International Journal of Medical and Health Research
www.medicalsciencejournal.com
ISSN: 2454-9142
Received: 02-12-2025, Accepted: 01-01-2026, Published: 15-01-2026
Volume 12, Issue 1, 2026, Page No. 12-16

# Role of functional foods and bioactive compounds in the nutritional management of Gestational Diabetes Mellitus

**Anmayee Nanda[1], Payel Roy[2], Saswati Sanyal[3], Srijita Mukherjee[4], Rimly Mukherjee[3*]**
[1] Senior Consultant Dietitian, Shusrut Hospital and Truma Care, Bhubaneswar, Odisha, India
[2] Food Processing and Nutrition Science, IIEST, Shibpur, Howrah, West Bengal, India
[3] Department of Food and Nutrition, Swami Vivekananda University, Barrackpore, West Bengal, India
[4] Department of Food and Nutrition, Barrackpore Rastraguru Surendranath College, Barrackpore, West Bengal, India

**Abstract**
Gestational diabetes mellitus (GDM) is one of the most common metabolic complications of pregnancy, characterized by glucose intolerance with onset or first recognition during gestation. The increasing prevalence of GDM parallels rising rates of obesity, sedentary lifestyles, and poor dietary patterns, posing significant risks to both maternal and fetal health. Conventional management strategies include dietary modification, physical activity, glucose monitoring, and pharmacotherapy when necessary. In recent years, growing attention has been directed toward functional foods and bioactive compounds as adjunct nutritional interventions for GDM management. Functional foods rich in dietary fibre, probiotics, polyphenols, omega-3 fatty acids, and low-glycemic carbohydrates have demonstrated beneficial effects on glycemic control, insulin sensitivity, lipid metabolism, inflammation, and oxidative stress. Bioactive compounds such as flavonoids, phenolic acids, carotenoids, and short-chain fatty acids exert mechanistic effects through modulation of gut microbiota, enhancement of insulin signaling, reduction of oxidative damage, and regulation of inflammatory pathways. Evidence from observational studies, randomized controlled trials, and meta-analyses suggests that targeted inclusion of functional foods—such as whole grains, legumes, fermented foods, fruits, vegetables, and nuts—can improve fasting and postprandial glucose levels while reducing adverse pregnancy outcomes. This review summarizes current evidence on the role of functional foods and bioactive compounds in the nutritional management of GDM and highlights their potential as safe, cost-effective, and sustainable strategies to support maternal metabolic health.

**Keywords:** Gestational Diabetes Mellitus, functional foods, bioactive compounds, glycemic control, probiotics, dietary fibre

## Introduction

Gestational diabetes mellitus (GDM) affects approximately 10–20% of pregnancies worldwide and is associated with increased risks of preeclampsia, cesarean delivery, macrosomia, neonatal hypoglycemia, and future development of type 2 diabetes in both mother and child (International Diabetes Federation, 2024; Sweeting *et al*., 2024; Wang *et al*., 2022) [15, 41, 45]. Nutritional therapy remains the cornerstone of GDM management, aiming to maintain normoglycemia without compromising fetal growth (American Diabetes Association, 2026; Cheong *et al*., 2025; Tsirou *et al*., 2019) [2, 6, 43]. Beyond macronutrient distribution, increasing emphasis is being placed on diet quality and the inclusion of functional foods containing biologically active components that provide health benefits beyond basic nutrition (Dolatkhah *et al*., 2019; Assaf-Balut *et al*., 2018) [3, 10].

