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RISK FACTORS DUE TO DIABETES DURING PREGNANCY

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ABSTRACT

Diabetes in pregnancy is increasing on the global scene, particularly in the low and middle-income countries. The gap in knowledge about the main risk factors and biological processes of its adverse outcome remains. The present study aims at defining these risk factors and their impact on mothers and infants to facilitate more efficient screening and care. This thesis examines the connection between maternal metabolic disorders, specifically, gestational diabetes mellitus (GDM), obesity, and a malfunction of the pancreatic β cells and their impact on the health of the mother and the child, through a thematic analysis. The responses were divided into five main themes maternal risk factors, neonatal outcomes, clinical management and preventive strategies, long-term effects, and effects on the baby. An unhealthy diet and lack of physical exercise also enhance maternal hyperglycemia. Complications are well controlled through early screening using oral glucose tolerance test and probation using diet, exercise and glycemic control. These findings are consistent with the previous research which found maternal age, obesity, family history of diabetes, and certain prenatal factors to be the important causes of diabetes in pregnancy. Comprehensively, the results emphasize that the most effective strategies on preventing early interventions to improve the maternal and fetal outcomes and decrease the intergenerational rates of metabolic diseases focus on the metabolic health of the mothers.

Key Words- diabetes, risk factors, maternal, neonatal, obesity

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1 INTRODUCTION

According to The Global Diabetes Competency Form, it will exceed half a billion of the world's population by 2030. More than 420 million people worldwide are affected by Type 1 and type 2 diabetes. The world health organization has estimated that about 6 percent of the world population (The Global Diabetes Competency Form 2021). The International Diabetes Federation has observed for many years that hyperglycemia during pregnancy is becoming an increasingly common occurrence (Yuan et al. 2019). This trend is largely observed in low- and middle-income countries. This is because lifestyle changes and genetic predispositions in these countries have contributed to the increase in the burden of the disease. The risks of both short-term and long-term outcomes for both mother and child during pregnancy are high (Yuan et al. 2019). Complications of maternal care include preeclampsia, cesarean section, and an increased risk of developing type 2 diabetes in later life (Nakshin & Jogdand 2023). Uncontrolled maternal hyperglycemia in the fetus is associated with macrosomia, neonatal malformations, neonatal hypoglycemia, and long-term metabolic disorders (Nakshin & Jogdand 2023). Therefore, in order to improve maternal and infant health, it is necessary to identify and understand the risk factors for diabetes during pregnancy. Risk factors identified in past studies include maternal age, obesity, family history of diabetes, and certain ethnic origins, among other prenatal factors, such as late macrosomic births or stillbirths (Nakshin & Jogdand 2023) as research scope.

The aim of the study is to determine the risk factors for diabetes during pregnancy, its role in epidemiology, the biological mechanisms of pathogenesis, and the effects of diabetes on maternal and fetal health. A deeper understanding of these determinants can influence evidence-based screening programs, population health interventions, and clinical decision-making to achieve the best pregnancy outcomes. Therefore, the necessity of this research lies in the fact that it will help to fill the urgent gap of seeking modifiable risk factors linked with adverse outcomes of pregnancy, which will lead to the improvement of maternal and neonatal health,

decrease the healthcare burden, and improve the process of clinical decision-making.

2 TYPES OF DIABETES AND FACTORS

The most common types of diabetes are type 1 diabetes (T1DM) and type 2 diabetes (T2DM), which are recognized by the WHO as different variants. T1DM is an autoimmune disease primarily associated with the destruction of pancreatic β cells. This results in a complete deficiency of insulin (Nakshin & Jogdand 2023). T2DM, in contrast, is characterized by insulin resistance combined with a relative lack of insulin secretion, which is strongly associated with obesity, sedentary lifestyle, and heredity (Nakshin & Jogdand 2023). When a woman becomes pregnant, her body's glucose metabolism undergoes changes. Also, the hormones human placental lactogen, progesterone, and cortisol induce an insulin-resistant state in late pregnancy to ensure that the fetus has sufficient glucose (Kampmann et al. 2019). However, gestational diabetes is a life-threatening complication for both mothers and babies. The increasing prevalence of diabetes among pregnant women in the modern world emphasizes the importance of a thorough examination of the etiology, risk factors, and consequences of this disease. In the following subchapters, I will discuss Diabetes in Pregnancy, Type of diabetes and risk factors.

2.1 Diabetes in Pregnancy?

Diabetes is a persistent chronic metabolic disease that is marked by long-lasting hyperglycemia which is caused by a lack of insulin, insulin resistance, or both.It is one of the fastest-growing noncommunicable diseases in the world and a health threat to all health systems in the world (Kampmann et al. 2019). Regardless of the type of diabetes, type 1 or type 2 or gestational diabetes (GDM), this condition is doubly important due to the complex impact that the health of the mother and fetus has on this condition (Pati et al. 2024). Pregnancy is a special physiological state characterized by a large increase in metabolic rates. In many cases, the changes confirm the presence of latent glucose intolerance. Therefore, gestational diabetes is a clinical as well as a major population health problem, and its consequences

have long-term and short-term consequences. Gestational diabetes has become one of the most serious health problems worldwide. In the early stages, maternal metabolism is insulin-sensitive, leading to the mobilization of glycogen and adipose tissue.

However, during pregnancy, insulin resistance gradually increases due to the influence of placental hormones such as human placental lactogen, cortisol, progesterone, and growth hormone (Kampmann et al. 2019). This is necessary because the growing fetus is continuously connected to a glucose supply, and the fetus is almost completely dependent on maternal glucose (Parrettini et al. 2020). An otherwise healthy woman can overcome this resistance by increasing insulin levels by pancreatic β-cells. However, the compensatory mechanism fails in women with a small β-cell reserve, in obese women, or in women who are already insulin-resistant, resulting in hyperglycemia. (Tuduri et al. 2022). Some women are diagnosed with diabetes only during pregnancy, and it can be difficult to manage the existing diabetes as the pregnancy progresses. Clinically, gestational diabetes can be classified into two broad categories. These contain pre-existent diabetes and gestational diabetes. (Banday et al. 2020). However, glucose intolerance, which is first diagnosed during pregnancy, may be diagnosed first. Although this is likely to be curable during delivery, it exposes the mother to the lifelong risk of type 2 diabetes. It predisposes the offspring to obesity and metabolic syndrome in adulthood.

Women with type 2 diabetes have a higher risk of developing GDM in the postpartum period (sevenfold risk) in the decade following delivery. For the fetus and newborn, maternal hyperglycemia can cause macrosomia, birth defects, birth trauma, neonatal hypoglycemia, respiratory distress syndrome, and even stillbirth. Children born to diabetic mothers are at increased risk of developing obesity and glucose intolerance in the prenatal period and beyond. (Miller & Lim 2021). However, despite the growth in knowledge, the problem of standardized screening and control practices remains. Some countries use universal screening whereby all expectant mothers undergo an oral glucose tolerance test (OGTT), whereas others use selective screening which is determined by the risk factors. This

heterogeneity causes a large range of changes in the estimates of prevalence making international comparisons difficult. (Luo et al. 2024).

