



Short report

Hip adductor muscle strength is reduced preceding and during the onset of groin pain in elite junior Australian football players

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Abstract

Groin pain is a condition with a high prevalence in young Australian football players. It is considered that early identification of this condition allows for optimal management. Eighty-six players from two elite under-age Australian football sides were screened weekly for hip adductor muscle strength, using a hand-held dynamometer and for the onset of groin pain. The maximum variation in the average hip adductor muscle strength values of the sample was a 2.6% decrease from baseline in week 7 of the study. Twelve players (14% of the sample studied) reported groin pain for two consecutive weeks and were considered to have an onset of groin injury. The mean hip adductor muscle strength of these players was decreased significantly from baseline by an average of $11.75 \pm 2.50\%$ at the week of pain onset ($F = 264.76$ (1,11), $p < 0.001$), and $5.82 \pm 5.16\%$ in the week preceding the onset of pain ($F = 14.03$ (1,10), $p = 0.004$). These results confirm that hip adductor muscle strength is decreased both preceding and during the onset of groin injury in elite under-age Australian footballers.

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1. Introduction

Groin injury has a high incidence in all football codes. Elite junior Australian football players have an increased risk of developing groin injury compared with their senior counterparts with over 50 injuries per ten thousand player hours.¹ Although this condition is poorly defined and lacks clear diagnostic criteria, it is one that is prone to chronicity and recurrence.²

It has been suggested that groin pain is part of a continuum of pathology and that early identification might be the key to optimal management.^{3,4} Several clubs in the Australian Football League reportedly perform screening of hip adductor muscle strength in individual players as they believe a loss of strength may precede the onset of groin injury.⁴ The purpose of this study was to test the hypothesis that hip adductor mus-

cle strength is decreased in the weeks preceding the onset of groin injury in a group of elite junior Australian footballers.

2. Methods

Participants were recruited from the pre-season training squads of two elite under-age Australian football clubs competing in the Transport Accident Commission (TAC) Cup. Players ($n = 113$, aged 16–18 years) gave informed written consent, which included consent from a parent or guardian, to participate in this study which had been approved by the University Human Research Ethics Committee. Players completed an initial survey of demographic information. A pain provocation test called the “squeeze” test, which has been shown to have a positive predictive value of 79%,⁵ was then used to screen players for the presence of groin pain. Players with a positive squeeze test, a history of surgery to their lower abdominal, hip or groin region, or who reported they had

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experienced groin pain in the last six months were excluded from the study.

Baseline measures of bilateral hip adductor muscle strength were obtained using a hand-held dynamometer (Microfet², USA) which has been shown to have a measurement error of $\pm 2\%$.⁶ The player laid supine with knees bent and feet flat according to a testing protocol described by Mens et al.,⁷ that has previously been shown to have good intra-rater (ICC = 0.79 (95% CI = 0.65–0.87)) and inter-rater reliability (ICC = 0.79 (95% CI = 0.64–0.88)).⁷ The test took approximately 1 min/player.

The hip adductor muscle strength of the participants was measured weekly throughout the pre-season training period (nine weeks) by two testers. Testing was, where possible, performed before training on the same day each week. Players were required to report each week whether they had experienced any groin pain in the previous week. Where a player reported groin pain for two consecutive weeks they were considered to have an onset of groin injury. The groin injury was considered to have commenced in the week that the player first reported their pain.

Independent samples *t*-tests were conducted to test whether participants from the two clubs were different in height, weight and baseline mean hip adductor strength. Changes in hip adductor strength were tested using within-subjects repeated measures ANOVA with post hoc Bonferroni and Cohen's effect size (*d*) analyses to demonstrate statistical and practical significance respectively. An alpha level of $p < 0.05$ was used to identify statistical significance.

3. Results

After the application of exclusion criteria 86 players remained in the study (Club 1 = 53; Club 2 = 33). Over the pre-season period nine players (Club 1 = 6; Club 2 = 3) were deselected by coaches from the training squads and consequently dropped out of the study. No other players chose to withdraw from the study. No significant differences in height ($p = 0.25$), weight ($p = 0.36$) or baseline hip adductor muscle strength ($p = 0.24$) were apparent between the two clubs.

The largest variation in the mean hip adductor muscle strength of the sample was a 2.6% decrease from baseline seen in the seventh week of the study. Over the nine-week period 12 players (14% of the sample studied) experienced an onset of groin injury (Club 1: $n = 7$; Club 2: $n = 5$). Mean onset of groin injury occurred after 3.58 ± 1.88 weeks of training. The mean hip adductor muscle strength of these players was significantly decreased from baseline by an average of $11.75 \pm 2.50\%$ in the week of injury onset ($F = 264.76$ (1,11), $p < 0.001$) and $5.83 \pm 5.16\%$ (range: 1.0%, or 3 N to 14.2% or 48 N decrease) in the week preceding the onset of groin injury ($F = 14.03$ (1,10), $p = 0.004$). At two weeks preceding the onset of groin injury adductor muscle strength decreased by an average of $1.99 \pm 4.28\%$ (range: 1.4%, or 5 N, to 9.4%, or 29 N, decrease) from baseline, although this was not statis-

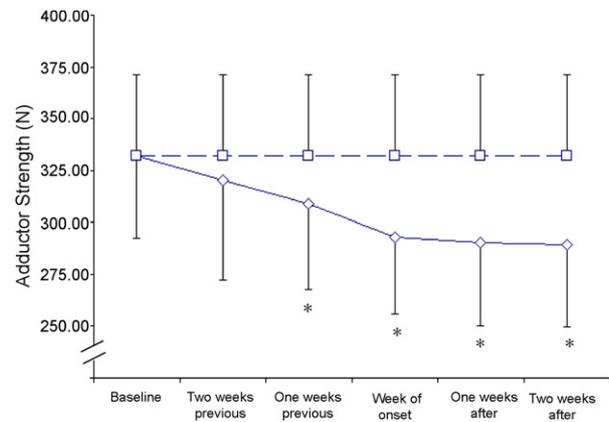


Fig. 1. Changes in group mean hip adductor muscle strength (N) from baseline in participants who experienced an onset of groin injury. Unbroken line represents change in hip adductor muscle strength, and the broken line represents baseline measures. Data presented is mean (\pm SD) and an asterisk indicates a significant difference to baseline measures ($p < 0.05$).

tically significant ($F = 1.3$ (1,5), $p = 0.307$) (Fig. 1). The effect sizes for each of these differences were calculated as $d = 0.98$ (95% CI = 0.20–1.77) at the week of pain onset, $d = 0.55$ (95% CI = -0.19 –1.31) in the week preceding the onset of injury, and $d = 0.26$ (95% CI = -0.48 –1.0) two weeks preceding the onset of injury.

4. Discussion

This study supports the role of regular screening by the use of a hand-held dynamometer to allow for early identification of groin injury. Further investigation is required to establish the real value of this protocol in terms of its impact on groin injury duration.

The finding of a high incidence of groin injury in this population of elite junior Australian footballers is consistent with results reporting an onset of groin injury in 4 out of a group of 18 elite junior soccer players (16–17 years) over four months of training at the Australian Institute of Sport.² As individual players are likely to have different thresholds for reporting groin pain it is possible that groin injury may have been under-reported in the study. Future research might consider using measures of activity restriction when screening for groin injury.

In conclusion, hip adductor muscle strength is decreased in elite junior Australian football players both before and during the onset of groin injury, and this change may be detected in the weeks prior to the onset of injury using a hand-held dynamometer in the squeeze test position.

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