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Maternal Health in Women with Gestational Diabetes: Impact on Neonatal Health and Long-Term Outcomes

Eduardo Henrique Mendes Rezende[1], Igor Costa Santos[2], Silvio Fernandes Filho[3], Stefânia Domingos de Deus[4]; Aline Moreira Moraes[4] e Durval José dos Santos Filho[4].

LITERATURE REVIEW

RESUMO

Introdução: O diabetes gestacional é uma condição que afeta um número crescente de mulheres durante a gravidez, caracterizado por níveis elevados de glicose no sangue que não eram previamente diagnosticados. Este distúrbio não só tem implicações significativas para a saúde materna, mas também pode impactar adversamente a saúde neonatal. A literatura existente sugere que mulheres com diabetes gestacional enfrentam um maior risco de complicações durante a gravidez, incluindo hipertensão e parto prematuro, que podem, por sua vez, influenciar os resultados neonatais e a saúde a longo prazo dos recém-nascidos. A compreensão dos efeitos do diabetes gestacional é crucial para a formulação de estratégias preventivas e interventivas eficazes. Objetivo: Avaliar o impacto do diabetes gestacional na saúde neonatal e os resultados a longo prazo associados a essa condição. Metodologia: A metodologia seguiu o checklist PRISMA para garantir a transparência e a qualidade da revisão. Foram pesquisadas bases de dados relevantes, incluindo PubMed, Scielo e Web of Science. Utilizaram-se os seguintes descritores: "gestational diabetes," "neonatal health," "long-term outcomes," "maternal health," e "complications." Foram incluídos artigos publicados nos últimos 10 anos que abordavam diretamente os impactos do diabetes gestacional. Critérios de Inclusão: Estudos que envolviam mulheres diagnosticadas com diabetes gestacional e seus neonatos. Artigos que discutiam os efeitos da condição na saúde neonatal e resultados a longo prazo. Publicações revisadas por pares e disponíveis em inglês, português ou espanhol. Critérios de Exclusão: Estudos focados em diabetes tipo 1 ou diabetes tipo 2, sem conexão direta com diabetes gestacional. Artigos que não forneciam dados relevantes sobre a saúde neonatal ou resultados a longo prazo. Publicações anteriores a uma década ou não revisadas por pares. Resultados: Os resultados indicaram que o diabetes gestacional está associado a um aumento significativo no risco de complicações neonatais, como distúrbios respiratórios e baixo peso ao nascer. Além disso, os neonatos de mães com diabetes gestacional apresentaram uma probabilidade maior de desenvolver problemas metabólicos e cardiovasculares ao longo da vida. A revisão também evidenciou que a gestão eficaz do

diabetes gestacional pode mitigar alguns desses riscos, melhorando os resultados tanto para as mães quanto para os bebês. Conclusão: A revisão destacou a importância da monitorização e do gerenciamento do diabetes gestacional para minimizar suas consequências negativas para a saúde neonatal e os resultados a longo prazo. A evidência sugere que estratégias de intervenção precoce e cuidados contínuos são essenciais para melhorar os desfechos para mães e bebês afetados por essa condição.

Palavras-chaves: "diabetes gestacional," "saúde neonatal," "resultados a longo prazo," "saúde materna," e "complicações."

ABSTRACT

Introduction: Gestational diabetes is a condition affecting an increasing number of women during pregnancy, characterized by elevated blood glucose levels that were not previously diagnosed. This disorder not only has significant implications for maternal health but can also adversely impact neonatal health. Existing literature suggests that women with gestational diabetes face a higher risk of complications during pregnancy, including hypertension and preterm birth, which can, in turn, affect neonatal outcomes and the long-term health of the newborns. Understanding the effects of gestational diabetes is crucial for developing effective preventive and interventional strategies. Objective: Review was to assess the impact of gestational diabetes on neonatal health and the long-term outcomes associated with this condition. Methodology: The methodology followed the PRISMA checklist to ensure transparency and quality in the review process. Relevant databases, including PubMed, Scielo, and Web of Science, were searched. The following descriptors were used: "gestational diabetes," "neonatal health," "long-term outcomes," "maternal health," and "complications." Articles published in the past 10 years that directly addressed the impacts of gestational diabetes were included. Inclusion Criteria: Studies involving women diagnosed with gestational diabetes and their neonates. Articles discussing the effects of the condition on neonatal health and long-term outcomes. Peer-reviewed publications available in English, Portuguese, or Spanish. Exclusion Criteria: Studies focused on type 1 or type 2 diabetes with no direct connection to gestational diabetes. Articles that did not provide relevant data on neonatal health or long-term outcomes. Publications older than a decade or not peer-reviewed. Results: The results indicated that gestational diabetes is associated with a significant increase in the risk of neonatal complications, such as respiratory disorders and low birth weight. Additionally, neonates of mothers with gestational diabetes had a higher likelihood of developing metabolic and cardiovascular issues later in life. The review also highlighted that effective management of gestational diabetes could mitigate some of these risks, improving outcomes for both mothers and their babies. Conclusion: The review underscored the importance of monitoring and managing gestational diabetes to minimize its negative consequences on neonatal health and long-term outcomes. Evidence suggests that early intervention strategies and ongoing care are essential for improving outcomes for mothers and babies affected by this condition.

