

*Review Article*

# Medication adherence and quality of life in gestational diabetes mellitus: A comprehensive review

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Gestational diabetes mellitus (GDM) is an increasingly significant public health issue with serious implications for both maternal and fetal health. This comprehensive review seeks to explore the factors that affect medication adherence and quality of life (QoL) among pregnant women with GDM in India. We conducted a systematic search of peer-reviewed literature published between 2019 and 2024, utilizing PubMed, Scopus, and other relevant databases. Key findings indicate that the prevalence of GDM in India is on the rise, with recent studies estimating a national prevalence of 13%. Factors that influence medication adherence include patient education, socioeconomic status, and the complexity of treatment. Additionally, the QoL for GDM patients is impacted by social support, knowledge about the condition, and various clinical factors. Our review highlights the necessity for standardized screening protocols, personalized patient education, and comprehensive management strategies to enhance medication adherence and QoL for those with GDM.

**Keywords:** Fetal health, Gestational diabetes mellitus (GDM), Maternal health, Medication adherence, Quality of life (QoL), Prevalence

**INTRODUCTION**

Gestational diabetes mellitus (GDM) is an escalating public health issue that impacts a considerable number of pregnant women globally. Defined by the onset of glucose intolerance during pregnancy, GDM presents risks to both maternal and fetal health, such as a heightened likelihood of macrosomia, preterm birth, and the development of type 2 diabetes. Successful management of GDM necessitates a multifaceted approach that emphasizes medication adherence as well as consideration of quality of life (QoL).

Medication adherence is essential for achieving optimal glycemic control and reducing complications associated with GDM. However, various factors—including socio-demographic characteristics, health beliefs, and access to healthcare—can affect adherence rates. Furthermore, GDM can considerably influence the QoL for pregnant women, impacting their physical, emotional, and social well-being.

Recent advancements in GDM research underscore the necessity for a more nuanced understanding of its prevalence, risk factors, and management strategies. This review aims to thoroughly investigate the factors that influence medication

adherence and QoL among pregnant women with GDM in India. By exploring these aspects, we intend to identify key challenges and opportunities for enhancing GDM care.

A study examining GDM among pregnant women in India from 2015 to 2021 revealed a significant increase in prevalence. The percentage of GDM cases rose from 0.53% in 2015-2016 to 0.80% in 2019-2021, with this upward trend observed in most Indian states. In contrast, Arunachal Pradesh showed a decline in GDM prevalence, decreasing from 1.61% in 2015-2016 to 0.87% in 2019-2021.<sup>1</sup>

An analysis of 117 studies across India highlights the significant burden of GDM, revealing a pooled national prevalence of 13%. However, notable regional disparities were identified, with higher rates observed in the North and lower rates in the Western, Central, and Eastern regions. This review emphasizes the need for standardized screening and diagnostic strategies to address these variations and ensure effective management of GDM throughout the country.<sup>2</sup>

Elevated maternal blood glucose levels, including prediabetes (preDM), are associated with negative perinatal outcomes.

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When compared to pregnancies that maintain normoglycemia throughout gestation, these conditions significantly increase the risk of macrosomia (large for gestational age, [LGA]) and congenital malformations in neonates. Furthermore, the likelihood of preterm birth, cesarean delivery, and birth trauma is also notably heightened.<sup>3</sup>

GDM is a recognized risk factor for various complications affecting both mothers and their newborns. These complications can include pre-eclampsia (high blood pressure during pregnancy), preterm birth (delivery before 37 weeks), cesarean sections, and even stillbirth. Additionally, GDM is linked to increased risks of macrosomia (large babies), birth defects, and neonatal issues such as low blood sugar and the need for intensive care. Research indicates a potential connection between GDM and a woman's long-term health, elevating her risk of developing type 2 diabetes, metabolic syndrome, and cardiovascular disease later in life. Moreover, children born to mothers with GDM may also be at greater risk for metabolic issues.

