Proprioceptive Training to Prevent Ankle Injuries in Basketball

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Objective: To investigate the effectiveness of a multistation proprioceptive exercise program for the prevention of ankle injuries in basketball players.

Design: Cluster-randomized controlled unblinded trial, stratified by level of performance and sex, during 1 season of competition.

Setting: Basketball leagues near Münster, Germany.

Participants: Players were recruited from the 7 top basketball leagues. They all played basketball regularly. Players who wore braces or tape to stabilize the ankles or who had previously performed proprioceptive exercises were excluded. At baseline (n = 198), the groups were similar in incidence of previous injuries (control group, 46% vs training group, 48%) and anthropomorphic characteristics. Players in the control group were older than those in the training group (mean, 25.5 years vs 22.6 years) and participated in fewer sports activities per week (mean, 2.8 vs 3.5).

Intervention: The control group continued with their normal workout routines. The teams in the training group did 6 progressive exercises once per week for 20 minutes. The 6 stations involved walking, balancing, jumping, and/or dribbling, using a balance beam, tilt board, inclined surface, soft or firm mat, or resistance strap, with or without a ball or partner. The exercises were introduced by a physiotherapist, and a detailed protocol, including correct posture, was also given to the coaches, whom the investigators contacted regularly during the season.

Main Outcome Measures: The primary measure was occurrence of ankle injuries. All injuries were registered by the person in charge of the team, using an injury questionnaire. In the case of an ankle injury, the coach and player were contacted by the investigators and more details of the circumstances, severity, and medical diagnosis were obtained. An injury was defined as an event that forced the player to leave play and miss the next scheduled basketball activity. The main analysis included 90% of the players. Incidence of injury was calculated.
Main Results: Control group players had 21 ankle injuries and the training group had 7 injuries (overall mean participation, 55 training and match sessions), giving an injury rate per 1000 sport participations of 4.31 versus 1.53 for the groups, respectively. In logistic regression, the odds ratio (OR) for an ankle injury in the training group was reduced to 0.355 [95% confidence interval (CI), 0.151-0.835], with the number needed to treat (with the proprioceptive training regimen) to prevent 1 ankle injury being 7. Among all the players who had previously had an ankle injury, the OR for an injury was 1.6 (95% CI, 0.755-3.553; \( P = 0.212 \)). The training group swayed less at posttest and were more accurate in estimating neutral joint position than at pretest \( (P < 0.05) \) but did not differ from the control group in any changes.

Conclusions: A weekly session of proprioceptive exercise training was effective in lowering the rate of ankle injuries in recreational and professional basketball players.

COMMENTARY

Ankle injuries are the most frequent injury in basketball. As such, preventative measures are frequently sought, both in the form of equipment and as training programs designed to limit risk of injury. As Eils et al state, most studies have not adequately correlated laboratory measurements to changes in injury rates.

The authors present 2 major findings: The first is that a proprioceptive training regimen can reduce the number of ankle injuries in an active population of basketball players. The second is that this regimen caused specific neuromuscular laboratory measurements to change. These findings are interesting from both a scientific and a clinical viewpoint. Reducing the risk of an ankle injury by 35% with a 20-minute time commitment per week is an important finding. However, the connection between the epidemiologic findings and the neuromuscular laboratory results should not be overstated.

Eils et al measured postural stability and proprioception, which are commonly investigated as predictors of injury. However, questions arise when discussing static closed kinetic chain measures of balance in the context of dynamic injuries that are affected by a myriad of other intrinsic and extrinsic factors. It would also be beneficial to include measures of ankle range of motion (ROM) when ankle joint position tests are performed. Sensory information from muscles, tendons, and skin mechanoreceptors contribute to joint positioning and may be important predictors of injuries. However, players with limited ROM may be approaching their physical limits and be cueing in on changes in joint stiffness rather than other proprioceptive cues. It is believed by many National Basketball Association and National Collegiate Athletic Association medical staff that there is a widespread problem of limited ankle dorsiflexion in basketball players, which has been linked to injuries. If this is true, a better understanding of the relationship between ROM, joint-position tests, proprioception, and ankle injuries is needed.

In the study by Eils et al, the smaller laboratory subgroups were reported to be representative of the larger stratified groups, although there appeared to be differences between the training and control groups in their pretest measures for both postural sway (total sway distance) and joint position error (plantar flexion). This highlights the difficulties in establishing causation between the laboratory and injury data. Eils et al have not proven that their laboratory measurements are predictive of ankle injuries. Nonetheless, it is important to consider the potential implications of this research. It may never be possible to eliminate ankle injuries in basketball, but there is no evidence to suggest that performing a proprioceptive training program will harm an athlete or impede performance. At best, an athlete will have a reduced risk of ankle injury. Sounds like good advice.

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REFERENCES

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