Groin Problems in Male Soccer Players Are More Common Than Previously Reported

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Background: The majority of surveillance studies in soccer have used a time-loss injury definition, and many groin problems result from overuse, leading to gradually increasing pain and/or reduced performance without necessarily causing an absence from soccer training or match play. Thus, the magnitude of groin problems in soccer has probably been underestimated in previous studies based on traditional injury surveillance methods.

Purpose: To investigate the prevalence of groin problems among soccer players of both sexes and among male soccer players at different levels of play through a new surveillance method developed to capture acute and overuse problems.

Study Design: Descriptive epidemiology study.

Methods: We registered groin problems during a 6-week period of match congestion using the Oslo Sports Trauma Research Center Overuse Injury Questionnaire. A total of 240 players from 15 teams across different levels of play and from both sexes were included, and they responded to the weekly questionnaire. We calculated the average weekly prevalence of all groin problems and substantial groin problems.

Results: Of the 240 players, 112 male players (59%) and 20 female players (45%) reported at least 1 episode of groin problems. The average weekly prevalence of any groin problem and substantial groin problem for all male players was 29% (range, 23%-32% across different levels) and 10% (7%-13%), respectively. Elite male players had an increased risk of experiencing groin problems (odds ratio: 3.1, 95% CI: 1.5-6.4, P = .03) compared with elite female players. There was no difference in the risk of experiencing groin problems among elite, subelite, and amateur male players. For substantial problems, there was no difference between elite male and elite female players or among levels of play for senior male soccer players.

Conclusion: We found a high prevalence of groin problems among male soccer players during a period with match congestion. Time-loss definition as used in previous injury surveillance studies captured only one-third of the male groin problems registered with the new method. Elite male players had 3 times' higher risk of reporting groin problems as compared with elite female players, while playing level did not influence the risk of reporting a groin problem among males.

Keywords: epidemiology; prevalence; groin; injury; soccer

Groin injuries are prevalent in sports involving kicking, rapid changes of direction, and acceleration.7,10,13,16,18,19 A recent review on groin injuries in senior soccer concluded that groin injuries during club season play account for up to 19% and 11% of total injuries among male and female soccer players, respectively.25 In the UEFA (Union Européenne de Football Association) Champions League study, 19% to 22% of elite male players were reported to have suffered a groin injury each season, based on a time-loss definition.27 In contrast, in a 1-season study among subelite male players, based on an injury definition expected to capture more injuries, the season prevalence was as low as 5%.13 In both cases, injuries were reported by team medical staff.

The majority of injury surveillance studies reporting on injuries in soccer have used a time-loss definition, where injuries are recorded if a player is unable to participate in soccer training or match play.2,6,14,16,24 However, it is
well documented that athletes often continue to train and compete despite suffering from symptoms of overuse injuries. Many groin injuries are the result of overuse, leading to pain and/or reduced performance, yet are not sufficient to result in absence from training or match play. Thus, the traditional approach to injury surveillance might be inappropriate for studying overuse injuries, resulting in gross underestimation of the true magnitude of overuse problems. In retrospective studies on male soccer players, up to 70% reported groin pain during the previous season. The data reported from surveillance studies may therefore represent only the “tip of the iceberg,” and the correct magnitude of groin problems in soccer is still uncertain.

To address these challenges, a new approach has been developed to improve on the recording of overuse injuries in sport, capturing both acute injuries and overuse injuries and based on an “all physical complaints” injury definition, regardless of the consequences for time loss from sport. This method has been validated across different sports, identifying almost 10 times’ more overuse problems and injuries as compared with standard injury registration methodology.

Thus, the purpose of this prospective cohort study was to apply the Oslo Sports Trauma Research Center (OSTRC) Overuse Injury Questionnaire to assess the prevalence of groin problems in Norwegian soccer in both sexes and across different levels of play.

METHODS

Participants

We invited a convenience sample of 302 soccer players from 15 teams in the Oslo region (Table 1). Of the 302 players invited, 240 agreed to participate; 33 players declined; 12 players suffered long-term injury; 11 players were already included in another study; and 6 players made transfer to other clubs during the study period. Teams represented a range of performance levels, including male elite (3 teams), male subelite (3 teams), male amateur (3 teams), under-19 male elite (3 teams), and female elite (3 teams).

The Norwegian Data Inspectorate and South-Eastern Norway Regional Ethical Committee approved the study (42841/3/MSS and 2015/719). All players provided written informed consent before participation. The study is described according to the STROBE statement checklist.