Advanced maternal age (AMA) is another established risk factor for both GDM and adverse pregnancy outcomes. The prevalence of GDM is significantly higher in women of advanced age compared to younger mothers. Additionally, AMA is associated with an increased incidence of stillbirth, preterm birth, and both small for gestational age (SGA) and macrosomic infants.<sup>4</sup>

GDM is a significant public health issue that affects pregnant women globally. Characterized by the onset of glucose intolerance during pregnancy, GDM poses risks to both maternal and fetal health. Early identification and management of GDM are crucial to preventing adverse outcomes such as macrosomia, preterm birth, and an increased risk of type 2 diabetes for both the mother and child. Several factors have been identified as risk factors, including a family history of diabetes, ethnicity, age, obesity, polycystic ovary syndrome, high blood pressure, gestational age, and lifestyle factors like diet, physical activity, and smoking. By understanding these risk factors, healthcare providers can implement targeted screening and prevention strategies to reduce the prevalence and impact of GDM. This review aims to explore the prevalence, risk factors, and management of GDM in India, a country facing a substantial burden from this condition.<sup>5</sup>

Gestational diabetes management usually involves a combination of medication, such as insulin or metformin, alongside dietary modifications and exercise programs. Adhering to prescribed medication regimens and attending regular prenatal appointments are essential for achieving optimal health outcomes during pregnancy. However, concerns about medication safety and potential teratogenic effects can lead to non-adherence among some patients.

This lack of adherence is a well-documented issue linked to increased maternal and neonatal morbidity and mortality, as well as imposing a significant economic burden on healthcare systems due to poorer pregnancy outcomes.<sup>6</sup>

## METHODOLOGY

This systematic review aimed to evaluate the prevalence, risk factors, medication adherence, and QoL among pregnant women with GDM in India. We adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure methodological rigor.

### Search strategy

A thorough literature search was conducted using the following electronic databases: PubMed, Scopus, Google Scholar, and ShodhGanga. The search strategy incorporated a combination of medical subject headings (MeSH terms) and free-text terms related to GDM, prevalence, risk factors, medication adherence, QoL, and India. Boolean operators (AND, OR, NOT) were employed to refine the search results.

The search was limited to studies published in English from 2019 to 2024.

### Inclusion and exclusion criteria

Studies were included if they met the following criteria:

- Investigated pregnant women diagnosed with GDM
- Reported data on prevalence, risk factors, medication adherence, or QoL
- Published as a full-text article in a peer-reviewed journal

Studies were excluded if they:

- Were case reports, case series, or reviews
- Did not report on the relevant outcomes
- Were conducted in non-English-speaking countries

## MEDICATION ADHERENCE: THE KEY TO POSITIVE HEALTH OUTCOMES

Modern medicine depends on effective medications, but their success largely relies on patients taking them as prescribed. This often overlooked aspect is known as medication adherence.

The World Health Organization (WHO) defines adherence as a patient's active participation in their treatment plan, which includes medication use, dietary changes, lifestyle modifications, and collaboration with healthcare providers. Although adherence and compliance are sometimes used interchangeably, adherence emphasizes the patient's active

agreement, promoting a more collaborative approach to healthcare.

Assessing adherence is complex due to its nature. Various methods exist, including:

- **Subjective measures:** Gathering information from patients, family, caregivers, and doctors.
- **Objective measures:** Counting pills, reviewing pharmacy refills, and using electronic monitoring systems.
- **Biochemical measures:** Using tracers in medication to assess their presence in bodily fluids or measuring drug levels.

Researchers often combine these techniques, along with monitoring treatment outcomes, to gain a comprehensive understanding of medication adherence.

Managing GDM often necessitates medications, like insulin or metformin, to control blood sugar levels, which affects both mother and baby. Even highly motivated women may face challenges with adherence. To address this, a multidisciplinary healthcare team should prioritize comprehensive education on GDM, available treatment options, and self-care practices. Empowering women with knowledge throughout their pregnancy can enhance adherence and potentially lead to improved maternal health outcomes.<sup>7</sup>

## DETECTING MEDICATION ADHERENCE

- **Direct methods:**
  - **Drug level measurements:** Blood or urine levels can indicate recent medication intake, but may not be reliable for long-acting medications.
  - **Biochemical markers:** Adding tracers to medications and measuring their presence in the body raises ethical concerns.
- **Indirect methods:**
  - **Pill counts:** Counting the remaining pills in the bottle provides a rough estimate.
  - **Refill rates:** Monitoring prescription refills offers insights into adherence patterns.
  - **Electronic monitoring:** Electronic pill bottles track opening times for a more accurate picture.<sup>8</sup>

## APPROACHES TO PROMOTE MEDICATION ADHERENCE

Poor medication adherence remains a major healthcare challenge. Here are key strategies healthcare professionals can use to improve it:

- **Streamline regimens:** Simplify schedules and dosages, and use organizers/reminders.

