



## IMMEDIATE EFFECT OF GASTROCNEMIUS AND SOLEUS STRETCHING ON FALL RISK IN COMMUNITY DWELLING ELDERLY ADULTS – PILOT STUDY

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### ABSTRACT

**Background:** For community-dwelling older adults, mobility is a major factor contributing to independence. The more frequently falls occur, the greater the likelihood of mortality and morbidity for the older adult.

**Objective:** To find out effect of gastrocnemius and soleus stretching for decreasing fall risk in older population.

**Design:** Quasi Experimental Study.

**Method:** The Pre Test outcome measures was taken, then the samples were taught about the gastrocnemius and soleus stretching. After the intervention the immediate recordings are taken and analysed.

**Result:** Result was calculated statistically using Paired t test. There was significant change after the intervention has been given with P value 0.0005 .

**Conclusion:** Ankle Kinematics with limited ankle DFROM has been improved. The study found out that there is effect of gastrocnemius and soleus stretching for decreasing fall risk in older population.

**KEYWORDS :** Stretching, Gastrocnemius-soleus muscles, Elderly.

### INTRODUCTION:

Falls are most regular reason for accident related injury and are regularly connected with accident related death in the older people. In India, the commonness of falls has been assessed as 14 - 53%<sup>(1)</sup>. For community-dwelling older adults, mobility is a major factor contributing to independence. Loss of independence frequently follows a fall or injury associated with a fall<sup>(3)</sup>.

Muscle tightness makes muscles and tendons more susceptible to injuries and limits the movement of the joint where the muscle is involved, causing functional problems<sup>(2)</sup>. Decreased length of the calf musculotendon unit (MTU) is associated with normal aging in both men and women. A shortened muscle might create imbalance at joints and faulty postural alignment that may lead to injury and joint dysfunction<sup>(9)</sup>. Stretching is commonly utilized to stretch the muscle and increase the ROM around the joint and theorized to improve balance performance<sup>(3)</sup>.

Gastrocnemius stretching exercises are often performed to increase ankle DF PROM with the knee extended. Gastrocnemius stretching exercises lead to greater ankle DF PROM with the knee extended because of increased tolerance to stretching, modification in sensation, and changes in the architecture of the gastrocnemius muscle-tendon unit, especially in the displacement of the myotendinous junction (MTJ) of the gastrocnemius<sup>(4)</sup>.

In adults aged 65 and older, the estimated annual prevalence of falls is 28%. Falls are associated with significant morbidity and mortality in the elderly: they are the most common cause of accidental death and nonfatal accidental injury<sup>(5)</sup>. So the present study may be useful for improving the activity of daily living by decrease risk of falls by giving stretching techniques. The objective of present study is to find out immediate effect of gastrocnemius and soleus stretching for decreasing fall risk in older population.

### Outcome Measure:

**1.Length Test: For Soleus muscles:** Sit forward in a chair with knees bent and feet pulled back toward chair enough to raise the heels slightly from the floor. Press down on thigh to help force heel to the floor.

Normal ROM for soleus is 20degree<sup>(6)</sup>.

**For Gastrocnemius muscles:** Stand erect on board inclined at a 10° angle, with feet in approximately 8° to 10° of outtoeing.

Normal ROM for gastrocnemius muscle is 10 degree<sup>(6)</sup>.

**2.Time Up and Go Scale:** The subjects were asked to sit on a corner chair, and the time it took for the subjects to get up and touch the wall 3 meter in front them, return and sit on a chair again was measured. Three trials were performed and the mean time was calculated. Subjects scoring greater than 13.5 were considered as high risk fallers and were included in the study<sup>(8)</sup>.

### Procedure:

**Recruitment of samples:** Samples is recruited according to inclusion and exclusion criteria.

**Material used:** Chair,incline wooden board, stretching belt, watch, pen, paper.

### Evaluation:

- After obtaining clearance from the ethical committee from the Dr. Vithalrao Vikkhe Patil Foundation college of physiotherapy, Ahmednagar, instructions was given to the participants about study and its benefits and risk in their own language.
- Consent was taken from participants. 7 samples were recruited for the study which was calculated statistically.
- The participants was selected on basis of inclusion and exclusion criteria. Patient Aged 60 and more ,both genders were included in the study which was conducted in Dr. Vithalrao Vikkhe Patil Memorial Hospital, Ahmednagar.
- For the purpose of selecting the subject in the study they were evaluated with the length test.  
Community dwelling elderly individuals within the age of 60-80 years, Tight gastro-soleus muscles, Elderly with mini mental score  $\geq 25$  ,TUG score  $> 13.5$  are included in the study and subject with Cognitive impairment ,Current history of dislocation of lower limb, Fractures of lower limb, within 6 months prior to inclusion ,Neurological disorders ,Malignancy, Bone diseases, Excessive pain, Hypermobility of ankle joint ,Recent injury to ankle joint are excluded from the study.
- Subjects was taught active stretching of gastrocnemius and soleus muscles.