Injury Recording

We used smartphone application software (Spartanova; Spartanova NV) to distribute the OSTRC Overuse Injury Questionnaire each week, for a total of 6 weeks, to all players participating in the study during a period of match congestion in April-June 2015 (male) and July-September 2015 (female). This period was in the competitive season, and most of the teams played an extra midweek cup or league match, in addition to regular league matches each weekend. Each player received a notification to complete the questionnaire every Sunday evening, and nonresponders received a daily reminder until they filled it in. For players who failed to respond to the questionnaire through the smartphone application, we asked them to complete it on paper during a training session the subsequent week. The questionnaire consisted of 4 questions addressing the consequences of groin problems on soccer participation, training volume, performance, and pain. This method has been validated across different sports, identifying almost 10 times’ more overuse problems and injuries as compared with standard injury registration methodology.

Specifically, for the players on these teams who reported reduced exposure, we asked whether it was caused by another injury or illness. Based on this review, all cases were classified as either an acute or overuse injury. Acute injuries were defined as those associated with a specific, clearly identifiable injury onset. All other cases were regarded as overuse injuries, regardless of whether their onset was gradual or rapid.

TABLE 1
Demographic Characteristics for Players in the 5 Cohorts

<table>
<thead>
<tr>
<th>Group</th>
<th>Competitive Level</th>
<th>Players, n</th>
<th>Age, y (SD)</th>
<th>Height, cm (SD)</th>
<th>Weight, kg (SD)</th>
<th>Years as Senior (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elite Division 1</td>
<td>45</td>
<td>23 (4)</td>
<td>169 (5)</td>
<td>63 (5)</td>
<td>8 (3)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elite Divisions 1 and 2</td>
<td>49</td>
<td>24 (4)</td>
<td>183 (5)</td>
<td>79 (6)</td>
<td>7 (5)</td>
<td></td>
</tr>
<tr>
<td>Subelite Division 3</td>
<td>57</td>
<td>22 (4)</td>
<td>183 (5)</td>
<td>77 (9)</td>
<td>4 (4)</td>
<td></td>
</tr>
<tr>
<td>Amateur Division 4</td>
<td>45</td>
<td>24 (4)</td>
<td>181 (5)</td>
<td>77 (6)</td>
<td>6 (4)</td>
<td></td>
</tr>
<tr>
<td>U19 elite Division 1</td>
<td>44</td>
<td>18 (1)</td>
<td>179 (7)</td>
<td>72 (9)</td>
<td>0 (0)</td>
<td></td>
</tr>
</tbody>
</table>

*Data provided as mean (SD). U19, under 19.
*The number of years playing soccer on the senior level in a professional league.
Prevalence Measures

We calculated the weekly prevalence of all groin problems (acute and overuse) during the study period by dividing the number of players that reported any problem (ie, anything but the minimum value in any of the 4 questions) by the number of players included in the study. We also calculated the prevalence of substantial groin problems in the same way but included only players with problems leading to at least moderate or severe reductions in training volume or sporting performance or a total inability to participate. Finally, we calculated the cumulative incidence for all groin problems and substantial groin problems as the number of new cases each during the study period divided by the number of players included in the study.

Statistical Analyses

To assess differences in the prevalence of all groin problems and substantial groin problems between the elite male and elite female groups and among the senior male groups over time, we performed generalized estimating equations using an exchangeable covariance matrix. Missing data were imputed through multivariate imputation by a chained equation algorithm in combination with a predictive mean matching approach, which led to the pooled results of 5 multiple imputed data sets. As we were unable to identify any associations between athlete characteristics and data completeness through logistic regression analyses, we assumed that data were missing at random.

The injury incidence rate of acute groin injuries was calculated per 1000 hours of soccer exposure (number of injuries / hours of exposure × 1000). All analyses were performed with SPSS 21 (IBM Corp) with a significance level ($\alpha$) of 0.05.

RESULTS

Response Rate

The overall response rate among the 240 participants to the 6 weekly questionnaires was 97% in elite male teams, 94% in subelite male teams, 98% in elite female teams, 96% in amateur male teams, and 95% in under-19 male teams. During the course of the study, 74% of the players responded to all 6 questionnaires.

Prevalence and Incidence of Groin Problems

During the 6 weeks, 112 male players (59%) and 20 female players (45%) reported at least 1 episode of a groin problem, while 47 male players (25%) and 4 female players (9%) reported at least 1 episode of a substantial groin problem. As shown in Figure 1, 34% of the groin problems among male players and 20% among the female players led to time loss. Of the registered problems among male players, 67% had a gradual onset according to the new OSTRC method and 74% per a time-loss definition. All the problems reported by female players had a gradual onset.

The incidence rate of acute time-loss groin problems for male players was 4.0 per 1000 hours (95% CI: 2.6-5.4 per 1000 hours). No acute groin problems were reported by female players.

