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PERSPECTIVES IN FOOTBALL MEDICINE

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Abstract

The high injury rate among men's professional football players is well-known. Therefore, the Union of European Football Associations (UEFA) launched an injury study already in 2001. This study, the UEFA Elite Club Injury Study (ECIS), currently includes data from a total of 51 clubs from 18 European countries with more than 14,000 registered injuries. With the 21st World Cup (WC) in Russia just around the corner, we have from our study identified a higher match injury rate and a higher proportion of severe injuries in the European Championships compared to the preceding club competitive seasons. Moreover, we have also recently showed that the muscle injury rate is higher when players are given a recovery window of five days or less between two matches. Considering the congested match schedule of the upcoming WC, it is therefore likely that injuries and fatigue once again will be a topic of discussion this summer.

Die hohe Rate an Verletzungen im männlichen professionellen Fußball ist bekannt. Daher startete der Europäische Fußballverband (UEFA) bereits im Jahr 2001 eine Verletzungsstudie. Diese Studie, die "UEFA Elite Club Injury Study (ECIS)", schließt Daten von insgesamt 51 Clubs aus 18 Europäischen Fußballnationen mit mehr als 14.000 registrierten Verletzungen ein. Bis zur nun anstehenden 21. Fußballweltmeisterschaft in Russland, wurde in unserer Studie eine höhere Verletzungsrate in Spielen und eine höhere Rate an schweren Verletzungen in den Europäischen Turnieren identifiziert, verglichen mit den vorangegangenen Saisons in Club-Wettbewerben. Zudem konnte kürzlich gezeigt werden, dass die Rate an Muskelverletzungen ansteigt, wenn Spieler einen Genesungszeitraum von 5 Tagen oder weniger zwischen den Spielen haben. Berücksichtigt man den überfüllten Spielplan der bevorstehenden Weltmeisterschaft, ist es wahrscheinlich, dass Verletzungen und Übermüdung der Spieler erneut ein wichtiges Thema in diesem Sommer sein werden.

Background

The injury risk among men's professional football players is approximately 1000 times higher compared with, for example, traditional industrial occupations otherwise associated with high risk [3]. Fortunately, the main international governing bodies for football, the Federation of International Football Associations (FIFA) and the Union of European Football Associations (UEFA), have therefore prioritised research during the 2000s to find out more about the physical and mental demands being placed on the modern footballer and the translation of these demands into injuries and illnesses [8]. The purpose of this report is to summarise the UEFA-directed research being carried out during the 2000s and to give the reader some thoughts before the upcoming 21st FIFA World Cup (WC) in Russia this summer.

The UEFA injury surveillance

At the request of their former president, Lennart Johansson, UEFA initiated its injury surveillance project already in 1999. The first step in this project was a discussion within the Medical Committee about the optimal methodological design and system for injury reporting in men's professional football [4]. This work ended up in a UEFA methodological consensus for injury definitions and data collection procedures (Table 1) [14], and two pilot studies on the men's premier leagues in Sweden and Denmark in January 2001 [13, 23]. Based on the experiences from the pilot studies, the UEFA Champions League Injury Study was launched in July 2001 [24].

Insert Table 1 near here

Football Research Group

The Scandinavian pilot studies and the UEFA Champions League Injury Study, subsequently re-named the UEFA Elite Club Injury Study (ECIS), were carried out by a research group

based in Linköping, Sweden, under the leadership of the former vice chairman of the UEFA Medical Committee, Professor Jan Ekstrand, and two doctoral students, Markus Waldén and Martin Hägglund. Subsequently, as the study grew and the number of research projects increased, additional doctoral students, such as Karolina Kristenson and Håkan Bengtsson were added to the group. Moreover, a few established researchers and a statistician joined the group which now took the name the Football Research Group (FRG). Still, the group was mainly based in Sweden, but with the increasing global interest for the study and the possibility of carrying out studies beyond the traditional injury and illness surveillance objectives [21, 29], FRG became truly international a few years ago by also recruiting people outside Scandinavia with different skills and merits to better understand the complex nature of professional football (Table 2).