Keywords: "gestational diabetes," "neonatal health," "long-term outcomes," "maternal

health," and "complications."

Instituição afiliada – UniEVANGÉLICA[1], Universidade Federal de Jataí[2] , Faculdade Tiradentes[3], UniRV[4].
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Autor correspondente*: Eduardo Henrique Mendes Rezende, email do autor igorcsantos01@gmail.com*

INTRODUCTION:

Gestational diabetes is a condition affecting an increasing number of women during pregnancy, characterized by elevated blood glucose levels that were not previously diagnosed. This disorder presents several significant implications for both neonatal and maternal health.

One of the main impacts of gestational diabetes is the increased risk of immediate neonatal complications. Babies born to mothers with this condition are more likely to face issues such as respiratory distress syndrome, which occurs due to inadequate lung development. Additionally, there is a higher incidence of neonatal hypoglycemia, where the newborn's blood glucose levels drop to dangerous levels shortly after birth. Jaundice is also common, resulting from excessive breakdown of red blood cells. These complications may require specialized medical care, extending hospital stays and affecting the overall health of the newborn.

Another critical aspect is the impact of gestational diabetes on birth weight. Women with gestational diabetes have an increased likelihood of delivering babies with macrosomia, a condition where the newborn has an excessive weight. Increased birth weight can lead to complications during delivery, such as birth injuries or the need for a cesarean section. Furthermore, macrosomia is associated with a higher risk of both immediate and long-term health issues for the child, including challenges in glucose control and an increased risk of childhood obesity.

These two issues underscore the importance of effective monitoring and management of gestational diabetes to improve outcomes for both mother and baby, highlighting the need for appropriate preventive and interventional strategies during pregnancy.

Gestational diabetes not only affects the immediate post-birth period but also has significant long-term repercussions for the health of both children and mothers. One major concern is the increased risk of future metabolic problems for the babies. Studies show that children born to mothers with gestational diabetes are more likely to develop conditions such as obesity and type 2 diabetes as they grow older. These chronic diseases can manifest from childhood

and persist throughout life, requiring ongoing attention and early interventions to prevent additional complications.

For mothers, gestational diabetes is not an isolated condition; it can be a precursor to the development of type 2 diabetes after pregnancy. Women who experience gestational diabetes have a significantly higher likelihood of developing this chronic condition in the future. Proper management and follow-up after childbirth are essential for monitoring the mother's metabolic health and implementing preventive strategies, such as lifestyle changes and regular glucose monitoring.

Furthermore, effective management of gestational diabetes is crucial for improving outcomes for both mother and baby. This approach includes strict control of blood glucose levels during pregnancy, which can be achieved through a combination of diet, exercise, and, in some cases, medication. Implementing monitoring strategies and early interventions helps reduce the likelihood of both immediate and long-term complications, ensuring better health for both mother and newborn. Thus, a proactive and well-structured approach to managing gestational diabetes proves fundamental in promoting overall well-being and preventing adverse outcomes for both.

METHODOLOGY

The methodology for this systematic literature review was developed based on the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) checklist, which ensured quality and transparency in the selection and analysis of the included studies. Relevant literature searches were conducted in the databases PubMed, Scielo, and Web of Science, using the following descriptors: "gestational diabetes," "neonatal health," "long-term outcomes," "maternal health," and "complications."

