

# The effects of strength training on muscle strength, asymmetry in lower limb muscle strength and mobility in older men and women with a history of hip fracture

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<b>Registration date</b> 13/07/2006	<b>Overall study status</b> Completed	<input type="checkbox"/> Protocol
<b>Last Edited</b> 06/02/2013	<b>Condition category</b> Musculoskeletal Diseases	<input type="checkbox"/> Statistical analysis plan
		<input checked="" type="checkbox"/> Results
		<input type="checkbox"/> Individual participant data

## Plain English summary of protocol

Not provided at time of registration

## Study website

<http://www.jyu.fi/sport/laitokset/tutkimusyksikot/sgt/en/>

## Contact information

### Type(s)

Scientific

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## Additional identifiers

EudraCT/CTIS number

**IRAS number**

**ClinicalTrials.gov number**

**Secondary identifying numbers**

N/A

## **Study information**

**Scientific Title**

### **Study objectives**

Older people with a history of hip fracture often have generally low muscle strength and power in the lower limbs, especially on the fractured side, which may result in mobility limitations. This considerable asymmetrical deficit may further complicate balance and independent living.

Progressive strength-power training may increase muscle strength and power. Taking into account asymmetrical deficit in the lower limbs may lead to larger improvements in mobility function in older people than conventional strength training.

### **Ethics approval required**

Old ethics approval format

### **Ethics approval(s)**

The study was approved by the Ethical Committee of the Jyväskylä Central Hospital Board on 14 /10/2004

### **Study design**

A randomised controlled trial; men and women randomised in blocks. Data collected in two phases using the exact same protocol equipment and staff.

### **Primary study design**

Interventional

### **Secondary study design**

Randomised controlled trial

### **Study setting(s)**

Not specified

### **Study type(s)**

Treatment

### **Participant information sheet**

### **Health condition(s) or problem(s) studied**

Hip fracture

### **Interventions**

Participants assigned to the intervention groups, participated twice a week in a 12-week progressive strength-power training specifically designed to increase lower limb muscle strength and power and to reduce asymmetry in lower limb strength and power. Resistance equipment was used to train: leg press, knee flexion, hip abduction and adduction exercises, in addition, plantar flexion exercise was provided by means of a weighted vest. The one repetition maximum (1 RM; calculated from the observed 3-5 RM) for the exercises used in the training was assessed twice during the training. The resistance of the strength training (usual velocity) was progressively increased from 50 to 80 % of the 1RM of the respective leg. Leg press and plantar flexion exercises were trained in addition with high-velocity low-load resistance (power training). For these exercises, the number of repetitions was progressively increased. In order to equalise muscle strength and power asymmetry between the legs, the weaker leg was trained with more sets of repetitions and/or a higher percentage of resistance. The training was supervised by an experienced physiotherapist.

The participants assigned to the control group were encouraged to continue their lives as they were used to.

### **Intervention Type**

Other

### **Phase**

Not Specified

### **Primary outcome measure**

1. Maximal muscle strength and power in both legs:
  - 1.1. Voluntary isometric knee extension strength
  - 1.2. Rate of force production
  - 1.3. Leg extension power (Nottingham power-rig)
2. The strength and power difference between the legs (asymmetry)
3. Mobility (habitual and maximal walking velocity and other walking parameters, such as step length and time)
4. Time of walking a figure 8
5. Ability and time to climb stairs
6. Timed-up-go test
7. Chair rise ability and time

### **Secondary outcome measures**

1. Balance:
  - 1.1. Static and dynamic balance measured on a force plate
  - 1.2. Functional balance (Berg balance scale)
  - 1.3. Self-assessed balance confidence (ABC scale)
2. Falls (collected retrospectively and by means of a prospective follow-up)
3. Disability
4. Pain in the legs
5. Bone density and geometry of tibia (peripheral computed tomography)

### **Overall study start date**

01/06/2004

### **Completion date**

31/12/2006

# Eligibility

## Key inclusion criteria

Community-dwelling 60 - 85-year-old men and women living in the Jyväskylä Central Hospital District that had an operation following a hip fracture, from six months to seven years earlier

## Participant type(s)

Patient

## Age group

Senior

## Sex

Both

## Target number of participants

30 participants in each group (60 in total)

## Key exclusion criteria

The criteria of American College of Sports Medicine (e.g. severe cardiovascular disease) were used to exclude people from participation in the randomized controlled trial. Additionally, severe progressive (e.g. cancer) or neurological disease (e.g. advanced Alzheimer's disease), lower limb amputation, inability to walk outside without assistance of another person and alcohol abuse were used as exclusion criteria for this study.

## Date of first enrolment

01/06/2004

## Date of final enrolment

31/12/2006

# Locations

## Countries of recruitment

Finland

## Study participating centre

Finnish Centre for Interdisciplinary Gerontology

Jyväskylä

Finland

FI-40014

# Sponsor information

**Organisation**

Ministry of Education Finland

**Sponsor details**

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**Sponsor type**

Government

**Website**

<http://www.minedu.fi>

**ROR**

<https://ror.org/02w52zt87>

**Funder(s)****Funder type**

Government

**Funder Name**

Ministry of Education (Finland)

**Alternative Name(s)**

Ministry of Education of the Republic of Korea, , MOE

**Funding Body Type**

Government organisation

**Funding Body Subtype**

National government

**Location**

Korea, South

**Funder Name**

Finnish Cultural Foundation (Finland)

**Alternative Name(s)**

Finnish Cultural Foundation, SKR

**Funding Body Type**

Private sector organisation

**Funding Body Subtype**

Trusts, charities, foundations (both public and private)

**Location**

Finland

**Funder Name**

Juho Vainio Foundation (Finland)

**Alternative Name(s)**

Juho Vainio Foundation, Reppy Institute

**Funding Body Type**

Private sector organisation

**Funding Body Subtype**

Trusts, charities, foundations (both public and private)

**Location**

Finland

## Results and Publications

**Publication and dissemination plan**

Not provided at time of registration

**Intention to publish date****Individual participant data (IPD) sharing plan****IPD sharing plan summary**

Not provided at time of registration

**Study outputs**

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
<a href="#">Results article</a>	results	01/09/2008		Yes	No
<a href="#">Results article</a>	results	01/12/2012		Yes	No