2.2 Types of Diabetes and Pathophysiology

Gestational diabetes is not a homogeneous disease; it consists of several clinical entities with different pathophysiological processes and consequences for maternal and fetal health. These are type 1 diabetes (T1DM), type 2 diabetes (T2DM), and gestational diabetes (GDM). The various forms of diabetes overlap with the pregnancy metabolic changes and hence differ in their risk and outcome.

Type 1 Diabetes (T1DM) is an autoimmune condition that is marked by the total lack of insulin as a result of the destruction of pancreatic β- cells. Its most frequent onset is observed in the childhood or adolescent stage (Roy et al. 2024), although onset in adulthood is also becoming more accepted. In contrast to other types of diabetes (Popoviciu et al. 2023), T1DM is not directly related to obesity or lifestyle predisposition. It is the result of the interaction between genetic factors and autoimmune stimuli. In women with T1DM, pregnancy is particularly complicated by the need for absolute dependence on exogenous insulin and the increased risk of complications in the absence of adequate glycemic control. The prenatal phase can be considered a critical time. Maternal hyperglycemia during this period is strongly related to birth defects such as neural tube and heart defects, as well as skeletal defects (Roy et al.2024). However, insulin insensitivity is induced by placental hormones, which cause increased insulin requirements in the later stages of pregnancy (Khin et al. 2023). Failure to adapt insulin regimens on a dynamic basis may result in hyperglycemia, which is associated with macrosomia and adverse neonatal outcomes, including hypoglycemia and respiratory distress.

Among mothers, the complications of diabetes caused by long-term use are retinopathy and nephropathy, which can be aggravated in pregnancy. Of great concern is the progression of retinopathy since pregnancy-induced hormonal and hemodynamic alterations may hasten the damage to the retina. In the same way, diabetic nephropathy poses a risk of preeclampsia and poor perinatal outcomes. All these complications necessitate a multidisciplinary approach to managing the

process. Obstetricians, endocrinologists, and dietitians should be involved to ensure that the ongoing pregnancy can be carefully monitored (Khin et al. 2023).

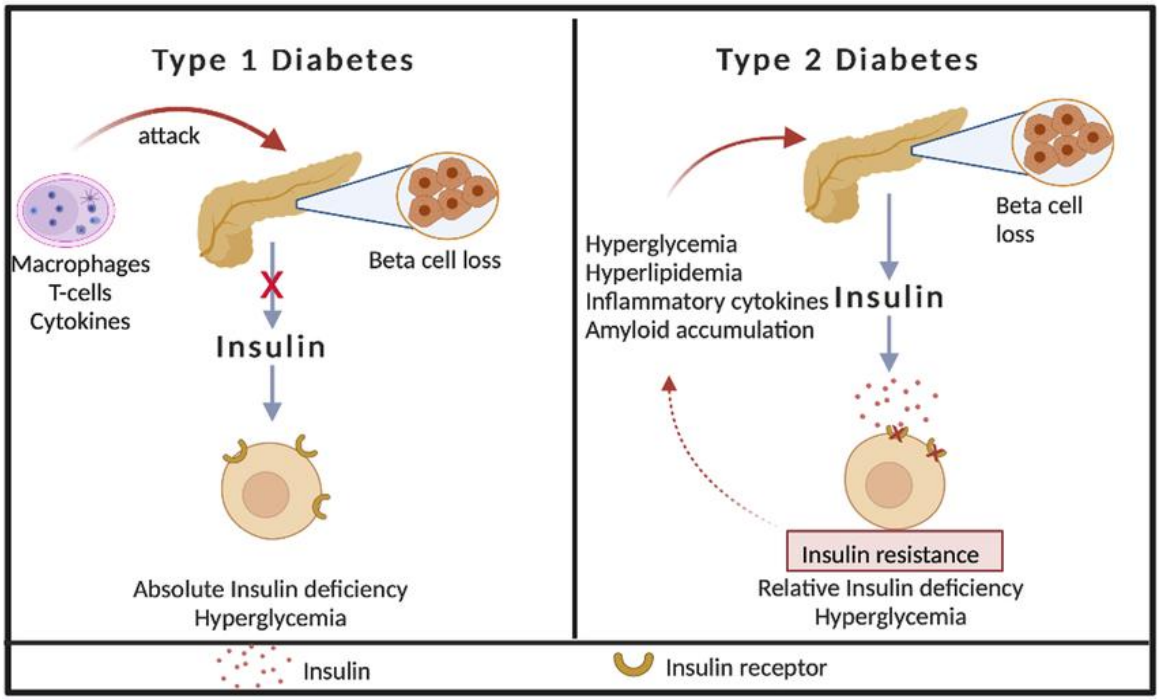

Figure 1: Pathogenesis of type 1 and type 2 diabetes (Khin et al.2023).

As shown in figure 1, in contrast to T1DM, T2DM is associated with insulin resistance and relative insulin deficiency (Khin, Lee & Jun 2023). Pregnancy outcomes in women with T2DM are generally similar to or worse than those with T1DM. It is of concern that many women with T2DM become pregnant without being aware of their hyperglycemia, hypertension, and obesity, a condition that increases the risk of pregnancy complications (Gen et al.2025). Poor preconceptional glycemic control has been associated with a high rate of congenital malformations, miscarriage, and intrauterine fetal death. The characteristic risks of pregnancy complicated by T2DM include macrosomia, neonatal hypoglycemia, and stillbirth. According to some studies, women with T2DM may have a higher perinatal mortality rate than women with T1DM, the main reasons being late diagnosis, poor glycemic control, and the presence of features of the metabolic syndrome (Rekani & Raouf 2021).

Human placental lactogen (hPL) increases lipolysis and therefore leads to an increase in free fatty acid levels, which disrupts insulin signaling in maternal tissues

(Khin et al .2023). Another placental hormone is cortisol, which further increases insulin resistance by increasing hepatic gluconeogenesis. Insulin sensitivity is also a direct effect of progesterone and estrogen, but these effects are less direct (Rassie et al. 2022). In addition, placental growth hormone promotes hepatic glucose production and reduces maternal insulin sensitivity. All these hormonal changes contribute to the development of diabetes in late pregnancy. To overcome resistance, women increase pancreatic insulin secretion, thereby maintaining normal glucose levels (Khin et al. 2023). However, in women with preexisting beta-cell capacity or insulin resistance, the compensation level is insufficient, leading to hyperglycemia and ultimately GDM. In addition to regulating maternal glucose, placental hormones affect fetal development (Karcz & Królak-Olejnik 2024).

2.3 **Risk Factors Associated with Diabetes in Pregnancy**

The main factors that influence the development of gestational diabetes include genetic factors, physiological, environmental and lifestyle factors. (Oskovi-Kaplan & Ozgu-Erdinc 2021). Knowledge of these risk determinants is critical in the identification, prevention and management of maternal as well as fetal complications at an early stage. The historical approach to risk factors of diabetes during pregnancy is to differentiate between maternal risk factors and fetal or neonatal risk factors (Alia et al. 2019). These are the basic risk factors that must be thoroughly reviewed to develop specific screening activities and preventive measures. High maternal age is a thoroughly reported risk factor in gestational diabetes (Alia et al. 2019). Beta cell malfunction with age minimizes the ability to counter the insulin resistance during pregnancy, and thus, the risk of gestational diabetes mellitus (GDM). Epidemiological reports always indicate that the proportion of GDM increases with maternal age, without considering other confounding variables, including parity and body mass index (BMI) (Habibi et al. 2022). Another significant maternal risk factor is obesity and high levels of pre-pregnancy BMI (Oskovi-Kaplan & Ozgu-Erdinc 2021). Obesity, especially central, facilitates insulin resistance by inflammatory mechanisms, increasing free fatty acids, and disregarding adipokines (Stogianni et al. 2025). Overweight gain during gestation enhances this risk, which is the case of the synergistic effect of pre-existing and pregnancy metabolic stress. A family history of diabetes closely

predicts maternal hyperglycemia. Genetic predisposition is a contributing factor to impaired B-cell functionality and insulin resistance, which are also significant factors involved in the pathophysiology of gestational diabetes (Stogianni et al. 2025).