Inclusion criteria were rigorously defined to ensure the relevance and quality of the selected studies. Firstly, only articles directly addressing the impact of gestational diabetes on neonatal health and long-term outcomes were included, providing a focused and relevant analysis. Additionally, only studies published in the past 10 years were considered to ensure that the evidence reflected the most recent practices and findings. Only peer-reviewed articles were

selected, ensuring the credibility and accuracy of the information. It was also required that the studies be available in English, Portuguese, or Spanish to facilitate understanding and analysis. Finally, only studies presenting primary data and detailed analyses on the impact of gestational diabetes were included, avoiding reviews or reports that did not directly contribute to understanding the topic.

Exclusion criteria were applied to further refine the selection of studies. Initially, studies focusing on type 1 or type 2 diabetes were excluded, as the focus was specifically on gestational diabetes. Articles that did not provide relevant or specific data on neonatal health or long-term outcomes related to gestational diabetes were also disregarded. Additionally, publications older than a decade were excluded to ensure that only the most current literature was included. Studies that had not undergone peer review were similarly excluded, as they did not meet the necessary standard of scientific rigor. Finally, articles not available in the specified languages were eliminated, limiting the analysis to sources understandable to the researchers involved.

Applying these criteria ensured a selection of studies that offered a comprehensive and up-to-date view on the impact of gestational diabetes, providing a solid foundation for the systematic review and critical analysis of the findings.

RESULTS

Gestational diabetes significantly increases the risk of immediate neonatal complications, which are critical concerns in managing the health of newborns. The condition often leads to respiratory distress syndrome, a serious complication where the infant's lungs are not fully developed, resulting in difficulty breathing. This syndrome necessitates specialized medical interventions, such as supplemental oxygen or mechanical ventilation, to support the newborn until their lungs mature sufficiently. Consequently, the presence of respiratory distress syndrome can prolong the hospital stay and complicate the initial adjustment period for the baby, affecting their overall health and development.

Additionally, neonates born to mothers with gestational diabetes frequently experience hypoglycemia shortly after birth. This condition, characterized by

abnormally low blood glucose levels, can lead to various health issues, including seizures or developmental delays if not promptly addressed. Medical staff must monitor these infants closely, often providing intravenous glucose or other interventions to stabilize their blood sugar levels. Moreover, jaundice, another common complication, results from an excess of bilirubin in the blood due to the breakdown of red blood cells. This condition often requires phototherapy to reduce bilirubin levels and prevent further complications.

Gestational diabetes also influences the newborn's birth weight significantly. Infants born to mothers with this condition are at a higher risk of macrosomia, a condition where the baby’s weight exceeds the typical range for their gestational age. This increased birth weight can result from elevated maternal glucose levels, which promote excessive fetal growth. Macrosomia can lead to complications during delivery, such as shoulder dystocia, where the baby's shoulders become stuck during birth, necessitating interventions like a cesarean section. This situation not only increases the risk of injury to both the mother and the newborn but also may impact the baby’s health in the short and long term.

Furthermore, the elevated birth weight associated with gestational diabetes has long-term implications for the child's health. Macrosomia often correlates with a higher risk of metabolic issues, including an increased likelihood of developing obesity and type 2 diabetes later in life. These outcomes are particularly concerning, as they set the stage for chronic health conditions that require ongoing management and lifestyle modifications. Therefore, managing gestational diabetes effectively is crucial not only for preventing immediate delivery-related complications but also for mitigating the risk of future health problems for the child.

Neonates born to mothers with gestational diabetes often face significant challenges with blood glucose control shortly after birth. This condition, commonly known as neonatal hypoglycemia, arises when the newborn’s blood glucose levels drop below the normal range soon after delivery. Since the maternal glucose levels are typically elevated during pregnancy, the infant’s insulin production also increases, which can lead to a rapid decrease in blood sugar levels once the umbilical cord is clamped and the source of high glucose is

removed. Consequently, this can result in symptoms such as irritability, lethargy, and feeding difficulties.

To manage neonatal hypoglycemia effectively, healthcare providers routinely monitor the newborn's blood glucose levels and, if necessary, administer intravenous glucose or other appropriate treatments. The management of hypoglycemia is crucial because untreated low blood sugar can lead to severe complications, including seizures or long-term developmental issues. Additionally, ensuring proper glucose control in the neonatal period requires vigilant monitoring and prompt intervention, which may influence the length of the hospital stay and the overall initial care required for the infant.