- **Improve knowledge:** Educate patients with clear information and resources.
- **Manage perceptions:** Address beliefs and concerns and consider reward programs.
- **Enhance communication:** Practice active listening, involve patients, and offer appointment flexibility.
- **Eliminate bias:** Tailor education to patients' backgrounds and understanding.
- **Evaluate adherence:** Regularly monitor adherence through various methods.<sup>9</sup>

## MEDICATION ADHERENCE EVALUATION

Medication adherence scales offer a multidimensional assessment of a patient's medication-taking behavior. They extend beyond merely evaluating adherence (i.e., taking medications as prescribed) to explore the underlying factors that influences it. These scales typically assess three key dimensions: behaviors related to medication compliance, attitudes toward medication adherence, and perceptions of adverse effects and psychiatric medications.

The more widely used currently available adherence rating scales include:

- **Morisky medication adherence questionnaire (MAQ):**
  - Researchers used the Morisky Medication Adherence Scale-8 (MMAS-8) to assess medication adherence. This self-reported questionnaire, with eight yes/no and Likert scale questions, evaluates medication-taking behavior. Higher scores (8+) indicate high adherence, while lower scores (<6) suggest lower adherence.<sup>10</sup>
- **Medication adherence rating scale (MARS):**
  - MARS (Medication Adherence Rating Scale) is a 10-question, self-reported tool used to assess a patient's medication adherence, particularly for those with psychiatric conditions. It combines elements from two existing scales and has been shown to be reliable and valid.<sup>11</sup>

## QUALITY OF LIFE IN GDM

GDM extends beyond physical health concerns for mothers and babies; it significantly affects mental and emotional well-being, often increasing anxieties related to health and pregnancy. Research consistently indicates a connection between diabetes and a decline in QoL across various dimensions. Factors such as poor blood sugar control, complications, and the use of insulin are all known to contribute to this decline.

The WHO defines QoL as an individual's perception of their overall well-being, shaped by cultural background, values, and personal aspirations. It encompasses physical and mental

health, environment, work, family, and social interactions. Notably, research indicates a decline in QoL during pregnancy, even in the absence of pre-existing conditions. Factors such as gestational age, number of previous pregnancies (parity), fertility treatments, and other health issues can further impact QoL during this period.<sup>12</sup>

## MEASURE QUALITY OF LIFE OR QUALITY OF LIFE SCALE

Measuring health-related quality of life (HRQoL) is increasingly important in healthcare. As the population ages and treatment options advance, patient-reported outcomes, particularly self-assessments of HRQoL, are gaining prominence. HRQoL is now recognized as a crucial factor in evaluating treatment effectiveness, alongside traditional survival rates. However, achieving a consistent definition of HRQoL remains a challenge. Due to its subjective nature, a multidimensional approach is necessary, taking into account physical symptoms, mental well-being, social interactions, and the effects of illness and treatment. A variety of HRQoL instruments are available to assess these different aspects of health, and these tools are continually evolving to become more sophisticated and comprehensive. It is essential to select valid and reliable instruments tailored to each population being studied, but comparisons between studies can be complicated by the use of different measurement tools.<sup>13</sup>

There are different types of QoL measuring tools, some of them are given below:

### ➤ **Quality of life scale (QoLS)**

The QoLS is a multidimensional instrument designed to evaluate overall well-being. It explores various domains that contribute to a person's QoL, including physical health, social relationships, personal development, and leisure activities.<sup>14</sup>

### ➤ **Short form 36 [SF 36]**

The Short Form 36 (SF-36) is a widely used measure of QoL that assesses eight key dimensions: physical functioning, limitations due to physical health, bodily pain, general health perceptions, vitality (energy levels), social functioning, limitations due to emotional problems, and mental health.<sup>15</sup>

