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Prevention of shoulder and knee injuries in adolescent elite handball players

Submission date
11/04/2018

Recruitment status
No longer recruiting

Registration date
17/04/2018

Overall study status
Completed

Last Edited
15/07/2022

Condition category
Musculoskeletal Diseases

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

Plain English summary of protocol

Background and study aims
Handball is a body contact team sport, which includes throwing, with a great portion of overhead movement patterns in the shoulder girdle, as well as frequent side-cutting movements and jumping. It is one of the most injury prone sports, shoulder, knee and ankle injuries are dominant. Furthermore, recent studies have identified that external rotational shoulder strength, as well as scapula dyskinesia and rapid and high increases in training load are risk factors for shoulder injuries in handball players. Additionally, handball is one of the sports with the highest incidence of anterior cruciate ligament (ACL) injuries. Thus, primary prevention of shoulder and knee injuries for players enrolled at handball-profiled secondary school is highly warranted. In this study we will investigate if training programmes, with a main focus on increasing shoulder strength and lower limb control, have a preventive effect on shoulder respective knee injuries in adolescent elite handball players.

Who can participate?
Uninjured adolescent handball players enrolled to or accepted for any of the Swedish Handball Federation licensed top-elite level handball-profiled secondary schools. The schools needs to have an approximately even enrolment of female and male players and have capacity of at least 30 players.

What does the study involve?
Participants are randomly allocated into one of three groups:
1. Shoulder group: Participants in this group receive a training programme during the pre-season and season, focusing on shoulder and trunk strength and handball throws.
2. Knee group: Participants receive a training programme during the pre-season and season, focusing on lower limb and trunk strength and control.
3. Control group: Participants will not receive any training programme and are instructed to carry on with their handball activity during the pre-season and season, without any restrictions.

What are the possible benefits and risks of participating?
Each group of participants, except for the control group, receives an injury prevention programme that has been used in other studies on other adolescent populations/sports, where a significant injury reduction has been shown. This indicates that there is a clear potential benefit

of participating in the study. The risks of serious adverse events of these training programmes are minimal. In recent studies, investigating similar injury prevention programs in other adolescent sports, no serious adverse events have been reported.

When is study starting and how long is it expected to run for?
August 2017 to June 2019

Who is funding the study?
The Swedish Research Council for Sport Science

Who is the main contact?
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Protocol serial number
P2018-0091

Study information

Scientific Title
Prevention of shoulder and knee injuries in adolescent elite handball players - a cluster randomised controlled trial

Acronym
KHAST RCT

Study objectives
In this study two different training programmes performed during the pre-season preparation period and during the handball season will be evaluated. The first programme aims to strengthen the shoulder and trunk. The other programme aims to strengthen the lower limb and trunk and increase the lower limb neuromuscular control.

Our hypotheses for the primary outcomes are that the training programmes will reduce the number of shoulder and knee injuries, respectively and that the training programmes will increase shoulder strength and throwing velocity and knee control, respectively.

Our hypotheses for the secondary outcomes are that the training programmes will reduce the number of time-loss shoulder and knee injuries, respectively.

Specific primary research questions:
1. Does the training programme, which aims to strengthen the shoulder and trunk, reduce shoulder injuries in male and female adolescent elite handball players?

2. Does the training programme, which aims to strengthen the shoulder and trunk, increase shoulder strength and/or throwing velocity in male and female adolescent elite handball players?

3. Does the training programme, which aims to strengthen the lower limb and trunk and increase lower limb neuromuscular control, reduce knee injuries in male and female adolescent elite handball players?

4. Does the training programme, which aims to strengthen the lower limb and trunk and increase lower limb neuromuscular control, increase knee control, in male and female adolescent elite handball players?

Specific secondary research questions:
1. Does the training programme, which aims to strengthen the shoulder and trunk, have an injury reducing effect, specific to time loss shoulder injuries in male and female adolescent elite handball players?

2. Does the training programme, which aims to strengthen the lower limb and trunk and increase lower limb neuromuscular control, have an injury reducing effect, specific to time loss knee injuries in male and female adolescent elite handball players?

Ethics approval required
Old ethics approval format

Ethics approval(s)
Central Ethical Review Board (Stockholm) (www.epn.se), 20/1/2018, ref: 2017/2549-31

Primary study design
Interventional

Study design
Single-centre cluster randomised controlled trial

Study type(s)
Prevention

Health condition(s) or problem(s) studied
Shoulder and knee injuries

Interventions
Participants are randomly allocated to three treatment arms:
1. Shoulder and trunk training: a 10-15 minutes shoulder and trunk training programme in combination with handball throwing, to be performed at least three times a week during the pre-season (August) and the handball season (September-May). In total, the programme includes six exercises that aim to increase shoulder/trunk strength and neuromuscular control. The programme is instructed during a “face-to-face” practical session and also delivered through a smartphone application and the participants perform the programme unsupervised during the pre-season phase and supervised during the handball season.

