Dr. Miguel Ángel María Tablado.
Family and Community Physician.
C.S. Canillejas, Madrid, Spain.
Member, Women and Diabetes Working Group, SED.

Miriam Sánchez López.
Health care Professional and Breastfeeding Consultant.
Member, Women and Diabetes Working Group, SED.
Social media educator on gestational diabetes and breastfeeding in women with diabetes.

Breastfeeding as personalized medicine, proven benefits of breastfeeding

Breastfeeding (BF) has been widely overlooked during recent decades in medical practice, leading to the assumption that it can be replaced by artificial products without adverse consequences. This important oversight occurs in high-income countries, where only 1 in 5 children receives BF at 12 months.

Findings from studies conducted in different populations and biologic analyses confirm that the decision not to breastfeed has important long-term negative effects on child health, nutrition, and development, as well as maternal health.

No other health-related behavior may provide such potentially beneficial outcomes simultaneously for the 2 individuals involved: mother and infant.

Immunologic, epigenetic, microbiome, and stem cell research performed during the last 2 decades investigating possible mechanisms through which BF improves outcomes will likely be followed by even more fascinating discoveries regarding the exquisite individualized medicine provided by human milk.[1]

Children breastfed for longer periods exhibit lower morbidity and mortality related to infections of all types, fewer dental problems, and greater intelligence than those breastfed for shorter periods or not breastfed at all. This disparity persists even beyond 3 years of age. Furthermore, increasing evidence suggests that BF may protect against overweight status and diabetes in adulthood. BF also benefits mothers by helping prevent breast cancer and potentially reducing the risk of diabetes and ovarian cancer.

High-income countries have shorter BF durations than low- and middle-income countries. It is estimated that extending BF to more women and for longer durations could prevent 823,000 child deaths and 20,000 breast cancer deaths annually worldwide.

In this context, women with diabetes mellitus (DM), whether type 1, type 2, or gestational diabetes, frequently have concerns regarding the safety and feasibility of breastfeeding. These concerns are understandable given the metabolic component of the disease and the need for pharmacologic treatment in many cases. However, current scientific evidence clearly supports that BF is not only possible in women with DM but also constitutes a highly beneficial practice for both mother and infant.

From a physiologic perspective, BF is not contraindicated in women with DM. Insulin, one of the most widely used treatments, is not excreted in significant quantities through breast milk and therefore poses no risk to the infant.[2–6] However, DM may influence certain aspects of the BF process. For example, some women may experience delayed lactogenesis, that is, delayed onset of abundant milk production after childbirth, commonly referred to as "milk coming in." This delay may be associated with hormonal and metabolic factors inherent to the disease, as well as obstetric complications related to DM, such as an increased risk of cesarean delivery.

In addition, significant changes in maternal metabolism occur during lactation. Milk production requires considerable energy expenditure, which may result in reduced blood glucose levels. Consequently, women with DM have an increased risk of hypoglycemic episodes, particularly during or after breastfeeding sessions.

Glucose self-monitoring should be more frequent during lactation, including measurements before and after breastfeeding or, preferably, continuous glucose monitoring systems and insulin pumps to facilitate prevention of hypoglycemia. Similarly, mothers should breastfeed in a safe position and have rapidly absorbable carbohydrates available, such as juice or oral glucose, for immediate intervention in cases of hypoglycemia. In many cases, insulin dosage or other glucose-lowering drugs will require adjustment because requirements may significantly decrease during this period. Such adjustments should always occur under medical supervision to avoid hypo- and hyperglycemic decompensation.

Another key aspect in BF management in women with DM is nutrition. Maintaining a balanced, nutrient-rich diet adapted to the energy requirements of lactation is essential to ensure adequate milk production. Hydration is equally important because milk production requires sufficient fluid intake. These recommendations do not differ substantially from those for any lactating woman; however, for mothers with DM they must be integrated into a broader metabolic management plan.

