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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

Registration date
13/07/2006

Overall study status
Completed

Last Edited
06/02/2013

Condition category
Musculoskeletal Diseases

[ ] Prospectively registered
[ ] Protocol
[ ] Statistical analysis plan
[X] Results
[ ] 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

Protocol serial number
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

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