Low fiber intake during pregnancy may delay development in infants' brains

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Undernutrition during pregnancy is one of the factors linked to an increased risk of diseases in children as they grow older. Yet, maternal malnutrition remains a problem for women worldwide.

Animal studies have shown that a low-fiber diet during pregnancy impairs brain nerve function in offspring. Now, in the first human cohort study on the relation of maternal nutritional imbalance and infants' brain development, researchers in Japan have investigated if the same effects can be found in humans.

"Most pregnant women in Japan consume far less dietary fiber than what is the recommended intake," said Dr. Kunio Miyake, a researcher at the University of Yamanashi and first author of the study published in *Frontiers in Nutrition*. "Our results provided reinforcing evidence that undernutrition during pregnancy is associated with an increased risk of neurodevelopmental delay in children."

Fiber for brain development

Miyake et al. compared the development of children whose mothers had the highest intake of dietary fiber to groups of mothers who consumed successively less fiber during pregnancy.

In comparison to the highest-intake group, the children of mothers in the low-intake groups were more likely to show neurodevelopmental delays. The effect of maternal fiber undersupply was noticeable in several domains related to brain function. Affected were communication skills, problem solving skills, and personal-social skills. The researchers also found delays in the development of large body part movement and coordination, as well as in the coordination of smaller muscles.

The researchers' results are based on the analysis of more than 76,000 mother-infant pairs from the Japan Environment and Children's Study. It is an ongoing project aiming to elucidate how the environment affects children's health.

To collect dietary information about the participants, the scientists used

a food frequency questionnaire, which asked respondents about their dietary status during the second and third trimester of pregnancy. Developmental delays were assessed in another questionnaire that was sent to parents once their children were three years old. Based on parents' answers, the researchers showed the correlation of maternal fiber intake and child brain development.

Nutritional guidance is crucial

The researchers also found that the median dietary fiber intake in Japan is just over 10 grams a day. Only 8.4% of Japanese pregnant women consumed enough fiber. They also pointed out that the recommended fiber intake for pregnant women varies: While in Japan the recommended daily dietary fiber intake is 18 grams each day, it is 28 grams in the US and Canada. "Our results show that nutritional guidance for pregnant mothers is crucial to reduce the risk of future health problems for their children," said Miyake.

The researchers also pointed to certain limitations of their study. "Human studies cannot assess the effects of dietary fiber alone. Although this study considered the impact of folic acid intake during pregnancy, the possibility of other nutrients having an impact cannot be completely ruled out," Miyake pointed out. "In addition, dietary fiber intake from supplements could not be investigated."

More information: Maternal dietary fiber intake during pregnancy and child development: The Japan Environment and Children's Study, *Frontiers in Nutrition* (2023). DOI: 10.3389/fnut.2023.1203669. www.frontiersin.org/articles/1 … ut.2023.1203669/full

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