## Functional Foods and Bioactive Compounds

Functional foods are foods that provide health benefits beyond basic nutrition by delivering biologically active constituents capable of modulating physiological processes and reducing disease risk (Martirosyan & Singh, 2022; Healthline, 2020) [13, 24]. In the context of gestational diabetes mellitus (GDM), functional foods serve as an important nutritional tool due to their ability to influence metabolic pathways involved in glucose homeostasis and insulin sensitivity (Lin, 2021; Santangelo *et al*., 2016) [20, 34]. Key bioactive compounds found in functional foods include dietary fibres, polyphenols, omega-3 fatty acids, probiotics, prebiotics, and other phytochemicals (Pheiffer, 2024; Wiyono *et al*., 2024) [31, 47]. Dietary fibres improve postprandial glycemic response by slowing carbohydrate digestion and absorption, while also enhancing satiety and insulin sensitivity (Sun & Wang, 2022; Shen *et al*., 2024) [35, 40]. Polyphenols and other antioxidant compounds reduce oxidative stress and inflammation, which are central to the development of insulin resistance during pregnancy (Zhao *et al*., 2023; Gao *et al*., 2021) [11, 52]. Omega-3 fatty acids contribute to improved lipid metabolism and exert anti-inflammatory effects that support metabolic health (Liu *et al*., 2023; Jiang *et al*., 2022) [16, 22, 23]. Additionally, probiotics and prebiotics modulate gut microbiota composition, enhancing intestinal barrier function and reducing metabolic endotoxemia, thereby improving glucose regulation (Kamińska *et al*., 2022; Suastika *et al*., 2024) [18, 38]. Through these synergistic mechanisms, functional foods and their bioactive components play a pivotal role in the nutritional management of GDM and support maternal and fetal health outcomes (Garai *et al*., 2023; Lin, 2021; Pheiffer, 2024) [12, 20, 31].

## Dietary Fibre and Low-Glycemic Foods

Dietary fibre plays a central role in the nutritional management of gestational diabetes mellitus (GDM) due to its beneficial effects on glucose metabolism and insulin sensitivity (Jones *et al*., 2025; Shen *et al*., 2024; Sun & Wang, 2022) [17, 35, 40]. High-fibre foods such as whole grains, legumes, vegetables, and fruits delay gastric emptying and slow the digestion and absorption of

carbohydrates, leading to a gradual rise in postprandial blood glucose levels (Pheiffer, 2024; Zhang *et al*., 2006) [31, 50]. Soluble fibres, in particular, form viscous gels in the gastrointestinal tract that reduce glucose diffusion and improve peripheral insulin sensitivity, thereby contributing to better glycemic regulation (Shen *et al*., 2024; Sun & Wang, 2022) [35, 40]. In addition, fibre-rich diets enhance satiety and help prevent excessive gestational weight gain, an important risk factor for poor glycemic control in pregnancy (Basu *et al*., 2021; Zhang *et al*., 2022) [4, 51]. Low-glycemic index (GI) foods, which elicit a smaller and slower increase in blood glucose levels, have been consistently associated with improved fasting and postprandial glucose concentrations in women with GDM (Liu *et al*., 2023; Wei *et al*., 2016) [22, 23, 46]. Clinical evidence indicates that adherence to low-GI dietary patterns can reduce the need for insulin therapy and improve pregnancy outcomes without compromising fetal growth, highlighting dietary fibre and low-glycemic foods as cornerstone components of medical nutrition therapy for GDM (Di *et al*., 2025; Yamamoto *et al*., 2018) [9, 49].

**Probiotics and Gut Microbiota Modulation**

Alterations in gut microbiota during pregnancy have been linked to insulin resistance and inflammation (Pinto *et al*., 2023; Amabebe *et al*., 2021; Su *et al*., 2021) [1, 32, 37]. Probiotic-rich functional foods such as yogurt, kefir, and fermented beverages improve gut microbial balance, enhance intestinal barrier integrity, and reduce systemic inflammation (Kamińska *et al*., 2022; Wan *et al*., 2022; Pandiyan *et al*., 2025) [18, 28, 29, 44]. Clinical trials suggest that probiotic supplementation may lower fasting blood glucose and improve insulin sensitivity in women with GDM (Zhuang *et al*., 2024; Sun *et al*., 2024; Özdemir, 2022) [27, 39, 40, 53].

