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In a prospective cohort study of patients with anterior cruciate ligament ruptures that were treated non-operatively, the prevalence of tibiofemoral osteoarthritis was 16% after 15 years – this increased if there was a history of an associated meniscal tear at the time of injury

Title: Prevalence of tibiofemoral osteoarthritis 15 years after nonoperative treatment of anterior cruciate ligament injury

Authors: Neuman P, Englund M, Kostogiannis L, Friden T, Roos H, Dahlberg LE

Reference: Am J Sports Med 2008; 36(9): 1717-1725

Type of study: Prospective cohort study

Keywords: knee, injury, anterior cruciate ligament (ACL), non-operative treatment, osteoarthritis (OA)

EB Rating: 7/10

CI Rating: 7.5/10

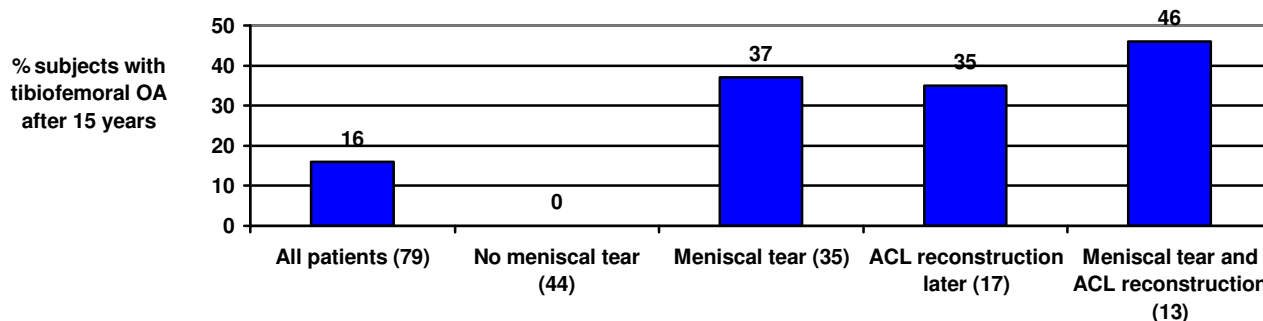
Background: Following an anterior cruciate ligament (ACL) injury, patients may not be treated operatively, but the longer term outcomes of this treatment such as osteoarthritis (OA) of the tibiofemoral joint are not well studied

Research question/s: If patients with ACL injury are treated non-operatively, what is the occurrence of tibiofemoral OA and knee function after a long period (15 years)?

Methodology:

- Subjects: 100 patients (26±8 yrs, female=42%) with acute, complete ACL injury who did not undergo surgery
- Experimental procedure: All the patients were assessed at the time of injury, and were not treated by surgical ACL reconstruction but rather underwent non-operative treatment (early supervised physical therapy, activity modification). Subjects were then followed up after 15 years with radiographs to document tibiofemoral joint OA (n=79), and the Knee injury and Osteoarthritis Outcome Score (KOOS)(n=93) to assess knee function
- Measures of outcome: Tibiofemoral OA (%), KOOS score

Main finding/s:



- Function: At follow-up, 68% of the subjects were asymptomatic and when compared to an age-matched population based group, activities of daily living were higher in the ACL group, but they had a lower quality of life score compared with the population based sample

Conclusion/s:

- In a prospective cohort study of patients with anterior cruciate ligament ruptures that were treated non-operatively, the prevalence of tibiofemoral osteoarthritis was 16% after 15 years – this increased if there was a history of an associated meniscal tear at the time of injury

Methodological considerations:

No suitable control group, possible selection bias, no diagnosis of patellofemoral OA

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A football injury prevention program, the “11” program by FMARC, did not reduce injury rates in female youth football players – this is most likely due to the low compliance of using the program in the intervention teams

Title: Preventing injuries in female youth football – a cluster-randomized controlled trial

