

# The frequency of injury, mechanism of injury, and epidemiology of ankle sprains\*

JAMES G. GARRICK,† M.D., *Phoenix, Arizona*

*From the Division of Sports Medicine, Department of Orthopaedic Surgery, University of Washington, Seattle, Washington*

Few injuries in sports are more ubiquitous than those involving the ankle. Athletes in some endeavors, notably football and basketball, routinely have their ankles prophylactically taped at a cost of hundreds of thousands of dollars and, probably, millions of man hours. Other sports, such as skiing, involve encasement of the foot, ankle, and lower leg in plastic and foam to the extent of almost complete exclusion of motion. In spite of these rather heroic measures, ankle injuries continue to constitute a significant threat to athletes in these and most other activities.

When one considers all interscholastic or intercollegiate sports, the thigh, knee, and ankle are the three most commonly injured areas. Thigh injuries are of two types, strains and contusions. The knee is subjected to a multitude of acute injuries—sprains, dislocations, meniscus lesions, etc., as well as a variety of overuse syndromes, chondromalacia, jumper's knee, etc. The ankle is almost unique in that the vast majority (85%)<sup>1</sup> of injuries are of a single type, sprains, and an equally high proportion of the sprains involve the same (lateral) structures. Thus, in athletes, the lateral ligament complex of the ankle is the most frequently injured single structure in the body.

Regardless of whose statistics one reads, ankle sprains are a major problem. In the National

Football League, over a 6-year period, the ankle was involved in over 10% of the time-loss injuries.<sup>2</sup> In the North Carolina study of high school football players 15.3% of all injuries involved the ankle.<sup>3</sup> At the University of Washington over the past 6 years, during any single year, no fewer than one-sixth of all time-loss injuries have involved ankle sprains. In 482 junior football players (ages 8 through 16) in the greater Seattle area, 18% of the trainer-documented time-loss injuries involved the ankle.

Women may have been discriminated against in the past regarding athletic participation, but the ankle has provided equal opportunities to be injured regardless of sex. Women basketball players have a frequency of ankle sprains equal to that of men. A recent study of 317 women gymnasts competing at high school, college, and club levels yielded 106 injuries, 13% of which involved the ankle.

In an attempt to ascertain the type and frequency of ankle injuries in athletes of similar ages in a wide variety of sports, the results of a 2-year study of four high schools were examined. During the investigation where certified athletic trainers examined all injuries, 2,840 participants in 14 sports sustained 1,176 injuries, 14% of which involved the ankle. The over-all injury rate for all sports was 0.415 (or 41 injuries per 100 participants per season). The rate of occurrence of ankle injuries was 6 (5.7%) per 100 participants per season, 1 ankle injury for every 17 participants. Of these ankle injuries, the vast majority (85%) were sprains. Ankle sprains were

---

\* This project was supported by the Consumer Product Safety Commission Grant CPSC-C-74-171.

† Address requests for reprints to: Affiliated Bone and Joint Surgeons, 333 East Virginia Avenue, Phoenix, Arizona 85004.

most common in basketball where they constituted 38 and 45% of all injuries in men's and women's basketball, respectively. Football yielded the next highest frequency with 13.2% of all injuries involving the ankle, 81% of which were sprains. Women's cross-country had the next highest frequency of ankle sprains, although the absolute number of participants (and injuries) was small. Of the 14 sports examined, only tennis (with men and women) yielded no ankle injuries.

The typical mechanism of injury is one of inversion plantar flexion and internal rotation. The injury can be "dynamic," i.e., a poorly executed cutting maneuver enhanced by inadvertent foot fixation as with long, conical football cleats on grass. The injury can also result from alighting on an irregular playing surface; for example, a rutted football or soccer field or, more commonly, alighting on another player's foot as in basketball. The relative shortness of the medial malleolus and natural tendency for the ankle to go into inversion rather than eversion usually result in a lateral ankle sprain.

Although it appears in excess of four of five ankle sprains involve primarily the lateral ligamentous structures, two circumstances appear to alter this pattern. (1) Ankle injuries in football or wrestling resulting from being struck (pulled or fallen on) by another player often result in either an eversion type sprain or hyper plantar flexion (anterior capsule) injuries. (2) Wrestlers appear to have an inordinately high frequency of medial ankle sprains, apparently as a result of the wide

stance in eversion so often seen in attempting to gain traction on the mat.

Both external support and the shoe surface interface appear to play a mitigating role in the frequency of occurrence of ankle sprains. In a study of college age intramural basketball players with histories of frequent recurrent ankle sprains, the use of prophylactic ankle taping and/or high top shoes resulted in significant decreases in the frequency of subsequent ankle sprains.<sup>4</sup> At the high school level, Torg and Quedenfeld<sup>5</sup> have shown a reduction in ankle injuries (sprains) secondary to the switch from traditional conical cleats to molded sole, multiply cleated soccer shoes. In spite of these safeguards, however, ankle sprains remain a major threat to participants in nearly all sports.

#### REFERENCES

1. Garrick JG: Epidemiology of Sports Injuries. Presented at Third Annual Sports Medicine Symposium. University of Montreal, Montreal, Canada, October 15, 1973
2. *National Football League 1974 Injury Study*. Stanford Research Institute, Menlo Park, California, June 1975
3. Blyth CS, Mueller FO: *An Epidemiologic Study of High School Football Injuries in North Carolina—1968–1972—Final Report*. Consumer Product Safety Commission. Washington, D. C.
4. Garrick JG, Requa RK: Role of external support in the prevention of ankle sprains. *Med Sci Sports* 5: 200, 1973
5. Torg J, Quedenfeld T: The effect of shoe type and cleat length in incidence and severity of knee injuries among high school football players. *Res Quart* 42: 203, 1971