

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

Submission date 01/06/2006	Recruitment status No longer recruiting	<input type="checkbox"/> Prospectively registered
Registration date 13/07/2006	Overall study status Completed	<input type="checkbox"/> Protocol
Last Edited 06/02/2013	Condition category 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

Contact information

Type(s)
Scientific

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Additional identifiers

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

Study type(s)

Treatment

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(s)

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

Key secondary outcome(s)

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)

Completion date

31/12/2006

Eligibility

Key inclusion criteria

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

Participant type(s)

Patient

Healthy volunteers allowed

No

Age group

Senior

Sex

All

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

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

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?
Results article	results	01/09/2008		Yes	No
Results article	results	01/12/2012		Yes	No
Study website	Study website	11/11/2025	11/11/2025	No	Yes