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Type 1 Diabetes in Pregnancy: A Review

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ABSTRACT

Up to 10% of all pregnancies in the US are complicated by diabetes. Among them, 0.2 to 0.5 % of the individuals had type 1 diabetes (T1DM). Preterm birth, preeclampsia, macrosomia, shoulder dystocia, intrauterine fetal death, fetal growth restriction, cardiac and renal abnormalities, as well as uncommon neural disorders including sacral agenesis, are all heightened risks for pregnancies affected by T1DM. It has been demonstrated that preconception planning and intensive glycemic control can lower the rate of fetal loss and abnormalities in pregnancies complicated by T1DM. The number of alternatives available to the obstetric team has risen as a result of recent improvements in insulin formulations and delivery techniques. To promote compliance and guarantee optimal glucose control, insulin regimens should be customized for each patient. For effective care, intensive preconception counseling with regular follow-up visits that emphasize strict glucose control is advised.

Keywords: Diabetic ketoacidosis, insulin, pregnancy, type 1 diabetes.

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I. Introduction

Hyperglycemia during pregnancy affects 21.3 million (16.2%) of the 131.4 million live births worldwide to women 20 to 49 years old. Of these 21.3 million cases, 6.2% result from diabetes discovered before pregnancy (either type 1 diabetes [T1DM] or type 2 diabetes). According to a 2015 national report from the UK, 0.21 % of all live births in England and Wales were from mothers who had T1DM, or about 1500 newborns. White women have the highest incidence of diabetes. Due in part to lower fertility, there is a lower incidence of T1DM in pregnant women than in the general population; nevertheless, the difference has largely closed over time [1].

II. Adverse Perinatal/Maternal Outcomes

Congenital abnormalities, stillbirths, and perinatal mortality are among pregnancy outcomes that are 2–5 times more likely to occur in women with T1DM. 5,6 A 2013 assessment of 12 population-based studies that compared 14,099 women with T1DM to 4,035,373 women from the background population and were published during the previous 10 years found that:

- Congenital malformations, 5.0% versus 2.1% (relative risk [RR] = 2.4)
- Perinatal mortality, 2.7% versus 0.72% (RR = 3.7)
- Large for gestational age (LGA) infants, 54.2% versus 10.0% (RR = 4.5)
- Preterm delivery, 25.2% versus 6.0% (RR = 4.2)

III. Pathophysiology

Compared to the non-pregnant state ("accelerated starvation") associated with hepatic insulin resistance, the adaptation of maternal metabolism during pregnancy entails a higher fall in plasma glucose and amino acids and a more significant increase in free fatty acids to overnight fasting. In later pregnancy, the expansion of the fetal placenta is matched by a gradual rise in postprandial glucose and its corresponding insulin response, which is linked to impaired insulin sensitivity. This rise quickly decreases following birth. This "facilitated anabolism" affects the proper modifications in the metabolism of carbohydrates, amino acids, and lipids, ensuring a sufficient supply of nutrients for the growing fetus. A lack of b-cell reserve, as seen in T1DM, will cause aberrant adaptations in the metabolism of carbohydrates, proteins, and fats. In T1DM, enough insulin is needed to make up for rising caloric requirements, rising adiposity, falling activity levels, and rising levels of anti-insulin hormones. In T1DM, the insulin dosage may rise up to three times during pregnancy to maintain normoglycemia and prevent maternal ketosis. Insulin resistance in late pregnancy has been linked to placental hormones, while the exact process is unclear and probably involves multiple factors [2].

IV. Pregnancy Planning

Over 40 years ago, it was discovered that newborns of diabetic mothers had an elevated risk of congenital abnormalities swiftly connected to maternal periconceptional hyperglycemia. The teratologically vulnerable period is when anomalies predominate until the seventh gestational week. It is well documented that achieving optimal glycemic control

early in the first trimester is linked to better outcomes, fewer congenital abnormalities, and lower perinatal mortality [3].