Authors: Steffen K, Myklebust G, Olsen OE, Holme I, Bahr R

Reference: Scand J Med Sci Sports 2008; 18: 605-614

Type of study: Randomized, controlled, clinical trial

Keywords: football, soccer, injury, prevention, female

EB Rating: 8/10

CI Rating: 7.5/10

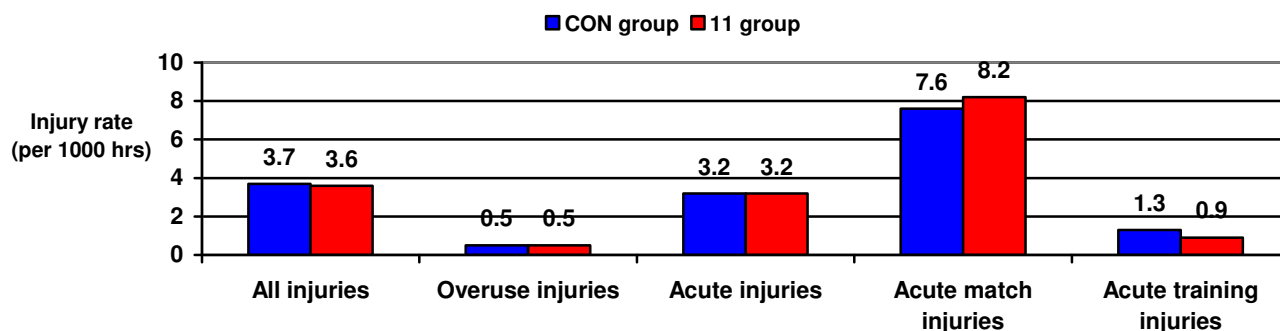
Background: Injury prevention programs, such as the specific set of exercises developed by FMARC – the “11” – may reduce the risk of injury in female football players

Research question/s: Does the “11” injury prevention program reduce the risk of injury in female youth football?

Methodology:

- Subjects: 113 football teams (20092 players)
- Experimental procedure: Using a cluster randomization, the teams were randomized to either an intervention (11 group=59 teams, 1091 players who were taught the “11,” exercises for core stability, lower extremity strength, neuromuscular control and agility, and used these as a 15-min warm-up program for football training) or a control group (CON group=54 teams, 1001 players). Teams were followed over an 8-month season (< 3% drop-out in both groups) and all injuries (definition- unable to participate in the next training session or match) were recorded by physical therapists who were assigned to teams; coaches provided team exposure data
- Measures of outcome: Injury rates (per 1000 hrs) between groups, compliance to training intervention

Main finding/s:



No differences between groups

- Injury rates for specific injuries: There were no significant differences in injury rates for specific injuries between groups
- Compliance to the training program: In the first 4 months, the training program was used during 60% of the training sessions - only 14 out of 58 intervention teams completed more than 20 prevention training sessions

Conclusion/s:

- A football injury prevention program, the “11” program by FMARC, did not reduce injury rates in female youth football players – this is most likely due to the low compliance of using the program in the intervention teams

Methodological considerations:

Well conducted study, poor compliance to the intervention program, small number of specific injuries

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In a case control study, there is evidence of trunk muscle asymmetry in cricketers - in those cricketers with lower back pain, there is also evidence of impaired motor control of the trunk muscles

Title: MRI study of the size, symmetry and function of the trunk muscles among elite cricketers with and without low back pain

Authors: Hides J, Stanton W, Freke M, Wilson S, McMahon S, Richardson C

Reference: Br J Sports Med 2008; 42: 509-513

Type of study: Case control study

Keywords: cricket, lower back pain, trunk muscles, motor control

EB Rating: 7/10

CI Rating: 7.5/10

Background: Lower back pain is common in cricketers, particularly in fast bowlers – asymmetry of lower back muscle and reduced motor control may be associated with low back pain in these players

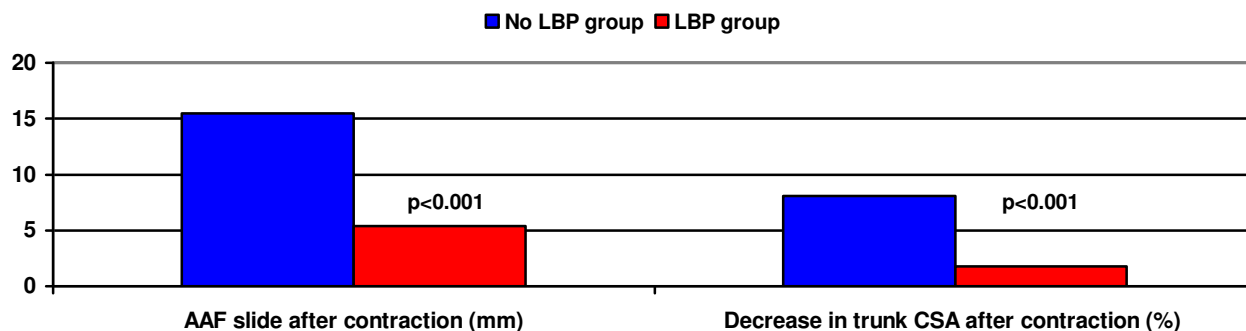
Research question/s: Is there evidence of asymmetry of trunk muscles and deficits of motor control in elite cricketers with and without low back pain (LBP)?

