



Original research

A snapshot of chronic ankle instability in a cohort of netball players



Alison S. Attenborough^{a,*}, Peter J. Sinclair^a, Tristan Sharp^c, Andrew Greene^{a,d},
Max Stuelcken^{a,e}, Richard M. Smith^a, Claire E. Hiller^b

^a Exercise and Sport Science Discipline, The University of Sydney, Australia

^b Arthritis and Musculoskeletal Research Group, The University of Sydney, Australia

^c Sydney University Sport & Fitness, The University of Sydney, Australia

^d Postgraduate Medical Institute, Anglia Ruskin University, United Kingdom

^e School of Health and Sport Sciences, University of the Sunshine Coast, Australia

ARTICLE INFO

Article history:

Received 7 October 2014

Received in revised form 24 March 2015

Accepted 12 April 2015

Available online 23 April 2015

Keywords:

Joint instability

Sports

Sprain

Ankle joint

Ankle injury

ABSTRACT

Objectives: Ankle injuries account for the highest percentage of injuries in netball, yet the chronic nature of ankle sprains is under reported within this population group. Chronic ankle instability is a term used to describe certain insufficiencies that persist after an acute ankle sprain. The aim of this study was to investigate recurrent sprain, perceived ankle instability and mechanical ankle instability in a cohort of netball players.

Design: Cross-sectional study.

Methods: Ninety-six female netball players (24.1 ± 7.9 years) were recruited (42 club players and 54 inter-district players). Recurrent sprain was defined as two or more lifetime sprains to the same ankle. Perceived ankle instability was quantified with the Cumberland Ankle Instability Tool – Youth. Mechanical ankle instability was quantified via inversion–eversion rotations using an ankle arthrometer at torques of 3 N m. **Results:** Forty-seven percent of the cohort had recurrently sprained an ankle. Of the 69 players with a previously sprained ankle, 64% had a moderate-severe degree of perceived ankle instability. The total inversion–eversion angle was 31.1 ± 8.7 degrees. Club players had more cases of moderate-severe perceived ankle instability ($p = 0.01$) and larger inversion–eversion angles ($p = 0.001$) compared to inter-district players.

Conclusions: Recurrent ankle sprain and perceived ankle instability are easily identifiable aspects of chronic ankle instability shown to be prevalent within this cohort. Additional research is required to quantify a cut-off value for mechanical instability. Club netball players were found to have more counts of moderate-severe perceived ankle instability and larger inversion–eversion angles when compared to the inter-district netball players.

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1. Introduction

Netball is a highly popular sport in countries of the British Commonwealth. In Australia, it ranks second only to soccer in terms of population participation in organised team sports.¹ Netball is a physically demanding activity that requires participants to engage in jumping, bounding, pivoting and cutting manoeuvres.² Landing from these movements, together with the footwork rule in which a player in possession of the ball is required to stop suddenly to prevent a further step from occurring, make the lower limb highly susceptible to injury.³ Previous investigations have found the ankle

to be the anatomical site most commonly injured in netball.^{3–5} In a group of elite netball players, 39% of all injuries over the course of one playing season were reported to involve the ankle.⁶ Similarly, within a cohort of community netball players, 32% of total body injuries involved the ankle.⁷

A single history of ankle sprain predisposes the same ankle to recurrent damage,⁸ especially in the case of improper rehabilitation and premature return to play. Mechanical changes to the ankle joint complex often become evident following an acute ankle sprain, as do perceived limitations such as feelings of instability and sensations of ‘giving way’.^{9,10} There is a substantial amount of scientific literature that reports on the incidence of acute ankle sprains during specific sporting and recreational activities, yet only a small proportion of papers report on persisting chronic problems that remain after the injury is said to be healed.¹¹

* Corresponding author.

E-mail address: aatt4376@uni.sydney.edu.au (A.S. Attenborough).

Chronic ankle instability (CAI) is a condition that encompasses at least one of three individual components that persist following an acute ankle sprain: perceived ankle instability, mechanical ankle instability and recurrent sprain.¹² CAI has previously been defined on the premise that if an ankle has mechanical and perceived instability then it is susceptible to sprain.⁸ Whilst this remains true, research suggests that an individual can also repeatedly sprain an ankle in the absence of any functional limitations.¹³ The Hiller¹² model of CAI allows recurrent sprain to be included in the definition of CAI – irrespective of whether mechanical or perceived ankle instability are present.

No previous study investigating a netball cohort has reported all three aspects of CAI.¹¹ A single study investigated the recurrent nature of ankle injuries sustained during netball tournaments in South Africa but only reported on the recurrence of injuries sustained during the tournament period.⁵ Another investigation examined only the perceived instability of previously sprained ankles in a population of state representative netball players.¹⁴ Of the previously sprained ankles in the study, 39% were reported to be weak or unstable; however, no reliable tool was used to assess the level of perceived instability.