The increased risk of developing obesity and type 2 diabetes later in life is another serious consequence for children born to mothers with gestational diabetes. Research consistently shows that these children are more susceptible to metabolic disorders as they grow older. The elevated birth weight associated with gestational diabetes often sets the stage for these long-term health issues. Infants with macrosomia, a common outcome of gestational diabetes, are at a higher risk of experiencing insulin resistance and obesity during childhood and adolescence.

Long-term studies highlight that children who were exposed to high glucose levels in utero tend to have a higher propensity for developing metabolic syndrome and type 2 diabetes as adults. This increased risk necessitates ongoing surveillance and preventive measures throughout the child's life. Interventions such as promoting healthy eating habits, regular physical activity, and periodic glucose screening are essential for managing these risks and improving the child's overall health and quality of life. Thus, understanding and addressing these long-term health concerns are vital components of comprehensive care for children born to mothers with gestational diabetes.

Gestational diabetes poses a significant risk for the development of type 2 diabetes in women after pregnancy. This condition frequently serves as an early indicator of potential future metabolic disorders. Women who have experienced gestational diabetes are considerably more likely to develop type 2 diabetes later in life compared to those who have not had this condition. The underlying mechanism involves the insulin resistance that characterizes gestational

diabetes, which can persist beyond the pregnancy and lead to the development of type 2 diabetes.

Postpartum management of women with a history of gestational diabetes is crucial for mitigating this risk. Regular monitoring of blood glucose levels is essential to detect any signs of diabetes early. Additionally, healthcare providers typically recommend lifestyle modifications such as dietary changes and increased physical activity to enhance insulin sensitivity and prevent the onset of type 2 diabetes. These preventive measures are supported by evidence showing that maintaining a healthy weight and engaging in regular exercise can significantly reduce the risk of developing type 2 diabetes in the future. Thus, proactive and sustained management strategies are fundamental to improving long-term health outcomes for women who have had gestational diabetes.

Effective management of gestational diabetes requires intensive monitoring throughout pregnancy to ensure the health of both mother and baby. Strict control of blood glucose levels is essential to minimize the risk of complications associated with this condition. This monitoring involves frequent measurements of glucose levels using specific devices and continuous evaluation of results to adjust treatment as needed. The approach typically includes dietary modifications, with the implementation of a balanced meal plan that helps regulate glucose levels, as well as regular physical exercise, which is also recommended to improve insulin sensitivity.

Additionally, the administration of insulin or hypoglycemic medications may be necessary in some cases to maintain glucose levels within the ideal range. Intensive monitoring allows for the early identification of any deviations in glycemic control, enabling immediate adjustments in therapeutic interventions and ensuring the prevention of complications for both mother and baby. Therefore, integrating rigorous monitoring strategies and continuous treatment adjustments is crucial for the successful management of gestational diabetes.

Early interventions play a vital role in managing gestational diabetes and improving outcomes for both mothers and babies. Rapid detection and intervention help prevent severe complications and promote adequate glucose control. Effective strategies include the early implementation of dietary changes and the introduction of exercise programs tailored to the needs of the pregnant

woman. These interventions not only help maintain glucose levels under control but also contribute to the overall health of both mother and baby, reducing the risk of complications associated with gestational diabetes.

Furthermore, the active involvement of healthcare professionals, including doctors, nutritionists, and exercise specialists, is essential for the effectiveness of interventions. Coordination among these professionals ensures an integrated and personalized treatment plan that addresses all dimensions of the condition. Continuous education for the pregnant woman on the importance of managing gestational diabetes and recommended practices is also a critical component of successful early interventions. Thus, a collaborative and proactive approach is fundamental to achieving optimal results and minimizing the risks associated with gestational diabetes.

Education and psychological support for women with gestational diabetes are essential aspects for effective management of the condition and improving outcomes for both mothers and babies. The stress and anxiety associated with a gestational diabetes diagnosis can negatively impact treatment adherence and the overall well-being of the pregnant woman. Therefore, providing appropriate psychological support helps reduce emotional burden, enhancing the woman's ability to cope with the condition and implement medical recommendations more effectively.

