Can pomegranate juice protect the infant brain?

August 21 2019

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When it comes to protecting the newborn brain, taking steps to mitigate risk before birth may be critical. Some newborns, such as those with intrauterine growth restriction (IUGR), are at heightened risk. Being able

to intervene before birth to aid in protecting the newborn brain may prevent the often-devastating effects of brain injury. In ongoing investigations, clinical researchers from Brigham and Women's Hospital are exploring whether pomegranate juice intake during pregnancy can have a protective effect.

In a paper appearing in *PLOS One*, the team presents its preliminary findings from a clinical trial of expectant mothers whose babies were diagnosed with IUGR. The exploratory study, supported by National Institute of Health Grants, The Foundation for Barnes-Jewish Hospital and an unrestricted gift from POM Wonderful, shows promise, with evidence of better brain development and brain connectivity in infants born to mothers who consumed pomegranate juice daily. A second, larger clinical trial is currently underway at the Brigham to validate these findings.

"Our study provides preliminary evidence suggesting potential protective effects for newborns exposed to pomegranate juice while in utero," said senior author Terrie Inder, MBCHB, chair of the Department of Pediatric Newborn Medicine at the Brigham. "These findings warrant continued investigation into the potential neuroprotective effects of polyphenols in at-risk newborns, such as those with hypoxic-ischemic injury."

In cases of IUGR, a baby in the womb is measuring small for its gestational age, often because of issues with the placenta, which brings oxygen and nutrients to the growing fetus. One out of every 10 babies is considered to have IUGR. The process of birth itself can further decrease blood flow or oxygen to the baby, including to the baby's brain. If this is very severe, it can result in a condition known as hypoxic-ischemic injury, which contributes to almost one-quarter of newborn deaths worldwide.

Polyphenols, which include tannic acid and ellagitannins, are part of a class of antioxidants found in many foods and beverages, including nuts, berries, red wine and teas. Pomegranate juice is a particularly rich source of these molecules. Polyphenols are known to cross the blood-brain barrier, and studies in animal models have demonstrated protective effects against neurodegenerative diseases. To date, no clinical studies had evaluated the potential effects of giving pregnant women pomegranate juice to protect the brains of at-risk newborns.

The current randomized, controlled, double-blinded study enrolled 78 mothers from Barnes-Jewish Hospital obstetric clinic in St. Louis with IUGR diagnosed at 24-43 weeks' gestation. Women were randomized to receive 8 ounces of pomegranate juice daily or a taste/calorie matched placebo that was polyphenol free. Women drank the juice daily from enrollment until delivery. The team measured several aspects of brain development and injury, including infant brain macrostructure, microstructural organization and functional connectivity.

While the team did not observe differences in brain macrostructure, they did find regional differences in white matter microstructure and functional connectivity.

"These measures tell us about how the brain is developing functionally," said Inder. "We saw no difference in brain growth and baby growth, but we did see improvement in cabling network and brain development measured by synchronous blood flow and visual development of the brain."

The authors note that the findings warrant the need for a larger, rigorously designed clinical trial to allow continued investigation into the potential neuroprotective effects of polyphenols. Such a study is now underway at the Brigham.

"We plan to continue investigating these exciting findings," said Inder. "While the preliminary evidence shows promise, additional study and replication is needed."

Provided by Brigham and Women's Hospital