However, the mother must understand that these dangers are diminished by increasing glycosylated hemoglobin (HbA1c). Neural tube abnormalities and heart malformations are the most prevalent forms.

V. Pre-Pregnancy Care

Preconception counseling and pre-pregnancy care are two distinct parts of education regarding reproductive health for women with T1DM (PPC). The education and discussion of pregnancy and contraception with women of reproductive age are known as preconception counseling. Throughout a woman's reproductive years, it should occur regularly and involve instruction and conversation about the following [4]:

- Upcoming pregnancy plans
- When using contraception, the risks associated with each method are considered.
- Inadequate glycemic control's association with increased risks of adverse outcomes
- PPC's characteristics and potential for enhancing pregnancy outcomes
- Taking supplements of folic acid before and during pregnancy Taking supplements of folic acid before and during pregnancy
- The risks of alcohol and smoking during pregnancy
- Avoidance of statins and ACE inhibitors during the first trimester of pregnancy

PPC is the additional care necessary to get a diabetic woman ready for pregnancy. PPC should ideally be delivered by a multidisciplinary team that will look after her while she is pregnant, and this process should start at least six months before conception. Prior to conception, PPC seeks to improve glycemic control.

Not all women with T1DM attend PPC, despite the program's apparent benefits in improving outcomes. These women are more likely to be younger, single, and have not completed their third year of college. In recent years, even nonattenders have understood the justification for PPC in female T1DM patients. According to one study, not attending was most frequently due to inadequate planning for the pregnancy or conception taking place sooner than anticipated (45%). Other reasons for not attending PPC included concerns about fertility (31%), bad connections with medical experts (21%), complex emotional difficulties (17%), such as the desire for a "normal pregnancy" and the fear of being disappointed, and logistical/financial issues (10%) [2].

VI. Complications of Type 1 Diabetes in Pregnancy

A. Low Blood Sugar

Hypoglycemia is a crucial obstacle to maintaining close to normal blood glucose levels during pregnancy, defined as a blood glucose level of less than 4.0 mmol/L. Both types, which occur more commonly during pregnancy, are subclassified as mild (self-treated) or severe (requiring aid from another person)—according to a review of the literature, 3 to 5 times as many women with T1DM had severe hypoglycemia in the early stages of pregnancy as they did right before conception, which affected 45 % of these women during pregnancy. Impaired hypoglycemia awareness, a history of severe hypoglycemia, having had diabetes for a long time, having a low HbA1c in the first trimester of pregnancy, variable blood sugar levels, and using too much extra insulin between meals are all risks factors for developing severe hypoglycemia [5].

The long-term effects of maternal hypoglycemia on human kids are not currently known. The lady herself is at the most significant risk for serious side effects such as unconsciousness, seizures, hospitalization, and death [6].

B. Retinopathy

Diabetic retinopathy is a leading cause of acquired blindness in young and middle-aged adults. The precise mechanisms of diabetic retinopathy progression during pregnancy remain unclear but include metabolic, hormonal, hemodynamic, and immune-inflammatory theories. Diabetic eye screening and optimizing blood glucose control, hypertension, and serum lipids before pregnancy are essential, as is regular monitoring to detect and reduce the risk of retinopathy progression during pregnancy and postpartum. Retinal screening protocols usually comprise surveillance 6 months before pregnancy, during the first and second trimester, and postpartum, with additional assessments being directed by significant disease and previous treatments for diabetic retinopathy [7].

C. Hypertension/Nephropathy

One in ten pregnancies is complicated by hypertension, and the frequency is significantly higher in women with diabetes, where up to 40% of them are said to have blood pressure higher than 140/90 mmHg. Pregnancy can result in any of four hypertension diseases, all of which raise the danger of unfavorable pregnancy outcomes [8]:

- Chronic hypertension
- Gestational hypertension
- Preeclampsia
- Diabetic nephropathy

There are two ways that diabetic nephropathy impacts pregnancy:

- The pregnancy must be terminated if severe maternal hypertension develops, resulting in preterm birth.
- Impaired placental development that increases the risk of stillbirth and fetal growth restriction

