# Clinical Trial Protocol
# Iranian Registry of Clinical Trials

17 Sep 2026

## The effect of plantar flexor muscle fatigue on postural control and muscular activation pattern during external perturbation in healthy students (20-35 Y/O) of Shiraz Rehabilitation School

## Protocol summary


**Summary**

Aim: The purpose of this study is to identify the effect of localized muscle fatigue on postural stability and muscular activation patterns before, during and after sudden hand loading. Study design: Quasi- experimental, subjects randomly will select among students of Shiraz Faculty of Rehabilitation. Method: Fifteen healthy young adults (20-35 years) will recruite to participate in this study. The exclusion criteria are experience of any surgery in the trunk and lower extremity, history of injury or pain to the trunk and lower extremity for at least previous 6 months, musculoskeletal , neurological or other impairments that could affect the postural control. Subjects will sit on the bed and maximum voluntary contractions (MVC) will collect from both plantar flexor muscles. In the next step, we will have 3 experiment consist of: pre-fatigue test, the fatigue protocol and post-fatigue test. In all experiments, subjects will stand on a force platform with feet shoulder width apart and surface electromyographic activities from the following muscles will record: transvers abdominals, semitendinosus, erector spinae and soleus. In the pre and post fatigue situations, the subjects will expose to a rapid loading in to the right palm (25% of body weight) with two expected and unexpected conditions. The fatigue protocol consists of three sets of isometric submaximal plantar flexion to make the subjects fatigued. In this experiment the total time for each subject will be about one hour


## General information

**Acronym**

**IRCT registration information**

IRCT registration number: **IRCT201109196767N1**
Registration date: **2011-10-12, 1390/07/20**
Registration timing: **prospective**
Last update:
Update count: **0**

**Registration date**

2011-10-12, 1390/07/20

**Registrant information**


**Name**

Samaneh Ebrahimi

**Name of organization / entity**

Shiraz University of Medical Sciences

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Iran (Islamic Republic of)

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**Recruitment status**

**Recruitment complete**


**Funding source**

Shiraz University of Medical Sciences


**Expected recruitment start date**

2011-10-22, 1390/07/30

**Expected recruitment end date**

2011-12-21, 1390/09/30

**Actual recruitment start date**

empty

**Actual recruitment end date**

empty

**Trial completion date**

empty

**Scientific title**

The effect of plantar flexor muscle fatigue on postural control and muscular activation pattern during external perturbation in healthy students (20-35 Y/O) of Shiraz Rehabilitation School

**Public title**

The effect of ankle muscle fatigue on postural control and muscular activation patterns

**Purpose**

Prevention

**Inclusion/Exclusion criteria**

Inclusion criteria: Healthy students aged 20-35 years old Exclusion criteria: Any deviation in the lower extremities and spine alignment; History of pain and trauma to the lower extremities and trunk in the past six months; Musculoskeletal and neuromuscular disorders; History of diseases that involve vestibular system, eyes, central nervous system and peripheral nervous system; Inner ear disease; History of surgery in the lower extremities and trunk; History of back pain in past 6 months; Doing regular exercise at least 3 times a week for 30-45 minutes

**Age**

From **20 years** old to **35 years** old

**Gender**

Both

**Phase**

N/A

**Groups that have been masked**

*No information*

**Sample size**

Target sample size: **15**

**Randomization (investigator's opinion)**

N/A

**Randomization description**

**Blinding (investigator's opinion)**

Not blinded

**Blinding description**

**Placebo**

Not used

**Assignment**

Single

**Other design features**

## Secondary Ids

empty

## Ethics committees

**1**

**Ethics committee**

**Name of ethics committee**

Shiraz University of Medical Sciences

**Street address**

Zand Ave

**City**

Shiraz

**Postal code**

**Approval date**

2010-09-15, 1389/06/24

**Ethics committee reference number**

CT-90-5682

## Health conditions studied

**1**

**Description of health condition studied**

Normal subjects

**ICD-10 code**

**ICD-10 code description**

## Primary outcomes

**1**

**Description**

Bilateral transverse abdominals muscle activation

**Timepoint**

Before and after expected and unexpected sudden hand loading (before and after plantar flexor muscle fatigue)

