

A simple way for older adults to assess arterial stiffness: reach for the toes

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How far you can reach beyond your toes from a sitting position - normally used to define the flexibility of a person's body - may be an indicator of how stiff your arteries are.

A study in the [American Journal of Physiology](#) has found that, among people 40 years old and older, performance on the sit-and-reach test could be used to assess the flexibility of the arteries. Because arterial stiffness often precedes cardiovascular disease, the results suggest that this simple test could become a quick measure of an individual's risk for early mortality from heart attack or stroke.

"Our findings have potentially important clinical implications because trunk flexibility can be easily evaluated," said one of the authors, Kenta Yamamoto. "This simple test might help to prevent age-related arterial stiffening."

It is not known why arterial flexibility would be related to the flexibility of the body in middle age and older people. But the authors say that one possibility is that stretching exercises may set into motion physiological reactions that slow down age-related arterial stiffening.

The study "Poor trunk flexibility is associated with arterial stiffening" appears in the *American Journal of Physiology - Heart and Circulatory Physiology*. The authors are: Kenta Yamamoto of the University of North Texas and the National Institute of Health and Nutrition, Japan; Hiroshi Kawano, Yuko Gando and Mitsuru Higuchi of Waseda

University, Japan; Motoyuki Iemitsu of International Pacific University, Japan; Haruka Murakami, Michiya Tanimoto, Yumi Ohmori, Izumi Tabata, Motohiko Miyachi of the National Institute of Health and Nutrition; and Kiyoshi Sanada of Ritsumeikan University, Japan. The American Physiological Society published the study.

Arteries should be elastic

Healthy blood vessels are elastic, and elasticity helps to moderate blood pressure. Arterial stiffness increases with age and is a risk factor for cardiovascular disease and death. Previous studies have established that physical fitness can delay age-related arterial stiffness, although exactly how that happens is not understood. The authors noted that people who keep themselves in shape often have a more flexible body, and they hypothesized that a flexible body could be a quick way to determine arterial flexibility.

The researchers studied 526 healthy, non-smoking adults, 20 to 83 years old, with a body mass index of less than 30. They wanted to see whether flexibility of the trunk, as measured with the sit and reach test, is associated with arterial stiffness. The researchers divided the participants into three age groups:

- young (20-39 years old)
- middle aged (40-59 years old)
- older (60-83 years old)

The researchers asked participants to perform a sit-and-reach test. The volunteers sat on the floor, back against the wall, legs straight. They slowly reached their arms forward by bending at the waist. Based on how

far they could reach, the researchers classified the participants as either poor- or high-flexibility.

The researchers also measured blood pressure and the speed of a pulse of blood as it flowed through the body. They measured how long the pulse takes to travel between the arm and the ankle and between the neck and the leg. They also measured aortic pressure in some participants and tested the participants for cardiorespiratory fitness, muscular strength and endurance.

The study found that trunk flexibility was a good predictor of artery stiffness among middle age and older participants, but not among the younger group. In middle age and older participants, they also found that systolic blood pressure (the peak pressure that occurs as the heart contracts) was higher in poor-flexibility than in high-flexibility groups.

What's happening?

Why would the flexibility of the body be a good indicator of arterial stiffness? In the study, the authors speculate on why this would be. One possibility is that there is a cause and effect: the stretching exercises that provide flexibility to the body may also slow the age-related stiffening of the arteries. The study found that arterial stiffness among middle age and older people was associated with trunk flexibility but was independent of muscle strength and cardiorespiratory fitness (as measured by performance on an exercycle). In addition, they cited another recent study that found that middle age and older adults who began a regular stretch exercise program significantly improved the flexibility of their carotids, a major artery found in the neck.

"Together with our results, these findings suggest a possibility that improving flexibility induced by the stretching exercise may be capable of modifying age-related arterial stiffening in middle-aged and older

adults," Dr. Yamamoto said. "We believe that flexibility exercise, such as stretching, yoga and Pilates, should be integrated as a new recommendation into the known cardiovascular benefits of regular exercise."

However, there are other possibilities as to why bodily flexibility should be an indicator of arterial stiffness. One possibility is that it is related to the higher [blood pressure](#) that was seen in the poor flexibility group. Another possibility is that the amount of collagen and elastin, which makes the muscles flexible, also makes the arteries flexible. Further research is needed to understand whether there is a cause-effect relationship between flexibility and [arterial stiffness](#), they said.

More information: *Am J Physiol Heart Circ Physiol* 297: H1314-H1318, 2009. First published August 7, 2009; [doi:10.1152/ajpheart.00061.2009](https://doi.org/10.1152/ajpheart.00061.2009)

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