Mechanical ankle instability, perceived ankle instability and recurrent sprain, whilst used to define CAI, can also be thought of as independent risk factors for ankle sprains.¹⁵ It is important to identify the extent to which these individual contributors are observed in netball players in order to determine whether acute ankle sprains develop into long term problems. The primary aim of this study was to report the presence of CAI within a cohort of netball players. As the probability of sustaining an injury is increased with heightened exposure to sporting activity, the level of competition at which a player participates could influence their susceptibility to develop CAI from an initial sprain due to differing training loads. Therefore, a secondary aim was to determine any differences in the presence of CAI between club and inter-district level netball players.

2. Methods

The study was approved by The University of Sydney Human Research Ethics Committee (protocol number 2012/469). The study reports pre-season cross-sectional CAI data from a larger prospective study investigating ankle sprain risk factors during netball participation. Sample size requirements for the prospective study were determined a priori. All participants were informed of procedures and volunteered for the study by signing a consent form. In the case of any participant being under the age of 18, consent was also obtained from her parent/guardian. All data for each participant were collected on a single day with questionnaires completed in the presence of a study investigator.

Ninety-six female netball players from the Sydney Metropolitan area participated in this study. Fifty-four played at an inter-district level and 42 played at a club level. The majority of the inter-district players (83%) were from the Sydney University Netball Club/City of Sydney Netball Association Elite Development Squad whilst the remaining inter-district players were individuals from a comparable representative netball association. The club players were largely a sample of convenience and were involved in netball at a social level which comprised no more than one netball specific training session per week.

For inclusion, participants had to be at least 15 years old at the time of pre-season testing, have at least one year of experience playing netball, and be registered to play in the subsequent netball season. Participants were excluded if they had sustained a lower limb injury in the six months prior to testing or had a history of ankle surgery or ankle fracture.

The definition of CAI used within the current study incorporates recurrent ankle sprain and/or perceived ankle instability and/or mechanical ankle instability following a previous ankle sprain.¹² Owing to the current study's exclusion criteria, all previous ankle sprains occurred a minimum of six months prior. Previous ankle sprains were recorded for each player by way of a self-administered form. The participants recorded the number of previous ankle sprains sustained to each ankle separately. Recurrent sprain was defined as two or more sprains occurring to the same ankle.¹⁶

The Cumberland Ankle Instability Tool is a valid and reliable nine item questionnaire that is used to assess the perceived instability of an ankle.¹⁷ For this investigation the Cumberland Ankle Instability Tool – Youth was used; a simplified version of the original tool, where the layout and language of the questionnaire are structured to be more easily read and interpreted¹⁸. An individual score was attained for each ankle of every participant. The youth version of the questionnaire has the same scoring protocol as the original Cumberland Ankle Instability Tool where a score of ≥ 28 is indicative of an ankle showing no signs of perceived instability.¹⁷ In line with criteria used for the selection of CAI participants in controlled research,¹⁹ a score of 24 or less indicated an ankle with moderate-severe perceived ankle instability. A score of 25–27 denoted an ankle with mild perceived instability.

An instrumented ankle arthrometer (BlueBay Research, Milton, FL) was used to measure ankle joint laxity during inversion–eversion at both ankles of each participant.²⁰ Inversion–eversion ankle laxity was determined by the total inversion–eversion range when the ankle was loaded with torques of 3 N m inversion and 3 N m eversion.²⁰ The angles achieved at this cut-off torque were determined by a linear interpolation between the data points either side of the 3 N m inversion torque and the 3 N m eversion torque respectively. For each participant the average of three trials were used to calculate means and standard deviations. As a threshold value to indicate the presence of mechanical ankle instability has not been established, the results of both ankles were analysed in regard to ankle sprain history.

All statistics were computed using SPSS version 22 with the level of significance set at 0.05. To satisfy the current study's primary aim, descriptive statistics were used to characterise the cohort. To investigate the secondary aim, a Chi-square test was used to compare the distribution of sprain history between the two competitive levels of players (club versus inter-district). Fisher's exact tests were used to analyse the presence of perceived ankle instability in relation to club versus inter-district players and the effect of sprain history and competitive level on total inversion–eversion laxity was analysed using a two-way analysis of variance.

3. Results

Club players had a mean \pm SD age of 24.1 ± 7.9 years, height of 167.6 ± 5.4 cm and mass of 68.5 ± 15.9 kg. Inter-district players had a mean \pm SD age of 19.4 ± 3.5 years, height of 172.8 ± 6.9 cm and mass of 72.0 ± 12.7 kg. Inter-district players were younger and taller than the club players ($p \leq 0.001$).

Sixty-nine participants reported a previous ankle sprain. Of these participants, 64 were classified as having CAI in terms of recurrent sprain and/or perceived ankle instability. Sixty-one participants reported some degree of perceived ankle instability following a previous ankle sprain and 45 participants had a history of recurrent ankle sprains. There were no significant differences between the distributions of sprain history when comparing club netball players to inter-district netball players ($p = 0.06$) (Table 1).

The perceived ankle instability scores of netball players with previously sprained ankles are presented in Table 2. Of the 69 netball players with a previous ankle sprain, 44 (64%) had a

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