The effect of preventive measures on the incidence of ankle sprains

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Authors' objectives
To critically review the current data concerning the efficacy of preventive measures described in the literature, on the incidence of lateral ankle ligament injuries.

Searching
MEDLINE, SPORTDiscus, and EMBASE were searched for papers published between 1980 and December 1998. The keywords used in the search were 'prevention' in combination with 'ankle', 'ankle taping', 'ankle bracing', 'orthosis', 'shoes' and 'proprioception'. The reference lists of identified studies were also searched for relevant literature.

Study selection

Study designs of evaluations included in the review
Randomised controlled trials (RCTs), controlled trials and time interventions were eligible for inclusion. The specific designs included were RCTs, a prospective cohort study, and a retrospective study.

Specific interventions included in the review
Interventions relating to the prevention of lateral ankle ligament injuries. The specific interventions investigated in the included studies were: an outside-the-boot brace; an injury prevention programme; low- and high-top shoes; prophylactic taping combined with high-and low-top shoes; taped and laced ankle stabilisers; semirigid ankle orthosis; and orthosis and ankle disk training. The time span of interventions ranged from one to three seasons, 2 to 6 years, or for 3,674 parachute jumps.

Participants included in the review
The authors do not specify any participant inclusion or exclusion criteria.

Outcomes assessed in the review
Incidence rates of lateral ankle ligament injuries. The specific outcomes investigated in the included studies were: the incidence of ankle sprains, recurrent ankle sprains, inversion ankle sprains and ankle injuries; and the frequency of ankle sprains and ankle injuries.

How were decisions on the relevance of primary studies made?
The authors do not state how the papers were selected for the review, or how many of the reviewers performed the selection.

Assessment of study quality
A set of 14 predefined criteria were used to assess validity. These criteria were adapted from three other publications (see Other Publications of Related Interest nos.1-3) to cover the topic of the review. Two reviewers assessed the quality of studies according to the predefined criteria. Both reviewers tried to reach agreement on items on which they had different opinions. If no accord was reached, a third reviewer made the final decision.

Data extraction
The authors do not state how the data were extracted for the review, or how many of the reviewers performed the data extraction. The categories of data extracted from each study included author, year, sample size, design, type of preventive measure, type of activity, time span of intervention, and outcome.

Methods of synthesis
How were the studies combined?
A narrative synthesis was undertaken where studies were grouped by the type of preventive measure. Publication bias was not assessed.

How were differences between studies investigated?
Differences between the studies were discussed.

Results of the review
A total of 8 studies (n=7,513) were included: 6 RCTs (n=6,402), 1 prospective cohort study (n=814) and 1 retrospective study (n=297).

Prophylactic taping (2 studies).
The 2-year prospective study showed that taping reduced the incidence of sprains in basketball players. The severity of ankle sprains in the taped group was also of a lesser degree overall than the sprains sustained in the untaped group. However, the taped group included higher proportions of previously injured athletes than the untaped group. The 6-year retrospective study found that laced ankle stabilisers were twice as effective as taping in preventing ankle injuries in football players.

Low- and high-top shoes (3 studies).
The prospective study found that high-top shoes were more protective than low-top shoes, particularly among athletes with taped ankles. On the contrary, the retrospective study found low-top shoes to be more protective than high-top shoes when both were combined with laced stabilisers. Another study found no difference between low- and high-top basketball shoes in the incidence of ankle sprains.

Ankle braces (4 studies).
One study found that significantly more soccer players sustained an ankle sprain in a control group, as opposed to a group using ankle orthosis. This effect was also significant for participants with previous ankle sprains. Such a difference was not found for participants without previous ankle sprains.

One study found that significantly more inversion ankle sprains occurred in paratroopers who were parachute jumping in a non-braced group than in a braced group. The severity of sprains in the braced group was also of a lesser degree than in the non-braced group.

One study found a higher injury rate for a group of intramural basketball players wearing no brace, than for a group using semirigid ankle orthosis.

With regard to contact injuries, those players who wore braces had significantly fewer ankle injuries than players in the control group. However, for non-contact ankle injuries, no statistical difference existed between the two groups.

Intervention programmes (2 studies).
One study found a significant reduction in the incidence of ankle injuries after the introduction of an intervention programme consisting of an injury awareness session, technical training, and a balance board training programme. The risk of re-injury in previously injured ankles was also reduced.

Another study found that significantly fewer ankle sprains were sustained in a group with balance board training, compared with the control group. A significant effect was also found for participants with previous ankle sprains. The
incidence for ankle sprains was the same for the group with previous ankle sprains and balance board training, as it was for the group without previous ankle sprains and without balance board training.

There was great variation in the methodology and study design of the eight studies analysed. Therefore, only general results could be compared between studies.

Quality assessment.

The methodological quality score varied between studies from 65 to 93% of the maximal attainable score, and all studies met the predefined cut off score of 60%. The inter-rater agreement, expressed as Cohen's Kappa, was 0.73.

Authors' conclusions
The use of either tapes or braces reduced the incidence of ankle sprains. Next to this preventive effect, the use of tape or braces resulted in less severe ankle sprains. However, braces seemed to be more effective in preventing ankle sprains than tape. It is unclear which athletes benefited more from the use of preventive measures, those with or those without previous ankle sprains.

The efficacy of shoes in preventing ankle sprains was unclear. It is likely that the age of the footwear, i.e. newer footwear, plays a more important role than shoe height in preventing ankle sprains.

Proprioceptive training reduced the incidence of ankle sprains in athletes with recurrent ankle sprains to the same level as those without any history of ankle sprains.

CRD commentary
The review question was clearly stated and was well supported by the inclusion criteria, although the authors did not make any reference to the participants included in the review.

The literature search was adequate, but made no attempt to identify unpublished studies. In addition, it was not specified if there were any language restrictions.

The validity assessment was adequate and the data were synthesised narratively, according to type of preventive measure. However, publication bias was not assessed. Some study details were missing, e.g. it was not always clear what the control condition was (i.e. another preventive measure or no preventive measure). Some details regarding the review process were given, e.g. how judgements of validity were made. However, other details were missing, such as how the decisions on the relevance of primary studies were made and how the data were extracted.

The authors' conclusions appeared to follow on from the results, but should be treated with some caution given the limitations mentioned.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.

Research: The authors state that future studies, preferably using a randomised controlled design, should try to establish the clinical effect of braces in the reduction of ankle sprain incidence.

Bibliographic details

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Other publications of related interest

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Subject indexing assigned by NLM

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.