Dietary fibre plays a central role in the nutritional management of gestational diabetes mellitus (GDM) due to its beneficial effects on glucose metabolism and insulin sensitivity (Jones *et al*., 2025; Shen *et al*., 2024) [17, 35]. High-fibre foods such as whole grains, legumes, vegetables, and fruits delay gastric emptying and slow the digestion and absorption of carbohydrates, leading to a gradual rise in postprandial blood glucose levels (Pheiffer, 2024; Sun & Wang, 2022) [31, 40]. Soluble fibres, in particular, form viscous gels in the gastrointestinal tract that reduce glucose diffusion and improve peripheral insulin sensitivity, thereby contributing to better glycemic regulation (Shen *et al*., 2024) [35]. In addition, fibre-rich diets enhance satiety and help prevent excessive gestational weight gain, an important risk factor for poor glycemic control in pregnancy (Basu *et al*., 2021) [4]. Low-glycemic index (GI) foods, which elicit a smaller and slower increase in blood glucose levels, have been consistently associated with improved fasting and postprandial glucose concentrations in women with GDM (Liu *et al*., 2023; Wei *et al*., 2016) [22, 23, 46]. Clinical evidence indicates that adherence to low-GI dietary patterns can reduce the need for insulin therapy and improve pregnancy outcomes without compromising fetal growth, highlighting dietary fibre and low-glycemic foods as cornerstone components of medical nutrition therapy for GDM (Di *et al*., 2025; Yamamoto *et al*., 2018) [9, 49].

Research indicates that integrating probiotic foods with high-fibre diets can synergistically improve metabolic health during pregnancy (Mu *et al*., 2023; Deng *et al*., 2022; Beldie *et al*., 2024) [5, 8, 26]. The combination of these dietary strategies supports gut health, reduces systemic inflammation, and enhances insulin sensitivity, which are critical factors in managing GDM effectively (Wan *et al*., 2022; Pheiffer, 2024) [31, 44]. Healthcare professionals should consider personalized nutritional plans that incorporate both probiotics and high-fibre foods to optimize maternal and fetal health outcomes in pregnancies complicated by GDM (Cosmai *et al*., 2025; Kamińska *et al*., 2022) [7, 18].

Research underscores the importance of integrating dietary strategies into comprehensive GDM management plans (American Diabetes Association, 2026; World Health Organization, 2025; Cheong *et al*., 2025) [2, 6, 48]. Emphasizing the consumption of high-fibre, low-GI foods can significantly influence maternal glucose levels and overall pregnancy health (Jones *et al*., 2025; Di *et al*., 2025; Moses *et al*., 2009) [9, 17, 25]. Healthcare providers should tailor nutritional advice to individual needs, considering cultural preferences and dietary habits, to optimize adherence and outcomes (Stennett *et al*., 2023; Liu *et al*., 2025; Saenz, 2025) [21, 33, 36]. Furthermore, ongoing studies continue to explore the gut microbiota's role in metabolic regulation during pregnancy, which may lead to novel therapeutic approaches in the future (Pheiffer, 2024; Crusell *et al*., 2024; Ye *et al*., 2024) [31].

**Polyphenols and Antioxidant Compounds**

Polyphenols found in fruits, vegetables, tea, cocoa, and whole grains exhibit strong antioxidant and anti-inflammatory properties. These compounds modulate glucose transporters, enhance insulin signaling, and reduce oxidative stress—a major contributor to insulin resistance in pregnancy. Flavonoids and phenolic acids have shown promising results in improving glycemic and lipid profiles.

6. Omega-3 Fatty Acids and Lipid Metabolism

Omega-3 fatty acids from fish, flaxseed, and walnuts improve insulin sensitivity and reduce inflammatory markers. Supplementation during pregnancy has been associated with improved lipid profiles and reduced insulin resistance, making them valuable functional components in GDM dietary management.

**Clinical Implications and Future Perspectives**

Incorporating functional foods into dietary therapy for GDM offers a non-pharmacological, culturally adaptable, and sustainable approach. However, variability in individual responses, dosage standardization, and long-term safety require further large-scale randomized trials. Personalized nutrition approaches integrating functional foods may represent the future of GDM management.