Women suffering from GDM in a previous pregnancy, giving birth to macrosomic babies, or experiencing stillbirths are at very high risk during subsequent pregnancies(Chiou et al.2018). The PCOS women are generally characterized by hyperandrogenism, chronic anovulation and obesity, which lead to impaired glucose metabolism. Ethnicity and heredity are factors that determine prenatal risks of diabetes. Research shows that the prevalence rate of GDM is higher in South Asian, African, Hispanic, and Indigenous women than in Caucasian women (Ballena-Caicedo et al. 2025). High intake of refined carbohydrates, alcoholic drinks sweetened by sugar, raises postprandial hyperglycemia, and an inactive lifestyle decreases insulin sensitivity. Dietary and physical activity interventions in public health have been observed to curb the occurrence of GDM among high risk groups (Khin et al.2023). One of the most prevalent effects of maternal diabetes is macrosomia, which is considered to be a weight exceeding 4,000 grams at birth (Rekani & Raouf 2021).

The presence of excessive glucose through the placenta prompts fetal pancreatic insulin secretion that is a strong growth factor resulting in overgrowth of adipose tissue and risks of birth trauma, shoulder dystocia and cesarean section. Hypoglycemia in the newborn of hyperglycemic mothers is a common problem (Khin et al.2023). The abrupt ending of maternal glucose intake, along with the continued appearance of fetal hyperinsulinemia, causes low blood glucose levels after birth, which may cause, neurological damage or even the death of the newborn infant should they not be corrected (Chiou et al.2018). Gestational diabetes is linked to premature birth and stillbirth. Hyperglycemia may cause placental dysfunction, polyhydramnios, high blood pressure and preeclampsia, which subsequently predispose the occurrence of preterm birth. In extreme or uncontrolled conditions, the infant might die inside the womb, and this is where close follow up and glycemic regulation during pregnancy hold the key to saving life (Nakshine & Jogdand 2023). Congenital anomalies pose a significant threat to

the infants of a mother with pre-existing diabetes. Hyperglycemia at the critical phase of organogenesis in the first trimester may interfere with cellular differentiation, resulting in structural defects, especially of the heart, the neural tube, and the skeletal system (Jain et al .2021). Maternal hyperglycemia has been associated with exposure involved, which affects fetal insulin sensitivity, adiposity, and appetite regulation to cause later life offspring to obesity, impaired glucose tolerance, and type 2 diabetes. Maternal factors are combined with fetal factors to increase the risk profile of maternal diabetes (Jain et al.2021).

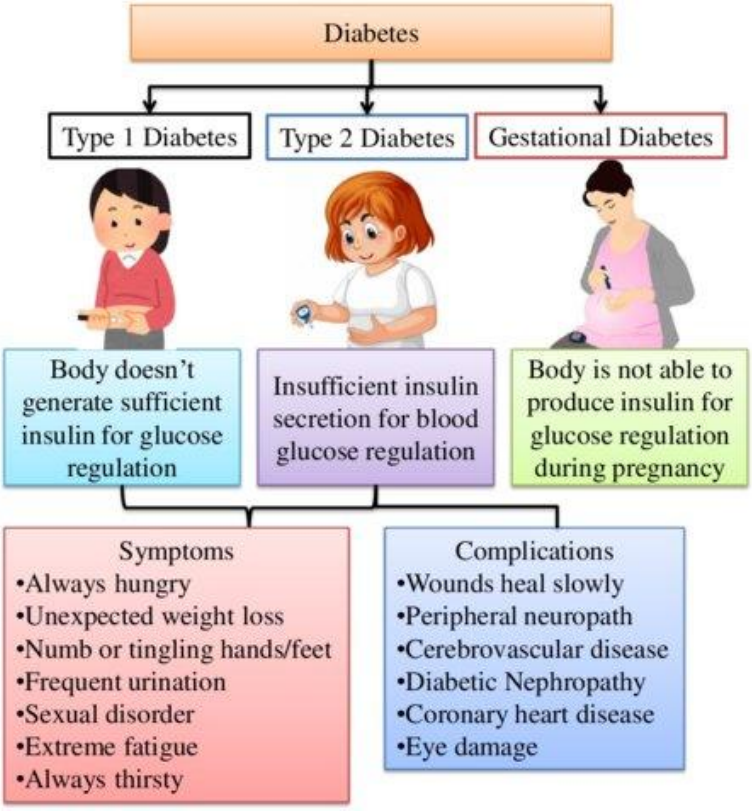

Figure 2 : Different types of diabetes and their symptoms (Jain et al. 2021).

There are different types of diabetes as shown in figure 2. However, maternal obesity increases the risk of both GDM and fetal macrosomia, which together contribute to a maternal-fetal metabolic risk cycle. Equally, an ethnic disposition coupled with lifestyle, particularly high energy diets and a lack of physical activity, continues to increase the chances of unfavorable results (Khin et al. 2023). These complex interactions are crucial to understanding how to construct predictive

models and interventions. Since risks vary, risk-based stratification is vital for successful screening. Early on screening helps with the identification of at-risk women and allows for timely interventions, such as lifestyle changes, medical nutrition therapy, and pharmacological treatment when necessary (Khin et al. 2023).

The previous study has specific scope of analyzing the risk factors of diabetes in pregnancy, in the form of gestational diabetes mellitus (GDM). However, this new study involves both epidemiological, biological, and clinical aspects in offering a comprehensive insight into the determinants and outcomes of diabetes in pregnancy. It covers pregnant women with gestational or pre-existing diabetes, who have been provided with antenatal care, and it takes into account maternal variables like age, body mass index (BMI), family history of diabetes, diet, lifestyle and past obstetric history. The short-term impacts of maternal diabetes on the fetal health are also determined by neonatal outcomes like birth weight, preterm birth, and neonatal hypoglycemia. The paper focuses on the determination of the major risk factors and their association with negative pregnancy outcomes to inform the preventive and early detection measures.

However, it does not include women with other metabolic or endocrine conditions not related to diabetes, elaborated pharmacological or treatment procedures, and postnatal outcomes longer than the neonatal. In general, the planned scope of the study is to create the evidence that will promote the further knowledge of the maternal and neonatal risk factors, help in the development of the evidence-based clinical decisions, and play the role in the activities that will help to lessen intergenerational transmission of metabolic diseases.