### ➤ **WHO quality of life [WHOQoL]**

Developed by the World Health Organization (WHO), the WHOQoL is a tool designed to measure various subjective aspects of quality of life. The WHOQoL-BREF version, available in over 40 languages, is particularly popular for cross-cultural comparisons of QoL.<sup>16</sup>

### ➤ **Eq-5D [EUROQoL]**

The EQ-5D is a versatile and widely used tool for measuring health status. Available in three versions (3L, 5L, and Y), it has been employed in research and healthcare for over 25

years. Translated into many languages, the EQ-5D is easy to use and can be completed quickly. Its strength lies in providing both a detailed health profile and a single score, making it valuable for a variety of applications.<sup>17</sup>

## DISCUSSION

Unveiling a troubling trend, two recent studies in India indicate a concerning rise in GDM among pregnant women. Analyzing national survey data, one study revealed a significant increase in GDM prevalence from 2015 to 2021. Meanwhile, a broader review estimated a national prevalence of 13%, highlighting regional variations across the country. Despite differing methodologies, both studies agree that GDM poses a substantial public health burden in India, identifying risk factors such as age, body mass index (BMI), heart disease, and thyroid disorders. Additionally, the findings suggest a potential north-south divide in GDM prevalence, with slightly higher rates noted in urban areas. Researchers emphasize the necessity for a standardized diagnostic approach, potentially incorporating specific testing around 24 weeks of pregnancy, while also recognizing the importance of addressing cost limitations. Combining this evidence underscores the need to explore cost-effective screening methods and implement a unified diagnostic strategy to improve GDM management and ensure better pregnancy outcomes for women throughout India.<sup>1</sup>

The analysis of maternal and neonatal outcomes in pregnancies complicated by GDM reveals significant adverse effects. These include high rates of polyhydramnios (38.4%), pregnancy-induced hypertension (46.1%), preterm labor (16.3%), postpartum hemorrhage (4.8%), and neonatal complications such as hypoglycemia (29.8%), prematurity (16.3%), and macrosomia (10.5%). This prospective study, conducted over a year at a tertiary care hospital in Gujarat with a sample of 104 pregnant women, underscores the critical importance of early antenatal screening and comprehensive management of GDM to enhance both maternal and fetal outcomes. Effective management strategies, including medical nutrition therapy and the use of insulin or oral hypoglycemic agents are vital. The study also highlights the long-term risk of developing type 2 diabetes and identifies significant demographic risk factors, such as advanced maternal age and obesity, which influence the prevalence and complications of GDM. These findings align with global research, emphasizing the need for robust screening and management protocols to address the complex challenges associated with GDM.<sup>18</sup>

Two recent studies on gestational diabetes underscore the importance of patients actively adhering to treatment plans. One study found that ongoing educational programs significantly enhanced patients' knowledge, attitudes, and behaviors, as reflected in improved knowledge, attitude,



practice (KAP) scores regarding the condition. This increased understanding resulted in better medication adherence and ultimately improved blood sugar control, regardless of whether patients were using metformin or insulin. Another study examined adherence to dietary and treatment recommendations, revealing a clear connection between good adherence and positive outcomes for both mothers and babies. Women who closely followed their plans required less insulin during labor and had a lower likelihood of needing a cesarean section. These findings strongly suggest that integrating education and tools to support patient adherence should be standard practice in GDM care. This comprehensive approach has the potential to optimize treatment outcomes and reduce complications for both mothers and their newborns.<sup>4,19</sup>

A cross-sectional research design was employed to evaluate knowledge, attitudes, and practices related to GDM among patients at Hangzhou Women's Hospital in China. Analyzing data from 499 women revealed positive correlations among knowledge, attitudes, and practice scores, highlighting the crucial role of comprehensive understanding and positive perceptions in effective GDM management. Notably, the study identified higher knowledge and attitude scores as independent predictors of better practices, emphasizing the importance of tailored educational interventions to enhance self-management among women with GDM in China. These findings illuminate the current landscape of GDM care and advocate for targeted education and training programs to optimize patient outcomes in this demographic.<sup>20</sup>

