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EPIDEMIOLOGY OF FOOTBALL INJURIES

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ABSTRACT

Aim

The overall aim of this on-going injury study is to increase the safety in football.

Study design

Prospective cohort survey

Methods.

The study population consisted of two cohorts: The UEFA Champions League (UCL) cohort and the Swedish Superleague cohort. The UEFA Champions League (UCL) cohort with 17 teams from 9 countries was followed over five consecutive seasons (2001 to 2006). The Swedish Super-league with 14 teams was followed for two full consecutive seasons (2001 and 2002). Exposure for training and matches in the club and in national teams was registered in minutes for each player. The team doctor reported all injuries causing the player to miss at least one match or training session. The study follows the consensus on methods for studies on football injuries agreed upon by FIFA and UEFA.

Results.

Totally 6300 injuries have been registered during 800.000 hours of exposure. The incidence of injury at top level football is 6-9 injuries/1000 hours of total exposure (3-5 injuries/1000 training hours and 24-30 injuries/1000 matchhours). As a mean, a team of 25 players can expect 40-50 injuries per season, half of them causing absence less than a week but 6-p of them causing absence more than a month. The risk of injury has not increased during the 5-year period. Thigh muscle injury is the most common injury at top level with an injury incidence of 1.6/1000 hours of exposure, which means that a team can expect 10 such injuries each season. The risk of ankle sprain has been reduced by 50%, probably due to the thorough knowledge in top-level teams about optimal treatment and prevention. A correlation has been found between major injuries (causing absence > 4 weeks) and performance. There is a considerable variation in the number of matches played per season in European professional leagues. Top level players are obliged to play many matches, especially during the final period of the season. A correlation was found between many matches at the end of a season and an increased injury risk and/or underperformance during subsequent world tournaments

Conclusion

The injury risk has not increased in male professional football during recent years. At elite level, the risk of ankle sprain has been lowered and thigh muscle strain is the most common injury. A period with a congested match calendar can lead to fatigue, increasing the risk of injury and poor performance during the following period.

INTRODUCTION

Tremendous occupational hazard in professional football

It has been demonstrated that the overall risk of injury to professional football players is approximately 1000 times higher than for industrial occupations generally regarded as high risk.¹ The governing bodies of football, FIFA (Federation of International Football Associations) and UEFA (Union of European Football Associations) have expressed a concern about the demands being placed on the modern footballer, and the translation of these physical and mental demands into injuries. Further, both FIFA and UEFA as well as national football associations have initiated research in order to prevent injuries and increase the safety in football.

Identifying and describing the injury problem is an important first step to injury prevention

According to the van Mechelen model², prevention of sports injury can be seen as a four step sequence:

1) the extent of the injury problem is evaluated through injury surveillance, 2) injury risk factors and injury mechanisms are established, 3) based on this information preventive strategies are introduced, and, 4) these strategies are evaluated by repeating step one.

This means that injury surveillance studies in order to evaluate the epidemiology of injuries are essential when aiming for prevention of injuries.

Consensus of study design

A fundamental problem associated with an epidemiological assessment of data concerned with football injuries is the inconsistent manner in which injury is defined and further how data are collected and recorded.³⁻⁵ Commonly, researchers compare the results from their study with results from other published studies. However, the methodological differences between studies might be greater than any statistically significant differences between the studies which are concerned.^{6,7}

Meaningful comparisons of exposure and injury epidemiology can only be made between studies with more similar study design, definitions and methods.

Recently, a methodological consensus for football injury studies was created by FIFA and UEFA in cooperation with representatives from major football research groups in the world.⁸

The aim of this article is to present some results from in-depth studies on professional football in Europe carried out on behalf of UEFA by using the methodology according to the consensus agreement.

MATERIAL

The study population consisted of two cohorts: The UEFA Champions League (UCL) cohort and the Swedish Superleague cohort.

The UEFA Champions League (UCL) cohort was followed over five consecutive seasons (July 2001 to May 2006). Seventeen teams from 9 countries that had been playing in the UEFA Champions League regularly in the last decade were chosen by UEFA to participate in the study.

The Swedish Super-league with 14 teams was followed for two full consecutive seasons (January 2001 to November 2002). All players in the first team squads during the first study month each new season were included in the study.

METHOD

The methodology used is previously described in details.^{7,8} Each team doctor was provided with attendance record forms and was responsible for completing these forms with data about the players' attendances at training sessions and matches. The attendance records included all training sessions and matches. Only coach-directed sessions that included physical activity were recorded.

A recordable injury was defined as an injury resulting in a player being unable to take a full part in training or match play at any time following the injury.

All injuries were recorded on a special card. The injury card consisted of a single page on which all injuries were listed in tabular form.

Each injury was followed until the final rehabilitation date. A player was considered injured until the medical staff allowed full participation in all types of training or match play. Injury severity was defined as the number of days that have elapsed from the date of injury to the date of return to full participation in team training and availability for match selection: slight (1-3 days), minor (4-7 days), moderate (8-28 days) and major (> 28 days). A recurrent injury was defined as the same type of injury to the same side and location within two months after the final rehabilitation day of the previous injury.

RESULTS

Totally, 6300 injuries were recorded during an exposure of 800.000 hours of football.

The overall injury incidences were 3-5 injuries/1000 training hours and 24-30/1000 match hours respectively. This means that a team of 25 players can expect about 40-50 injuries each season. Half of these injuries will be slight or minor, causing absence less than a week but a team can each season expect 6-9 major injuries causing absence more than 4 weeks.

The injury risk has not increased during the 5-year period.