As the research gap, there is considerable evidence of the prevalence of gestational diabetes mellitus (GDM) and its complications globally, the context-specific risk factors and short-term maternal and neonatal outcomes that are related to diabetes during pregnancy are still poorly understood. Most of the literature available pays attention to a general epidemiological statement or to long-term metabolic consequences of mothers and children without paying special attention to local determinants, including cultural dietary habits, healthcare availability, and genetic readiness, which could contribute to GDM risk in a certain

group. Moreover, although other studies singly find risk factors such as maternal obesity, advanced age, and family history of diabetes, little has been incorporated involving biological, lifestyle, and obstetric factors into one comprehensive framework to establish the overall influence they have on the health conditions of mothers and their babies. Also there is a dearth of information to connect maternal glycaemic trends during pregnancy with neonatal immediate outcomes (including abnormal birth weights, preterm birth, and neonatal hypoglycaemia), especially in health care options that are resource-restrained. Hence, the research is required that would provide the comprehensive analysis of the interaction of maternal risk factors and neonatal outcomes in a particular population setting. This gap will help us in improving the risk stratification, early diagnosis, and evidence-based measures to curtail adverse pregnancy outcomes related to diabetes.

3 RESEARCH PURPOSE, OBJECTIVE AND RESEARCH QUESTION

Diabetes during pregnancy is a growing concern in maternal and child health, as it can cause severe complications for both mother and child. Although widely recognized as a risk factor for adverse outcomes, there is a lack of understanding in the existing literature about how maternal and neonatal risks interact and contribute to health. Thus, the following purpose, objective, and research question have been defined for this study.

The purpose is to provide evidence that can be used to improve early detection, prevention, and management of diabetes during pregnancy during prenatal care.

The objective of this thesis is to evaluate the risk factors for gestational diabetes and its impact on maternal and child health outcomes.

Therefore, the research question of this thesis is: What are the maternal and neonatal risk factors associated with diabetes during pregnancy, and how do they impact health outcomes?

4 RESEARCH METHODOLOGY

This chapter includes the steps used in the process of reviewing literature on the topic of diabetes in pregnancy and the associated maternal and neonatal risk factors. The methodology consists of a descriptive literature review to identify relevant studies, clearly stated inclusion and exclusion criteria to determine study eligibility, a comprehensive data search strategy to find evidence using reliable databases. All these steps provide a complete way of addressing the research objective and question. The thematic analysis was chosen as it offers a highly elastic method of finding, categorizing and analyzing patterns of significance within a considerable amount of qualitative data. Thematic analysis provides the researcher with the opportunity to understand the complexity and context of the results reported in the reviewed studies unlike quantitative synthesis methods such as meta-analysis.

4.1 Descriptive Literature Review

The literature review is a specific critical consideration of the available literature covering a particular research topic. It offers a summary along with an analysis of the evidence available (Cronin et al. 2008). It enables researchers to develop a holistic understanding of the phenomenon being studied. It also allows them to identify knowledge gaps that require further investigation (Timmins & McCabe 2005).

This thesis employed a descriptive literature review approach to examine the phenomenon of diabetes in pregnancy. It is associated with maternal risk factors, and neonatal outcomes. The method provided a clear theoretical framework and contextual insight into the topic, allowing the researcher to answer the developed research questions. In this review, a descriptive literature review was conducted, searching academic databases to find studies on the topic of diabetes during pregnancy, maternal risk factors, and the outcomes for babies. The literature was analyzed and reviewed to determine the presence of common themes, gaps in research areas covered and evidence to support the claims in this thesis.

4.2 Data Search

To collect pertinent evidence, reliable research databases, repositories of peer-reviewed journals, articles, and scientific papers can be used (Peterson, 2023). The search for data is crucial in finding high-quality data effectively, as it enables researchers to access studies of interest based on specific or combinations of keywords related to their research objectives. To conduct this study, CINAHL, google scholar and PubMed databases were searched to find articles that focus on maternal risk factors, outcomes of neonatal care, and interventions involving diabetes during pregnancy. The keywords used were *diabetes during pregnancy*, gestational diabetes, maternal risk factors, and neonatal outcomes, to ensure that relevant literature was retrieved. The search strategy prioritized peer-reviewed research articles as a means of scientific rigor and reliability of the findings. About 150 research papers were found from 500 reference studies, of which 105 papers were included. Of these, 45 were rejected. In total, 13 of the 45 papers were included.

As shown in Table 1, the inclusion and exclusion criteria were well-defined to minimize the inclusion of low-quality and irrelevant studies. The inclusion criteria were that the articles must be published in the past 7 years (2018 - 2025) to obtain the most up-to-date evidence. The studies were only to be included if they were in full text and in English, to enable a thorough and proper evaluation. In addition, the articles that were selected needed to be of direct relevance to maternal risk factors, neonatal outcomes or interventions associated with diabetes during pregnancy. Peer-reviewed articles were only taken into consideration to make it reliable and scientifically credible. (See an Appendix 1)

Table 1 : Inclusion and Exclusion

Criteria	Inclusion	Exclusion
Time Frame	Articles published within the last seven years (2018 - 2025), including articles and book chapters relevant to the topic.	Articles published more than five years ago (before 2017) or those unrelated to the topic.
Full-text Availability	Articles accessible in full text.	Articles not available in full text.
Language	Articles written in English.	Articles written in other languages.
Relevance	Articles that directly address the research question.	Articles that do not provide answers to the research question.
Format	Peer-reviewed articles and journals.	Non-peer-reviewed articles.

4.3 Data Analysis

The data obtained during the literature review were interpreted using a thematic analysis method, which involves defining patterns and classifying them into broad themes. It is the adaptable method that makes it possible to synthesize qualitative data and to make general conclusions without referring to the existing theoretical frameworks. Due to the analysis of the selected articles, typical patterns and concepts were identified and sorted into categories and expressed in key themes. This helped the researcher to state the relations between the research objectives and the research findings as indicated in the literature. Thematic analysis can be performed in two ways, which are deductive and inductive. Deductive thematic analysis is applied where a theory or framework guides the research, whereas inductive thematic analysis is applied when the researcher generates themes directly out of the data and has no predetermined categories (McLeod 2024). Sage journal, ScienceDirect used as other sources for descriptive literature review. This study used the inductive method in order to categorize the patterns into major themes and sub-themes, thus allowing the discovery of new information about maternal risk factors, neonatal outcomes, and intervention measures. The given strategy contributed to a comprehensive and methodical literature review, which enabled a coherent and comprehensible synthesis of the findings that give a direct answer to the developed research questions and objectives.

When the thematic analysis was used for this review, firstly, the literature was first reviewed by reading the selected articles carefully to acquire a deep understanding of the information and to observe recurring ideas and concepts that would relate to the research questions.

After that, recurring ideas and concepts were identified and grouped into meaningful categories, major themes and sub-themes reflecting patterns of important ideas across the literature. The findings were obtained by means of a step-by-step thematic analysis of the chosen studies. The review of the literature resulted in the first step that involved the extraction of data that were relevant to diabetes during pregnancy, maternal risk factors, and the outcome of neonatal birth. The information was then coded and then grouped into significant categories,

which were further formulated into themes. These themes showed the prevalent maternal risk factors, infant health outcomes, and where evidence was wanting

Finally, the inter-relationships between these themes were examined, integrating the results to provide an overall narrative that specifically answered the research objectives, as detailed in Appendix 3

The findings have been tabulated based on these key themes and these highlight the main findings that directly answer the study objectives.