Comparing medication adherence in GDM management between two studies reveals nuanced insights. The Palakkad study utilized the Morisky Medication Adherence Scale (MMAS-8) to assess adherence levels, reporting a significant improvement from baseline to follow-up visits among 60 participants. This indicates the positive impact of pharmaceutical care and patient education. In contrast, the Houston study, also employing the MMAS-8 tool, identified challenges affecting adherence, with 37 out of 79 women reporting low adherence. Although birth weight outcomes did not significantly differ between the groups, low adherence was linked to a higher incidence of neonatal hypoglycemia. These findings emphasize the critical role of medication adherence in GDM management, highlighting the necessity for multifaceted interventions to address both patient-specific and systemic barriers, ensuring optimal maternal and neonatal outcomes.<sup>21,22</sup>

A study examined the relationship between socioeconomic status (SES) and adherence to medical recommendations in pregnant women with GDM. Surprisingly, it found that women with lower SES exhibited better adherence compared to those with higher SES, and this inverse association

was statistically significant. The authors propose several explanations for this unexpected finding. Lower income may limit treatment options, resulting in stricter adherence to the prescribed regimen. Additionally, women with lower educational levels might have a heightened perception of risk, motivating them to follow medical advice more closely. In contrast, women with higher education may be employed and have less time for self-care, potentially leading to poorer adherence. Furthermore, fear of insulin and prevailing social norms around treatment compliance could also influence adherence behaviors. This study underscores the complex interplay between SES factors and medication adherence, indicating a need for further research to better understand these dynamics within the context of GDM.<sup>14,23</sup>

A retrospective cohort study aimed to explore the potential association between social vulnerability factors at the community level and medication adherence among pregnant women diagnosed with GDM. Conducted from 2007 to 2019, the research focused on Medicaid-enrolled pregnant patients in Tennessee who had filled prescriptions for metformin, glyburide, or insulin for at least 30 days before delivery. The study assessed medication adherence through the proportion of days covered by the medication, reporting a median adherence rate of 91.2%. While the study found no significant association between overall social vulnerability and medication non-adherence, it did identify a notable impact of specific social vulnerability subthemes—particularly Housing and Transportation—on adherence. Patients living in crowded housing conditions with limited access to transportation exhibited higher rates of non-adherence. Additionally, the study highlighted other factors influencing medication adherence, such as younger age, increased parity, and the use of insulin compared to glyburide. Despite the high overall adherence rates observed, the findings underscore the need for further investigation into the influence of social determinants, like housing and transportation, on medication adherence in GDM treatment. This study offers valuable insights into the complexities of medication adherence among pregnant women with GDM, highlighting potential areas for intervention and improvement in clinical practice.<sup>24</sup>

The study by Staynova *et al.* (2019) highlights the effectiveness of well-structured, easily understandable printed educational materials in enhancing the knowledge and satisfaction of women with GDM. The developed manual addressed essential topics, including the definition, risk factors, diagnostic criteria, and treatment options for GDM, with a focus on balanced nutrition, physical activity, self-monitoring of blood glucose, and insulin administration. Evaluated by a focus group of 20 pregnant women with GDM, the manual received high satisfaction ratings, with 95% of respondents finding the content useful and the presentation clear and accessible.

Feedback indicated that the manual's plain language, relevant information, and engaging illustrations were particularly effective. This study aligns with other research, demonstrating that patient-tailored educational materials can significantly improve knowledge, adherence to treatment, and self-management of GDM, ultimately optimizing therapeutic outcomes and reducing complications. Future research will investigate the long-term impact of these materials on patient knowledge and disease management. Integrating such educational resources into routine GDM care could enhance patient engagement and health outcomes.<sup>25</sup>

