

# Study reveals how small changes in walking technique may help treat knee osteoarthritis

Gait analysis and pain measures show that subtly adjusting the angle of the foot during walking may reduce knee pain caused by osteoarthritis. This approach may also slow progression of the condition, an incurable disease in which the cartilage cushion inside a joint breaks down.

Led by a team of researchers at NYU Langone Health, the University of Utah, and Stanford University, a new study explored whether changing the way patients position their feet when walking could lessen extra loading—stress on the joint during motion—and help treat the disease.

For the investigation, the scientists tested this intervention in 68 men and women with mild to moderate knee osteoarthritis and then used advanced MRI scans to track how well it worked.

The results suggest that those trained to angle their feet slightly inward or outward from their natural alignment experienced slower cartilage degeneration in the inner part of their knee compared with those who were encouraged to walk more frequently without changing their foot position. A report on the study published online August 12 in the journal *The Lancet Rheumatology*.

“Although our results will have to be confirmed in future studies, they raise the possibility that the new, noninvasive treatment could help delay surgery,” said study co-lead author Valentina Mazzoli, PhD.

Dr. Mazzoli, an assistant professor in the Department of Radiology at NYU Grossman School of Medicine, notes that the earlier patients receive a knee replacement, the more likely they are to require additional procedures in the future.

The findings also revealed that those who adjusted their foot angle reduced their pain score by 2.5 points on a 10-point scale, an effect equivalent to that of over-the-counter pain medications. By contrast, those who did not change their gait reduced their pain scores by little more than a point.

“Altogether, our findings suggest that helping patients find their best foot angle to reduce stress on their knees may offer an easy and fairly inexpensive way to address early-stage osteoarthritis,” added Dr. Mazzoli.

About one in seven Americans have some form of osteoarthritis, commonly in the inner side of the knee, according to the US Centers for Disease Control and Prevention. A leading cause of disability, the disease is often managed with pharmaceutical pain relievers, physical therapy, and in the most severe cases, knee-replacement surgery. Experts believe that excess loading can over time contribute to the condition.

Past research has offered little evidence that changes in gait can effectively reduce knee pain caused by osteoarthritis, says Dr. Mazzoli. Some previous trials trained all participants to adopt

the same foot angle and found no relief, while others did not compare the intervention to a control group or only followed the participants for a month.

The new study is the first to show that tailoring each patient's foot angle to their unique walking pattern can alleviate the disease's symptoms in the long term and may slow cartilage breakdown, the authors say.

Dr. Mazzoli adds that this technique may have a significant advantage over pharmaceutical painkillers. These drugs, she says, do not address the underlying disease and can cause liver and kidney damage, stomach ulcers, and other unwanted side effects when taken for long periods.

For the study, the research team recorded the participants walking on a treadmill at a specialized gait-assessment laboratory. A computer program simulated their walking patterns and calculated the maximum loading that occurred in the inner side of their knees. Next, the team generated computer models of four new foot positions—angled inward or outward by either 5 or 10 degrees—and estimated which option reduced loading the most.

The patients were then randomly divided into two groups. Half were trained in six sessions to walk with their ideal angle, while the other half were instructed to continue walking naturally. Pain scores and MRI scans were taken at the beginning of the study period and one year after the intervention.

Study findings showed those who adjusted their gait reduced the maximum loading in the knees by 4 percent, while those who kept their normal walking pattern increased their loading by more than 3 per cent.

“These results highlight the importance of personalizing treatment instead of taking a one-size-fits-all approach to osteoarthritis,” said Dr. Mazzoli. “While this strategy may sound challenging, recent advances in detecting the motion of different body parts using artificial intelligence may make it easier and faster than ever before.”

While the authors relied on a specialized laboratory for the new study, AI software that estimates joint loading using smartphone videos is now available and can allow clinicians to perform a gait analysis in the clinic.

The researchers next plan to test whether these tools can indeed identify the most effective walking method for osteoarthritis patients, says Dr. Mazzoli. They also plan to expand their study to people with obesity.

Funding for the study was provided by National Institutes of Health grant P2CHD101913. Further study funding was provided by the US Department of Veterans Affairs and the National Science Foundation.

Along with Dr. Mazzoli, Scott Uhlrich, PhD, at the University of Utah in Salt Lake City, served as study co-lead author. Julie Kolesar, PhD, at Stanford University in California, served as study senior author.

Other study co-investigators are Amy Silder, PhD; Feliks Kogan, PhD; Garry Gold, MD; Scott Delp, PhD; and Gary Beaupré, PhD, at Stanford University, and Andrea Finlay, PhD, at the Veterans Affairs Palo Alto Health Care System in California.

NYU Langone Health is a fully integrated health system that consistently achieves the best patient outcomes through a rigorous focus on quality that has resulted in some of the lowest mortality rates in the nation.

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