A Comparative Analysis of Guidelines for Managing Gestational Diabetes: An Overview

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Overview

Authors

Mojghan Karamnia Far[1], Bahareh Abbasi[1,2*], Mohammad Reza Nateghi[1], Elham Karimi MansoorAbad [1]

1- Sarem Gynecology, Obstetrics and Infertility Research Center, Sarem Women's Hospital, Iran University of Medical Sciences (IUMS), Tehran, Iran
2- Department of Medical Genetics, National Institute of Genetic Engineering and Biotechnology (NIGEB), Tehran, Iran

Corresponding Authors: Bahareh Abbasi; Sarem Fertility & Infertility Research Center (SAFIR), Sarem Women's Hospital, Iran University of Medical Sciences (IUMS), Tehran, Iran.
Address: Sarem Women Hospital, Basij Square, Phase 3, Ekbatan Town, Tehran, Iran. Postal code: 1396956111, Phone: +98 (21) 44670888, Fax: +98 (21) 44670432.
Email: b.abbasi@nigeb.ac.ir

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ABSTRACT

Gestational diabetes mellitus (GDM) is a prevalent condition with significant health implications for mothers and infants. Numerous guidelines exist for managing GDM, reflecting the diversity of healthcare systems, regional practices, and research advancements. This narrative review compares and contrasts eight prominent guidelines: American Diabetes Association (ADA), International Association of Diabetes and Pregnancy Study Groups (IADPSG), National Institute for Health and Care Excellence (NICE), American College of Obstetricians and Gynecologists (ACOG), Endocrine Society, Royal College of Obstetricians and Gynecologists (RCOG), Canadian Diabetes Association (CDA), and European Association for the Study of Diabetes (EASD). Common themes include emphasizing lifestyle modifications, particularly medical nutrition therapy, and physical activity, as the cornerstone of management. When lifestyle changes are insufficient, insulin is frequently recommended as first-line pharmacotherapy, although variations in diagnostic criteria and glycemic targets exist. Metformin use is also suggested by some guidelines. This review underscores the complexity of GDM management, highlighting the need for individualized care to achieve optimal maternal and fetal health outcomes.

Keywords: Gestational Diabetes Mellitus (GDM); Treatment; Managing; Guideline; Review Article.

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Background

Gestational diabetes mellitus (GDM) is a prevalent medical condition that affects pregnant women worldwide. It is characterized by elevated blood glucose levels during pregnancy, with the condition typically arising in the second or third trimester. Gestational diabetes poses significant health risks not only to the mother but also to the developing fetus, making its proper management of utmost importance (1). Over the years, various guidelines and protocols have been developed to address the management of gestational diabetes, aiming to optimize maternal and fetal outcomes. However, the diversity in healthcare systems, regional practices, and advancements in medical research has led to the emergence of different approaches to GDM management. Consequently, medical practitioners and researchers are faced with the challenge of identifying the most effective and evidence-based protocols among the array of options available (2). The need to ascertain the optimal management strategies for gestational diabetes has prompted the conduct of numerous clinical trials and studies. While individual studies have provided valuable insights into particular approaches, their findings are often limited by small sample sizes and potential biases. To address these limitations and to provide comprehensive and reliable conclusions, reviews have become essential tools in medical research. In light of the multitude of guidelines available for managing gestational diabetes, it is crucial to conduct a rigorous comparison and synthesis of existing evidence. By pooling and analyzing data from various studies, this review aims to assess the effectiveness, safety, and overall impact of different protocols employed in the management of gestational diabetes. The primary objectives of this review is to describe and compare different protocols in controlling blood glucose levels among pregnant women with gestational diabetes (3, 4). Here are the description of eight prominent guidelines on gestational diabetes followed by comparison of these guidelines.

American Diabetes Association (ADA):

The ADA provides comprehensive guidelines for the management of diabetes, including gestational diabetes. Their guidelines emphasize medical nutrition therapy, blood glucose monitoring, physical activity, and pharmacological interventions when necessary (5). The treatment protocol for gestational diabetes recommended by the American Diabetes Association (ADA) involves a multidisciplinary approach that includes diet and lifestyle modifications, self-monitoring of blood glucose levels, and, if necessary, medication therapy. The goal of treatment is to maintain blood glucose levels within a target range to minimize the risk of complications for both the mother and the baby (5). Medication therapy may be required for women with gestational diabetes who are unable to achieve adequate blood glucose control through diet and lifestyle modifications alone. Insulin is the recommended first-line medication for the treatment of gestational diabetes. It is safe for use during pregnancy and has been shown to effectively control blood glucose levels. In some cases, oral antidiabetic agents, such as metformin or glyburide, may be used as an alternative to insulin. However, the use of oral antidiabetic agents in pregnancy is still a topic of debate and further research is needed to establish their safety and efficacy (5).

