

# The Effectiveness of Shank Muscle Training On Ankle Flexibility Among Western Toilet Users.

D MURUGAN MPT<sup>1</sup>, REVATHI PANDURANGAN MPT<sup>2</sup>

<sup>1</sup>(Assistant Professor, Sri Venkateshwaraa College of Physiotherapy, Puducherry, India)

<sup>2</sup>(Student, Sri Venkateshwaraa College of Physiotherapy, Puducherry, India)

---

## Abstract:

**Background:** Due to decreased physical activity, muscle flexibility in modern housewives is usually reduced. The habit of toileting seems to affect the flexibility for most of the population.

**Materials and Methods:** The subjects included 30 subjects were randomly allocated in two groups : Group A [N = 50] shank muscle training and Group B [N=15] Control group. All the subjects were given informed consent form will be taken from each of the subjects to participation. Instruction are given to the subjects about technique performed. The subjects was included in the study through self made screening score and measured using ankle dorsiflexion wall test (using inch tape).

**Results:** Unpaired t test was used for between group analysis. The result of the study shows that GROUP A Shank muscle training has significant improvement in ankle flexibility ( $p < 0.0001$ ).

**Conclusion:** The study concluded that shank muscle training shows greater results in ankle flexibility among housewives.

**Key Word:** Ankle flexibility, Inch tape, VISAA scale, ankle dorsiflexion test.

---

Date of Submission: 07-05-2024

Date of Acceptance: 17-05-2024

---

## I. Introduction

The Achilles tendon (AT) is the thickest and strongest tendon in the human body. Its origin lies close to the middle of the calf, and fuses with the gastrocnemius muscle proximally.<sup>[1]</sup> The gastrocnemius is a fusiform muscle formed by two heads, medial and lateral, each separately crossing the knee joint. The average length of the AT is 15 cm, ranging from 11 to 26 cm. The mean width of 6.8 cm (4.5–8.6 cm) at its origin gradually decreases at the midsection (1.8 cm, range 1.2–2.6 cm). The AT becomes more rounded at an average of 4 cm above the calcaneus, and has a width of 3.4 cm (2.0–4.8 cm) at its insertion site over the posterior surface of the calcaneus. Ankle flexibility can be determined by exerting a known torque and measuring angular displacement. For linear elastic system doubling the flexibility is exactly same as doubling the compliance<sup>[9]</sup>. When we sit on commode, hamstring muscle pull on and rotate pelvis, which flatten lumbar spine. Disc pressure increase on front and create additional strain on ligament. Sitting leads to 40-90% increase in load on lumbar region than in standing position<sup>[5]</sup>. Shank muscle training can reduce over pronation, assist in restricting the foot. It is easy to perform, cost free and provides long term effect. However it requires time to improve symptoms and must be performed continuously and consistently<sup>[7]</sup>. Gastrocnemius and the soleus stretch. Tibialis anterior strengthening. Peroneus longus strengthening. Therefore, the purpose of the study to find the effectiveness of shank muscle training on ankle flexibility among western toilet user.

## II. Material And Methods

Study Design	: Experimental Study.
Study Setting	: Puducherry Community Dwelling Housewives (Reddiarpalayam)
Dept Of Physiotherapy ,Svmch & Rc Ariyur.	
Study Population	: Western Toilet Users (Middle Age Women )
.Sampling Technique	: Convenient Sampling
Study Sample	: 30 Subjects.
Study Duration.	: 6 Months. Treatment Duration : 6 Weeks
Outcome Tool	: Ankle Dorsiflexion Wall Test, Visa Ascale
Outcome Measures	: Ankle Flexibility.

### **Materials Used In This Study**

Assessment sheet  
Towel  
Theraband  
Plinth  
Measuring tape

### **Selection Criteria**

#### **Inclusion Criteria:**

Age group 30 -50 years are included.  
Subjects used with western toilet for last 5 years.  
Ankle dorsiflexion wall test below 10 cm.  
VISA A scale more than 30 score.  
Subjects who are willing to participate.

#### **Exclusion Criteria:**

Foot or ankle surgery.  
Any foot abnormalities.  
Any present injuries on the lower extremity.  
Uncooperative subjects.  
Leg length discrepancy > 1 cm.  
Patient with lesion on physical examination.

### **Procedure**

Patient who fulfilled the inclusion criteria were included in the study. The benefit of the study and the treatment were explained to the patient and written consent form was taken. All subjects (n=30) included in the study were randomly allocated into 2 groups consisted of 15 subjects each.

