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Roya Kelishadi*, Motahar Heidari-Beni

Child Growth and Development Research Center, Research Institute for Primordial Prevention of Non-Communicable Disease, Isfahan University of Medical Sciences Isfahan, Iran

Associations of Maternal Dietary Energy Density with Birth Size and Child Neurodevelopment: The PERSIAN Birth Cohort-Isfahan

Abstract:

Background: Maternal nutrition has a crucial role in fetal growth and neurodevelopment. Dietary energy density (DED) is a marker of diet quality. This study aims to investigate the association between maternal DED during the three trimesters of pregnancy and birth outcomes and neurodevelopmental outcomes.

Methods: This longitudinal study was part of the PERSIAN Birth Cohort in Isfahan, Iran. Maternal dietary intake was assessed each trimester using a validated semi-quantitative food frequency questionnaire. Child neurodevelopment was evaluated using the Ages and Stages Questionnaire (ASQ), and the Child Behavior Checklist (CBCL).

Results: This study was analyzed on 3200 mother-child. Higher maternal DED in the second trimester was associated with nearly two-fold increased odds of low birth weight (OR = 1.94; 95% CI: 1.13–3.34), and in the third trimester with greater risk of low birth weight in crude models (OR = 1.88; 95% CI: 1.20–3.00). First-trimester DED was linked to smaller neonatal head circumference in unadjusted analyses (OR = 1.29; 95% CI: 1.03–1.63). Longitudinally, one-unit increases in first-trimester DED were associated with problem-solving delays at 1 year (OR = 2.2; 95% CI: 1.01–4.70) and personal-social problems at 5 years (OR = 3.2; 95% CI: 1.3–7.4). Elevated second-trimester DED predicted fine motor delays at 5 years (OR = 6.1; 95% CI: 2.4–15.5), while third-trimester DED was linked to communication (OR = 1.83; 95% CI: 1.03–3.24) and problem-solving issues (OR = 1.64; 95% CI: 1.03–2.60). Higher first-trimester DED increased sleep problems at age 2 (OR = 1.74; 95% CI: 1.01–3.10), and third-trimester DED was associated with social problems at age 4.

Conclusion: Maternal DED shows trimester-specific associations with fetal growth and child developmental outcomes over time. These findings highlight the importance of dietary quality in pregnancy.

Biography: Professor Roya Kelishadi is specialist in Pediatrics, working as a faculty member of Isfahan University of Medical Sciences in Iran. Over her 30-year career, she focused on primordial/primary prevention of non-communicable diseases. She is the founder and chair of the Research Institute for Primordial Prevention of Non-Communicable Disease, as well as the founder and chair of the Child Growth and Development Research Center affiliated to Isfahan University of Medical Sciences. She is also the founder and Editor-in-Chief of the International Journal of Preventive Medicine. She combines her clinical and research background for prevention and control of risk behaviors and risk factors of adult diseases from the pediatric age. Her studies are focused on lifestyle and environmental factors related to the early life origins of adult chronic diseases. She has been awarded several times at national and provincial levels. She has more than 1000 articles published in high-rank journals and more than 50 books, which are mainly in the field of disease prevention and health promotion