**Table 1:** Summary of Previous Studies on Functional Foods and Bioactive Compounds in Gestational Diabetes Mellitus

| Functional Food / Bioactive Compound | Author(s) & Year | Study Design | Participants | Key Outcomes |
|---|---|---|---|---|
| Probiotics (Lactobacillus spp., Bifidobacterium spp.) | Kijmanawat *et al*. (2018) | Randomized controlled trial | Women with GDM | Reduced fasting glucose, improved insulin sensitivity |

| | | | | |
|---|---|---|---|---|
| Dietary fibre (whole grains, legumes) | Zhang *et al*. (2006) [50] | Observational study | Pregnant women at risk for GDM | Higher dietary fiber intake associated with lower postprandial glucose and reduced risk of GDM (implying reduced insulin requirement in affected women) |
| Omega-3 fatty acids | Liu *et al*. (2023) [22, 23] | Meta-analysis of RCTs | GDM patients | Improved insulin resistance and lipid profile |
| Low-glycemic index diet | Wei *et al*. (2016) [46] | Meta-analysis | Pregnant women with GDM | Improved glycemic control and reduced macrosomia risk |
| Polyphenol-rich foods | Santangelo *et al*. (2016) [34] | Systematic review | Pregnant women | Reduced oxidative stress and improved glucose metabolism |
| Probiotic yogurt | Tabatabaeizadeh (2023) [42] | Meta-analysis of clinical trials | Women with GDM | Reduced inflammatory markers and fasting glucose |
| Fermented foods | Pandiyan & Marco (2025) [28, 29] | Review (drawing from cohort and intervention studies) | Pregnant women | Improved glucose tolerance and gut microbiota diversity |
| Functional foods (whole grains, nuts) | Hernandez *et al*. (2018) [14] | Review of dietary intervention studies | GDM subjects | Better glycemic control and maternal outcomes |

## Conclusion

Functional foods and bioactive compounds play a significant role in the nutritional management of gestational diabetes mellitus by improving glycemic control, insulin sensitivity, lipid metabolism, and inflammatory status. Their integration into standard dietary therapy offers a safe, effective, and holistic approach to managing GDM and reducing long-term metabolic risks. Continued research focusing on personalized nutrition, optimal intake levels, and long-term maternal–offspring outcomes is essential to fully harness their therapeutic potential.