- As the study is Quasi Experimental study the Pre and Post values are recorded and analysed.
- **Gastrocnemius muscle self- stretching:** While the subject was in long sitting position with a towel positioned around the forefoot, he/she was instructed to actively dorsiflex the talocrural joint and then apply graded overpressure into dorsiflexion direction using the towel. Exercise was performed 3 times holding for twenty seconds, then relax<sup>71</sup>
- **Soleus muscle self-stretching:** While the subject was in sitting position at the edge of the bed with a towel positioned around the forefoot, he/she was instructed to actively dorsiflex the talocrural joint and then applies graded overpressure into dorsiflexion direction using the towel. Exercise was performed 3 times holding for twenty seconds, then relax<sup>71</sup>.
- The data will be collected and analysed.

**RESULT ANALYSIS:**

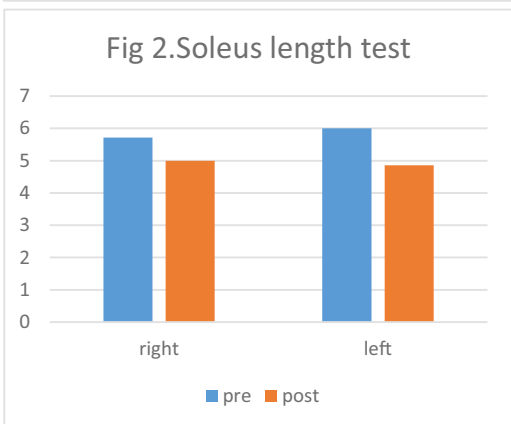
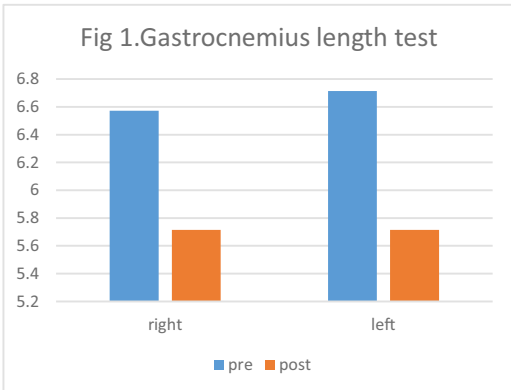
- Data was collected and analysed using Graphpad Instat version 3.06,32 bit for windows statistical software.
- Paired t test was used to see the result of pre test and post test values.
- Table 1 display the gender, age, height, and weight of the groups. Gastrocnemius and soleus muscle has found significant changes after the intervention has been given with P value 0.0005(fig 1,2) ,also there is significant change in TUG score post treatment.

**Table 1. Demographics of participants.**

Variables	Mean
Age	68.14286
Height	113.4343
Weight	54.42857

**Table 2. Outcome measure data at baseline**

Variables	Pre test Values	Post test Values	P Value
TUG	20 ± 6.137	19 ± 1.069	0.0191



**DISCUSSION:**

The findings of the present study demonstrate that individuals with limited ankle DF PROM with the knee extended in long sitting and with Knee flexed in chair sitting position who received sustained stretching of gastrocnemius and soleus muscles has found improvement in there TUG score.

Hylton B. Menz has done a mini review on Biomechanics of the Ageing Foot and Ankle which provided an overview of the changes in the structure and function of the foot that are associated with ageing and that have considerable implications for the well-being of the older person. With advancing age, there is a general tendency for the foot to exhibit increased soft-tissue stiffness, a decreased range of motion, decreased strength.

A study on the effect of gastrocnemius stretching combined with talocrural joint mobilization on weight-bearing ankle dorsiflexion passive range of motion was done by Min-Hyeok Kang (2015) which concluded that gastrocnemius stretching with joint mobilization needs to be considered to improve ankle kinematics during gait, and this supports the present study.

**CONCLUSION:**

These findings suggest that gastrocnemius and soleus stretching should be considered to improve ankle kinematics in individuals with limited ankle DF PROM. The study found out that there is immediate effect of gastrocnemius and soleus stretching for decreasing fall risk in older population.

**Conflict of interest -** None.

**Funding Sources -** None

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