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Changes in muscle coordination following upper-body strength training

Submission date
04/02/2015

Recruitment status
No longer recruiting

Registration date
11/02/2015

Overall study status
Completed

Last Edited
18/02/2022

Condition category
Musculoskeletal Diseases

[ ] Prospectively registered
[ ] Protocol
[ ] Statistical analysis plan
[X] Results
[ ] Individual participant data

Plain English summary of protocol

Background and study aims:
During complex resistance movements such as bench press, large amounts of muscle mass are activated, and multiple muscles are coordinated to achieve the desired movement. The aim of the current study is to evaluate if changes occur in the muscular coordination, following an increase in strength.

Who can participate?
Healthy men at the age of 18-40 with no previous surgery in the shoulder or elbow joint can participate.

What does the study involve?
Participants will be randomly allocated to one of two groups: a training group and a control group (no training). Subjects in the training group perform upper-body strength training for 5 weeks, 3 times a week. Each training session will last approximately 60 minutes and take place at the Center for Sensory-Motor Interaction, Aalborg (Denmark). Both groups will be tested in two sessions: before the start of training and after completion of the training (approx. 3 hours per session). The maximum strength in bench press will be measured and surface electromyograhy (EMG) will be recorded during 3 sets of 8 repetitions at submaximal intensity.

What are the possible benefits and risks of participating?
After completion of the training program, subjects are expected to have gained upper-body strength.
No risks or side effects are known to be associated with the methods used in the present study.

Where is the study run from?
Center for Sensory-Motor Interaction, Aalborg (Denmark).

When is study starting and how long is it expected to run for?
The project will run from September 2014 to March 2014.

How long will the trial be recruiting participants for?
Aalborg University (Denmark)

Who is the main contact?
PhD student Mathias Kristiansen
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Contact information

Type(s)
Scientific

Contact name
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Additional identifiers

EudraCT/CTIS number

IRAS number

ClinicalTrials.gov number

Secondary identifying numbers
N/A

Study information

Scientific Title
Changes in muscle coordination after 5 weeks of bench press training in previously untrained participants: A randomised controlled trial

Study objectives
Following 5 weeks of intensive upper-body strength straining the training group will display:
1. Increased strength in bench press
2. Changes in muscle coordination as measured by the extracted muscle synergies

Ethics approval required
Old ethics approval format

Ethics approval(s)
The North Denmark Region Committee on Health Research Ethics, Denmark, July 2012, ref: N-20120036

Study design
Randomised controlled trial

Primary study design
Interventional

Secondary study design
Randomised controlled trial

Study setting(s)
Other

Study type(s)
Other

Participant information sheet

Health condition(s) or problem(s) studied
Inter-muscular coordination

Interventions
Subjects randomized to the training group will perform upper-body strength training 3 times per week for 5 weeks.
Subjects randomized to the control group will not perform any training.

Intervention Type
Other

Primary outcome measure
Upper-body strength, measured as 1RM in bench press. Will be assessed pre and post the 5 week intervention.
Muscle coordination, measured by extracting muscle synergies from surface electromyography (EMG). Will be assessed pre and post the 5 week intervention.

Secondary outcome measures
Compliance. Will be measured at each training session.

Overall study start date
30/07/2014

Completion date
20/12/2014

Eligibility

Key inclusion criteria
1. Males
2. Age 18-40

Participant type(s)

Healthy volunteer

Age group
Adult

Lower age limit
18 Years

Upper age limit
40 Years

Sex
Male

Target number of participants
32

Key exclusion criteria
1. No previous surgery in shoulder or elbow joint
2. Regular strength training within 24 months before the study
3. Consumption of alcohol or pain-relieving drugs 24h prior to the experiment
4. Hypertension (>160/>100 mmHg) and heart diseases
5. Addictive or previous addictive behavior defined as the abuse of cannabis, opioids or other drugs
7. Previous neurological or mental disorders
8. Inability to cooperate

Date of first enrolment
30/09/2014

Date of final enrolment
30/10/2014

Locations

Countries of recruitment
Denmark

Study participating centre
Aalborg University
Denmark
-

Sponsor information

Organisation
Aalborg University

Sponsor details
Fredrik Bajersvej 7D
Aalborg
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9220

Sponsor type
University/education

ROR
https://ror.org/04m5j1k67

Funder(s)

Funder type
University/education

Funder Name
Aalborg University

Results and Publications

Publication and dissemination plan
We are intending to publish a conference abstract at the European Conference on Sports Science June, 2015 in Malmø, Sweden.
And an original research paper to the Scandinavian journal of Medicine and Science in Sports.

Intention to publish date
31/12/2015

Individual participant data (IPD) sharing plan
Not provided at time of registration

IPD sharing plan summary
Not expected to be made available

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Results article		01/07/2016	18/02/2022	Yes	No