Each visit should include close blood pressure monitoring (target 140/90) and routine urine albumin testing. When tight antihypertensive treatment is administered in the early stages of pregnancy, the serum creatinine is less than 124 mmol/L, proteinuria is less than 1 g/24 hours, and blood pressure is normal. Pregnancy outcomes are generally favorable, and there is typically no decline in maternal renal function. A higher serum creatinine level than 176 mmol/L, severe hypertension, proteinuria (above 3 g/L), and a history of cardiovascular disease, on the other hand, are linked to a higher risk of adverse maternal and fetal outcomes as well as pregnancy-related kidney damage that can result in kidney failure. During pregnancy, it is possible to utilize methyldopa, b-adrenergic medications (such as labetolol), and slow-release calcium channel blockers. Angiotensin receptor blockers and ACE inhibitors should be substituted before or at the latest during the early stages of pregnancy [8].

D. Diabetic Ketoacidosis

Prevalence rates of 1 to 2 % have been recorded historically, and recent data suggest that these rates have not changed (2.7 % in 2016 UK National Diabetes in Pregnancy Audit). Absolute or relative insulin insufficiency is the cause of DKA. A lack of insulin causes hyperglycemia, which raises plasma glucagon levels, triggering hepatic gluconeogenesis and lipolysis, triggering ketogenesis. Pregnancy-related physiological changes can raise the danger of acidosis and eventual ketosis [9].

While caution is required to prevent overhydration, protocols for the fast detection of DKA in pregnant women are comparable to those in non-pregnant women. Recognizing and addressing precipitants such as infections, systemic illnesses, emesis, dehydration, insulin omission, and drugs (like tocolytics and corticosteroids) is essential. Fetal death rates have been documented in studies going back more than 20 years, ranging from 9 to 35%, though current rates are probably lower. The loss is highest if the diagnosis and treatment are postponed [10].

Mothers with T1DM must be regularly reminded of the need for supplemental insulin as directed by extensive home blood glucose monitoring. They also need to be conversant with the "sick day" regulations, including advice on detecting urine or capillary ketones. Access to the diabetes team's members in an emergency is crucial.

VII. Current Management

A multidisciplinary team working in a secondary or tertiary care setting has been advised to care for pregnant women with T1DM before pregnancy. A diabetes specialist midwife, a diabetes expert nurse, a diabetes specialist dietician, and an obstetrician are among the team members [10].

The overarching goal of collaborative prenatal diabetes care is to let the woman enjoy her pregnancy and give birth to a typical and healthy child. Attendance at PPC, referral for specialist treatment immediately after pregnancy diagnosis, biweekly multidisciplinary reviews during pregnancy, and clear postpartum plans for contraception with prompt referral back to her regular diabetic team are the best ways to do this.

A. Pregnancy Care

- Immediately referring patients to a joint prenatal diabetes clinic
- Targets for blood sugar and optimal glycemic management
- Elimination of any potentially teratogenic drugs
- Folic acid consumption
- HbA1c measurement to determine the potential of fetal abnormalities
- Detection, monitoring, and treatment of problems associated with diabetes
- Routine prenatal treatment, such as precise pregnancy dating and fetal abnormality identification by ultrasound
- Determining the most suitable delivery time and method
- Post-delivery blood glucose management strategy

B. Glycemic Targets

Glycemic objectives should ideally be discussed during the planning phase of pregnancy. Counseling the expectant mother about the dangers of hypoglycemia and how to treat it is equally vital. During pregnancy, it is indicated that women test their capillary blood glucose fasting before meals, one hour after, and before bed to meet the following glycemic objectives. Capillary glucose monitoring targets: 5.3 mmol/L when fasting, 7.8 mmol/L an hour after meals, and 6.4 mmol/L two hours after meals. The lesser goal is to keep the level of capillary plasma glucose above 4 mmol/L [10].