In reviewing the existing literature on the QoL in women with GDM during the third trimester of pregnancy, several key findings emerge. Studies consistently demonstrate that GDM negatively impacts QoL, particularly evident in declines in total health and social environment metrics. Standardized questionnaires like EQ-5D-5L and WHOQoL-BREF reveal significant reductions in these areas for women with GDM compared to controls, although psychological health and social relationships seem unaffected. Interestingly, while the ADDQoL questionnaire generally shows no significant differences between GDM and non-GDM groups, it does indicate a borderline reduction in "current QoL." The mode of GDM treatment—whether through diet alone or in combination with insulin—does not appear to significantly influence QoL outcomes. Additionally, the relationship between QoL and age is significant in controls but not in GDM patients, suggesting a differential impact based on GDM status. Further studies support these findings, indicating moderate to high QoL levels among GDM patients and highlighting significant associations with factors such as age, family type, treatment received, and past obstetric complications. Advanced analytical models reveal that social support is the most influential determinant of QoL, followed by age and body mass index (BMI). Knowledge about GDM also plays a role, indirectly enhancing QoL through improved self-efficacy. These results underscore the multifaceted nature of QoL in women with GDM, where sociodemographic and clinical variables interact to shape overall well-being. This points to the necessity for tailored interventions that address these specific factors to improve QoL during pregnancy. Future research should continue to explore these dynamics and develop comprehensive care strategies that integrate social support, education, and clinical management to enhance QoL outcomes in this population.<sup>12,26,27</sup>

Studies investigating GDM highlight several areas for improvement. One study identified a gap between national guidelines and healthcare professionals' awareness of metformin as a first-line treatment. Another emphasized the need for further research on the long-term effectiveness of current treatment approaches for both mothers and their

offspring. These findings, coupled with the recognized importance of medication adherence in GDM management, underscore the necessity for enhanced education for healthcare professionals. Additionally, targeted interventions may be required to optimize treatment strategies and improve health outcomes for women with GDM and their babies.<sup>28-31</sup>

## KEY CHALLENGES AND OPPORTUNITIES IN GDM MANAGEMENT

Our comprehensive review has identified several critical challenges and opportunities in the management of GDM:

1. **Standardization of screening and diagnosis**
  - o *Challenge*: Inconsistent screening protocols and diagnostic criteria across different healthcare settings.
  - o *Opportunity*: Implement uniform, cost-effective screening methods to ensure early detection and timely intervention.
2. **Medication adherence**
  - o *Challenge*: Suboptimal adherence rates due to concerns about fetal safety, complex regimens, and lack of understanding.
  - o *Opportunity*: Develop patient-centered education programs and leverage technology for medication reminders and support.
3. **Quality of life considerations**
  - o *Challenge*: Inadequate attention to the psychosocial impact of GDM on pregnant women.
  - o *Opportunity*: Integrate QoL assessments into routine care and provide targeted psychosocial support.
4. **Healthcare access disparities**
  - o *Challenge*: Unequal access to GDM care, particularly in rural and resource-limited settings.
  - o *Opportunity*: Explore telemedicine and community-based interventions to improve care accessibility.
5. **Long-term follow-up**
  - o *Challenge*: Insufficient monitoring of long-term outcomes for mothers and offspring.
  - o *Opportunity*: Establish comprehensive follow-up programs to address post-pregnancy risks and improve intergenerational health.

## ACTIONABLE RECOMMENDATIONS FOR HEALTHCARE PRACTITIONERS AND POLICYMAKERS

Based on our findings, we propose the following evidence-based recommendations:

### For healthcare practitioners:

- a) Implement a standardized GDM screening protocol at the first antenatal visit and between 24-28 weeks of gestation.

- b) Utilize validated adherence scales (e.g., MMAS-8) to regularly assess medication adherence and identify barriers.
- c) Incorporate brief QoL assessments (e.g., WHOQoL-BREF) into routine GDM care visits.
- d) Provide culturally sensitive, literacy-appropriate educational materials on GDM management.
- e) Offer personalized medication counseling, addressing specific concerns about fetal safety and side effects.
- f) Encourage the use of smartphone apps or text message systems for blood glucose monitoring and medication reminders.