International Association of Diabetes and Pregnancy Study Groups (IADPSG) guidelines:

Based on the provided references, there is no specific mention of the dosage of insulin therapy for gestational diabetes based on the International Association of Diabetes and Pregnancy Study Groups (IADPSG) guidelines. The references discuss various aspects of gestational diabetes, including screening, diagnosis, and management, but do not provide specific information on insulin dosage (6). It is important to note that the management of insulin therapy for gestational diabetes is individualized and based on factors such as the woman's blood glucose levels, medical history, and specific needs. The dosage of insulin will vary for each individual and may be adjusted over time to achieve optimal blood glucose control (6). The IADPSG guidelines recommend screening for gestational diabetes using a 75g oral glucose tolerance test (OGTT) between 24 and 28 weeks of gestation. However, the specific dosage of insulin therapy is not mentioned in the provided references. It is recommended that women with gestational diabetes work closely with their healthcare provider to determine the appropriate dosage of insulin and to receive ongoing monitoring and support. Regular monitoring of blood glucose levels is essential to assess the effectiveness of the insulin therapy and make any necessary dosage adjustments(6).

National Institute for Health and Care Excellence (NICE) Guidelines:

The National Institute for Health and Care Excellence (NICE) offers comprehensive guidelines for managing gestational diabetes, including recommendations pertaining to insulin therapy initiation and titration. Insulin therapy is typically considered when lifestyle interventions, encompassing medical nutrition therapy and physical activity, fail to attain and sustain adequate glycemic control (7). The decision to initiate

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insulin is contingent upon specific blood glucose thresholds as follows: Fasting Plasma Glucose (FPG): Insulin therapy is generally initiated if the fasting glucose level equals or exceeds 5.6 mmol/L (or 5.3 mmol/L in the absence of HbA1c testing) (7). Postprandial Glucose Levels: Insulin therapy may be considered if the 2-hour post-meal glucose level consistently surpasses 7.8 mmol/L (7). The NICE guidelines emphasize an individualized approach to insulin dosing, taking into account various factors such as blood glucose levels, the patient's response to therapy, and maternal weight. For women requiring insulin therapy, a basal insulin regimen is typically initiated, employing long-acting insulin analogs like insulin glargine or detemir. The initial starting dose usually ranges from 10 to 14 units per day. Subsequent insulin dosage adjustments should be made based on regular blood glucose monitoring, with the aim of achieving and maintaining glycemic targets. The specific titration protocols may vary depending on individual response and healthcare provider preferences. However, a common practice is to gradually adjust the insulin dose (e.g., by 1-2 units) every few days until the desired blood glucose targets are attained (7). In certain instances, supplementary prandial (mealtime) insulin may be necessary to effectively control postprandial glucose levels. The dosage and timing of prandial insulin should be tailored to the individual based on blood glucose monitoring results, carbohydrate intake, and meal patterns (7). It is crucial to emphasize that the precise insulin dosage and titration should be determined by a healthcare professional, taking into consideration individual patient characteristics, blood glucose levels, and specific clinical considerations. Regular monitoring and close collaboration between healthcare providers and patients are vital components of gestational diabetes management in accordance with the NICE guidelines (7).

American College of Obstetricians and Gynecologists (ACOG) Guidelines:

Insulin therapy for gestational diabetes, as per the American College of Obstetricians and Gynecologists (ACOG) guidelines, involves distinct considerations for initiation, dosing, and monitoring. When lifestyle modifications, including medical nutrition therapy and physical activity, prove ineffective in achieving and maintaining glycemic control, insulin therapy is typically initiated based on specific blood glucose thresholds. The decision to commence insulin therapy relies on specific criteria: a fasting plasma glucose (FPG) level equal to or exceeding 95 mg/dL (5.3 mmol/L) and a 2-hour post-meal plasma glucose (2hPG) level consistently surpassing 120 mg/dL (6.7 mmol/L). ACOG recommends diverse insulin regimens, encompassing basal-bolus insulin and biphasic insulin, with the choice of regimen being contingent upon individual patient factors, glucose control goals, and healthcare provider expertise. The basal-bolus insulin regimen involves administering a long-acting basal insulin (e.g., insulin glargine or detemir) for continuous insulin coverage and rapid-acting insulin (e.g., insulin aspart or lispro) to address mealtime glucose fluctuations. Basal insulin is typically administered once daily, while rapid-acting insulin is given before meals (8). Biphasic insulin entails a combination of intermediate-acting insulin (e.g., neutral protamine Hagedorn [NPH] insulin) and rapid-acting insulin. This regimen is suitable for patients who may find multiple daily insulin injections challenging. It provides a blend of basal and prandial insulin in a single injection. Insulin dosage is personalized based on factors like blood glucose levels, weight, and insulin sensitivity. Healthcare providers typically initiate therapy with a conservative initial dose and gradually titrate it based on regular blood glucose monitoring to attain glycemic targets. Specific dosage adjustments are at the discretion of the healthcare provider and may vary for each patient. Frequent self-monitoring of blood glucose (SMBG) plays a critical role in gestational diabetes insulin therapy. ACOG recommends frequent monitoring of fasting and postprandial glucose levels to guide insulin dosing adjustments and ensure glycemic control (8). Insulin dose titration and adjustments are informed by SMBG results and individual response to therapy. Patients may be advised to incrementally increase or decrease insulin doses by a predefined amount (e.g., 2 units) to achieve target blood glucose levels. The frequency of dose adjustments may vary depending on the patient's glycemic control and healthcare provider's recommendations. Comprehensive education and support are essential for patients receiving insulin therapy, including instruction on proper insulin administration techniques, self-monitoring of blood glucose, dietary modifications, and recognizing and managing hypoglycemia. It is important to acknowledge that ACOG guidelines are subject to regular updates, and specific recommendations may vary. To optimize insulin therapy for gestational diabetes in line with ACOG guidelines, individualized care and close collaboration between patients and healthcare providers are of paramount importance (8).

Endocrine Society Guidelines:

Insulin therapy for gestational diabetes, following the guidelines of the Endocrine Society, entails specific considerations concerning initiation, dosing, and monitoring. Typically, insulin therapy is introduced when lifestyle modifications, such as medical nutrition therapy and physical activity, fail to attain and sustain appropriate glycemic control (9). The decision to commence insulin treatment is predicated on specific blood glucose thresholds, namely: A. Fasting Plasma

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Glucose (FPG): If the fasting glucose level is equal to or exceeds 95 mg/dL (5.3 mmol/L), insulin therapy is generally initiated (9). B. 1-Hour Plasma Glucose (1hPG): If the 1-hour post-meal glucose level consistently surpasses 140 mg/dL (7.8 mmol/L), insulin therapy may be considered (9). The Endocrine Society advocates insulin therapy through various regimens, including basal-bolus insulin and biphasic insulin. The selection of a specific regimen depends on individual patient factors, glucose control objectives, and the healthcare provider's expertise. In the basal-bolus insulin regimen, a long-acting basal insulin, such as insulin glargine or detemir, is administered to provide a continuous insulin background. Additionally, rapid-acting insulin, like insulin aspart or lispro, is given to cover glucose spikes during mealtime. Basal insulin is typically administered once daily, while rapid-acting insulin is given before meals (9). The dosage of insulin is tailored to individual factors such as blood glucose levels, weight, and insulin sensitivity. Healthcare providers usually commence therapy with a conservative initial dose and gradually adjust it based on regular blood glucose monitoring results, aiming to achieve glycemic targets. Specific dosage adjustments are guided by the healthcare provider and may vary for each patient. Regular self-monitoring of blood glucose (SMBG) is of utmost importance in insulin therapy for gestational diabetes. The Endocrine Society recommends frequent monitoring of fasting and postprandial glucose levels to guide insulin dosing adjustments and ensure glycemic control. Insulin dose titration and adjustments are based on SMBG results and individual response to therapy. Healthcare providers may advise patients to gradually increase or decrease insulin doses by a specified amount (e.g., 2 units) to attain target blood glucose levels. The frequency of dose adjustments may vary depending on the patient's glycemic control and the healthcare provider's recommendations (9). Patients receiving insulin therapy should receive comprehensive education and support from healthcare providers, encompassing instructions on proper insulin administration techniques, self-monitoring of blood glucose, dietary modifications, and recognition and management of hypoglycemia (9).