As a gauge of periconceptual glycemic control and a predictor of unfavorable outcomes, such as congenital abnormalities, HbA1c levels should be assessed during the booking visit. In individuals who are at risk for hypoglycemia, the American Diabetes Association and the UK's National Institute for Health and Care Excellence (NICE) recommendations recommend a goal HbA1c of 6.0 % to 6.5% (42-48 mmol/mol) or less than 7.0 % (53 mmol/mol) [11].

Preeclampsia, perinatal/neonatal mortality, and congenital abnormalities are at higher risk when HbA1c levels are higher in the periconceptual phase and first trimester. Given the changed red blood cell turnover throughout the second and third trimesters of pregnancy, measurements of HbA1c may need to be interpreted with additional caution. Nevertheless, high levels are linked to preeclampsia, preterm delivery, LGA, and neonatal intensive care hospitalization; when the HbA1c level is greater than 48 mmol/L, the risk level rises (6.5 %) [12].

In early pregnancy, only 13 to 15% of pregnant women with T1DM meet the goal HbA1c (48 mmol/mol), rising to 35 % in late pregnancy, according to the 2016 UK National Diabetes in Pregnancy Audit7 audit. Preterm delivery, low birth weight (LGA), and newborn intensive care unit (NICU) rates exceeded 50% in women with suboptimal HbA1c levels (>48 mmol/mol after 24 weeks), compared to 30% in women with appropriate HbA1c levels (48 mol/mol after 24 weeks) [12].

C. The Phase of Target Blood Glucose Levels

Even at night, the variability of blood sugar levels has been brought to light by continuous glucose monitoring systems (CGMS), which conventional preprandial and postprandial capillary blood glucose monitoring may not have recognized. This method has gained acceptance as a reliable clinical blood glucose measurement and trial endpoint due to improved sensors and a developing consensus on the expression of CGMS data [12].

According to the research, pregnant women with T1DM who use regular pumps and pens only spend 12 hours per day with close to normal glucose levels (50 % time in target during pregnancy). They spend 10 hours per day above and 2 hours per day below the NICE-recommended glucose threshold (3.9-7.8 mmol/L; 40% of the time too high) (10% of the time too low). Even with regular antenatal clinic visits, maternal hyperglycemia slightly decreased by the third trimester. Furthermore, it is unclear whether sensor-augmented pumps are superior to regular pumps [13].

D. HbA1c, Preprandial Glucose, and Postprandial Glucose Levels Concerning the Maternal-Fetal Outcome

Although the advantages of near-normal glycemic management, both before and throughout pregnancy, are widely acknowledged, the best way to accomplish this is yet

uncertain. Manderson and colleagues' randomized controlled trial (RCT) revealed that regulating postprandial glucose levels were more likely related to a favorable pregnancy outcome than regulating fasting glucose levels. Moreover, surges in high glucose levels (>11 mmol/L [198 mg/dL]) are a reliable indicator of LGA/macrosomia [14].

VIII. Management of Glycemia

A. Insulin

Most patients who had diabetes before becoming pregnant currently use a multiple dose insulin (MDI) regimen that includes short-acting prandial insulin and an intermediate/long-acting insulin up to three times per day. A major RCT comparing insulin aspart to conventional soluble insulin in T1DM revealed similar efficacy, with a trend to reduce rates of hypoglycemia and no apparent toxicity. However, data on the safety and efficacy of analog insulins have mostly come from observational studies. Noninferior HbA1c values were found in an RCT of 310 T1DM patients assigned to insulin detemir or NPH insulin (both with mealtime insulin aspart). Although there are no large RCT data for insulin glargine, a review of observational studies did not reveal an overabundance of unfavorable outcomes [15].