### **GROUP A -Shank Muscle Strengthening**

### **GROUP B - Soft Tissue Manipulation.**

### **GROUP - A SHANK MUSCLE TRAINING**

45 mins was spent for each exercise, 10-15 reps for 3 sets

#### **Anterior Tibialis Strengthening:**

Attach theraband to secure object. Loop theraband around forefoot .Without moving your leg, from full abduction, adduct the foot with theraband.3 sets 20 reps 2 times a day.Leg extended on the couch. Anchor elastic band on a support. Wrap around the feet. Pull the toes upwards. 10 reps for 20 reps.

#### **Peroneus Longus Strengthening:**

Sit on a chair next to a large heavy item of furniture. Loop the therapy band around the furniture. Loop the band around the front half of your foot and ankle inwards.Keeping your heel on the floor to act as pivot slowly turn your foot outwards against the resistance and bend foot upwards. Hold for 2 sec 5 reps.

#### **Calf Stretching:**

Sit with leg extended, roll up a towel and put it around the ball of the foot .keeping both knee and back straight, pull toes towards you with both hands until moderate stretch is felt hold 30-60 secs.

## **III. Discussion**

This experimental study conducted to find out the effectiveness of shank muscle training on ankle Flexibility among western toilet users. This study was selected for the purpose to get desirable improvement in ankle Flexibility among western toilet users.30 subjects who fulfilled the inclusion and exclusion criteria were taken with age group between 30-50 years in this study. They were allocated to two groups, group A and B, each containing 15 subjects. shank muscle training were given to experimental group (Group A) and soft tissue manipulation was given to group B(Control group).

The outcome was measured by ADWT and VISA A questionnaire.

Pre and post values were assessed before and after 4 weeks using the ankle dorsiflexion wall test .These values were statistically analyzed using repeated measures of paired 't' test. In this study patients had difficulty in performing the exercise with mild pain in the beginning and Patients with severe pain were treated

with soft tissue manipulation friction and given rest on that day and instructed them to perform home based exercises. Patients with severe pain were initially treated with cryotherapy and ultrasound later they were progressed gradually to do strengthening exercise. This made them to gain the confidence over the re-education of exercise. Shank muscles strengthening may adjust the alignment of foot during mid stance event of gait and induce lateral weight distribution. In this study muscle training adjust the alignment of foot, strengthens the ankle and foot muscles distributing weight equally thus improving the ankle flexibility but experimentally shank muscle training is slightly more effective in increasing the ankle flexibility .

As per the findings of **Antonio Ce judo et al in 2019** done a simplified version of the weight-bearing ankle lunge test: description and test-retest reliability and conclude the main benefit of the new version of the ankle dorsiflexion wall test developed in the current study when contrasted with the original version are the speed of the test, the simplicity of the measurement method, and its ease of execution. Therefore, it is possible that the rater became more proficient with the measurement techniques as the study progressed.

In addition, since the rater was not blinded to the measurements, it is possible that his or her knowledge of the initial values may have influenced subsequent measures.

**Kaniya et al in 2012** reported that the tibialis posterior muscle was essential muscle used for maintaining the medial longitudinal arch during dynamic weight bearing.

**Gray in 1969** found that the tibialis anterior, tibialis Posterior, peroneus longus and Soleus muscles play a role in sustaining the medial longitudinal arch in individuals with flatfoot.

**Baumbach et al ., (2014 )** has concluded that the study revealed the influence of knee position on ankle dorsiflexion . Various pathologies affecting the lower extremity cause limited ankle dorsiflexion . The muscles gastrocnemius has an influence in ankle dorsiflexion because it bridges the knee and ankle joint . Under physiological condition the gastrocnemius is under full tension when the knee is extended. on the contrary , knee flexion increases ankle dorsiflexion. Ankle dorsiflexion not limited to the tibiotalar joint, but also occurs partially in the subtalar and midtarsal joints. We tried to account for this problem by maintaining the foot in a subtalar neutral position. The value of ankle dorsiflexion wall test (group a ) 1.47 and VISA A scale (group a 3.53) scores show a significant result in GROUP A (SHANK MUSCLE TRAINING).

Result of the current study demonstrated that six week of Shank muscle training helps in improving the ankle flexibility.

#### **IV. Conclusion**

This experimental study was concluded the effectiveness of shank muscle training on ankle flexibility among western toilet users shows greater results in treatment duration of 6 weeks. So, this study has rejects null hypothesis.