Royal College of Obstetricians and Gynaecologists (RCOG) Guidelines:

Insulin therapy for gestational diabetes is an important aspect of management, as recommended by the Royal College of Obstetricians and Gynaecologists (RCOG) guidelines. The goal of insulin therapy is to achieve and maintain optimal blood glucose control to minimize the risk of complications for both the mother and the baby (10). Insulin is considered the standard therapy for women with gestational diabetes requiring drug treatment. It is safe for use during pregnancy and has been shown to effectively control blood glucose levels. The RCOG guidelines do not specify which type(s) of insulin to utilize, but insulin regimens typically involve the use of short-acting or rapid-acting insulin before meals to cover the rise in blood glucose levels after eating, and long-acting insulin to provide a steady background insulin level (10). The dosage of insulin therapy for gestational diabetes is individualized based on factors such as the woman's blood glucose levels, medical history, and specific needs. The dosage may be adjusted over time to achieve optimal blood glucose control. Regular monitoring of blood glucose levels is essential to assess the effectiveness of the insulin therapy and make any necessary dosage adjustments (10). Insulin therapy has been shown to improve glycemic control and decrease the risk of neonatal hypoglycemia, macrosomia (large birth weight), and cesarean delivery. It is important for women with gestational diabetes to work closely with their healthcare provider to determine the appropriate insulin regimen and to receive ongoing monitoring and support (10). While insulin is the standard therapy for gestational diabetes, there have been studies exploring the use of other medications such as metformin and glyburide. However, the use of these medications in pregnancy is still a topic of debate, and further research is needed to establish their safety and efficacy. In summary, insulin therapy is recommended as the standard treatment for gestational diabetes according to the RCOG guidelines. The dosage of insulin is individualized based on factors such as blood glucose levels and specific needs. Regular monitoring of blood glucose levels and close collaboration with a healthcare provider are essential for determining the appropriate insulin regimen and achieving optimal blood glucose control (10).

Canadian Diabetes Association (CDA) Guidelines:

The CDA guideline emphasizes a personalized approach to insulin therapy for gestational diabetes. Treatment decisions should be based on individual patient factors, glycemic control goals, and healthcare provider expertise. The dosage of insulin is individualized based on factors such as blood glucose levels, weight, and insulin sensitivity. Healthcare providers typically start with a conservative initial dose and gradually titrate it based on regular blood glucose monitoring results to achieve glycemic targets. The specific dosage adjustments should be guided by the healthcare provider and may vary for each patient. In some cases, additional prandial (mealtime) insulin may be required to control postprandial glucose levels adequately. The CDA guideline suggests considering the addition of rapid-acting insulin analogs, such as insulin aspart or lispro, before meals if postprandial glucose targets are not achieved with basal insulin alone (11).

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European Association for the Study of Diabetes (EASD) Guidelines:

The initial step involves screening pregnant women for gestational diabetes through appropriate screening tests. Subsequently, the diagnosis of gestational diabetes is confirmed based on diagnostic criteria, such as the results of an oral glucose tolerance test (OGTT) (12). Patients are educated on self-monitoring of blood glucose (SMBG) using a glucometer. Collaboratively, glycemic targets are established, taking into account fasting and postprandial glucose levels, to optimize glycemic control.Insulin therapy is initiated if lifestyle modifications fail to achieve the desired glycemic control. Specifically, insulin initiation is considered if glycemic targets are not met despite medical nutrition therapy (MNT) and physical activity. The decision to start insulin is guided by predefined thresholds available in established guidelines or expert consensus. The appropriate insulin regimen is selected based on patient-specific factors. For instance, the basal-bolus insulin approach involves administering a long-acting basal insulin (e.g., insulin glargine or detemir) once daily, complemented by rapid-acting insulin analogs (e.g., insulin aspart or lispro) before meals. Alternatively, for patients with challenges in multiple daily injections, biphasic insulin preparations are considered, which consist of a blend of rapid-acting and intermediate-acting insulin (12). The insulin dosage is tailored to individual factors, including weight, blood glucose levels, and insulin sensitivity. Commencing with conservative initial doses, gradual titration based on SMBG results is initiated. Basal insulin doses are adjusted based on fasting blood glucose levels, while prandial insulin doses are adjusted based on pre-meal or postprandial glucose levels. Carbohydrate counting is utilized to guide mealtime insulin doses. The overarching goal is to achieve optimal glycemic control while avoiding hypoglycemia (12).

