduate Medical Journal; 13(1):1-3.

Khattab A, Satti G, Shalayel M, Ahmed S (2007). Prevalence of gestational diabetes mellitus and impaired glucose tolerance in pregnant Sudanese women in the third trimester, International Journal of Medicine and Biomedical Research; 2:59-61.

Kim C, Newton K, Knopp R (2002). Gestational diabetes and the incidence of type 2 diabetes, Diabetes; 25:1862-1868.

Kitzmiller J, Dang-Kilduff L, Taslimi M (2007). Gestational diabetes after delivery Short-term management and long-term risks, Diabetes Care; 30(2):225-235.

Metzger B, Buchanan T, Coustan D, Leiva A, Dunger D, Hadden D (2007). Summary and recommendations of the fifth international workshop-conference on gestational diabetes mellitus, Diabetes Care; 30:251-254.

Poprzeczny, A. J., Mitchell, M., Deussen, A. R., Habibi, N., Cheung, T. O., & Grieger, J. A. (2025). Pre-Pregnancy Diet and/or Physical Activity Interventions for the Prevention of Gestational Diabetes Mellitus: A Systematic Review and Meta-Analysis. *Australian and New Zealand Journal of Obstetrics and Gynaecology*.

Sattar N, Greer I (2002). Pregnancy complications and maternal cardiovascular risk opportunities for intervention and screening, British Medical Journal; 325:157-160.

Saldan T, Siega A, Adai S (2004). Effect of macronutrient intake on the development of glucose intolerance during pregnancy, American Journal of Clinical Nutrition; 79:479-486.

Sha, X., Guan, Z., Wang, Y., Han, J., Wang, Y., & Chen, Z. (2025). SSC-Net: A multi-task joint learning network for tongue image segmentation and multi-label classification. *Digital Health*, *11*, 20552076251343696.

Shafiq, M., Kavitha, J., Rinku, D. R., Senthil Kumar, N. K., Poon, K., Jaffar, A. Y., & Saravanan, V. (2025). Dual smart sensor data-based deep learning network for premature infant hypoglycemia detection. *Scientific Reports*, *15*(1), 23442.

Shefali A, Kavitha M, Deepa R, Mohan V (2006). Pregnancy outcomes in pregestational and gestational diabetic women in comparison to non-diabetic women. A prospective study in Asian Indian mothers, Journal of the Association of Physicians of India; 54:61-63.

Szymanska M, Bomba-Opon D, Wielgos M (2008). Blood pressure and lipid changes in gestational diabetes mellitus, Neuroendocrinology Letters; 29:328-333.

Torloni M, Betran A, Horta B, Nakamura M, Atallah A (2009). Prepregnancy BMI and the risk of gestational diabetes a systematic review of the literature with meta-analysis, Obesity Reviews; 10:194-203.

Wu, Q., Wang, X., & Zhu, F. (2025). Effect of Milking Interventions at Different Stages on Breastfeeding Rate and Quality in Women with Gestational Diabetes Mellitus. *International Journal of Women's Health*, 2523-2535.

Xiang, Y. X., Xu, Z., Xiao, R., Yao, Y. L., Tang, X. J., Fu, L. J., ... & Ding, Y. B. (2025). Interacting and joint effects of assisted reproductive technology and gestational diabetes mellitus on preterm birth and the mediating role of gestational diabetes mellitus: a cohort study using a propensity score. *Journal of Assisted Reproduction and Genetics*, *42*(2), 489-498.

Xiong X, Saunders L, Wang F, Demianczuk N (2001). Gestational diabetes mellitus prevalence, risk factors, maternal and infant outcomes, International Journal of Gynaecology and Obstetrics; 75: 221-228.

Yameny, A. A. (2025). Diabetes Mellitus: A Comprehensive Review of Types, Pathophysiology, Complications, and Standards of Care in Diabetes 2025. *Journal of Medical and Life Science*, *7*(1), 134-141.

Yogev Y, Chen R, Langer O, Hod M (2004). Diurnal glycemic profile characterization in non-diabetic non obese subjects during the first trimester, American Journal of Obstetrics and Gynecology; 191(3):949-953.

Zargar A, Sheikh M, Bashir M, Masoodi S, Laway B, Wani A (2004). Prevalence of gestational diabetes mellitus in Kashmiri women from the Indian subcontinent, Diabetes Research and Clinical Practice; 66:139-145.