DISCUSSION

This study is the first to register acute and overuse groin problems in soccer according to the OSTRC Overuse Injury Questionnaire, irrespective of time loss. Our main finding was that, in a squad of 20 players, approximately 6
experienced groin problems at any given time. Of these, only one-third would be captured via a time-loss injury definition. Moreover, approximately 2 of these 6 reported substantial problems, defined as at least moderate or severe reductions in training volume or sporting performance or a total inability to participate.

We found no association between the prevalence of groin problems and the level of play in senior male soccer. This conflicts with results from a recent review suggesting that higher level of play is a risk factor for groin injury in sports. Hölmich et al suggested that playing at a higher level of soccer almost tripled the risk of developing a groin injury. However, several factors might explain the apparent conflict. We registered groin problems for 6 weeks during a period of match congestion. In this period, many of the teams played an extra midweek cup or league match, in addition to regular league matches during the weekend. Thus, given our results, we would argue that senior male players experience the same high magnitude of groin problems, independent of level of play, during periods with match congestion.

The 3.1 times’ increased risk for males vs females is in accordance with a recent review that showed a 2.4 higher rate of time-loss injuries among males. Teams in the female top division in Norway did not play matches from mid-May to mid-July, as a result of the 2015 FIFA Women’s World Cup. This led to 2 periods with match congestion: before and after the World Cup. Therefore, to match the loading conditions between males and females, we delayed data collection in the female league until after the World Cup. This is also highlighted in previous studies showing a substantial difference in the prevalence of groin problems in soccer across continents and between positions, with the World Cup group experiencing a lower prevalence of groin problems compared to the non-Women’s World Cup group. In this period, many of the teams played an extra midweek cup or league match, in addition to regular league matches during the weekend. Thus, given our results, we would argue that senior male players experience the same high magnitude of groin problems, independent of level of play, during periods with match congestion.

Methodological Considerations

One of the limitations of this study is that we recorded injuries only during a 6-week period of match congestion, which may not reflect the prevalence of groin injuries during other parts of the season. Second, we did not report any specific diagnoses, such as adductor-, iliopsoas-, inguinal-, or pubic-related groin pain; players self-reported only the presence/absence and severity of groin problems. In the wake of the First World Conference on Groin Pain in Athletes in Doha (November 2014), the consensus group advised that, when athletes experience groin pain, their groin injuries should be classified and reported according to the Doha agreement on terminology and definitions. The apparent discrepancy in prevalence reported among studies may reflect methodological differences. Two factors seem particularly important: who is doing the reporting and which injury definition is being used. In the present study, we relied on players to report any groin problem. The direct response from the players reduces the risk for any bias that can occur if a third party records the injury or problem, such as team medical staff members, as done in most previous studies on groin injuries.

Another significant strength of the current study is that we used the OSTRC Overuse Injury Questionnaire to register groin problems. This method has been tested in different sports and body regions, identifying almost 10 times’ more overuse injuries when compared with standard injury registration methods based on a time-loss injury definition. Although this study covered a limited period, we would argue that the results represent a more correct estimate of the magnitude of groin problems in soccer in comparison with similar studies using a time-loss injury definition.

Our data also demonstrate that the majority of groin injuries reported were gradual-onset injuries, most likely caused by overuse, and as many as two-thirds did not cause time loss from training or match play. Previous surveillance studies, based on medical staff reporting and a time-loss definition, may therefore have substantially underestimated groin injuries in soccer.

A major strength of this study was the high response rate, which varied from 94% to 98% across different levels and both sexes. During the project period, three-quarters of the players responded to all 6 questionnaires. We had weekly contact with players and teams to encourage them to respond, and we asked nonresponders to fill in a paper version of the questionnaire for the previous week. We are aware of the risk of recall bias— in this case, when asking for groin problems experienced up to 2 weeks earlier — and so we reminded players about the previous match result and their involvement, in an attempt to minimize such bias. Thus, we believe that recall bias was low and that a mixed-methods approach with both a smartphone application and a paper administration can ensure high participation in future surveillance studies.

Perspectives

Previous injury studies in soccer have used methods poorly suited to record overuse problems, whereas this study used a method designed to capture all problems, whether acute or overuse. Our data therefore represent a more complete picture of the extent of groin problems in soccer, and the method used in this study appears to be a better alternative to record such problems. The results from this study also highlight the need to focus on developing methods to prevent groin problems in soccer.

CONCLUSION

We found a high prevalence of groin problems among male soccer players during a period with match congestion. Time-
loss definition as used in previous injury surveillance studies captured only one-third of the groin problems recorded via the new method in male soccer players. Elite male players had 3 times' higher risk of reporting groin problems as compared with elite female players, while playing level did not influence the risk of reporting groin problems.

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REFERENCES


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