5 RESULTS

The results of this literature review emphasise the fact that diabetes during pregnancy is a multifactorial, highly complicated process that is predisposed by genetic factors, metabolic imbalance and environmental factors (Oskovi-Kaplan & Ozgu-Erdinc 2021). Maternal hyperglycemia (either pre-existing diabetes (type 1 or type 2) or gestational diabetes) provides a metabolic environment with a significant impact on the health of the mother and the fetus. The review indicates that uncontrolled glucose levels are closely related to maternal complications, which may include preeclampsia, cesarean delivery rates, infections, and the development of diabetic complications (Jain et al. 2021).

Through the thematic analysis of the selected studies, the major themes and subthemes regarding maternal risk factors and their effects on neonatal outcomes in pregnancies complicated by diabetes were identified. The major themes are maternal risk factors, neonatal outcomes, clinical management and prevention, and long term intergenerational effects. These results are based on 13 papers according to below. The findings are structured into five main themes.

5.1 Theme 1: Maternal Risk Factors

A number of studies highlight the critical maternal factors that predispose women to gestational diabetes and the associated complications. According to a study by (Gen et al. 2025), the age above 25 years, obesity, high parity, and a family history

of diabetes mellitus (DM) and a history of GDM or macrosomic infants were the most important predictors (Alia et al. 2019). In a comparable study (Stogianni et al. 2025), highlighted maternal obesity as one of the major modifiable risk factors that cause not only GDM but also preeclampsia, thromboembolism, or high rates of cesarean birth

In its turn, the research also pointed out that obesity increases the risk of type 2 diabetes, especially in multiparous women, which requires specific preventive actions and alterations in lifestyle (Gen et al.2025). As mentioned, hormonal/metabolic imbalance in polycystic ovary syndrome (PCOS) became another significant risk factor that increases the risk of GDM, which the researcher emphasized the need to implement special screening in the high-risk groups (Mustaniemi et al. 2018). Taken together, the results prove that maternal obesity, unhealthy diet, lack of physical activities, and metabolic diseases are the major contributors to gestational diabetes and its consequences.

5.2 **Theme 2: Neonatal Outcomes**

Neonatal effects of maternal metabolic anomalies are extensive and, in most cases, have found out that maternal hyperglycemia and insulin resistance puts a baby at risk of developing hyperinsulinism, which leads to macrosomia (Khin et al.2023). Neonatal hypoglycemia may also be caused by the fact that the fetal pancreas has been overstimulated by maternal glucose exposure, so that once the fetus is born, the maternal glucose supply will be withdrawn suddenly (Patil et al. 2024).

Moreover, it has been established that the maternal glycemic control during pregnancy is less effective, which leads to a higher risk of preterm delivery, stillbirth, and placental complications, which supports the essay on the significance of early diagnosis and treatment (Ovesen et al. 2025). Also pointed out/found that the processes of inflammatory events that are observed among women with GDM might also cause chronic hypertension and cardiovascular risks in later life, which is how the outcomes of both neonatal and maternal life are biologically interconnected (Miller & Lim 2021). Their findings affirm that proper maternal

glucose self-control is the key to the prevention of adverse conditions in neonates and the provision of healthy fetal development.

5.3 Theme 3: Clinical Management and Preventive and Screening Strategies.

Clinical management and preventive strategies can have serious impacts on improving outcomes in both the mothers and the infants. The International Association of Diabetes in Pregnancy Study Group (IADPSG) suggests using a one-step screening method with an oral glucose tolerance test 75g (OGTT) between 24 and 28 gestation weeks (Rani 2025). This is a universal approach that allows the detection and tracking of vulnerable women early.

It was conceded that dietary modification, routine physical activities, glycemic monitoring, and in some case, insulin therapy were the foundation of GDM management (Alia et al. 2019). Women can have an earlier education on self-management and lifestyle adaptation, which helps them better control the level of glucose and prevent complications like macrosomia and preterm delivery. The adoption of individualized interventions guided by personal metabolic reactions is also an indication of a move towards preventive obstetric care, lessening the attendant GDM risks (Ovesen et al. 2025).

5.4 Theme 4: Long-Term Effects and Analysis.

The studies under review show that the metabolic and cardiovascular consequences of gestational diabetes and maternal obesity do not cease to influence them after pregnancy. The dysfunction of the pancreatic β-cell is the key to the development of hyperinsulinemia into hypoinsulinemia with the subsequent lack of insulin release. In the long-run, glucotoxicity and lipotoxicity are associated with 29-cell apoptosis, which worsens the threat of diabetes type 2 (Khin et al .2023).

In addition, have found that women who had developed GDM in the past are prone to chronic hypertension, cardiovascular diseases in the future, and a few even

develop type 1 diabetes as the body starts autoimmunity against the pancreatic islet cells (Miller & Lim 2021). On the same note, it was found that diabetic adults have a greater global dyslipidemia prevalence, and regular metabolic screening and personalized medical care should be implemented. These findings are piled up in favor of the reality that GDM is not a temporary condition but a signifier of long-term metabolic dysfunction in the mothers and their children (Ballena-Caicedo et al. 2025).

5.5 **Theme 5: Effects on the Baby**

Hyperglycemia in mothers has far-reaching consequences on the development of the fetus and infant welfare. Continued exposure to high levels of glucose in the womb causes hyperinsulinemia in the fetus, which leads to macrosomia and fat accumulation (Khin et al. 2023). The subsequent high insulin secretion may result in neonatal hypoglycemia, which, without treatment, can result in neurological complications. Also noted that these intra-uterine disorders could program the metabolic pathways to predispose children to obesity, insulin resistance, and diabetes type 2 in adulthood (Khin et al.2023).

Also, favour these results, saying that it is necessary to diagnose and control the glycemic level early to avoid negative outcomes associated with premature birth and stillbirth (Ovesen et al. 2025). The transgenerational impact of maternal hyperglycemia portrays that fetal metabolic programming is central to risk of diseases in the future. Thus, maternal hyperglycemia prevention not only helps to protect infant survival but also reduces both the occurrence of long-term metabolic disorder and intergenerational metabolic disorder (Patil et al. 2024).

The studies also highlighted that intergenerational transmission of metabolic diseases could be broken through education, continuing surveillance after giving birth, and preventive interventions. The awareness of these risks was found to improve family planning and preconception counseling for future births.

6 DISCUSSION

6.1 Reviewing The Results

The clinical issue of maternal diabetes encompassing both pre-existing diabetes (type 1 and type 2) and gestational diabetes (GDM) is severe due to its prevalence in terms of influencing the health of the newborn (Popoviciu et al. 2023). It clarifies the role of maternal risk factors, such as example obesity, old age, and family history, on the neonatal outcome of macrosomia and hypoglycemia (Khin et al 2023). Maternal hyperglycemia has implications on fetal development that are enormous, both in the short term and in the long term (Patil et al. 2024). The most frequent of these effects on the newborn are macrosomia, which is the most clinically significant. Macrosomia is an overweight of fetus which is generally regarded as 4000 to 4500 grams or greater weight of a baby at birth or above 90th percentile of gestational age. The mechanism of pathophysiology of macrosomia in the course of pregnancy in the presence of diabetes in the mother is primarily associated with hyperinsulinemia of the fetus (Khin et al. 2023).