## References


1. Amabebe E, Robert FO, Agbalalah T, Orubu ESF. Microbial dysbiosis-induced obesity: What the gut microbiome tells the host in response to maternal high-fat diet during pregnancy and lactation. Reproduction & Fertility,2021:2(1):RAF-20-0034. https://doi.org/10.1530/RAF-20-0034
2. American Diabetes Association. 15. Management of diabetes in pregnancy: Standards of care in diabetes—2026. Diabetes Care,2026:49(Suppl 1):S321–S340. https://doi.org/10.2337/dc26-S015
3. Assaf-Balut C, García de la Torre N, Durán A, Fuentes M, Bordiú E, del Valle L, *et al*. Medical nutrition therapy for gestational diabetes mellitus based on Mediterranean diet principles: A subanalysis of the St Carlos GDM prevention study. BMJ Open Diabetes Research & Care,2018:6(1):000550. https://doi.org/10.1136/bmjdrc-2018-000550
4. Basu A, Basu R, Basu S, Kurien BT. Dietary blueberry and soluble fiber supplementation reduces risk of gestational diabetes in women with obesity in a randomized controlled trial. The Journal of Nutrition,2021:151(7):1728–1737. https://doi.org/10.1093/jn/nxab053
5. Beldie LA, Popescu AM, Popescu C. The interactions between diet and gut microbiota in preventing gestational diabetes mellitus. Nutrients,2024:16(18):3124. https://doi.org/10.3390/nu16183124
6. Cheong L, Pan X, Yap J, Sea YL, Wang Y, Su LL. Medical nutrition therapy for women with gestational diabetes mellitus: A narrative review. Nutrients,2025:17(7):1210. https://doi.org/10.3390/nu17071210
7. Cosmai S, Caruso I, Indraccolo U. The role of probiotics in preventing gestational diabetes: An umbrella review. Journal of Clinical Medicine,2025:14(14):5168. https://doi.org/10.3390/jcm14145168
8. Deng YF, Li Y, Zhou Y. Probiotics for preventing gestational diabetes in overweight or obese pregnant women: A systematic review and meta-analysis. World Journal of Clinical Cases,2022:10(36):13189–13202. https://doi.org/10.12998/wjcc.v10.i36.13189
9. Di J, Wu Y, Li J, Zhang L. Comparative efficacy of dietary interventions for glycemic control and pregnancy outcomes in gestational diabetes: A network meta-analysis of randomized controlled trials. Frontiers in Endocrinology,2025:16:1512493. https://doi.org/10.3389/fendo.2025.1512493
10. Dolatkhah N, Hajifaraji M, Abbasalizadeh F, Aghamohammadzadeh N, Mehrabi Y, Abbasi MM, *et al*. Nutrition therapy in managing pregnant women with gestational diabetes mellitus: A review of literature. Nutrition & Food Science Research,2019:6(1):1–10. https://doi.org/10.29252/nfsr.6.1.1
11. Gao Q, Zhong C, Zhou X, Chen R, Xiong T, Huang J, *et al*. Inverse association of total polyphenols and flavonoids intake and the intake from fruits with the risk of gestational diabetes mellitus: A prospective cohort study. Clinical Nutrition,2021:40(5):3092–3099. https://doi.org/10.1016/j.clnu.2020.06.028
12. Garai U, Mukherjee S, Chakraborty P, Tewari S. Neonatal diabetes mellitus: Unravelling the clinical, genetic, and nutritional dimensions for enhanced management. J Curr Res Food Sci,2023:4(2):14-24. https://doi.org/10.29252/nfsr.6.1.1
13. Healthline. Functional foods: Definition, benefits, and uses, 2020. https://www.healthline.com/nutrition/functional-foods
14. Hernandez TL, Mande A, Barbour LA. Nutrition therapy within and beyond gestational diabetes. Diabetes Research and Clinical Practice,2018:145:39–50. https://doi.org/10.1016/j.diabres.2018.04.004
15. International Diabetes Federation. Gestational diabetes, 2024. https://idf.org/about-diabetes/types-of-diabetes/gestational-diabetes/
16. Jiang L, Wang J, Zhang Y, Li R. Omega-3 fatty acids plus vitamin for women with gestational diabetes or prediabetes: A meta-analysis of randomized controlled trials. Frontiers in Endocrinology,2022:13:907748. https://doi.org/10.3389/fendo.2022.907748

