PRESS RELEASE

8 February 2023 | FOR IMMEDIATE RELEASE

Metabolites better reflect consumption of the Mediterranean diet during pregnancy compared to self-reported dietary measures, study finds

In the context of preventing gestational diabetes, and chronic diseases associated with it, maternal metabolites may reflect a more objective assessment of the consumption of a Mediterranean diet among pregnant women, as compared to self-reported dietary information.

Singapore, 8 February 2023—A Mediterranean diet is a dietary pattern characterised by high intakes of olive oils, nuts, fruits and vegetables, legumes, fish, and whole grains. Randomised-controlled trials and observational studies have consistently demonstrated its beneficial effects on blood glucose control and overall cardiometabolic profile, both in the general population and among pregnant individuals.

For pregnant individuals, interventional studies have suggested protective effects of adhering to the Mediterranean diet during pregnancy on the reduced risks of gestational diabetes, gestational disorders of hypertension, preterm birth, and better birth outcomes.

Metabolites are small molecules within the human cells, biofluids, tissues, or organisms. Collectively, they may objectively reflect one's overall metabolism status. Findings have shown that several classes of maternal metabolites during pregnancy are differentially associated with the Mediterranean diet. These findings support the role of Mediterranean diet as a potentially modifiable factor of adverse pregnancy outcomes.

Researchers often use an individual's self-reported information to evaluate the adherence to the Mediterranean diet, but this is often subject to errors and recall bias. As such, identifying metabolites associated with the Mediterranean diet as objective measures is critical.

Homing in on this, a research team led by Professor Cuilin Zhang, Director of the Global Centre for Asian Women's Health (GloW) and a professor in the Department of Obstetrics and Gynecology at the Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine), and Associate Professor Liwei Chen from the University of California, Los Angeles (UCLA), in collaboration with investigators from the National Institutes of Health (NIH), investigated the association of maternal plasma metabolites with the Mediterranean diet in pregnant individuals. The study is published in the journal of Clinical Nutrition.

In this prospective study of racially diverse pregnant individuals, the researchers assessed participant's degree of adherence to the Mediterranean diet during their first- and second-trimesters. They scored them according to the alternate Mediterranean diet index – a score based on the intake of nine items: vegetables, legumes, fruit and nuts, dairy, cereals, meat and meat products, fish, alcohol, and the ratio of monounsaturated to saturated fat.

The investigators collected maternal blood samples during pregnancy and measured a panel of more than 400 metabolites. They identified several key metabolites in the first and second trimesters, respectively, that were associated with the Mediterranean diet. These metabolites included plasma lipids, amino acids, and sugar alcohols.

Concentrations of some metabolites were positively associated with the alternate Mediterranean diet index score, while the concentrations of the others were inversely associated with the score, reflecting the complex maternal physiology during pregnancy.

Their findings also shed light on how the Mediterranean diet may potentially be related to various maternal outcomes through its role on distinct physiological pathways. Particularly, these metabolites may be novel as an objective indicator to quantify the adherence to Mediterranean diet among pregnant individuals.

"To prevent adverse pregnancy outcomes, identifying modifiable factors associated with maternal outcomes like gestational diabetes and chronic diseases is key, and diet is one of them. To date, this is the first study to examine and characterize maternal metabolites of the Mediterranean diet among pregnant individuals. Findings from the present study are consistent with the underlying mechanisms and the beneficial roles of adherence to the Mediterranean diet on several maternal adverse outcomes", said Professor Chen from UCLA, the first author of the study.

"Our findings identified several metabolites that may serve as novel objective assessment to quantify the adherence to Mediterranean diet among pregnant individuals. These findings also provide insights into distinct pathways that explain the underlying associations of the Mediterranean diet with various pregnancy complications," said Professor Zhang, the senior author of this study.

Dr Jiaxi Yang, a co-author and a postdoctoral research fellow at GloW and the Department of Obstetrics and Gynecology at NUS Medicine who is currently leading the working group of Nutrition and Lifestyle at GloW, noted, "While some of these metabolites, such as major lipids and amino acids, were previously found to be associated with the Mediterranean diet among non-pregnant individuals, other metabolites, such as sugar alcohol and some organic acids, were not. These are interesting findings. It is possible that these novel metabolites of the Mediterranean diet may reflect the differences in the physiology of pregnant vs. non-pregnant individuals. In the context of Singapore, it would be meaningful to characterise maternal metabolic profiles associated with the local dietary patterns."

Tying in with their main aim of improving women's health, the team hopes to bring further awareness among the NUS research community, to continue identifying key modifiable factors related to women's health, while investigating underlying physiological mechanisms. said Professor Zhang, the senior author of this study.

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