In addition to that, Cesarean section is not only a maternal risk factor, but also a cause of neonatal morbidity, as infants are more likely to develop respiratory distress or slow adaptation to surgical delivery. Macrosomia is associated with metabolic abnormalities in the neonatal period, particularly neonatal hypoglycemia (Popoviciu et al. 2023). Neonatal hypoglycemia is a direct consequence of congenital hyperinsulinemia in children (Khin et al.2023). These results confirm the importance of glucose testing and prompt treatment in the postpartum period for mothers with uncontrolled hyperglycemia who have premature infants (Khin et al .2023). The greatest time intervals for the teratogenic effect of maternal hyperglycemia are during the first trimester, during organogenesis.

Gestational Diabetes causes congenital malformations that affect the heart and skeletal abnormalities. Women who had poor glycemic regulation in the prenatal period and in the first trimester of pregnancy are at high risk of giving birth to a child with structural anomalies. This shows the significance of preconception and early maximization of glycemic regulation of diabetic women. Other maternal diabetes

complications are preterm birth and stillbirth. Hyperglycemia may cause placental abruption, polyhydramnios, and fetal distress particularly when the maternal vessels are involved. Spontaneous and medically induced preterm births are risky in presence of predisposing conditions. The neurophysiological issues affecting the born baby because of preterm birth are respiratory distress syndrome, intraventricular hemorrhage, and neurodevelopmental issues in the long term (Popoviciu et al. 2023).

Maternal hyperglycemia is a health condition that can be managed through endocrinologists, obstetricians, nutritionists, and neonatologists as part of a multidisciplinary setting to achieve better clinical outcomes by minimizing morbidity and mortality in clinical practice. Fetal exposure to hyperglycemia can be reduced by close maternal blood glucose monitoring and compliance with medical nutrition therapy in combination with insulin or, in some instances, oral drug therapy (Popoviciu et al. 2023). The effects of maternal diabetes on the newborn are further reduced with the postpartum planning, consisting of breastfeeding programs, glucose monitoring, and the neonatal intensive care where necessary. Mother hyperglycemia during prediabetes or gestational diabetes (GDM) is a severe risk to the fetus and may result in the occurrence of fetal hyperinsulinemia, macrosomia, and glucose metabolism syndrome (Patil et al. 2024). Thus, it is necessary to find women who may be at risk and diagnose hyperglycemia at the intensive stage to avoid adverse consequences. Clinical practice guidelines have promoted risk-based and universal screening with force (including the application of oral glucose tolerance test (OGTT). Risk-based screening is a theoretical model that can be applied to women of high maternal age, women with a history of GDM, or women with a family history of diabetes type 2; in other words, they need to be detected early and managed early. The screening of the people is conducted in women between the ages of 24- 28 weeks of pregnancy and this minimizes the risks of complications occurring after birth. The mothers are diagnosed sooner than otherwise (Ovesen et al.2025). Dietary interventions centered around healthy macronutrient diets, low-carbohydrate (low glycemic index) diets, and balanced caloric consumption, medical nutrition therapy (MNT) have been repeatedly linked to better glycemic control, fewer cases of fetal growth restriction and fewer cases

of maternal complications, such as preeclampsia and cesarean delivery. Females receiving a mix of dietary and physical activity measures have lower chances of pharmacological therapy, which demonstrates the preventive nature of nonpharmacological programs. Gestational diabetes puts women at the risk of getting diabetes type 2 and the babies experience ongoing metabolic problems, hence the need to consult. A diabetic pregnancy is a very sensitive time in the health of the mother and the child. That way, the chances of women with gestational diabetes (GDM) developing type 2 diabetes (T2DM), metabolic syndrome, and even cardiovascular disease in the future increase (Popoviciu et al. 2023). It is stated that approximately half of women who experience GDM develop T2DM within 10 years of birth and thus, screening at an early stage is essential to screen all at-risk women (Mittal et al. 2025).

Those who are developing persistent hyperglycemia or glucose intolerance can be identified during postpartum monitoring and thereby, appropriate steps can be implemented to prevent the occurrence of overt diabetes. The general recommendations include 75 g oral glucose tolerance test (OGTT) at 6-12 weeks of the postpartum and periodicity of the tests and consider obesity and family history and ethnicity as the elements of risk (Boyd & Conway 2024). The children born by the mother with the condition of gestational diabetes are also at risk of acquiring chronic metabolic syndrome, being other than the maternal health risks. These findings highlighted metabolic disease intergenerational transmission where maternal hyperglycemia was found to be one of the key factors regarding intergenerational transmission of cardiometabolic risk factors (Khin et al. 2023). These long-term effects should be avoided by early detection of the children at risk through education on their lifestyle that includes nutrition and physical exercise. Effective postpartum follow up involves screening and prevention. The patient education aspect must also be taken care of since they will be able to self-monitor, maintain healthy lifestyles and follow regimes. The implementation of postpartum surveillance and prevention plans incorporates long time plans of surveillance and prevention of the same which can only be effective when multidisciplinary teams of care providers are implicated like endocrinologists, obstetricians, dietitians and primary care providers. Only metabolic disease prevention was not linked with the

value of postpartum follow-up. History of GDM in women increases the chances of developing hypertension, lipids, and cardiovascular disease and multimodal cardiovascular risk assessment and management is necessary (Popoviciu et al. 2023). The age of maternal conception has been linked to obesity, hypertension and metabolic syndrome, all of which predisposes to hyperglycemia in pregnancy. Regarding the prevalence, the issue of late childbearing in most societies, brought by occupation, education or socioeconomic factors has contributed to growth in the percentage of pregnancies among older women. This population transition can partially explain the rise in the rate of GDM in the world (Patil et al. 2024). In developed nations, successive pregnancies are about 2025 percent in women who are 35 years old or more; an even greater contributor to the problem of diabetes-linked pregnancy complications. Obesity is the most critical risk factor of diabetes in pregnancy that can be modified. Chronic inflammation, low-grade imbalance of adipokines, and high concentrations of free fatty acids are pathophysiological processes that result in the insulin loss of sensitivity (Popoviciu et al. 2023). Polycystic ovary syndrome (PCOS) is the other risk factor to consider as it is highly correlated with insulin resistance and hyperandrogenism. During pregnancy, lifestyle choices are very important in the development of diabetes. Carbohydrates in the food, saturated fats, and sugary beverages, in combination with minimal physical activity, are a major threat of hyperglycemia (Khin et al.2023). Past pregnancies are also good predictors of diabetes in future pregnancies because of placental complications. The multifactorial etiology of maternal risk factors of diabetes in pregnancy is highlighted by the distribution of the maternal risk factors. Even though maternal age and ethnicity, and family history are non-modifiable risk factors, others, including obesity and lifestyle behaviors, can be modifiable; hence, can be utilized as intervention targets.

6.2 **Ethics and Reliability**

The basis of any credible research process is reliability and ethics, which ensure that the findings are accurate, reliable, and transparent. In this review, reliability was ensured by using authentic academic sources and following sound methodological procedures and careful data collection. Mainly, peer-reviewed journal articles from reputable and well-recognized databases were included after

strict inclusion and exclusion criteria. Each of the publications that were chosen was carefully assessed on their methodological rigor and relevance in relation to the research topic. Likewise, the review was done by citing and acknowledging all authors to uphold academic integrity and transparency.

