Book of Abstracts

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Title: High prevalence of ankle, knee and low back problems in highly trained adolescent basketball players at the beginning of their competitive season

Authors: Mati Arend, Janno Jürgenson, Liis Toomsalu, Jarek Mäestu, Martin Mooses

Affiliations: University of Tartu, Faculty of Medicine, Institute of Sport Sciences and Physiotherapy

Introduction: Adolescent team sport athletes with high training volume and overscheduling have increased incidences of injuries compared to less active counterparts and these overuse injuries might negatively affect young athletes’ attitude towards physical activity. The aim of the study was to investigate the prevalence of low back, knee and ankle problems in young male basketball players.

Methods: The Oslo Sports Trauma Research Center (OSTRC) Overuse Injury Questionnaire was distributed weekly via E-mail to 16 adolescent athletes who regularly participated in basketball training and volunteered to participate in this study (age 15±1.2 years; bodyweight 72.1±11.8 kg; height 183.5±8.2 cm; BMI 21.1±2.5; training experience 7.4±1.2 years; training hours per week 6.6±3.8) for 12 weeks during the period from November to February.

Results: The response rate to the weekly questionnaire was 96.4%. A total of 94 overuse conditions were identified, affecting 15 athletes (94% of the cohort). The traditional injury severity classification method registered a total of 10 injuries in 15 athletes, nine minimal injuries and one mild injury. 15 out of 16 athletes (93.8%) in this group reported having knee problems, while low back and ankle problems were reported by 7 out of 16 athletes (43.8%) and 5 out of 16 athletes (31.3%), respectively.

Conclusions: Knee and low back problems seem to be very common in adolescent basketball players and should be the focus of regular injury prevention programs. Problems in these areas were more prevalent at the start of the study indicating the need for better pre-season physical preparation.
Title: Attack and serve hitting frequency during official games in top level volleyball players

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Introduction: Volleyball is a complex sport with technical, tactical and athletic demands and it is assumed to be a safe sport compared to other team sports where frequent tackles and physical contact are a part of the game. However, volleyball players may be at risk of injuries due to sport-specific tasks since repeated movements like jumping, external rotation and elevation of the shoulder are common maneuvers in this ‘overhead sport’.

Methods: Nine professional volleyball players participated in the study (average age 24,6±6,2 years, height 1,98±5,5 m, bodyweight 93,3±5,9 kg; BMI 23,7±1,0; training experience 14,2±5,9 years; 12-15 hours ball training per week). All matches were recorded with one camera (Sony HDR-CX240E, Japan). Statistics was collected with Data Volley software (Data Project Sport Software, Data Video Analysis, Italy)

Results: The team played 51 matches–27 Schenker League matches, 4 Estonian Cup matches, 11 Estonian Championships matches, 4 Euroleague matches, 3 Premium 7 Cup matches and 2 Schenker Supercup matches. Highest frequency of serve and attack hits during the season were divided by two outside hitters who attacked 1691 and 1209 times in 51 matches, while opposite position players hitting frequency was 1049. The smallest amount of hits were performed by middle blockers, respectively with 957 and 863 hits in attack and serve.

Discussion: In summary, there are not enough scientific studies or empirical data about shoulder overuse injuries connection with performed hits in volleyball. Greater attention should be paid to the volume of volleyball hitting/serving and jumping.
Title
Effect of Training Background on Maximal Strength and Power among Males of Different Age Groups

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Introduction
Training background has strong effect on maximal muscle strength and power, but aging causes decline in these attributes. It is unclear how much of the deterioration is due to disuse of the muscles and how much of the aging itself. We aimed to assess how training background and age affect ability to generate force on healthy males.

Methods
For our cross-sectional study speed, strength and endurance athletes and healthy controls of different ages were recruited. Subjects formed two age-groups: young, aged 20-40 (n=104), and old, aged 60-80 (n=181). Maximal strength was measured in isometric leg press and bench press equipment and muscle power in counter movement jump (CMJ).

Results
Isometric leg press, young
Strength athletes were stronger than other groups (p<0.001). Speed group was stronger than endurance group (p<0.05).

Isometric leg press, old
Strength group was stronger compared to endurance and control groups (p<0.05).

Bench press, young
Strength athletes were stronger than other groups (p<0.01). Speed athletes were stronger than endurance group or controls (p<0.001).

Bench press, old
Strength athletes were stronger than other groups (p<0.001).

CMJ, young
Speed and strength groups jumped higher than endurance athletes or controls (p<0.01). Endurance athletes jumped higher than controls (p<0.01).

CMJ, old
Speed and strength groups jumped higher than endurance athletes or controls (p<0.01).

Discussion
Training background has significant association on both lower and upper body strength in different age groups. Speed and strength training seem to maintain higher ability to generate lower body strength and power compared to healthy controls in elderly.
Title: No association between dynamic postural control and ACL injury risk: a prospective study of 179 young female team sport athletes

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Introduction: Female team sport athletes have a higher risk for ACL injury than males. Poor postural control has been suggested to be a risk factor for acute lower limb injuries. The aim of this study was to investigate whether postural control was associated with increased risk for non-contact ACL injuries in young female basketball and floorball players.

Methods: 179 (mean age 15.4 ± 2.0 at baseline) female basketball and floorball players took part in the study during 2011 - 2014. The modified Star Excursion Balance Test (SEBT) measurements (anterolateral, mediolateral and posterolateral directions with mean reach distance of three attempts in centimeters and adjusted to leg length in every direction) were used to assess dynamic postural control and balance. All ACL injuries (diagnosed with MRI) were collected prospectively during the follow-up.