Methodology:

- Subjects: 21 elite male cricket players (21.2±2.0 yrs)
- Experimental procedure: All the subjects were assessed in a hospital setting where subjects completed a questionnaire [to document lower back pain (LBP), player position such as fast bowler] and then underwent magnetic resonance imaging (MRI) of the trunk, including scanning during contraction of the transversus abdominis (TrA). MRI data were used to determine the cross-sectional areas (CSA) of the quadratus lumborum (QL), lumbar erector spinae plus multifidus (LES+M) and psoas muscles (PS), the thickness of the internal oblique (IO) and transverses abdominis (TrA) muscles, and lateral slide of the anterior abdominal fascia (AAF)
- Measures of outcome: CSA of muscles and trunk, thickness of muscles, lateral slide of the AAF (on the ipsi- and contra-lateral side of the dominant hand, and in an asymptomatic (n=13) and a LBP group (n=8)

Main finding/s:

- Asymmetry (ipsi- and contra-lateral to the dominant hand): The QL and LES+M muscles were larger on the ipsilateral, and the IO muscle was larger on the contra-lateral side – there were no differences in the sizes of the PS and the TrA.. In the subgroup of fast bowlers with LBP, asymmetry in the QL muscle was the largest



- Cricketers with LBP had a reduced ability to draw in the abdominal wall and contract the TrA muscle independently of the other abdominal muscles

Conclusion/s:

- In a case control study, there is evidence of trunk muscle asymmetry in cricketers - in those cricketers with lower back pain, there is also evidence of impaired motor control of the trunk muscles

Methodological considerations:

Small sample size, no cause-effect can be determined, only selected and not all muscles were studied

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An abnormal heart rate recovery and an abnormal chronotropic response to exercise testing, independently and when combined, are associated with an increased risk of all-cause mortality or nonfatal myocardial infarction

Title: The prognostic importance of abnormal heart rate recovery and chronotropic response among exercise treadmill test patients

Authors: Maddox TM, Ross C, Ho PM, Masoudi FA, Magid D, Daugherty SL, Peterson P, Rumsfeld JS

Reference: Am Heart J, 2008; 156: 736-744

Type of study: Prospective cohort study

Keywords: exercise treadmill testing, heart rate recovery, chronotropic response, all cause mortality, non-fatal MI

EB Rating: 8.5/10

CI Rating: 8/10

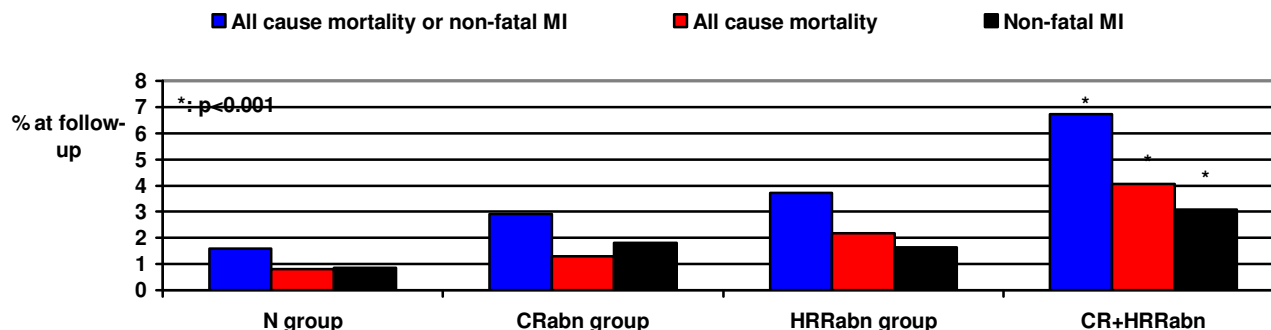
Background: Heart rate recovery (HRR) and chronotropic response to exercise (CR) each have prognostic value among patients undergoing exercise treadmill testing (ETT). However, little is known about their prognostic use in combination and in addition to the Duke Treadmill Score (DTS)

Research question/s: Is a combination of an abnormal heart rate recovery (HRR) and chronotropic response (CR) to exercise associated with increased all-cause mortality or nonfatal myocardial infarction (MI)?