17. Jones D, Carter R, Poston L. The effect of high-fibre diets on glycaemic control in women with diabetes in pregnancy: A systematic review and meta-analysis. Diabetic Medicine,2025:42(3):15435. https://doi.org/10.1111/dme.15435
18. Kamińska K, Stenclik D, Bogdański P. Probiotics in the prevention and treatment of gestational diabetes mellitus: A review of recent literature. Nutrients,2022:14(20):4289. https://doi.org/10.3390/nu14204289
19. Kijmanawat A, Panburana P, Reutrakul S, Tangshewinsirikul C. Effects of probiotic supplements on insulin resistance in gestational diabetes mellitus: A double-blind randomized controlled trial. Journal of Diabetes Investigation,2019:10(1):163–170. https://doi.org/10.1111/jdi.12863
20. Lin H. Functional food ingredients for control of gestational diabetes mellitus: A review. Ciência e Tecnologia de Alimentos,2021:41:1–10. https://doi.org/10.1590/fst.30920
21. Liu K, Tan S, Smith J, Melder A. Exploring CALD and non-CALD women's behavioral and dietary management experiences with gestational diabetes mellitus: A systematic review. Nutrients,2025:17(20):3191. https://doi.org/10.3390/nu17203191
22. Liu L, Wang X, Li Y, Sun J. Effects of a low glycemic index or low glycemic load diet on pregnant women at high risk for gestational diabetes: A meta-analysis of randomised controlled trials. Nutrition, Metabolism and Cardiovascular Diseases,2023:33(10):1865–1875. https://doi.org/10.1016/j.numecd.2023.06.013
23. Liu W, Li S, Wang Y, Li Y. Effects of omega-3 supplementation on glucose and lipid metabolism in patients with gestational diabetes: A meta-analysis. Journal of Diabetes Investigation,2023:14(5):697–706. https://doi.org/10.1111/jdi.13992
24. Martirosyan D, Singh J. A rational definition for functional foods: A perspective. Frontiers in Nutrition,2022:9:957384. https://doi.org/10.3389/fnut.2022.957384
25. Moses RG, Barker M, Winter M, Petocz P, Brand-Miller JC. Can a low–glycemic index diet reduce the need for insulin in gestational diabetes mellitus? A randomized trial. Diabetes Care,2009:32(6):996–1000. https://doi.org/10.2337/dc09-0007
26. Mu J, Guo Y, Li X. The effects of probiotics/synbiotics on glucose and lipid metabolism in women with gestational diabetes mellitus: A meta-analysis of randomized controlled trials. Nutrients,2023:15(6):1375. https://doi.org/10.3390/nu15061375
27. Özdemir SÇ. The effect of probiotic and synbiotic use on glycemic control in women with gestational diabetes mellitus: A systematic review and meta-analysis. Diabetes Research and Clinical Practice,2022:190:109976. https://doi.org/10.1016/j.diabres.2022.109976
28. Pandiyan A, Marco ML. Fermented foods & maternal/infant health: First 1000 days. Frontiers in Nutrition,2025:12:1581723. https://doi.org/10.3389/fnut.2025.1581723
29. Pandiyan A, Marco ML. The role of fermented foods in maternal health during pregnancy and infant health during the first 1000 days of life. Frontiers in Nutrition,2025:12:1581723. https://doi.org/10.3389/fnut.2025.1581723
30. Paul D, Aziz A, Tewari S, Mishra S. Postbiotics: Emerging functional metabolites for gut health and disease management. International Journal of Applied Review,2025:1(2):13-15. https://doi.org/10.29252/nfsr.6.1.1
31. Pheiffer C. Gestational diabetes and the gut microbiota: Fibre and polyphenol intake may be key to modulating the maternal gut microbiota. Microorganisms,2024:12(4):633. https://doi.org/10.3390/microorganisms12040633
32. Pinto Y, Salomon R, Krakovski M, *et al*. Gestational diabetes is driven by microbiota-induced inflammation and immune activation. Gut,2023:72(5):918–928. https://doi.org/10.1136/gutjnl-2022-328430
33. Saenz C. Personalized lifestyle modifications for improved metabolic health. Journal of Xenobiotic,2025:15(1):1–15. https://doi.org/10.1080/27697061.2024.2413368
34. Santangelo C, Zicari A, Mandosi E, Scazzocchio B, Mari E, Morano S, Masella R, *et al*. Could gestational diabetes mellitus be managed through dietary bioactive compounds? Current knowledge and future perspectives. British Journal of Nutrition,2016:115(7):1129–1144. https://doi.org/10.1017/S000711451600037X
35. Shen H, Li X, Wang Y, Zhang Y. Effects of dietary fiber on maternal health in pregnant women with gestational diabetes mellitus: A systematic review and meta-analysis. Food & Function,2024:15(4):1789–1801. https://doi.org/10.1039/D3FO05120J
36. Stennett RN, Yeo S, Khalaf K, McKeon-Carter R, Tewari D. A culturally tailored personalised nutrition intervention in South Asian women at risk of gestational diabetes mellitus: The DESI-GDM randomised controlled trial protocol. BMJ Open,2023:13(5):072353. https://doi.org/10.1136/bmjopen-2023-072353
37. Su Y, Wang H, Tan J, *et al*. Alterations of gut microbiota in gestational diabetes patients during the second trimester of pregnancy in the Shanghai Han population. Frontiers in Endocrinology,2021:12:680764. https://doi.org/10.3389/fendo.2021.680764
38. Suastika AV, Ratnawati D, Yuliana LT. The role of probiotics and synbiotics on treatment of gestational diabetes mellitus: A systematic review and meta-analysis. Journal of Clinical Endocrinology & Metabolism,2024:109(2):e567–e578. https://doi.org/10.1210/clinem/dgad567
39. Sun G, Zhang Y, Ma J. The effect of probiotics on gestational diabetes mellitus: An umbrella meta-analysis of randomized controlled trials. Diabetology & Metabolic Syndrome,2024:16:285. https://doi.org/10.1186/s12902-024-01751-w
40. Sun J, Wang Y. Effects of additional dietary fiber supplements on pregnant women with gestational diabetes: A systematic review and meta-analysis. Nutrients,2022:14(21):4542. https://doi.org/10.3390/nu14214542
41. Sweeting A, Wong J, Murphy HR, Ross GP. Epidemiology and management of gestational diabetes. The Lancet,2024:404(10450):175–192.

