Editorial

Dietary Diversity during Pregnancy: Constructing a Metabolic Barrier for Maternal and Infant Health

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Gestational diabetes mellitus (GDM) has emerged as a global public health challenge, posing significant threats to the well-being of both mothers and their offspring. In 2021, the prevalence of GDM in China reached approximately 17.0%, notably exceeding the global prevalence of 14.0%[1]. GDM not only escalates the risk of pre-eclampsia, macrosomia and cesarean delivery, but is also intricately linked to longitudinal metabolic outcomes, including maternal type 2 diabetes (T2DM) and pediatric metabolic syndrome[2]. Consequently, the development of evidence-based early dietary intervention strategies is of paramount importance.

A recent umbrella review underscored that, compared to single-nutrient supplementation, dietary patterns offer superior value in mitigating GDM risk[3]. In the current issue of *the journal*, Wang et al. utilized data from the Tongji Maternal and Child Health Cohort to prospectively analyze associations between the Minimum Dietary Diversity for Women (MDD-W) score and GDM risk among Chinese pregnant women[4]. They identified a significant inverse association between dietary diversity and GDM incidence: compared to women with high MDD-W scores (≥ 8), those with low scores (≤ 4) faced a 1.58-fold increased risk of developing GDM. Notably, a low intake frequency of dark green leafy vegetables (less than once per day) was identified as an independent risk factor. These findings not only highlight the central role of dietary diversity in preventing metabolic diseases but also establish the MDD-W as a standardized tool for clinical nutritional guidance.

Accumulating evidence suggests a synergistic effect between precise weight control and dietary interventions in reducing pregnancy-related risks. Research in the Chinese population indicates that maternal age-specific gestational weight gain (GWG) is highly correlated with adverse neonatal outcomes[5], necessitating the adoption of trimester-specific weight gain standards tailored to the local pregnant women[6]. Wang et al. extended this paradigm by revealing a “buffering effect” of dietary diversity among high-risk groups: for women who were pre-pregnancy overweight or obese and experienced excessive GWG, low dietary diversity significantly compounded their metabolic vulnerability, leading to the most pronounced risk of developing GDM. This suggests that for pregnant women facing challenges in weight regulation, enhancing dietary diversity may serve as a crucial compensatory pathway to mitigate the metabolic insults associated with adiposity. Furthermore, advanced maternal age (> 30 years) acts as a critical modulating factor that often exacerbates the biological consequences of metabolic imbalance, further highlighting the need for precision nutritional in these vulnerable women.

The efficacy of dietary patterns in chronic disease prevention lies in the synergy of their multi-target biological effects. Wang et al. demonstrated that the unification of dietary quality and quantity through food variety can effectively counteract the metabolic stress induced by physiological insulin resistance during pregnancy. Mechanistically, the high fiber content, low glycemic load, and abundant antioxidants (such as flavonoids and carotenoids) found in dark green leafy vegetables can significantly improve systemic oxidative stress. From a prospective viewpoint, dietary diversity directly modulates the diversity of the gut microbiota[7]. A rich variety of substrates promotes the proliferation of probiotics, such as short-chain fatty acid-producing bacteria, which in turn enhances intestinal barrier function and reduces systemic low-grade

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inflammation, thereby preserving insulin sensitivity. These insights support the diet-microbiota-metabolism axis as a theoretical foundation for future precision interventions[8].

The protective role of dietary diversity extends far beyond the gestational period, echoing broader epidemiological evidence on the primary prevention of T2DM. Recent studies have indicated that life-course body mass index trajectories are intricately linked to insulin resistance and the long-term incidence of diabetes[9]. Simultaneously, emerging evidence from lifestyle interventions highlights that structured plant-based dietary patterns are instrumental not only in glycemic regulation but also in achieving diabetes remission through sustainable weight management[10]. These findings collectively suggest that both short-term metabolic management during the critical window of pregnancy and the persistent maintenance of healthy diet throughout the life course are indispensable for reducing the global burden of chronic diseases. Consequently, the prevention of GDM should no longer be viewed as an isolated perinatal task; instead, it must be recognized as a pivotal node in a continuous spectrum of care aimed at improving population-level metabolic health.

In summary, the prevention of GDM is a priority for maternal and child health, and the promotion of dietary diversity combined with weight management is key to achieving this goal. By implementing simplified dietary assessment methods like the MDD-W and creating supportive healthy environments for pregnant women, we can not only significantly reduce the incidence of GDM and contribute to the overall enhancement of population health.

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