Methodology:

- Subjects: 9519 outpatients who underwent exercise treadmill testing between 2001 and 2004
- Experimental procedure: Demographic and clinical data were obtained from all the patients and the treadmill exercise data were used to categorize patients as follows: Normal heart rate recovery (HRR) and chronotropic response (CR) (N group=5429), Abnormal CR only (CRabn=1163), abnormal HRR only (HRRabn=1889) and abnormal CR and HRR (CRHRRabn=1038). Patients were followed for a median of 3.2 yrs and outcome measures were all cause mortality, all cause mortality or non-fatal myocardial infarct (MI), and nonfatal MI
- Measures of outcome: All-cause mortality or non-fatal (MI) (a cox proportional hazards model was used to control for demographics, clinical history, and Duke treadmill score - DTS)

Main finding/s:



- Multivariate analysis: Following adjustment for DTS, demographic and clinical variables, patients in the CRabn group, the HRRabn group and the CR+HRRabn group had higher rates of all-cause mortality or nonfatal MI compared with patients in the N group

Conclusion/s:

- An abnormal heart rate recovery and an abnormal chronotropic response to exercise testing, independently and when combined, are associated with an increased risk of all-cause mortality or non-fatal MI

Methodological considerations:

Well conducted study

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The best predictor of survival in patients with pulmonary hypertension is the 6 minute walking distance (6MWD) test – additional cardiopulmonary exercise test parameters only add marginally to the prognostic value of the 6MWD

Title: Exercise testing to estimate survival in pulmonary hypertension

Authors: Groepenhoff H, Vonk-Noordegraaf A, Boonstra A, Spreeuwenberg MD, Postmus PE, Bogaard HJ

Reference: Med Sci Sports Exerc 2008; 40(10): 1725-1732

Type of study: Prospective cohort study

Keywords: pulmonary hypertension, exercise test, predictors, mortality, 6-minute walk distance

EB Rating: 7.5/10

CI Rating: 7/10

Background: It is well established that the 6-min walk distance (6MWD) predicts survival in patients with pulmonary hypertension (PH) – it is not known if variables such as peak oxygen consumption (VO_{2peak}), ventilatory responses and gas exchange that can be measured during cardiopulmonary exercise testing, also relate to survival

Research question/s: What other exercise test parameters may add further prognostic value to the information that is derived from a 6-minute walk distance test in patients with pulmonary hypertension?

Methodology:

- Subjects: 115 patients with pulmonary hypertension
- Experimental procedure: All the patients underwent baseline right-heart catheterization (to measure haemodynamic parameters), exercise testing (cardio-respiratory parameters including heart rate, ventilatory responses, gas exchange parameters, VO_{2peak}), and a 6min walking distance (6MWD) test. Survival was documented over a 4 year follow-up period in which 18 patients died
- Measures of outcome: Parameters that were associated with a higher cumulative survival, a multivariate Cox regression was used to determine which parameters improved the prediction of survival from the 6MWD

Main finding/s:

- A higher cumulative survival was documented in patients with the following test parameters: a $V_E/VCO_{2SLOPE} < 48$, a $VO_{2peak} > 13.2 \text{ mL} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$, a $\Delta O_2 \text{ pulse} > 3.3 \text{ mL} \cdot \text{beat}^{-1}$, and a 6MWD $> 399 \text{ m}$ ($p < 0.05$)
- However, only $\Delta O_2 \text{ pulse}$ improved the univariate 6MWD prediction model significantly ($p < 0.05$)

Conclusion/s:

- The best predictor of survival in patients with pulmonary hypertension is the 6 minute walking distance (6MWD) test – additional cardiopulmonary exercise test parameters only add marginally to the prognostic value of the 6MWD

Methodological considerations:

Well conducted study, small sample size

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