Also important were the ethical considerations that were respected at all stages of the research. Ethics in research is the system of morality which controls the acceptable scientific behavior and guarantees the respect that others deserve. The study was carried out in accordance with the Responsible Conduct of Research (RCR) guidelines of the National Board on Research Integrity in Finland and in accordance with known ethical standards. Because the literature review only used secondary data, there were no human or animal subjects, and thus, formal ethical approval was not required. The researcher presented all the findings honestly, without misrepresentation, omission, or prejudice, so that interpretations were objective and based on evidence. These measures combined assures the ethicality of the research process and the reliability of the methodology.

6.3 Conclusions and Recommendations

The synthesis of the reviewed articles showed that effective antenatal care, early identification, and effective glycemic management play a fundamental role in the reduction of negative pregnancy outcomes. The results highlighted that lifestyle changes such as medical nutrition therapy, frequent exercise and education of the patients are the basis of managing the GDM, and pharmacological management such as insulin therapy is necessary in cases where non-pharmacological strategies are not effective. Besides, the findings emphasized the significance of a multidisciplinary care model associated with obstetricians, endocrinologists, dietitians, and midwives to achieve the best maternal and neonatal outcomes.

Even with the gains made, there are still a number of areas that need to be explored further. It is also suggested that further research into alternative pharmacological agents like metformin and novel glucose-lowering drugs should be conducted in order to determine their efficacy and safety. Also, the studies of digital health technologies, such as mobile glucose monitoring software and telemedicine,

should be increased to determine their cost-effectiveness and long-term effects on patient compliance and outcomes. Lastly, there remains a necessity to conduct more research on the intergenerational impact of maternal hyperglycemia with the aim of developing interventions that are culturally-sensitive and less expensive to implement, both in prevention and long-term care.

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Appendix 1/ 1

Table 2. Data search result

Databases	Search Title / Keywords	No. of Hits	Rejected Articles	Accept article	Records included based on full text	Screening the Accept and Reject articles
PubMed	Risk factors Pregnancy Diabetics GDM BMI	25	10	14 Abstract- 4 Full text - 10	4	After reading the title, abstract, and full study, Irrelevant Articles that did not fit the inclusion criteria
CINAHL	Risk factors Pregnancy Diabetics GDM Fetal Growth and Nutritional	50	40	10 Abstract- 5 Full text - 5	3	After reading the title, abstract, and full study, Irrelevant Articles that did not fit the inclusion criteria or were too broadly described were eliminated.

Appendix 1/2

Google Scholar	Risk factors Pregnancy Diabetics GDM Metabolic dysfunction	30	20	8 Abstract- 3 Full text - 5	3	After reading the title, abstract, and full study, Irrelevant Articles that did not fit the inclusion criteria or were too broadly described were eliminated.
ScienceDirect	Risk factors Pregnancy Obesity and insulin resistance Diabetics GDM	25	15	8 Abstract- 3 Full text - 5	3	After reading the title, abstract, and full study, Irrelevant Articles that did not fit the inclusion criteria or were too broadly described were eliminated.
Others	GDM Metabolic Risak factors	20		5		
Total		150	105	45	13	.

Appendix 2/1

Table 3. Data collection

Banday, Sameer & Nissar (2020)	Pathophysiology of diabetes: An overview	Avicenna Journal of Medicine	Systematic review was used.	I identify a summary of the pathophysiology of diabetes with a focus on insulin resistance and dysfunction of the beta cells.
Chiou, Hung & Liao (2018)	The Impact of Pre-pregnancy BMI and Gestational Weight Gain on Perinatal Outcomes for Women With GDM	Worldviews on Evidence-Based Nursing	Literature review using the Systematic method was used.	Pregnancy outcome is poorer in women with GDM due to high pre-pregnancy body mass index (BMI) and high gains in pregnancy weight.
Gen et al. (2025)	The Impact of Obesity on the Association between Parity and Risk of Type 2 Diabetes Mellitus	Diabetes and Metabolism Journal	A literature review using the thematic method was conducted.	I identified that Obesity enhances the relationship between parity and the chances of getting type 2 diabetes.

Appendix 2/2

Kampmann (2015)	Gestational diabetes: A clinical update	World Journal of Diabetes	Review was used.	I identified that assessment, diagnosis, and treatment emphasize the importance of early screening and lifestyle changes as a method of managing GDM.
Karcz & Królak-Olejnik (2024)	Impact of GDM on Fetal Growth and Nutritional Status in Newborns	Nutrients	Literature review using the Systematic method was used.	This Exposed to GDM results in abnormal fetal development, increased adiposity, and newborn nutritional profiles.
Luo et al. (2024)	Gestational Diabetes Mellitus: New Thinking on Diagnostic Criteria	Life	Literature Review was used.	The article suggests new diagnostic standards of GDM to enhance their early detection and treatment.

Appendix 2/3

Nakshine & Jogdand (2023)	A Comprehensive Review of GDM: Impacts on Maternal Health, Fetal Development, Childhood Outcomes, and Long-Term Strategies	Cureus	Literature Review was used	This includes Concisely presents both the long and short-term outcomes of GDM in mothers and their offspring; emphasizes the strategies to manage them.
Oskovi-Kaplan & Ozgu-Erdinc (2021)	Management of Gestational Diabetes Mellitus	Advances in Experimental Medicine and Biology	Literature Review was used	This article evaluates management plans such as diet, physical exercise, insulin, and new interventions in the management of GDM.
Parrettini, Caroli & Torlone (2020)	Nutrition and Metabolic Adaptations in Pregnancy: Focus on Obesity	Frontiers in Endocrinology	Literature Review was used	This includes Nutritional programs that play a significant role in the management of GDM

Appendix 2/4

Popoviciu et al. (2023)	Type 1 Diabetes Mellitus and Autoimmune Diseases: A Critical Review	Journal of Personalised Medicine	Literature Review was used	Explores links between T1DM and autoimmune conditions; suggests personalized treatment approaches.
Rassie et al. (2022)	Human Placental Lactogen in Relation to Maternal Metabolic Health and Fetal Outcomes	International Journal of Molecular Sciences	Literature review using the Systematic method was used	Human placental lactogen plays a significant role in maternal glucose metabolism and fetal growth outcomes.
Rekani & Raouf (2021)	Macrosomic Infants of Diabetic and Non-diabetic Pregnant Women	Journal of Pediatrics, Perinatology and Child Health	Literature review using the Systematic method was used	GDM significantly increases the prevalence of macrosomic infants compared to non-diabetic pregnancies.
Roy, Pokharel & Piganelli (2024)	Decoding the immune dance:	Molecular Metabolism	Literature Review was used	Reviews immune-mediated beta-cell destruction

Appendix 2/5

Tudurí et al. (2022)	The pancreatic β-cell in ageing: Implications in age-related diabetes	Ageing Research Reviews	Literature Review was used	This includes Ageing impairs beta-cell function, increasing the risk of type 2 diabetes in older adults.
Yang & Wu (2022)	GDM and Preeclampsia: Correlation and Influencing Factors	Frontiers in Cardiovascular Medicine	Literature review using the Systematic method was used	I could Identified a strong correlation between GDM and preeclampsia, highlighting shared risk factors.
Habibi et al. (2022)	Maternal metabolic factors and the association with gestational diabetes: A systematic review and meta-analysis	Diabetes/Metabolism Research and Reviews	Systematic Review & Meta-analysis were used.	I identified that Obesity and insulin resistance are metabolic risk factors that have a strong correlation with GDM.