Preparation for BF during pregnancy favors successful breastfeeding establishment after delivery. Antenatal colostrum expression and early initiation play fundamental roles. Skin-to-skin contact immediately after birth »

RESULTS OF STUDIES USING MODERN BIOLOGIC TECHNIQUES SUGGEST NEW MECHANISMS CHARACTERIZING BREAST MILK AS PERSONALIZED MEDICINE FOR INFANTS

IN WOMEN WITH A HISTORY OF GESTATIONAL DIABETES, BREASTFEEDING HAS BEEN ASSOCIATED WITH A REDUCED RISK OF DEVELOPING TYPE 2 DIABETES IN THE FUTURE

» and initiation of breastfeeding during the first hours of life are recommended. This practice not only stimulates milk production but also contributes to regulation of neonatal glucose levels. Infants of mothers with DM have an increased risk of neonatal hypoglycemia because of intrauterine exposure to elevated glucose levels and compensatory endogenous fetal hyperinsulinism; therefore, early breastfeeding serves as an effective preventive measure.

Regarding maternal benefits, BF offers significant metabolic advantages. It has been shown to improve insulin sensitivity, facilitating better glycemic control. In women with a past medical history of gestational diabetes, BF is associated with a reduced risk of developing T2DM later in life. This protective effect appears related to improved glucose metabolism and reduced insulin resistance occurring during lactation. Furthermore, breastfeeding contributes to postpartum weight loss. Additionally, a reduced incidence of cardiovascular disease has been observed among women who breastfeed.

Benefits for newborns are equally important. Breast milk may be regarded as true "personalized medicine" for infants because its composition is not static but dynamically adapts to the specific needs of each infant and maternal circumstances. Furthermore, breast milk promotes intestinal microbiota development and immune system maturation, reducing the risk of infections and chronic diseases. For offspring of mothers with DM, BF provides additional value because it contributes to reducing risks of obesity and diabetes later in life. Similarly, breastfeeding also helps stabilize neonatal glucose levels during the first days of life, reducing the risk of neonatal hypoglycemia as previously mentioned. It is also associated with lower incidence rate of respiratory and gastrointestinal infections, improving overall infant health.

Nevertheless, successful BF in women with DM requires adequate support. Health education, medical follow-up, and support from health care professionals are essential components. Informing mothers on the potential changes in insulin requirements, teaching recognition of hypoglycemia signs, providing strategies for safe breastfeeding, and offering hybrid closed-loop systems beginning in pregnancy planning are all key elements of this process. **D**

CONCLUSIONS

- BF is beneficial for all mothers and their children.
- In women with DM, including those receiving insulin treatment, BF is not contraindicated but rather strongly recommended.
- Metabolic and immunologic benefits for both mother and infant may extend over the long term.
- Hybrid closed-loop systems and continuous glucose monitoring may facilitate glycemic control during BF and reduce the risk of maternal hypoglycemia.
- BF requires support and reinforcement from everyone involved: family members, caregivers, and health care professionals.

REFERENCES

1. Victora CG, Bahl R, Barros AJ, França GV, Horton S, Krasevec J, Murch S, Sankar MJ, Walker N, Rollins NC; Lancet Breastfeeding Series Group. Breastfeeding in the 21st century: epidemiology, mechanisms, and lifelong effect. Lancet. 2016 Jan 30;387(10017):475-90 https://doi.org/10.1016/s0140-6736(15)01024-7
2. American Diabetes Association. La lactancia materna y la diabetes [Internet]. Arlington (VA): American Diabetes Association; [citado 22 abr 2026]. Disponible en: https://diabetes.org/es/vivir-con-diabetes/embarazo/diabetes-lactancia
3. Institutos Nacionales de la Salud. Amamantar podría mejorar la salud después de una diabetes gestacional [Internet]. NIH Noticias de Salud; 2016 ene [citado 2026 abr 22]. Disponible en: https://salud.nih.gov/recursos-de-salud/nih-noticias-de-salud/amamantar-podria-mejorar-la-salud-despues-de-una-diabetes
4. Ballard O, Morrow AL. Human milk composition: nutrients and bioactive factors. Pediatr Clin North Am. 2013 Feb;60(1):49-74 https://doi.org/10.1016/j.pcl.2012.10.002
5. Organización Mundial de la Salud. La OMS recomienda el contacto inmediato de piel con piel para lograr la supervivencia de los bebés pequeños y prematuros [Internet]. Ginebra: Organización Mundial de la Salud; 2022 nov 15 [citado 2026 abr 22]. Disponible en: https://www.who.int/es/news/item/15-11-2022-who-advises-immediate-skin-to-skin-care-for-survival-of-small-and-preterm-babies
6. e-lactancia. Gestational diabetes mellitus [Internet]. APILAM; [citado 2026 abr 22]. Disponible en: https://www.e-lactancia.org/breastfeeding/gestational-diabetes-mellitus/synonym/