

# Ankle-Dorsiflexion Range of Motion After Ankle Self-Stretching Using a Strap

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**Context:** A variety of ankle self-stretching exercises have been recommended to improve ankle-dorsiflexion range of motion (DFROM) in individuals with limited ankle dorsiflexion. A strap can be applied to stabilize the talus and facilitate anterior glide of the distal tibia at the talocrural joint during ankle self-stretching exercises. Novel ankle self-stretching using a strap (SSS) may be a useful method of improving ankle DFROM.

**Objective:** To compare the effects of 2 ankle-stretching techniques (static stretching versus SSS) on ankle DFROM.

**Design:** Randomized controlled clinical trial.

**Setting:** University research laboratory.

**Patients or Other Participants:** Thirty-two participants with limited active dorsiflexion ( $<20^\circ$ ) while sitting (14 women and 18 men) were recruited.

**Main Outcome Measure(s):** The participants performed 2 ankle self-stretching techniques (static stretching and SSS) for

3 weeks. Active DFROM (ADFROM), passive DFROM (PDFROM), and the lunge angle were measured. An independent *t* test was used to compare the improvements in these values before and after the 2 stretching interventions. The level of statistical significance was set at  $\alpha = .05$ .

**Results:** Active DFROM and PDFROM were greater in both stretching groups after the 3-week interventions. However, ADFROM, PDFROM, and the lunge angle were greater in the SSS group than in the static-stretching group ( $P < .05$ ).

**Conclusions:** Ankle SSS is recommended to improve ADFROM, PDFROM, and the lunge angle in individuals with limited DFROM.

**Key Words:** limited ankle dorsiflexion, rehabilitation, injury prevention

## Key Points

- Ankle self-stretching using a strap is a novel stretching technique used to improve ankle-dorsiflexion range of motion. It is more effective than static stretching and can be performed independently.
- For athletes with limited ankle range of motion, self-stretching with a strap can be recommended to improve their ankle-dorsiflexion range of motion and performance in functional and sports activities.
- The lunge angle was enhanced more with ankle self-stretching using a strap than with static stretching after 3-week interventions.

Ankle stretching has been considered an essential part of rehabilitation and physical fitness programs for injury prevention and improvement of ankle function.<sup>1</sup> Limited dorsiflexion range of motion (DFROM) may contribute to ankle, foot, and knee injuries, including plantar fasciitis,<sup>2,3</sup> ankle sprains,<sup>4</sup> Achilles tendinitis,<sup>5</sup> forefoot pain,<sup>6</sup> navicular stress fractures,<sup>7</sup> calf muscle tightness,<sup>8</sup> Achilles tendinopathy,<sup>9</sup> and anterior cruciate ligament injury.<sup>10</sup> Limited DFROM may be associated with various factors, such as tightness in the plantar flexors (gastrocnemius and soleus), soft tissue and capsular restriction, and loss of accessory motion at the tibiotalar, subtalar, tibiofibular, and midtarsal joints.<sup>11</sup> Posterior gliding of the talus should occur during ankle dorsiflexion (DF)<sup>12,13</sup>; reduced posterior gliding of the talus can contribute to limited DFROM.

Various interventions including static stretching,<sup>14</sup> runner's stretching,<sup>15</sup> mobilization with movement (MWM),<sup>16,17</sup> talus-stabilizing-taping (TST) techniques,<sup>5,18</sup> and orthoses<sup>19</sup> have been used to increase DFROM and

prevent ankle and foot injuries in individuals with limited DFROM. Two mobilization techniques are available to improve DFROM. One traditional MWM technique is performed passively to glide the talus posteriorly in a non-weight-bearing position. Another MWM technique is performed in a weight-bearing position to improve DFROM, provide pain relief, and allow functional activities such as lunging and squatting.<sup>17,18</sup> Mobilization with movement can be applied with combined manual force by a therapist to glide the talus posteriorly and permit active DF in a weight-bearing position.<sup>17</sup> Previous authors<sup>17,20</sup> found that for individuals with limited DFROM, MWM techniques using weight-bearing exercises were more effective than techniques with a non-weight-bearing component. However, the MWM technique for ankle DF requires a therapist's hand to stabilize the ankle joint,<sup>5,17</sup> making it difficult for individuals to perform MWM independently.

Two methods have been introduced to facilitate posterior gliding of the talus during ankle DF exercises in a weight-