Insert Table 2 near here

The UEFA Elite Club Injury Study

The UEFA-ECIS currently (as per February, 2018) includes data from a total of 51 clubs from 18 European countries with more than 14,000 injuries registered in our database. Briefly, a typical 25-player professional squad will face approximately 50 time-loss injuries each season [6]. Most of these injuries are located to the lower limbs with the single most frequent injury sub-type being injury to the hamstring muscle group. Interestingly, few and less severe injuries are intimately coupled to team success [17]. For example, a lower injury burden (days lost per 1000 exposure hours) and higher match availability were both significantly associated with a higher final league ranking and an increase in the UEFA Season Club Coefficient.

The importance of sub-studies

In addition to getting the overall big picture of the injury characteristics as outlined above, it is also important to study the occurrence of, and potential risk factors for, different injury sub-types. It could be argued, from a prevention perspective, that such research should mainly target injuries with a high injury burden such as the hamstring injury (a frequent injury with a short to moderate lay-off) or the anterior cruciate ligament (ACL) injury (an infrequent injury, but with a long lay-off) [1, 17]. However, it could also be argued that it is of similar importance to focus on injuries such as concussion even if the injury burden is low (an infrequent injury with usually a short lay-off), but where the short-term and long-term consequences can be devastating. In line with these arguments, we have designed and carried out sub-studies on hamstring injuries, ACL injuries and concussions, but also on, for example, groin injuries and medial collateral ligament (MCL) injuries of the knee (Table 3).

Insert Table 3 near here

Time-trends in injury rate

Using basically the same methodological approach consistently over the years, we have been able to carry out trend analyses for injuries in general and for a few specific injury sub-types on a large and robust dataset (Table 4). All in all, it seems that the overall injury rate has been essentially unchanged since 2001, but that the injury panorama has changed to some extent [9]. Muscle injuries continue to be the predominant problem among the players and the most frequent injury sub-type, the hamstring injury, has in fact increased by on average 2.3% per year [11]. On the other hand, ligament injuries in general appear to have a decreasing trend [9], including injuries such as to the medial collateral ligament of the knee and the lateral ligaments of the ankle [20, 26].

Insert Table 4 near here

Perspectives in national football

The bottomline of all epidemiological sports injury research is to collect detailed data on the extent of an injury problem to be able to identify possible risk factors and to evaluate the efficacy of any preventive measures that have been introduced. While the UEFA-ECIS investigates this sequence at the highest possible playing level, the results cannot be used to draw conclusions about injuries in other settings such as men's amateur and recreational football or women's and youth football. Whereas the overall injury risk in general decreases with the playing level [3], there are emerging evidence that re-injuries are a relatively bigger problem at lower levels where the medical support is sub-optimal or non-existent [18]. Consequently, large-scale injury surveillance and prevention studies on players regardless of age, sex and playing level are encouraged from all continents of the football family.

Perspectives in international football

With the 21st FIFA WC around the corner, we hope that the fantastic players from all around the world will be injury-free and fit to perform at their best. Unfortunately, this has not always been the case; remember the 17th WC in 2002 that was ironically termed "the World Cup in Fatigue" by the media. From the inaugural season of the UEFA-ECIS in 2001-2002, a total of 65 players also participated in the WC 2002 [5]. However, 29% of them incurred injuries during the tournament and 32% performed below their normal standard as evaluated by an expert panel. Moreover, 60% of the players who had played more than one match per week before the WC either incurred injuries or underperformed during the tournament.

So, what are the indications that the situation will be different this summer? Our own studies on the UEFA Men's European Championships have consistently identified a higher match injury rate and a higher proportion of severe injuries (around one-quarter of all injuries) in the

tournaments compared to the preceding club competitive seasons [15, 25]. Moreover, very recent findings show that the muscle injury rate during club-season matches is approximately 20% higher when players are given a recovery window of five days or less between two matches compared to longer recovery [2]. This increased rate of muscle injury following short recovery windows could possibly be the result of players being forced to play another match while still fatigued and insufficiently recovered from a previous match exposure. Considering the congested match schedule of the upcoming WC, with the majority of matches being played within a five-day recovery window, it is likely that player fatigue will be a topic of discussion around this WC as well.