Education and support programs should include comprehensive information about the nature of gestational diabetes, glycemic control strategies, and the importance of a balanced diet and regular physical activity. Continued education allows pregnant women to fully understand their condition and the necessary measures to maintain health. Additionally, psychological support may involve individual or group counseling, helping the woman develop coping skills and strengthen her motivation to follow medical advice and make necessary lifestyle adjustments.

The quality of postpartum care for women with gestational diabetes is crucial for preventing long-term complications and maintaining the mother's metabolic health. After delivery, it is critical to carry out ongoing follow-up to monitor recovery and detect early signs of the development of type 2 diabetes. This follow-up typically includes regular glucose level assessments and the

implementation of recommendations to maintain a healthy lifestyle.

Furthermore, postpartum support may involve collaborating with nutritionists and diabetes educators to develop a sustainable meal plan and promote regular physical activity. The goal is to help the woman return to her pre-pregnancy weight and improve her overall health. Continuity of care and effective monitoring after delivery are essential to ensure that the woman can manage her health effectively and minimize the risk of future diabetes-related complications. Thus, comprehensive and coordinated postpartum support is vital for the woman's long-term health.

The role of research and technological innovation in managing gestational diabetes is of utmost importance for improving outcomes and facilitating control of the condition. Ongoing advancements in medical technology provide new tools and devices that enable more precise and efficient monitoring of blood glucose levels. Emerging technologies, such as continuous glucose sensors and remote monitoring devices, offer patients the ability to track their glucose levels in real-time, allowing for immediate treatment adjustments and contributing to more effective control of the condition. These devices also provide valuable data for healthcare professionals, enabling a more detailed customization of the treatment plan.

In addition to monitoring devices, research into pharmacological treatments and management strategies is also advancing, offering new options for managing gestational diabetes. Recent studies explore new classes of medications and therapeutic approaches that may improve glycemic control effectiveness and reduce the need for insulin. Integrating new technologies and innovative treatments with established care practices is essential for providing a more comprehensive and effective approach to managing gestational diabetes. Collaboration among researchers, technology developers, and healthcare professionals is crucial for the successful implementation of these innovations and ensuring that the benefits are widely accessible to women facing this condition.

CONCLUSION

The review of the impact of gestational diabetes has revealed that this condition presents significant challenges for both maternal and neonatal health,

underscoring the need for effective management and a comprehensive approach to optimize outcomes. Scientific literature confirms that gestational diabetes is associated with a range of immediate and long-term complications. Immediately after birth, babies born to mothers with gestational diabetes often face issues such as respiratory distress syndrome, neonatal hypoglycemia, and jaundice, which require specialized medical care and often prolong hospital stays. These problems arise due to disruptions in glucose metabolism and the impact of fetal hyperinsulinemia, which affects lung development and the newborn's ability to regulate their own glucose levels.

Birth weight is another critical aspect associated with gestational diabetes. The condition has a strong correlation with macrosomia, where the baby is born with excessive weight, potentially leading to complications during delivery, such as obstetric trauma or the need for cesarean section. Macrosomia is also linked to future metabolic problems, such as type 2 diabetes and childhood obesity, highlighting the importance of glycemic control during pregnancy to mitigate these risks. Studies demonstrate that effective glucose management can reduce the incidence of these complications, emphasizing the importance of strategies such as balanced diets, regular physical activity, and, in some cases, medication.

Furthermore, gestational diabetes can have lasting implications for maternal health. Women with this condition have a significantly higher likelihood of developing type 2 diabetes in the future. Ongoing postnatal care, including regular glucose level monitoring and the implementation of interventions to promote a healthy lifestyle, is crucial to prevent the development of type 2 diabetes and other metabolic complications.

Finally, the integration of emerging technologies and innovations in the treatment and monitoring of gestational diabetes has the potential to transform the management of the condition. Devices such as continuous glucose monitors and new therapeutic options offer promising capabilities for more precise and personalized glucose control. Continued research and the development of new treatments are essential to further improve outcomes for women with gestational diabetes and their babies.

Therefore, the approach to managing gestational diabetes should be multifaceted, involving rigorous monitoring, early interventions, psychological

support, and the integration of technological innovations. These elements are fundamental to improving the health of mothers and babies, reducing both short- and long-term complications, and promoting overall better health.

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