Miller & Lim (2021)	The risk of diabetes after giving birth to a macrosomic infant	Maternal Health, Neonatology and Perinatology	Literature review using a Systematic method was used	The birth of a macrosomic baby puts the mother at risk of subsequent type 2 diabetes.
Mustaniemi et al. (2018)	Polycystic ovary syndrome and risk factors for GDM	Endocrine Connections	Literature review using Systematic method was used	Metabolic dysfunction has exposed women with PCOS to a high risk of developing GDM.
Patil et al. (2024)	Diabetes Mellitus: Classification, Pathophysiology, Risk Factors, Diagnostic Criteria and Advances in Management	African Journal of Biomedical Research	Literature Review was used	Identify new classification and diagnostic features of diabetes with lapses in improvements in management.
Stogianni et al. (2025)	Impact of maternal BMI above 30 kg/m2 on adverse	Acta Obstetricia et Gynecologica Scandinavica	Literature review was used	High maternal BMI (>30) increases risk of complications,

Table 4: Thematic analysis of study

Study (Title)	**Main Theme**	**Subthemes**	**Extracted Results**	**References**
Pancreatic Beta-cell Dysfunction in Type 2 Diabetes	Maternal Risk Factors	Maternal obesity; Lifestyle behaviors	Maternal obesity results in increased insulin resistance and risk of GDM; poor diet and low physical activity can result in increased maternal hyperglycemia.	(Khin, P.P., Lee, J.H. & Jun, H.S. 2023)
Pancreatic Beta-cell Dysfunction in Type 2 Diabetes	Neonatal Outcomes	Macrosomia; Neonatal hypoglycemia	Macrosomia resulting from foetal hyperinsulinism caused by maternal glucose;	(Khin, P.P., Lee, J.H. & Jun, H.S. 2023)
Pancreatic Beta-cell Dysfunction in Type 2 Diabetes	Clinical Management	Screening & management; Lifestyle interventions; Patient education	Glucose testing and monitoring should be instituted early; lifestyle management helps the mother	(Khin, P.P., Lee, J.H. & Jun, H.S. 2023)

Pancreatic Beta-cell Dysfunction in Type 2 Diabetes	Long-Term Effects	Intergenerational metabolic risk	Maternal hyperglycemia is a risk factor for obesity, insulin resistance and the risk of type 2 diabetes in the offspring in adulthood.	(Khin, P.P., Lee, J.H. & Jun, H.S. 2023)
Type 1 Diabetes Mellitus and Autoimmune Diseases: A Critical Review of the Association and the Application of Personalized Medicine	Maternal Risk Factors	Obesity; Family history; Lifestyle	Obesity and family history increase GDM risk such as lifestyle behaviors contribute to hyperglycemia.	(Popoviciu, M.S. et al. 2023)
Type 1 Diabetes Mellitus and Autoimmune Diseases: A Critical Review of the Association and the Application	Neonatal Outcomes	Macrosomia; Neonatal hypoglycemia; Preterm birth; Stillbirth	Macrosomia and hypoglycemia are common types of riisk. hyperglycemia increases preterm birth, stillbirth, and placental complications	(Popoviciu, M.S. et al. 2023)

Type 1 Diabetes Mellitus and Autoimmune Diseases: A Critical Review of the Association and the Application of Personalized Medicine	Clinical Management	Multidisciplinary care; Lifestyle pharmacologic management	Multidisciplinary Care Suggested Insulin Therapy Safe, effective Lifestyle Interventions Improves outcomes Pharmacologic Therapy Used when Lifestyle is inadequate	(Popoviciu, M.S. et al. 2023)
Type 1 Diabetes Mellitus and Autoimmune Diseases: A Critical Review of the Association and the Application of Personalized Medicine	Long-Term Effects	Intergenerational transmission; Postpartum	Higher risk of metabolic syndrome, obesity, cardiovascular disease, effect for Offspring. postpartum screening can reduce future diabetes risk.	(Popoviciu, M.S. et al. 2023)
Diabetes Mellitus: Classification, Pathophysiology, Risk Factors, Diagnostic Criteria	Maternal Risk Factors	Maternal age; Lifestyle behaviors	Older maternal age (>30-35 years) is a risk factor for GDM; poor diet	(Patil, M.S. et al. 2024)

Appendix 3/4

Diabetes Mellitus: Classification, Pathophysiology, Risk Factors, Diagnostic Criteria and Advances in Management	Neonatal Outcomes	Macrosomia; Congenital anomalies	Macrosomia associated with Fetal Hyperinsulinemia; poor control of glycemia in first trimester causes congenital heart and skeletal defects.	(Patil, M.S. et al. 2024)
Diabetes Mellitus: Classification, Pathophysiology, Risk Factors, Diagnostic Criteria and Advances in Management	Clinical Management	Lifestyle & pharmacologic interventions; Early screening	Lifestyle interventions help improve glycemic control; insulin therapy for those who do not have adequate glycemic control with lifestyle intervention; early screening of OGTT	(Patil, M.S. et al. 2024)
Diabetes Mellitus: Classification, Pathophysiology, Risk Factors, Diagnostic Criteria	Long-Term Effects	Metabolic syndrome in offspring	Maternal hyperglycemia - puts children at increased risk for metabolic syndrome, obesity,	(Patil, M.S. et al. 2024)

Appendix 3/5

Gestational Diabetes Mellitus:	Clinical Management	Screening and diagnosis	Risk based and universal ogtt screening (24 - 28	(Ovesen, P. et al. 2025)

Risks and Treatment			weeks) recommended; early detection will reduce maternal and neonatal complications.	
Gestational Diabetes Mellitus: Can The Obstetrician Make A Difference?	Maternal Risk Factors	Advanced maternal age	One step screened strategy has been suggested by the International Association of Diabetes in Pregnancy Study Group (IADPSG) whereby, a 75 grams (g) oral glucose tolerance test (OGTT) is performed to all pregnant women between 24 -28 weeks of gestation.	(Rani, S. 2025)

The risk of diabetes after giving birth to a macrosomic infant: data from the NHANES cohort', Maternal Health, Neonatology and Perinatoogy	Long-Term Effects	Post-GDM risk	Approximately 50% of women who have GDM develop type 2 diabetes within 10 years, it is essential that newborn screening and interventions are done soon after delivery.	(Miller, C. & Lim, E. 2021)
Gestational Diabetes Mellitus', Queenan's Management of High-Risk Pregnancy: An Evidence-Based Approach.	Long-Term Effects	Postpartum follow-up	75 g OGTT at 6–12 weeks postpartum identifies persistent for high-risk mothers.	(Boyd, A.R. & Conway, D.L. 2024)
Impact of maternal body mass index above 30 kg/m2 on adverse pregnancy outcomes in women with	Maternal Risk Factors	Obesity	Maternal obesity is an important modifiable risk factor for GDM, preeclampsia, thromboembolism and increased cesarean rates.	(Stogianni, A. et al. 2025)