2. Knee and trunk training: a 10-15 minutes knee and trunk training programme to be performed at least three times a week during the pre-season (June-August) and the handball season (September-May). In total, the programme includes six exercises that aim to increase hip/knee /trunk strength and the neuromuscular control of the lower limb. The programme is instructed during a “face-to-face” practical session and also delivered through a smartphone application and the participants perform the programme unsupervised during the pre-season phase and supervised during the handball season.

3. Control group: No intervention, no restriction in handball activity.

Randomization process:

First, potential handball-profiled secondary schools meeting the pre-set criteria were identified, which are 18. Eligible schools will be contacted and checked for interest to participate.

The randomization of the interested schools will be stratified on the number of players enrolled at the school to ensure an even distribution of players between the three study arms. The schools will be trichotomies based on number of players.

1. Each school will be given an identification number, noted on an envelope. The envelopes will then be divided into three piles depending on the size of the school. The key to this identification number will not be known to the assistant performing the randomization.

2. A research assistant not involved in the project will prepare 3 urns with 6 folded card with the number 1, 2 or 3 indicating the treatment arm.

3. To generate the random allocation sequence, one fold card at the time will be taken from the urn of each strata and put in the numbered envelope in each pile.

Using this procedure, only the study leader will know which arm the players at each school will belong to.

Players that accept to participate in the study will be allocated to the study arm that their school is randomised to. This information will not be revealed for either the schools or the players until all baseline data is collected, i.e. neither the schools or the players will know which arm they are allocated to until all baseline data is collected.

Intervention Type
Other

Primary outcome(s)
1.Shoulder and knee injuries are measured during one year on a weekly basis using the Oslo Sports Trauma Research Center (OSTRC) Overuse Injury Questionnaire.
2.Shoulder strength is measured with a handheld dynamometer at baseline, after 4 months and after one year.
3.Handball throwing velocity is measured using a speed radar gun at baseline, after 4 months and after one year.
4.Knee control is measured through video analysis of a jump and landing task at baseline, after 4 months and after one year.

Key secondary outcome(s)
1.Time-loss shoulder and knee injuries, defined as self-reported reduction in participation due to shoulder problem or knee problem, are measured during one year (on a weekly basis) using the Oslo Sports Trauma Research Center (OSTRC) Overuse Injury Questionnaire.
2.Prevalence of shoulder problems and knee problems is measured during a year (on a weekly basis) using the Oslo Sports Trauma Research Center (OSTRC) Overuse Injury Questionnaire.

Completion date
30/06/2019

Eligibility

Key inclusion criteria
1. Male or female handball player
2. Aged 14-19
3. Enrolled to or accepted for any of the eligible Swedish handball-profiled secondary schools.

For the schools to be eligible for the study, they need to meet all these three criteria:
1.Have a capacity for at least 30 handball-profiled students
2.Have an approximately even enrolment of male and female players
3.Have to be classified by the Swedish Handball Federation as being at the highest elite level.

Participant type(s)
Healthy volunteer

Healthy volunteers allowed
No

Age group

Mixed

Sex
All

Total final enrolment
627

Key exclusion criteria
1. Inability to understand Swedish
2a. For players allocated to the control group: Players who at baseline scores 40 or more on the OSTRC Overuse Injury Questionnaire regarding knee and shoulder problems or reporting having had shoulder and knee surgery during the preceding six months.
2b. For players allocated to the shoulder training programme: Players who at baseline scores 40 or more on the OSTRC Overuse Injury Questionnaire regarding shoulder problems or reporting having had shoulder during the preceding six months.
2c. For players allocated to the lower limb training programme: Players who at baseline scores 40 or more on the OSTRC Overuse Injury Questionnaire regarding knee problems or reporting having had knee surgery during the preceding six months.

Date of first enrolment
23/04/2018

Date of final enrolment
31/05/2018

Locations

Countries of recruitment
Sweden

Study participating centre
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Sponsor information

Organisation
Karolinska Institutet, Institute of Environmental Medicine

ROR
https://ror.org/056d84691

Funder(s)

Funder type
Not defined

Funder Name
The Swedish Research Council for Sport Science

Results and Publications

Individual participant data (IPD) sharing plan
The data sharing plans for the current study are unknown and will be made available at a later date

IPD sharing plan summary
Data sharing statement to be made available at a later date

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Results article		14/07/2022	15/07/2022	Yes	No