With their potential to lessen postprandial glycemic excursions and hypoglycemia, the pharmacokinetic properties of faster aspart (fast-acting insulin aspart [Fiasp]; onset of appearance in blood stream 4 minutes) and insulin degludec (half-life 25 hours) analogs have a unique conceptual appeal in pregnancy. A 12-month RCT of degludec/aspart versus glargine/aspart was associated with a significant reduction in nocturnal hypoglycemia and HbA1c compared with glargine in non-pregnant adults with T1DM. In contrast, prandial Fiasp was associated with improved 1-hour postprandial glucose levels versus aspart and significantly reduced HbA1c. The safety of fiasp during pregnancy has been established, and a trial to evaluate the efficacy and safety of degludec is underway.

B. Continuous Subcutaneous Insulin Infusion

The routine use of continuous subcutaneous insulin infusion (CSII) in pregnancy is not well supported by the available research. Although these studies were conducted in the preanalog era, lacked the power to detect differences in neonatal outcomes, and were probably biased due to selection, a meta-analysis of 6 studies (107 CSII vs. 106 MDI) revealed comparable glucose control and pregnancy outcomes [15].

The UK National Diabetes in Pregnancy Audit found that women who used standard pumps (30 % T1DM women) or pens (70 % T1DM women) had suboptimal glucose control (mean HbA1c 51 vs 52 mmol/mol in pump vs pen users >24 weeks), with no difference in glycemic control or maternal-fetal health outcomes [16].

A recent open-label crossover study investigated the possibility that closed loop technology might supplement existing delivery methods during pregnancy. The results revealed that 74.7 % of women with overnight closed loop were in the target range (3.5-7.8 mmol/L) overnight compared to 59.5 % with sensor-augmented pump therapy. When daytime and nighttime periods were considered, the time in target was much lower with closed loop pump therapy, at 66.3 %, compared to 56.8 % with sensor-augmented pump therapy [17].

C. Continuous Glucose Monitoring Systems

A study comparing CGMS with or without conventional glucose monitoring every 4 to 6 weeks between 8 and 32 weeks gestation in 46 type 1 and 25 type 2 women showed an improvement in mean HbA1c in late pregnancy (5.8% vs 6.4%; P=.0007), with lower LGA rates (35 % vs. 60%) compared with conventional monitoring [37]. In a later Danish RCT, women with pregestational diabetes who were tightly controlled at conception (HbA1c 6.6% vs. 6.8% [49 vs. 51 mmol/mol]) and who used intermittent real-time CGM (RT-CGM) in 60% of cases, did not experience any improvement in glycemic control or pregnancy outcomes [18].

According to a recent multicenter trial (CONCEPTT) involving 39 women with T1DM, pregnant women randomized to RT-CGM had lower HbA1c levels (0.19 %; 95 % P=.0207), spent more time in the target range (68 % vs. 61 %; P=.00344), and spent less time hyperglycemic (27 % vs. 32 %; P=.0279) than pregnant control participants, though there was no difference. In addition, there were fewer neonatal hypoglycemia incidences (0.45; 0.22-0.89; P=.0250) and fewer neonatal intensive care admissions lasting more than 24 hours (0.48; 0.26-0.86; P=.0157), and a 1-day shorter length of hospital stay (P=.0091) with RT-CGM. CGM didn’t appear to have any advantages for pregnant women [19].

Given the lack of difference between the CSII and MDI groups, the CONCEPTT trial would support a role for CGMS in the management of pregnant women with T1DM, possibly in preference to CSII. Trials are currently being conducted to compare closed loop insulin delivery systems to conventional methods; however, preliminary data indicates that daytime in target is not significantly different between these devices and CGMS, and a greater focus on fast-acting insulin analogs may be required to prevent postprandial glucose excursions. The high rate of adverse reactions (particularly skin) from CGMS devices may restrict use or compromise the accuracy of readings. The CGMS metrics for the time in target goals, nocturnal glucose ranges, expression of postprandial spikes, and the threshold for hypoglycemia during pregnancy also require universal agreement. Generally speaking, the cost of this technology is likely to limit its use to a select group of motivated, educated women working in seasoned facilities under specialized supervision [19].

IX. Obstetrics Surveillance

Pregnancy must be accurately dated, which is best done by ultrasound scan at 8 to 10 weeks. Obstetric surveillance is to spot the at-risk fetus and take prompt, appropriate action to lower perinatal morbidity and mortality.

