



Prevalence, Risk Factors, and Complications of Gestational Diabetes Mellitus: A Study from Tobruk, Libya (2020–2024)

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انتشار داء السكري الحلمي وعوامل الخطورة والمضاعفات: دراسة من طبرق، ليبيا (2020–2024)

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Abstract

Gestational Diabetes Mellitus (GDM), a common complication affecting 7-10% of pregnancies worldwide, has been rising due to increasing obesity and sedentary lifestyles. This study, conducted in Tobruk, Libya, analyzed 85 GDM and Type 2 Diabetes Mellitus (T2DM) cases between 2020 and 2024. Results highlighted a significant increase in GDM prevalence (73.3% in 2020–2021 to 55.5% in 2024), attributed to unhealthy lifestyles. Complications included higher miscarriage rates (11.11% in 2020–2021 to 55.5% in 2024), fetal macrosomia, congenital anomalies, and delivery complications, primarily among women aged 25–34. Effective glycemic control and a multidisciplinary care approach remain crucial for reducing maternal and neonatal risks.

Keywords: Gestational Diabetes Mellitus (GDM), Type 2 Diabetes Mellitus (T2DM), prevalence rate, pregnancy complications.

المخلص

داء السكري الحلمي (GDM)، وهو إحدى المضاعفات الشائعة التي تؤثر على 7-10% من حالات الحمل عالمياً، يشهد تزايداً نتيجة ارتفاع معدلات السمنة وأنماط الحياة الخاملة. تناولت هذه الدراسة، التي أجريت في طبرق، ليبيا، 85 حالة من داء السكري الحلمي (GDM) والسكري من النوع الثاني (T2DM) بين عامي 2020 و2024. أظهرت النتائج ارتفاعاً ملحوظاً في معدل انتشار السكري الحلمي، حيث بلغ 73.3% خلال 2020–2021 وانخفض إلى 55.5% في عام 2024، ويُعزى ذلك إلى الأنماط الحياتية غير الصحية. شملت المضاعفات ارتفاع معدلات الإجهاض (من 11.11% في 2020–2021 إلى 55.5% في 2024)، وتضخم حجم الجنين، والتشوهات الخلقية، ومضاعفات الولادة، خاصة بين النساء في الفئة العمرية 25–34 عاماً. يظل التحكم الفعال في مستوى السكر في الدم والنهج العلاجي متعدد التخصصات أمراً ضرورياً للحد من المخاطر الصحية للأم والجنين.

الكلمات الدالة: داء السكري الحلمي، السكري من النوع الثاني، معدل الانتشار، مضاعفات الحمل.

Introduction

Gestational Diabetes Mellitus (GDM) is a type of diabetes that is first diagnosed during pregnancy, characterized by hyperglycemia and insulin resistance that may resolve postpartum. GDM affects 7-10% of pregnancies worldwide, making it one of the most common complications during pregnancy (American Diabetes Association, 2023) [1]. In recent years, the prevalence of GDM has been increasing globally, largely due to rising rates of obesity and sedentary lifestyles (Zhu & Zhang, 2022). Women diagnosed with GDM are at an increased risk of developing

complications during pregnancy, including pre-eclampsia, preterm birth, and cesarean delivery. Additionally, babies born to mothers with GDM are more likely to experience macrosomia, shoulder dystocia, and neonatal hypoglycemia, which can lead to long-term health issues (Hod et al., 2022) [8]. Managing GDM effectively is essential to minimize these risks, as appropriate interventions can significantly reduce adverse maternal and neonatal outcomes (Melchior et al., 2023).

The primary cause of GDM is the hormonal changes during pregnancy that affect insulin sensitivity, combined with an increased need for insulin as pregnancy progresses. Hormones such as human placental lactogen (hPL) contribute to insulin resistance, making it challenging for some women to regulate blood sugar levels effectively (Buchanan & Xiang, 2021) [10]. Women with risk factors like a family history of diabetes, obesity, or advanced maternal age are more likely to develop GDM (Ferrara, 2023).

Screening for GDM is a crucial step, usually performed between 24 and 28 weeks of gestation using an oral glucose tolerance test (OGTT). Recent studies have highlighted the importance of early screening in high-risk populations, allowing for timely lifestyle interventions and medication if needed (Carpenter et al., 2023). Recommended management strategies include dietary adjustments, increased physical activity, glucose monitoring, and pharmacological treatments such as metformin or insulin when lifestyle modifications alone are insufficient (McIntyre et al., 2022).

Advancements in prenatal care have emphasized a multidisciplinary approach involving healthcare professionals like obstetricians, endocrinologists, dietitians, and diabetes educators to ensure comprehensive management. This approach has shown improved outcomes for both mothers and infants, reducing the risks of long-term complications such as type 2 diabetes and metabolic syndrome (Damm et al., 2023).

Research on Gestational Diabetes: Methodology, Results, and Recommendations

3. Methodology

3.1 Study Location

The study was conducted at Tobruk Medical Center, the Maternal and Child Center, and several private clinics in Tobruk city.

3.2 Data Collection

A total of 85 cases of diabetes were collected between March 2020 and March 2024. The data was sourced from medical records in the statistics and documentation departments at Tobruk Medical Center, the Maternal and Child Center, and private clinics. Visits were made multiple times to these centers, and information from 85 newborn files related to gestational diabetes cases was obtained. The collected data included the mother's age, gestational period, previous miscarriage history, newborn weight and gender, delivery type, and the presence or absence of congenital anomalies. The samples were categorized based on the type of diabetes (gestational diabetes or type 2 diabetes) and further grouped according to specific factors such as miscarriage history, anemia, postpartum complications, and their relation to maternal age.