#### For policymakers:

- a) Develop national guidelines for GDM screening and management, ensuring consistency across healthcare settings.
- b) Allocate resources for community health worker programs to support GDM patients in underserved areas.
- c) Invest in telemedicine infrastructure to improve access to specialist care in rural regions.
- d) Implement policies to ensure affordable access to essential GDM medications and monitoring supplies.
- e) Fund research initiatives focused on long-term follow-up of GDM-affected mothers and their offspring.
- f) Collaborate with patient advocacy groups to develop awareness campaigns about GDM risks and management

## CONCLUSION

A comprehensive review underscores the critical role of medication adherence and QoL in the management of GDM. The rising prevalence of GDM in India highlights the urgent need for standardized screening protocols and patient-centred interventions. Key findings include:

- The importance of early detection and comprehensive management in minimizing complications.
- The significant impact of patient education and support programs on improving medication adherence and glycemic control.
- The complex interplay between socioeconomic factors and adherence, necessitating tailored approaches to GDM management.
- The multifaceted nature of QoL in GDM patients, influenced by factors such as social support, knowledge, and clinical variables.

Moving forward, healthcare providers must prioritize:

- Implementing standardized screening and cost-effective diagnostic approaches.

- Developing and utilizing tailored educational materials to enhance patient knowledge and self-management.
- Addressing socioeconomic barriers to medication adherence through targeted interventions.
- Incorporating QoL assessments into routine GDM care to provide holistic patient-centred management.

By embracing a multidimensional approach that integrates clinical expertise with patient empowerment, we can strive towards better adherence, enhanced quality of life, and improved maternal and neonatal outcomes in the context of GDM.

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## REFERENCES

1. Chakraborty A, Yadav S. Prevalence and determinants of gestational diabetes mellitus among pregnant women in India: An analysis of national family health survey data. *BMC Women's Health* 2024;24:147.
2. Mantri N, Goel AD, Patel M, Baskaran P, Dutta G, Gupta MK, *et al.* National and regional prevalence of gestational diabetes mellitus in India: A systematic review and Meta-analysis. *BMC Public Health* 2024;24:527.
3. Reitzle L, Heidemann C, Baumert J, Kaltheuner M, Adamczewski H, Icks A, *et al.* Pregnancy complications in women with pregestational and gestational diabetes mellitus. *Dtsch Arztebl Int* 2023;120:81-86.
4. Krishnakumar S, Govindarajulu Y, Vishwanath U, Nagasubramanian VR, Palani T. Impact of patient education on KAP, medication adherence and therapeutic outcomes of metformin versus insulin therapy in patients with gestational diabetes: A Hospital based pilot study in South India. *Diabetes Metab Syndr* 2020;14:1379-83.