**Method of measurement**

Telemetry EMG (Mega electronics Ltd.Finland)

**2**

**Description**

Bilateral semitendinosus muscle activation

**Timepoint**

Before and after expected and un expected sudden hand loading (before and after plantar muscle fatigue)

**Method of measurement**

Telemetry EMG (Mega electronics Ltd.Finland)

**3**

**Description**

Center of pressure displacement

**Timepoint**

Before and after expected and unexpected sudden hand loading (before and after plantar flexor muscle fatigue)

**Method of measurement**

Kistler force plate (9286AA,Sweden)

**4**

**Description**

Center of pressure velocity

**Timepoint**

Before and after expected and unexpected sudden hand loading (before after plantar flexor muscle fatigue)

**Method of measurement**

Kistler force plate (9286AA,Sweden)

**5**

**Description**

Bilateral erector spinae muscle activation

**Timepoint**

Before and after expected and unexpected sudden hand loading (before and after plantar flexor muscle fatigue)

**Method of measurement**

Telemetry EMG (Mega electronics Ltd.Finland)

**6**

**Description**

Bilateral soleus muscle activation

**Timepoint**
Before and after expected and unexpected sudden hand loading (before and after plantar flexor muscle fatigue)
**Method of measurement**
Telemetry EMG (Mega electronics Ltd.Finland)

## Secondary outcomes

empty

## Intervention groups

### 1

**Description**
External perturbation (expected and unexpected): Subjects expose to a rapid loading in to the right palm (25% of body weight) from 20 cm obove his/har right palm, while the shoulder is in 90 flexion. In expected condition the subjects are aware of loading time (3 seconds after the beep sound the loading will occure). But in unexpected condition the subjects do not any thing about the loading time.
**Category**
Diagnosis

### 2

**Description**
Making the plantar flexor muscles fatigued: The person sitting on the bed with the thigh and leg on the it. One end of the load cell strap will be fixed to the bar behind the person and the other end will be fixed below the ankles. The maximum voluntary contraction of both flexor muscles will be evaluated using the electrical load cell. Then, 60 percent of this amount is applied to fatigue the muscles; The person will asked to apply pressure to the strap while maintain 60 percent of his/her maximum voluntary contraction by looking at the bar scale on the monitor until feel fatigue. When the bar scale is in green territory the person would maintain the contraction. But if it is in red territory and last for 5 seconds it assumes as fatigue
**Category**
Other

## Recruitment centers

### 1

**Recruitment center**
**Name of recruitment center**
Shiraz School of Rehabilitation
**Full name of responsible person**
Fatemeh Amiri
**Street address**
Shiraz School of Rehabilitation, First Abiverdi Ave. Chamran Boulevard.
**City**
Shiraz

## Sponsors / Funding sources

### 1

**Sponsor**
**Name of organization / entity**
Shiraz University of Medical Sciences
**Full name of responsible person**
Dr Gholam Reza Hatam
**Street address**
Shiraz University of Medical Sciences, Zand Ave
**City**
Shiraz
**Grant name**
**Grant code / Reference number**
**Is the source of funding the same sponsor organization/entity?**
Yes
**Title of funding source**
Shiraz University of Medical Sciences
**Proportion provided by this source**
100
**Public or private sector**
*empty*
**Domestic or foreign origin**
*empty*
**Category of foreign source of funding**
*empty*
**Country of origin**
**Type of organization providing the funding**
*empty*

## Person responsible for general inquiries

**Contact**
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## Person responsible for updating data

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## Sharing plan

**Deidentified Individual Participant Data Set (IPD)**
*empty*
**Study Protocol**
*empty*
**Statistical Analysis Plan**
*empty*
**Informed Consent Form**
*empty*
**Clinical Study Report**
*empty*
**Analytic Code**
*empty*
**Data Dictionary**
*empty*