It is popular in media to claim that the injury risk increases year by year in toplevel football. No previous medical studies have evaluated this topic. This consecutive study of top clubs have not shown an increase of injury risk during the 5-year period.

Fig.1

Injuries / 1000 matchhours for the UCL teams during the 5 year study period

Injury pattern

Figures 2 and 3 show the distribution between various types of football injury

Fig 2. Localization of injuries in male professional football (%)

Fig 3. Different types of injury (%)

Among outdoor players, 80-90 per cent of all injuries are to the lower extremity⁹⁻¹⁶, the most common sites of injury among male elite players being thigh (23%), knee (20%), ankle (13%) and hip/groin (12%). Overuse was the most common type of injury comprising almost one third of injuries and

typically affecting the groin, knee and lower leg. Muscle-tendon injuries (sprains) and ligament injuries (sprains) were also common.

Thigh muscle injuries - the most common at top level

Muscle injury to the thigh is the single most common injury sub-type in top-level football and accounts for 23% of all injuries. The risk of sustaining a thigh muscle injury is 1.6/1000 Hours of exposure, which means that a team with 25 players in the squad can expect (as a mean) 10 such injuries each season.

Typically, the injury to the posterior thigh muscles (the hamstrings) occur during a fast burst of speed and the frequent occurrence of these injuries at top level football may reflect the speed and velocity of modern top level football.

Since this is an injury that creates great problems for top-level clubs, we are striving to get more information about them to be able to prevent such injuries. During the last 2 seasons we have gathered more detailed information of thigh muscle strains (strain = injury to the muscle-tendon unit). At this level, all players with muscle injuries are examined by MRI (magnetic resonance imaging) or ultrasonography. Hamstring strains that displayed normal ultrasonography or MRI scans were fully recovered (back to full team training or match) within 1 week and they had a low risk of recurrence. Hamstring strains with pathological findings on ultrasonography or MRI scan caused longer absence (as a mean 2-4 weeks) and almost one third of these led to recurrences meaning that the severity of the injury was underestimated. These re-injuries caused longer absence than the initial injuries.

The risk of ankle sprain has been reduced by 50%

Ankle injuries are among the most common in football with previous studies indicating that they account for 11-20% of all injuries.¹⁷⁻²¹ In a Study of the Swedish Super league in 1982, the risk of ankle sprain was found to be 1.6 /1000 hours of exposure, meaning about 10 ankle sprains per team per season.²⁰ Further studies of the same Super league during recent years has shown that the risk of ankle sprain has been reduced by 50%¹³, which means that nowadays, a team can expect about 5 such injuries each season. The risk for ankle sprain in the UCL study is the same (0.8 injuries per 1000 hours of exposure, as a mean 5 injuries per team per season). There was no significant difference between different countries.

Ankle sprains are normally not severe, the mean absence from training being two weeks in our study.

The problem in football is the frequency rather than the severity of ankle sprains.

The lower risk of ankle sprain and the short rehabilitation period found in this study suggest that top-level teams have a thorough knowledge of optimal treatment and prevention. But the recurrence rate of ankle sprains was 21% in our study. This suggests that a monitored rehabilitation and tests are important before returning to team training and matches.

Major injuries and performance are correlated.

In an earlier study in the Swedish Super-league during the seasons 2001 and 2002, a positive correlation was found between performance (the final league position in the league play) and the number of major injuries for the six first teams. It seems clear that injuries affect performance (or is it the other way round??) and teams that can avoid major injuries have greater success.

During the season 2001/2002, the teams had an average of nine major injuries during the season. A major injury caused as a mean an absence of 77 days. The total days of absence due to these severe injuries were as a mean 693 days for a club with 25 players in a squad. As a mean each team had always 2 players absent due to a major injury.

An intensive match schedule increases the risk of injury and decreases performance.

The correlation between match exposure versus performance and injury risk has been intensively debated in both FIFA and UEFA. Our studies provide a scientific support for the risk of overplaying.²²

There are considerable differences in the number of matches played in a given season. However, the crowded fixture list seems to be acceptable to the top teams involved in the study. Even if some had between 60 and 76 matches during a season, the number played by individual players was much lower - a mean of 36 matches per player per season. Despite the considerable differences in the number of matches played by clubs in different countries, there was very little difference in the average number of matches played by individuals. In other words, the response to heavier workloads was a larger squad, allowing the coach to rotate players and avoid overplaying.

It is often suspected that, when domestic and European competitions approach their climax, teams tend to field all their star players even if there is a risk of mental exhaustion and/or injury. But our finding

that the injury risk was no higher during the last ten weeks of the season indicates that today's top player can cope with a congested match calendar for over a short period.

However, every second year the climax to the club season is rapidly followed by another series of intense matches at a World Cup or a European Championship. In 2002, the first World Cup matches were played only two weeks after the UEFA Champions League final - which could explain why a number of Europe's top players were deemed to have under-performed in Korea/Japan. We found that 29% of the players from our study incurred injuries during the World Cup and that 32% were considered to have performed below their normal standard.²² This suggests that carrying end-of-season fatigue into a major international event may increase the risk of injury and under-performance.

Rehabilitation - better safe than quick?

The percentage of re-injuries (defined as an identical injury within two months of the final rehabilitation day of the initial injury) varied. The Danish teams had an average of 30% re-injuries; the teams from Spain, England and Holland 19%; and the teams from France and Italy 11%. Controlled rehabilitation including tests and rules for return to team training and matches might help to reduce the risk of re-injuries.

Previous injury and risk of any new injury

A player with an injury during one season has a 3-fold increase of getting any new injury during the following season.²³ This finding underlines the importance of rehabilitation after an injury and it has an impact when selecting new players to the club

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