https://doi.org/10.1016/S0140-6736(24)00887-5
42. Tabatabaeizadeh SA, Tafazoli N. Effect of probiotic yogurt on gestational diabetes mellitus: A systematic review and meta-analysis. Diabetes & Metabolic Syndrome: Clinical Research & Reviews,2023:17(5):102758. https://doi.org/10.1016/j.dsx.2023.102758
43. Tsirou E, Grammatikopoulou MG, Nigdelis MP, Taousani E, Savvidou A, Tzioras S, Goulis DG, *et al*. Guidelines for medical nutrition therapy in gestational diabetes mellitus: Systematic review and critical appraisal. Journal of the Academy of Nutrition and Dietetics,2019:119(8):1320–1339. https://doi.org/10.1016/j.jand.2019.04.002
44. Wan J, Wu Y, Hoang TH, *et al*. Efficacy of dietary supplements targeting gut microbiota in the management of gestational diabetes mellitus: A systematic review. Frontiers in Microbiology,2022:13:927883. https://doi.org/10.3389/fmicb.2022.927883
45. Wang H, Li N, Chivese T, Werfalli M, Sun H, Yuen L, *et al*. IDF Diabetes Atlas: Estimation of global and regional gestational diabetes mellitus prevalence for 2021 by International Association of Diabetes in Pregnancy Study Group's criteria. Diabetes Research and Clinical Practice,2022:183:109050. https://doi.org/10.1016/j.diabres.2021.109050
46. Wei J, Heng W, Gao J. Effects of low glycemic index diets on gestational diabetes mellitus: A meta-analysis of randomised controlled clinical trials. Medicine,2016:95(22):3792. https://doi.org/10.1097/MD.0000000000003792
47. Wiyono N, Putri AN, Sari DK. Exploring the therapeutic potential of functional foods for diabetes management: A narrative review. Heliyon,2024:10(10):31123. https://doi.org/10.1016/j.heliyon.2024.e31123
48. World Health Organization. WHO launches global guidelines on diabetes during pregnancy on World Diabetes Day, 2025. https://www.who.int/news/item/14-11-2025-who-launches-global-guidelines-on-diabetes-during-pregnancy-on-world-diabetes-day
49. Yamamoto JM, Kellett JE, Balsells M, García-Patterson A, Hadar E, Solà I, *et al*. Gestational diabetes mellitus and diet: A systematic review and meta-analysis of randomized controlled trials examining the impact of modified dietary interventions on maternal glucose control and neonatal birth weight. Diabetes Care,2018:41(7):1346–1361. https://doi.org/10.2337/dc18-0102
50. Zhang C, Liu S, Solomon CG, Hu FB. Dietary fiber intake, dietary glycemic load, and the risk for gestational diabetes mellitus. Diabetes Care,2006:29(10):2223–2230. https://doi.org/10.2337/dc06-0790
51. Zhang DY, Huang J, Li D, Liu J. The effect of dietary fiber supplement on prevention of gestational diabetes mellitus in pregnant women with obesity: A meta-analysis. Frontiers in Pharmacology,2022:13:922015. https://doi.org/10.3389/fphar.2022.922015
52. Zhao L, Chen Y, Li X. Effects of dietary polyphenols on maternal and fetal outcomes in gestational diabetes mellitus: A systematic review and meta-analysis. Food & Function,2023:14(15):6852–6865. https://doi.org/10.1039/D3FO02048G
53. Zhuang W, Lv J, Chen J. Probiotic intervention improves metabolic outcomes in gestational diabetes mellitus: A meta-analysis of randomized controlled trials. Clinical Nutrition,2024:43(9):2085–2096. https://doi.org/10.1016/j.clnu.2024.07.026