



## **Analysis of the Pain Relief Effect of Walking Backwards Down on a Steep Slope in Patients with Plantar Fasciitis**

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### **Dear Editor-in-Chief**

Plantar fasciitis is a common symptom and main cause of heel stick pain, with more than one million people receiving treatment for it in the U.S. (1). This disease is caused by chronic degenerative changes occurring from inflammation and repetitive microtrauma due to excessive tensile force on the plantar fascia insertion site. Pain is caused as the dorsal flexion motion of the ankle joint is restricted due to a tight Achilles tendon, or as the plantar fascia is stretched while walking in the contracted state (2). First, conservative treatment and stretching are applied to patients with plantar fasciitis. Stretching can be easily applied, and it is a less costly method. It can be an effective treatment method, and it has been reported that 83% of patients with plantar fasciitis were treated with stretching (3). However, the application of plantar fascia stretching together with stretching to relieve hamstring muscle stiffness and extend the Achilles tendon shows better results (4, 5).

We aimed to analyze clinical effects from walking backwards down on a steep slope in patients with plantar fasciitis. The study results can provide a new vision and information for clinical specialists and researchers related to rehabilitation to consider the factors of slope angle and walking backwards down.

We targeted 20 male amateur badminton players in their 40s and 50s suffering from plantar fasciitis,

diagnosed through physical examinations and radiation tests by orthopedists in 2019. All patients had been complaining about pressure pain in the medial tuberculum part of the calcaneum, which is a clinical symptom of plantar fasciitis, for more than six months; pain became severe when they walked after sleeping or after taking a rest, and pain disappeared if they continued walking, which is a typical symptom of plantar fasciitis.

The purpose and procedure of the study were explained to patients, and they signed the consent and voluntarily participated in this study.

The steep-sloping concrete-paved forest road of Apsan Mountain in Daegu, South Korea, was chosen as the backward walking location. Patients were instructed to descend by walking backwards down the steep-sloping road, which had a slope of approximately 30 degrees and was 1.7 km in length, and they did this two times a week for four weeks. To analyze the effect of walking backwards down on a steep slope, this study used VAS (visual analogue scale) and evaluated the medial process of calcaneal tuberosity pressure pain, which is pain that patients experience when walking after getting up or after taking a rest, and pain in their daily life. Data were processed using the SPSS (Chicago, IL, USA) 23.0 Windows program to obtain the mean and standard deviation and perform a paired *t*-test for pretest and posttest comparison.



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The participant characteristics were as follows: group of walking backwards down on a steep slope (male, n = 10; age,  $47.20 \pm 5.30$  yr; height,  $174.30 \pm 4.99$  cm; weight,  $74.30 \pm 4.57$  kg) and control group (male, n = 10; age,  $50.60 \pm 4.78$  yr; height,  $172.70 \pm 6.42$  cm; weight,  $76.60 \pm 2.67$  kg). The group that walked backwards on the steep slope showed a significant reduction in the medial process of calcaneal tuberosity pressure pain ( $P=0.000$ ), pain when they walked after getting up ( $P=0.026$ ), pain when they walked after taking a rest ( $P=0.000$ ), and pain in their daily life ( $P=0.001$ ), compared to before the application of backward walking. In the control group, there were no significant changes in the medial process of calcaneal tuberosity pressure pain ( $P=0.229$ ), pain when they walked after getting up ( $P=0.394$ ), pain when they walked after taking a rest ( $P=0.591$ ), and pain in their daily life ( $P=0.678$ ). Therefore, the application of walking backwards down on a steep slope in patients with plantar fasciitis was confirmed to be helpful in terms of pain relief. This study can be meaningful in that a therapeutic exercise method, namely walking backwards down on a steep slope, was offered to rehabilitation-related clinical specialists and researchers who worry about the effect of therapeutic stretching and difficulties applying it to patients with plantar fasciitis. The study results are expected to contribute to the development of rehabilitation research related to patients with plantar fasciitis in the public health.

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## Conflict of interest

The authors declare that there is no conflict of interest.

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