A 20-week anomaly and fetal heart scan are part of the regular antenatal care for pregnant mothers with diabetes. The UK recommendation calls for individualized monitoring of fetal well-being for women at risk of intrauterine growth restriction (IUGR), those with the macrovascular disease, or those with nephropathy, as well as ultrasound monitoring of

fetal growth and amniotic fluid volume every four weeks from 28 to 36 weeks. Before 38 weeks, it is not advised to perform fetal well-being tests unless there is a risk of IUGR [7].

X. Labor and Delivery

The main goals are to prevent fetal death in utero and the risks of shoulder dystocia or obstructed birth brought on by fetal macrosomia. As a result, most of the world's cesarean section rates for women with pregestational diabetes are higher than 50%. (65 % in the 2016 UK National Diabetes in Pregnancy Audit). High rates of NICU hospitalization in T1DM are a result of iatrogenic prematurity [16].

In order to reduce the risk of preterm birth, LGA, and perinatal mortality, a skilled obstetrician must closely monitor both mother and child throughout labor. The mother should be informed about the date and method of delivery throughout her antenatal visits. The needs of the fetus estimated growth, glycemic control, diabetic complications, and previous obstetric history must all be considered individually.

Suppose no other relevant variables have emerged prior to this point. In that case, UK NICE guidelines advise that women with T1DM should be given the option of an elective birth between 37 and 38 weeks' gestation [7]. If serious metabolic or other maternal or fetal difficulties develop, an elective birth before 3710 weeks should be considered. The baby of a diabetic mother may be particularly at risk during preterm labor. The need for additional insulin should be expected because beta-sympathomimetic drugs used to stop uterine contractions and corticosteroids used to speed up fetal lung development may cause significant and sustained maternal hyperglycemia and even ketoacidosis. Several algorithms have been devised to manage glycemic control while receiving steroid medication. It is crucial to get hospitalized and be closely watched [17]. Standard procedures should be used to control labor, just as they would for women without diabetes. In order to avoid unnecessarily extending pregnancy, labor induction is routinely utilized. Prostaglandins are typically used first, frequently followed by oxytocin. A partograph and continuous electronic fetal monitoring by cardiotocography allow for careful progress monitoring.

A dedicated center with a newborn care unit outfitted and staffed to provide the highest quality of care should be used to manage diabetes during labor, adapting the protocol for time and delivery. Women with T1DM who use CSII should have the chance to talk with their doctor about glycemic control throughout labor and before delivery, and an individual plan should be laid out in their chart. According to UK NICE guidelines, maintaining a mother's blood glucose level between 4 and 7 mmol/L throughout labor and delivery will help lower fetal discomfort and neonatal hypoglycemia. Hourly capillary glucose readings offer a quick indicator of treatment effectiveness and the requirement for insulin titration. In the lack of a consensus, commonly utilized protocols call for a continuous glucose infusion and separate insulin infusions using an infusion pump. Whatever regimen is chosen, the anesthesia and midwifery personnel must be conversant with it [7], [10].

XI. Management of Postpartum Diabetes

In the first week or two after giving birth, insulin sensitivity rises before returning to normal. A 50% reduction in insulin infusion should be made once the cord is cut, along with regular capillary blood glucose monitoring and IV fluid administration until the mother can eat normally. The diabetes care team should closely monitor this and adjust the insulin dosage as necessary. To prevent hypoglycemia, it is advised for diabetic mothers to take a modest snack prior to breastfeeding. The need for insulin may rise throughout the day due to increased caloric intake and decline at night due to glucose syphoning into breast milk. Therefore, it is suggested that women cut back on long-acting insulin when nursing. To prevent increases in milk glucose and maternal hypoglycemia, it is best to maintain maternal glucose levels as close to normal as feasible. This is accomplished with the assistance of the diabetes specialist team, regular snacking, and careful insulin adjustment.