Results: During the three year follow-up, 17 ACL injuries occurred and 15 of them were non-contact injuries. A multilevel mixed-effects logistic regression model (leg as a unit, adjusted with previous ACL injuries and exposure time observed) revealed no significant association (p > 0.05) with non-contact ACL injury and anterolateral (OR 0.94, 95% CI 0.84 - 1.08), mediolateral (OR 0.97, 95% CI 0.89 - 1.06) or posterolateral (OR 0.96, 95% CI 0.90 - 1.02) modified SEBT directions.

Discussion: No association between the modified Star Excursion Balance Test and the risk of non-contact ACL injury could not be found in this study. This may be due to a relatively small amount of non-contact ACL injuries during the follow-up.
KOOS questionnaire as a risk factor for knee injuries in team sports.

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**Introduction:** Several risk factors for knee injuries have been proposed. There are different opinions and results for using KOOS questionnaire as a predictive tool for lower extremity injuries. The aim of this study is to investigate the correlations between knee injuries and self-explanatory opinions about knee problems in young team sports athletes.

**Methods:** Young female and male players age under 21 years (n=410) from nine basketball teams and nine floorball teams accepted the invitation to participate in four-and-half-year prospective follow-up study (PROFITS-study). The players entered the study either in 2011, 2012 or 2013. During each research session they completes the baseline and KOOS questionnaires. Following of the players started from the start of screening tests until the December 2015. The injuries were collected by five study physicians. They contacted the teams once a week to check the possible injuries. The primary outcome of this study is a traumatic non-contact knee injury.

**Results:** 65 knee injuries (11 non-contact injuries) occurred in the follow-up time. There was poor statistically significant correlation between knee injuries and total KOOS score (r= -.108). In KOOS subscores there were poor correlations between knee injuries and pain (r= -.096), function in daily living (r= -.141), function in sport and recreation (r= -.101) and knee related quality of life (r= -.099).

**Discussion:** The KOOS questionnaire can’t be use alone as a predictive tool for knee injury in sports. The combinations of KOOS questionnaire, exposure times and previous injuries might explain more about the relationships between different risk factors.

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Predictive Factors For Back Injuries In Youth Floorball And Basketball: A Prospective Three-Year Follow-Up Study

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Introduction
In Finland, nearly half of children and adolescents aged 10-16 years take part in organized sports club activities, floorball and basketball being among the most popular sports. Prospective studies in children and adolescents investigating predictive factors for back injuries in floorball and basketball players are limited in numbers.

Methods
In this prospective study 261 adolescent were observed prospectively for one, 80 for two and 55 for three study years (n=396). Total of 586 athlete-years were recorded (2011 to 2014). Athletes (mean age 15.8±1.9) performed physical tests and completed baseline questionnaires in the beginning of every follow-up year. During the follow-up, all time-loss non-contact back injuries were registered weekly and verified by a study physician.

Results
Altogether 62 back injuries were reported by 52 players and the incidence for overuse injuries was 53/1000 athlete-years. Family history of LBP increased the chances of back injury from 15.1 % to 54.4 % (OR 3.6, 95% CI 1.2-10.9). Having longer experience in training lowered the odds by 0.8 (95% CI 0.7-0.9). Asymmetry in hip abduction strength increased the risk for overuse back injuries up to 3.4-fold (95 % CI 2.5-4.6), but no significant associations between overuse injuries and flexibility variables were observed.

Discussion
Family history of low back pain and hip abduction strength asymmetry are significant risk factors among adolescent athletes for non-contact back injuries. In the future effective preventive measures should be targeted to these athletes.
Abstract

**Title:** Systematic Review: Validity of lab, clinical, and field based non-contact anterior cruciate ligament (nACL) injury prediction methods

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**Introduction:** 200,000 ACL injuries occur annually (USA) with 50% occurring in athletes age 15-25. 70% of ACL injuries are reported as non-contact (nACL). Subsequent knee instability has resulted in 100,000-175,000 ACL reconstructions annually (USA). However, ACL reconstruction has not decreased the prevalence of knee osteoarthritis. Therefore, prediction and prevention of ACL injuries is paramount. This systematic review highlights the validity of prospective studies for lab, clinical, and field based nACL injury prediction methods.

**Methods:** The search strategy utilized EBSChost and Pubmed databases. Eligibility criteria included reported sensitivity and specificity, or odds ratios for nACL injury prediction. A modified checklist was used to assess methodological quality and diagnostic odds ratios were calculated.

**Results:** 9 studies met the eligibility criteria. Valid nACL injury prediction methods include hip strength deficits [DOR = 19.12, hip external rotation; 12.43, hip abduction], trunk neuromuscular control [DOR = 15.46], knee valgus moment [DOR = 9.59], and the LESS in youth elite soccer [DOR = 15.04, Lab; 10.92, Field]. No significant evidence was reported for the Clinical Based Algorithm, lower extremity muscle strength, stiff landings, Vertical Drop Jump, or LESS in high school and college athletes.

**Discussion:** Hip strength deficits measured with handheld dynamometry (HHD) appear to be the most significant predictor of nACL injury. However, the effect of rater strength on interrater reliability and rater fatigue on intrarater reliability decrease the clinical utility of HHD. Future research should improve the clinical utility of HHD by utilizing a long lever arm for hip abduction and a supine patient posture for external rotation.

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