5. Alduayji MM, Selim M. Risk factors of gestational diabetes mellitus among women attending an antenatal care clinic in Prince Sultan Military Medical City (PSMMC), Riyadh, Kingdom of Saudi Arabia: A Case-Control Study. *Cureus* 2023;15:e44200.
6. Asiedu-Danso M, Kretchy IA, Sekyi JK, Koduah A. Adherence to antidiabetic medications among women with gestational diabetes. *J Diabetes Res* 2021;2021:9941538.
7. Brown MT, Bussell JK. Medication adherence: WHO cares? *Mayo Clinic Proceedings* 2011;86:304–14.
8. Hugtenburg JG, Timmers L, Elders PJ, Vervloet M, van Dijk L. Definitions, variants, and causes of nonadherence with medication: A challenge for tailored interventions. *Patient Prefer Adherence* 2013;7:675–82.
9. Atreja A, Bellam N, Levy SR. Strategies to enhance patient adherence: Making it simple. *MedGenMed* 2005;7:4.
10. Morisky DE, Ang A, Krousel-Wood M, Ward HJ. Predictive validity of a medication adherence measure in an outpatient setting. *J Clin Hypertens (Greenwich)* 2008;10:348–54.
11. Owie GO, Olotu SO, James BO. Reliability and validity of the Medication Adherence Rating Scale in a cohort of patients with schizophrenia from Nigeria. *Trends Psychiatry Psychother* 2018;40:85–92.
12. Pantartzis KA, Manolopoulos PP, Paschou SA, Kazakos K, Kotsa K, Goulis DG. Gestational diabetes mellitus and quality of life during the third trimester of pregnancy. *Qual Life Res* 2019;28:1349–1354.
13. Krantz E, Wide U, Trimpou P, Bryman I, Landin-Wilhelmsen K. Comparison between different instruments for measuring health-related quality of life in a population sample, the WHO MONICA project, Gothenburg, Sweden: An observational, cross-sectional study. *BMJ Open* 2019;9:e024454.
14. Burckhardt CS, Anderson KL. The Quality of Life Scale (QOLS): Reliability, validity, and utilization. *health qual life outcomes* 2003;1:60.
15. Lins L, Carvalho FM. SF-36 total score as a single measure of health-related quality of life: Scoping review. *SAGE Open Med* 2016;4:205031211667172.
16. Vahedi S. World Health Organization Quality-of-life Scale (WHOQOL-BREF): Analyses of their item response theory properties based on the graded responses model. *Iran J Psychiatry* 2010;5:140–53.
17. EuroQol Group, *et al.* EuroQol--a new facility for the measurement of health-related quality of life. *Health Policy* 1990;16:199–208.
18. Jani SK, Parikh PM, Patel KM, Shah AC, Patel BS, Rangrej RB. Fetomaternal outcome in patients with gestational diabetes mellitus. *Natl J Physiol Pharm Pharmacol* 2023;13:652–6.
19. Pigato F, Candido R, Zanette G, Zamagni G, Trojniak MP, Brunato B, *et al.* Gestational diabetes mellitus: Impact of adherence on patient management and maternal-neonatal complications. *Prim Care Diabetes* 2023;17:486–492.
20. Tan J, Chen L, Wu Y, Zhu X, Fei H. Knowledge, Attitude and practice of patients with gestational diabetes mellitus regarding gestational diabetes mellitus: A cross-sectional study. *Int J Gen Med* 2023;16:4365–76.
21. Suhana K, Mahesh TM, Sabitha J. A study on the impact of pharmaceutical care on the management of diabetes mellitus during pregnancy. *Biosci Biotech Res Asia* 2023;20: 609–16.
22. Lash KA, Garcia L, Salazar-Laso X, Chahine K, Hotra J, Blackwell SC, *et al.* 396: Medication adherence in women with gestational diabetes and its effect on pregnancy outcomes. *Am J Obstetrics and Gynecology* 2019;220:S270
23. Haghdoost AA, Baneshi MR, Razzaghi A, Noori A. The impact of socio economic factors on the adherence of patients with gestational diabetes mellitus to medical recommendations. *Iran J Public Health* 2019;48:1690–6.
24. Pham A, Wiese A, Spieker A, Ashley L, Phillips S, Adgent M, *et al.* Hypoglycemic medication adherence in women with gestational diabetes mellitus. *Am J Obstetrics and Gynecology* 2023;228:S428–9.
25. Staynova RA, Gueorguiev SR, Petkova-Gueorguieva ES, Vasileva EV, Stoimenova AH, Yanatchkova VE, *et al.* Written health education materials for women with gestational diabetes mellitus - evaluation of usefulness and patients' satisfaction. *Folia Med (Plovdiv)* 2019;61:127–133.
26. Ansarzadeh S, Salehi L, Mahmoodi Z, Mohammadbeigi A. Factors affecting the quality of life in women with gestational diabetes mellitus: A path analysis model. *Health Qual Life Outcomes* 2020;18:31.
27. Malik R, Roy SM. Assessment of quality of life among antenatal women with gestational diabetes mellitus. *Int J Reprod Contracept Obstet Gynecol* 2024;13:570–4.
28. Bayoumi MAA, Masri RM, Matani NYS, Hendaus MA, Masri MM, Chandra P, *et al.* Maternal and neonatal outcomes in mothers with diabetes mellitus in qatari population. *BMC Pregnancy and Childbirth* 2021;21:1–1.
29. Borzouei S, Eslahchi M, Esna-Ashari F. Adherence and related factors in pregnant women with gestational diabetes. *Acta Medica Iranica*. 2021 Oct 12:550–4.
30. Daud NAA, Mohiuddin SG, Ong YP, Yusof F, Yusoff F, Harun SN, *et al.* Metformin use in gestational diabetes: Awareness, attitude, and practice among healthcare professionals in Malaysia. *J Pharm Bioallied Sci* 2021;13:230–7.
31. García-Patterson A, Balsells M, Solà I, Gich I, Corcoy R. Impact of gestational diabetes mellitus treatment on medium/ long-term outcomes after pregnancy: A systematic review and meta-analysis. *Diabetic Medicine* 2023;40:e14998.

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