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## A systematic review into the efficacy of static stretching as part of a warm-up for the prevention of exercise-related injury

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### **CRD summary**

This review assessed the prevention of exercise-related injuries through static stretching and concluded that there were no reductions in overall injury rates, but that musculotendinous injuries may be reduced. Due to the poor reporting of the review process and overall poor quality of the included studies, the authors' conclusions should be interpreted with caution.

### **Authors' objectives**

To assess the prevention of exercise-related injuries through static stretching compared with no stretching or an unaltered stretching/warm-up routine.

### **Searching**

MEDLINE, SPORTDiscus and ScienceDirect were searched for published studies from 1990 to the end of 2007; search terms were reported. Only studies reported in full were eligible. Reference lists of included articles and key journals were manually searched to identify additional articles.

### **Study selection**

Randomised controlled trials (RCTs) and controlled clinical trials (CCTs) with a minimum of 20 participants and that assessed static stretching as an injury prevention measure or studies that assessed additional interventions in comparison with a control group were eligible for inclusion. Eligible participants were aged between 18 and 48 years of age who were professional or amateur sportsmen, as well as those engaged in physical activity or exercise. Static stretching techniques of differing durations and muscle groups were described in the included studies; these were most frequently compared with usual warm-up or no-stretching exercises. The main outcome was a reduction of the total injury risk. Included studies comprised (where stated) male army recruits, recreational runners or school football teams. Participants were aged 17 to 47 years (where reported).

The authors stated neither how the papers were selected for review nor how many reviewers performed the selection.

### **Assessment of study quality**

Two authors assessed methodological quality using a modified tool adapted from van Tulder et al (2003). The 11-item tool covered four categories: participants; interventions; outcome measures; and data presentation and analysis. Each category was scored out of 25 points and the maximum score was 100.

The authors did not state how disagreements were resolved.

### **Data extraction**

For each study the authors extracted data for the incidence of exercise-related injury. The authors did not state how many reviewers performed the data extraction.

### **Methods of synthesis**

A narrative synthesis was reported, supported by tables and with differences between studies discussed in the text.

### **Results of the review**

A total of seven studies were included in the review (n at least 4,446; range 195 to 1,538, where stated): four RCTs (quality score 51 to 79) and three CCTs (quality score 26 to 45).

Six studies found that static stretching was ineffective for curbing the incidence of exercise-related injury. One CCT

reported significantly fewer lower extremity overuse injuries ( $p < 0.02$ ). Three studies reported significant reductions in musculotendinous and ligament injuries.

### Authors' conclusions

Routine static stretching did not reduce overall injury rates, but may have reduced musculotendinous injuries.

### CRD commentary

The review question and inclusion criteria were clear. The search strategy appeared to consult some relevant sources, but the restriction to published articles may mean that some studies were missed. It was unclear whether language restrictions were placed on the search and language bias could have been present. There was no detail on how the review process was conducted and it was unclear whether methods were used to reduce error and bias. Appropriate criteria were used to assess the quality of the included studies, although it was unclear whether this was undertaken independently and how disagreements were resolved. Given the apparent diversity of the included studies the decision to employ a narrative synthesis was appropriate. Due to the poor reporting of the review process and overall poor quality of the included studies, the authors' conclusions should be interpreted with caution.

### Implications of the review for practice and research

**Practice:** The authors stated that factors that related to the potentially detrimental effects of static stretching on performance should be considered.

**Research:** High-quality RCTs and carefully controlled clinical trials, ideally within the athletic setting and examining the effect on musculotendinous injuries risk, were required.

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**Record Status**

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