ORIGINAL ARTICLE

Injury history as a risk factor for incident injury in youth soccer

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Objectives: To determine if athletes with a self reported history of previous injury have a higher incident injury rate than athletes without a self reported injury history.
Methods: A prospective cohort study of Classic League soccer players playing at the level under 12 through under 18. Injury history forms were mailed to all registering Classic League soccer players in the North Carolina Youth Soccer Association during 1997–2000 (n = 7000); 1483 (19%) returned the baseline questionnaire and were followed up for injuries.
Results: There were 5139 player-seasons of follow up and an estimated 171 957 athlete-exposures. More than half self reported an injury history (59.7%). Overall, the unadjusted incidence rate was 4.6 (95% confidence interval (CI) 4.3 to 4.9) incident injuries per 1000 athlete-exposures. Multivariate generalised Poisson regression modelling indicated that players with one previous injury had a twofold greater risk of incident injury (IRR = 2.6; 95% CI 2.0 to 3.3), and those with two or more previous injuries had a threefold greater risk of incident injury (IRR = 3.0; 95% CI 2.3 to 3.8) compared with athletes with no previous injuries.
Conclusions: Injury history was associated with an increased injury rate. This suggests that, even in these youth soccer players, those with an injury history may be at higher risk.

Soccer is the most popular sport worldwide for adults and youth,[1] with over 200 national associations representing about 200 million active players, of whom 40 million are women.[2] The Soccer Industry Council of America estimates that 18.2 million Americans, 13.8 of who were under 18 years of age, played organised soccer in 2000.[3]

Previous injury and inadequate rehabilitation have been shown to be the most important intrinsic predictors for subsequent injury.[4–8] Van Mechelen *et al*[9] reported that previous injury, with an odds ratio of 9.41 (95% confidence interval 2.80 to 31.58), was one of the strongest independent predictors for sports injury. Powell *et al*,[10] in a population based study, reported that in high school soccer 8.4% (148/1765) of injuries to boys and 10.4% (184/1771) of injuries to girls were reinjuries. Ekstrand and Tropp,[4] in a one year prospective cohort study of male adults, found 2.3 times greater risk of injury for soccer players with a history of ankle problems. A recent study by Arnason *et al*[8] found that adult male soccer players with a history of ankle or knee sprain were at an increased risk of subsequent sprain injury to the ankle (odds ratio (OR) = 5.3; 95% CI 1.5 to 19.4) or knee (OR = 4.6 95%; 95% CI 1.6 to 13.4).

Youth sports injuries in non-school sport settings are rarely attended by trained health professionals, and the reinjury risk may be increased in this population because of inadequate treatment and rehabilitation. The primary purpose of this study was to examine self reported injury history as a risk factor for incident injury in a group of young soccer players participating in the North Carolina Youth Soccer Association (NCYSA) Classic Soccer League. A secondary purpose was to determine if previous lower limb, ankle, and knee injury influence reinjury rate at those body locations. Lower limb, specifically the ankle and knee, are the body parts most often injured in youth soccer.[6 10–21] No previous soccer studies have used multivariate regression techniques to describe the association between predictor variables and the rate of soccer injury.

METHODS

The NCYSA Classic Soccer League is one of the highest levels of team soccer competition in the state of North Carolina, second only to the Olympic Development Program. Classic League soccer comprises about 5000 boys and 2000 girls divided into seven levels of competition: under 12 (U12), under 13 (U13), under 14 (U14), under 15 (U15), under 16 (U16), under 17 (U17), and under 18 (U18). Divisions are based on birth year at the beginning of the season, but players sometimes play in higher levels at the league's discretion. Girls and boys teams compete separately: level U12 to U14 boys and girls play fall (autumn) and spring seasons, level U15 to U18 boys play only the spring season, and level U15 to U18 girls play in the fall season. At the coaches' discretion, teams generally play 14 games (two per weekend) and hold 20 (two a week) practices in a season. In game situations, coaches are required to play every player listed on the game roster, thus guaranteeing each player some game time.

A prospective cohort study was conducted to describe the association between self reported injury history and prospective incident injury. Fact sheets, consent forms, and injury history forms were included with NCYSA registration forms sent out to every player during 1997–2000. Players and their parents read about the study, signed the consent forms, and completed previous injury history information at the beginning of the season. In addition, detailed project descriptions were sent out to coaches and managers. Players who returned the consent forms were followed prospectively for incident injury from fall 1997 to spring 2000. This study was approved by the institutional review board of the Duke University Medical Center.

Incident injuries were reported by coaches by mail to NCYSA. Each week during the season, coaches filled out an

Abbreviations: CI, confidence interval; IR, injury incidence rate; IRR, injury incidence rate ratio; OR, odds ratio