Disscussion:

The International Association of the Diabetes and Pregnancy Study Groups (IADPSG), the American Diabetes Association (ADA), and the World Health Organization (WHO) advocate for a universal one-step approach to diagnosis. This involves utilizing a fasting plasma glucose level of ≥5.1 mmol/L or a 2-hour plasma glucose level of ≥8.5 mmol/L during a 75 g oral glucose tolerance test (OGTT). On the other hand, the National Institute for Health and Care Excellence (NICE), the American College of Obstetricians and Gynecologists (ACOG), and the Royal College of Obstetricians and Gynaecologists (RCOG) adopt a two-step approach. They begin with initial screening using risk factors and proceed to a diagnostic OGTT if deemed necessary. The European Association for the Study of Diabetes (EASD) recommends risk factor-based screening and encourages the utilization of OGTT thresholds defined by each country (2, 6-11). All guidelines underline the significance of lifestyle modifications as the primary component of GDM management, encompassing medical nutrition therapy and physical activity interventions. In cases where lifestyle modifications do not achieve adequate glycemic control, insulin is universally endorsed as the first-line pharmacological therapy in most guidelines. Notably, some guidelines, such as ADA and NICE, propose metformin as an alternative to insulin, especially when patients decline insulin use or have contraindications to its usage (1-4, 7, 10). Regarding glycemic targets, the ADA and ACOG recommend fasting glucose levels below <5.3 mmol/L and 1-hour postprandial glucose levels below <7.8 mmol/L. On the other hand, the IADPSG suggests more stringent targets, aiming for fasting glucose levels below <5.1 mmol/L and 1-hour postprandial glucose levels below <7.8 mmol/L. In contrast, the EASD, NICE, and RCOG propose individualized glycemic targets, taking into account factors such as pre-pregnancy diabetes status, gestational age, and maternal/fetal conditions. These diverse recommendations from reputable medical organizations underscore the complexity of managing gestational diabetes and highlight the importance of tailoring treatment strategies to each patient's unique circumstances. A thorough understanding of these guidelines and their respective rationales is essential for healthcare providers to offer optimal care to pregnant women with GDM, ultimately promoting better maternal and fetal outcomes (3, 6, 7, 9, 10). A central tenet shared across all examined guidelines is the importance of lifestyle modifications. Medical nutrition therapy and physical activity are consistently highlighted as fundamental components of GDM management. These interventions, aimed at controlling blood glucose levels through healthy dietary choices and regular exercise, form the initial line of defense against GDM progression. By advocating for lifestyle changes, the guidelines acknowledge the potential of holistic approaches to mitigate the need for pharmacological interventions and improve maternal and fetal outcomes (13-16). The comparative analysis of these guidelines underscores the multifaceted nature of GDM management and the challenges faced by clinicians in selecting the most suitable approach. As evidenced by the guidelines' differences, there is no one-size-fits-all solution. Rather, GDM management requires a patient-centered approach that considers factors such as individual health history, cultural context, and patient preferences. As guidelines evolve with emerging research, clinicians must navigate a dynamic landscape, staying attuned to the latest evidence to deliver the best care possible (15).

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Conclusion:

In conclusion, the comparative analysis of GDM management guidelines emphasizes the importance of a holistic approach that integrates lifestyle modifications and pharmacological interventions tailored to individual patient needs. The guidelines converge on the significance of lifestyle changes, insulin therapy, and personalized care. Yet, they also highlight the complexity of GDM management, as evidenced by differing diagnostic criteria, glycemic targets, and medication recommendations. Ultimately, the overarching goal of all guidelines is to optimize maternal and fetal outcomes, underscoring the importance of multidisciplinary collaboration and evidence-based decision-making in GDM management. As healthcare systems and research continue to evolve, these guidelines will serve as vital tools in guiding clinicians toward effective and compassionate care for pregnant women with GDM.

Ethical Issue

There was no ethical issue in this systematic review.

Conflict of interests

There was no conflict of interest in this study.

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Authors' ORCID

Mohammad Reza Nateghi:
https://orcid.org/0000-0001-5754-0516

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