

Eating iron-fortified grain improves students' attention, memory

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Adolescent students in a rural school in India who consumed an iron-biofortified version of the grain pearl millet exhibited improved attention and memory compared to those who consumed conventional pearl millet, according to Penn State researchers.

The results were published July 17 in the *Journal of Nutrition*.

"Iron deficiency remains the most prevalent micronutrient deficiency globally, but few studies have examined how iron status relates to cognition in adolescents," said co-author Laura Murray-Kolb, associate professor of nutritional sciences and professor-in-charge of the graduate program. "Iron biofortification of staple food crops is being scaled up, yet it is unknown whether consuming biofortified crops can benefit cognition. Our objective was to determine the efficacy of iron-biofortified pearl millet in improving attention and memory in Indian school-going adolescents."

Researchers first observed changes in iron status in students who consumed the biofortified pearl

millet. They then observed that the subjects performed better on tests of attention and memory after consuming the biofortified millet over six months.

"Compared with conventional pearl millet, consumption of biofortified pearl millet resulted in greater improvement in attention and memory," Murray-Kolb said. "Reaction time on [attention](#) tasks was cut in half over a period of six months in those consuming biofortified versus conventional pearl millet."

The study was conducted with 140 Indian boys and girls, aged 12-16, from economically disadvantaged families attending a rural boarding school in the Ahmednagar district of Maharashtra, India. The students were asked to eat either iron-biofortified or conventional pearl millet. Researchers selected the school because of its high rates of anemia—a condition commonly caused by low iron levels.

The students' iron levels were measured at baseline and after four and six months. Five measures of cognitive function were obtained at baseline and six months.

While these results are promising, Murray-Kolb said more work needs to be done to ensure adolescents, especially in developing countries, are getting proper nutrients.

"Adolescents aren't always considered in these types of studies," she said. "But they should be. They're at an age where their brains are still developing, and nutrition is key. Iron deficiency can easily be passed on from generation to generation, especially if these young women with [iron](#) deficiencies are getting pregnant and having babies."

Murray-Kolb said future studies might examine if the [pearl](#) millet can also improve academic performance.

"We would be interested in following children into adulthood as they continue to consume the millet, and study long-term results," she said.

More information: Samuel P Scott et al. Cognitive Performance in Indian School-Going Adolescents Is Positively Affected by Consumption of Iron-Biofortified Pearl Millet: A 6-Month Randomized Controlled Efficacy Trial, *The Journal of Nutrition* (2018). DOI: [10.1093/jn/nxy113](https://doi.org/10.1093/jn/nxy113)

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