3.3 Statistical Analysis

The statistical analysis was performed using Microsoft Excel software.

4. Results and Discussion

Diabetes is a chronic disease that persists throughout an individual's life and is widespread worldwide (Al-Tayyara, 1998). Unlike other diseases that target specific organs, diabetes negatively affects all body organs, starting from the skin and reaching the bones, passing through all tissues and systems, such as the heart and blood vessels. Its impact extends beyond the body, also affecting the patient's economic situation (Munir, 2015), with an estimated global annual cost of \$286 billion for those aged 20 and above. This cost includes laboratory tests, medical drugs, hospital visits, and work absenteeism due to diabetes complications (Al-Hamid, 2007). Hormonal changes during pregnancy make the body's cells less responsive to insulin. When the pancreas cannot meet the increased demand for insulin, blood sugar levels rise, leading to gestational diabetes, which affects 4–10% of pregnant women. Although gestational diabetes is

a temporary condition, it poses significant risks and complications for both mother and fetus (Al-Anazi, 2010).

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Diabetes is one of the chronic diseases that persist throughout an individual's life and is widely prevalent globally (World Health Organization, 1998). Diabetes is not considered similar to other diseases confined to the affliction of a specific organ in the human body. It affects all organs and tissues of the body negatively and has a significant impact on the cardiovascular system, leading to complications such as heart disease and blood vessels. However, it does not stop at its effect on the body only but also affects the individual economically (Minar, 2015) and significantly increases the economic burden caused by this disease, estimated to cost patients around 286 billion dollars annually. This figure represents only the costs of medical prescriptions, medications, and medical care and does not include absences from work, resulting in diabetes complications (Hamid, 2007). Hormonal changes during pregnancy make a woman's body less responsive to insulin. The pancreas compensates for this by increasing insulin production to

maintain normal blood sugar levels. If the pancreas fails to keep up, this results in gestational diabetes, which affects about 10-14% of pregnancies. It increases the risk of complications for the mother and fetus during pregnancy and delivery, and both may develop type 2 diabetes in the future (Hamad, 2010).

Table 1: Distribution of the sample population by Type of Diabetes

2024		2023- 2022		2021-2020		Type of Diabetes
%	Number	%	Number	%	Number	
66.7	30	80	20	73.3	11	Gestational Diabetes
33.3	15	20	5	26.7	4	Type 2 Diabetes

Results in Table 1 showed that the incidence of gestational diabetes was higher than the prevalence of type 2 diabetes between 2020-2021, reaching around 73.3%. This increase is attributed to noncommunicable diseases, such as the rise in the number of women with gestational diabetes and obesity-related diabetes. The latter is expected to continue increasing steadily to reach approximately 33.3% in 2024, likely due to unhealthy lifestyle habits such as lack of physical activity and unhealthy eating.

Table 2: Distribution of the sample population by the percentage of gestational diabetes cases:

%	Number	Period
11.11	3	2021-2020
33.3	9	2023-2022
55.5	15	2024
100	27	Total

Several studies have proven that spontaneous abortion in fetuses is associated with poor blood sugar control in mothers with gestational diabetes. As shown in Table 2, the rate of miscarriage increased from 11.11% in 2020–2021 to approximately 55.5% in 2024. This increase may be attributed to anemia accompanying gestational diabetes.

Table 3: Distribution of the Sample Population by Anemia Cases

Anemia After Pregnancy		Anemia During Pregnancy		Period
%	Number	%	Number	
26.7	4	11.1	2	2021-2020
40	6	33.3	6	2023-2022
33.3	5	55.5	10	2024
100	15	100	18	Total

The results presented in Table 3 indicate that the proportion of women suffering from gestational diabetes during pregnancy rose to 55.5% in 2024, while the highest percentage of women who

developed diabetes after pregnancy was recorded between 2022 and 2023. This increase may be due to poor nutrition or an unhealthy dietary pattern. The harmful effects of gestational diabetes are more pronounced on the fetus than on the mother. This is because the fetus, during its early developmental stages, is exposed to elevated blood glucose levels. Any deficiency or excess in fetal nutrition can lead to growth abnormalities, sudden intrauterine fetal death, congenital malformations, fetal macrosomia (large birth weight), and delivery complications. It may also result in an increase in amniotic fluid volume, increasing the risk of preterm delivery despite fetal growth restriction. Due to the immaturity of the liver and lungs at this early stage, the infant may develop jaundice and respiratory distress syndrome (Leous & Najeeb, 2012). The appearance and severity of complications depend on the degree of blood sugar control in the mother. Adverse effects are more evident in fetuses of mothers with poor blood sugar regulation. Conversely, mothers who follow necessary measures and achieve tight glycemic control can deliver healthy babies (Ahmed & Al-Moataz, 2011).

Table 4: Distribution of the Sample Population by Child complication and Maternal Age.

Congenital Anomalies or Shoulder Fractures	Death	Macrosomia	Age
8	1	13	24-18
9	9	25	34-25
4	3	12	45-35
21	13	50	Total

As shown in Table 4, delivering a large baby, a stillborn baby, or a baby with congenital abnormalities or shoulder fractures was more common among women aged 25–34 years.

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