XII. Neonatal Management

It is recommended to measure the blood sugar of newborns whose mothers have T1DM using a technique that has been approved for use in newborns. Women should start feeding their newborns within 30 minutes of delivery and continue to do so frequently (every 2-3 hours) until prefeeding capillary plasma glucose levels are maintained at a minimum of 2.0 mmol/L. Additional interventions, such as tube feeding or intravenous dextrose, should be employed if capillary plasma glucose concentrations are below 2.0 mmol/L on two consecutive readings despite maximal support for feeding, if there are aberrant clinical indications, or if the baby will not feed adequately orally. For the reasons listed below, up to 50% of infants may require admission to neonatal intensive care [20]:

- Having hypoglycemia and atypical clinical symptoms breathing difficulty
- Signs of congenital heart disease or cardiomyopathy leading to cardiac decompensation
- Neonatal encephalopathy warning signs
- Have polycythemia symptoms and probably require a partial exchange transfusion.
- Needed for intravenous fluids
- Tubular feeding (unless adequate support is available on the postnatal ward)
- Jaundice needs intensive phototherapy and regular bilirubinemia monitoring
- Before 34 weeks of pregnancy (or between 34 and 36 weeks if dictated clinically by the initial assessment of the baby and feeding on the labor ward)

Neonates should not be moved into community care until they are at least 24 hours old, maintaining an average blood glucose level, and eating normally.

XIII. Postpartum Contraception

Women with T1DM must plan their pregnancies carefully to optimize their glucose control, as was already indicated. When choosing a method of birth control, keep the following things in mind:

- Since many maternal and newborn outcomes in this population group are related to an increased chance of unintended pregnancy, the strategy should be successful.
- The process should not impact glucose metabolism or insulin sensitivity. Breastfeeding should not be hindered by contraception, nor should it raise the risk of postpartum depression disorders.
- It should be easy to use and secure even in the presence of comorbidities.
- Long-term cardiovascular risk factors, such as those linked to diabetic problems, should not grow.

Growing evidence points to the need for starting contraception before a woman is released from the hospital. This is due to the realization that sexual activity and ovulation begin far sooner than previously thought. Furthermore, many women skip their postpartum checkups. According to the World Health Organization, women with T1DM can access almost all forms of contraception. However, women with diabetes problems like retinopathy, nephropathy, or cardiovascular disease should avoid estrogen-containing treatments. Women who do not want to get pregnant in the next year should use intrauterine contraceptive methods. Hormonal contraception combining estrogen and progesterone is considered safe for healthy women who want to get pregnant sooner. As the absolute increase in arterial thromboembolism is thus shallow (1/12,000) and comparable with that among healthy users and nonusers, the lowest dose (estrogen 35 mg) and potency formulation should be employed. Their high failure rates make barriers and natural family planning methods less desirable. Female sterilization and vasectomy are options after childbearing has finished.

Under the supervision of their diabetic care team, women with T1DM should resume their regular diabetes treatment. They remind women considering additional pregnancies of the need for preconception preparation for the best possible pregnancy result: future difficulties and potential remedies [21].

- Although type 1 diabetes is being treated with modern obstetric and neonatal care, mother and child still face considerable risks.
- The challenge of encouraging women to plan their pregnancies must be met with a multifaceted strategy that uses professional and public tools to raise awareness starting in adolescence, makes the most of family doctors and pharmacists as points of contact, provides timely and sensitive contraceptive advice, and uses social media wisely.
- It is advised to use a multidisciplinary team that operates in the same geographical area to provide coherence of care.
- Better ways of identifying pregnant women for whom early birth is advised and who are at increased risk of fetal compromise toward the end of the pregnancy are required.
- It is anticipated that the focus on technology will increase over the coming decade. However, rigorous analysis of the relative contributions of CGM, CSII/RT-CGMS, and closed loop devices, together with rapid-acting insulin analogs, is needed to improve glycemic control in particular patients.

CONFLICT OF INTEREST

Authors declare that they do not have any conflict of interest.

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