

Beetroot juice promotes healthy circulation in postmenopausal women, finds study

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After women go through menopause, their risk of heart disease increases dramatically. To improve and support heart and blood vessel health among postmenopausal women, researchers at Penn State studied

whether beetroot juice can improve how blood vessels function.

Results published today in [Frontiers in Nutrition](#) indicated that daily consumption of beetroot juice by postmenopausal women may improve blood vessel function enough to reduce future heart disease risk.

Beetroot juice contains high levels of nitrate, which the body converts to [nitric oxide](#). Nitric oxide helps blood vessels expand, making it easier for blood to flow through the circulatory system. The ability of nitric oxide to widen blood vessels is known to be particularly helpful during periods of limited [blood flow](#) and oxygen delivery, such as during a heart attack, according to the researchers.

David Proctor, professor of kinesiology and physiology at Penn State, and Jocelyn Delgado Spicuzza, who earned her doctorate in integrative and biomedical physiology from Penn State in May, led an interdisciplinary team of researchers who tested how nitrate-rich beetroot juice impacted blood vessel health in 24 postmenopausal women in their 50s and 60s.

"After menopause, women no longer produce estrogen, which helps maintain nitric oxide in the body," said Delgado Spicuzza, first author of the research and current SAFE-T center research project manager. "This loss of nitric oxide production contributes to the substantial increase in heart disease risk for postmenopausal women. Foods that are rich in nitrate—especially beets—are being investigated as a natural, non-pharmaceutical way to protect the heart and blood vessels."

Nitrate is an approved food additive for some animal-based food products, such as processed meats. However, nitrate food additives and preservatives are strictly regulated due to their potential to cause cancer, according to Delgado Spicuzza.

In contrast, plants like beets, spinach and lettuce naturally accumulate nitrate from the soil. These plant-based sources of nitrate have [cardiovascular benefits](#) because the human body can convert nitrates from plants to nitric oxide, which it cannot do with nitrate added to meats.

In this study, participants had their vascular function tested at the Penn State Clinical Research Center and then consumed two 2.3-ounce bottles of beetroot juice as an initial dose, followed by one bottle every morning for a week. All participants consumed concentrated beetroot juice, with each serving providing as much nitrate as three large beets. A few weeks later, the participants drank beetroot juice with the nitrate removed.

Neither the researchers nor the participants knew which juice was being consumed at the time of testing. A day after their last dose, participants returned for testing of their vascular function. The researchers compared how well [blood vessels](#) expanded for each woman when they were and were not consuming the nitrate-rich beetroot juice.

The researchers used an ultrasound sensor to monitor how blood flowed through the brachial artery—which is in the upper arm and supplies blood to the hands—during a [stress test](#) in which blood flow was restricted in each participant's forearm for five minutes. When the restriction was removed, researchers measured how blood flow changed in the brachial artery again.

The results showed that consumption of nitrate-rich beetroot juice each day improved blood flow compared to when the participants drank nitrate-free beetroot juice. The researchers said that this level of improved blood-vessel function—if it could be maintained over the postmenopausal years—could significantly reduce the risk of heart disease. They said that long-term health benefits of beetroot juice have not been studied at this point, but the long-term benefits of nitrate-rich

vegetables have been confirmed.

"Women may need to consume beetroot juice daily—or even more often—to experience all of the potential cardiovascular benefits," Proctor said. "Still, this research shows that beetroot juice can be very useful in protecting blood vessel health of midlife women during a period of accelerating heart disease risk."

This study included women considered early postmenopausal, or one to six years post-menopause, and late postmenopausal, six or more years post-menopause. Late postmenopausal women saw the same benefits as the early postmenopausal group.

Delgado Spicuzza said the research team was particularly excited to find that beetroot juice improved blood vessel health for women who had gone through menopause years earlier. Some treatments for protecting cardiovascular health in postmenopausal women—like [hormone therapy](#)—are only safe during the first several years post-menopause. After that, hormone therapy can increase the risk of cancers and stroke.

"Some clinicians are already recommending beetroot juice to men and women with [high blood pressure](#)," Delgado Spicuzza said. "By providing a safe and effective way to improve blood vessel function, beets could help maintain cardiovascular health in postmenopausal women. When you consider that most women are postmenopausal for at least a third of their lives, you can begin to understand the potential significance of these results."

Delgado Spicuzza won the Mid-Atlantic American College of Sports Medicine 2023 Doctoral Student Investigator Award for her presentation on this research in fall of 2023. She said it is gratifying to see this research resonate with other researchers and especially with the women in the study, who seemed to embrace the potential of beetroot juice.

"Several of the participants said that they intended to continue consuming [beetroot juice](#) after the study concluded," she said. "There seems to be a real desire on the part of [postmenopausal women](#) to support their cardiovascular health without taking additional medications. In part, I believe beets can be a complimentary food to improve blood vessel health in millions of women as they age."

More information: Seven-day dietary nitrate supplementation clinically significantly improves basal macrovascular function in postmenopausal women: a randomized, placebo-controlled, double-blind, crossover clinical trial, *Frontiers in Nutrition* (2024). [DOI: 10.3389/fnut.2024.1359671](#). [www.frontiersin.org/articles/10.3389/fnut.2024.1359671/full](#)

Provided by Pennsylvania State University

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