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Competing interests

There is no conflict of interest.

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TABLE AND FIGURE LEGENDS

Table 1 UEFA methodological consensus on injury definitions and data collection procedures

Table 2 Football Research Group as per February, 2018

Table 3 Summary of main sub-studies carried out on specific injury types

Table 4 Summary of studies investigating time-trends in injury rates

Table 1 UEFA methodological consensus on injury definitions and data collection procedures

Item	Recommendation
Study design	Prospective cohort study
Exposure factor	Individual participation time recorded in minutes
Study period	At least one full football season
Data collection forms	Baseline form with anthropometrics Individual-based attendance record One-page injury card with tick boxes
Study manual	Including all definitions and examples on how to complete forms
Contact person	A member from the medical/technical staff registers exposure and injuries
Inclusion criterion	All players with a first team contract
Definition of injury	Time-loss from participation, only injuries occurring during team activities
Injury severity	Based on lay-off from the date of injury to date of full return

Table 2 Football Research Group as per February, 2018

Researcher	Titles	Current working location
Jan Ekstrand	MD, PhD	Linköping, Sweden
Markus Waldén	MD, PhD	Hässleholm, Sweden
Martin Häggglund	PT, PhD	Linköping, Sweden
Jón Karlsson	MD, PhD	Gothenburg, Sweden
Anna Nordström	MD, PhD	Umeå, Sweden
Magnus Forssblad	MD, PhD	Stockholm, Sweden
Håkan Bengtsson*	PT, PhD	Falkenberg, Sweden
Alan McCall	PhD	London, UK
Grégory Dupont	PhD	Clairfontaine, France
Clare Ardern	PT, PhD	Linköping, Sweden
Michel D'Hooghe	MD	Buges, Belgium
Michael Davison	MBA	London, UK
Armin Spreco**	PhD	Linköping, Sweden
Matilda Lundblad	MD, PhD student	Gothenburg, Sweden
Johann Windt	PhD student	Vancouver, Canada
Jonas Werner	MD	Norrköping, Sweden
Anna Hallén*	PTI	Linköping, Sweden
Mariann Gajhede	PT	Aalborg, Denmark
Henrik Hedenvik**	MSc	Linköping, Sweden

* Study controllers

** Statisticians

Table 3 Summary of main sub-studies carried out on specific injury types

Sub-study	Injury	Principal finding
Ekstrand et al., 2012 [7]	Hamstring injury	83% of the injuries were located to the biceps femoris muscle
Ekstrand & van Dijk, 2013 [10]	5 th metatarsal fracture	54% of the injuries were categorised as stress fractures
Gajhede-Knudsen et al., 2013 [12]	Achilles tendon injury	96% of the injuries were categorised as tendinopathies
Häggglund et al., 2011 [16]	Patellar tendon injury	Many playing hours was a risk factor for patellar tendinopathy
Lundblad et al., 2013 [20]	MCL injury	69% of the injuries were related to contact with another player or object
Nilsson et al., 2013 [22]	Head injury	27% of concussed players returned to play within 5 days
Waldén et al., 2013 [26]	Ankle injury	Foul play was involved in 40% of the match-related ankle sprains
Waldén et al., 2016 [27]	ACL injury	100% of ACL-reconstructed players returned to training
Werner et al., 2009 [28]	Groin injury	64% of the injuries were categorised as adductor-related injuries

ACL denotes anterior cruciate ligament; MCL denotes medial collateral ligament

Table 4 Summary of studies investigating time-trends in injury rates

Sub-study	Injury	Principal finding
Ekstrand et al., 2013 [9]	General	A non-significant decreasing trend of on average 1.5% per year for match injuries
Ekstrand et al., 2016 [11]	Hamstring injury	An increasing trend of on average 2.3% per year for hamstring injuries
Häggglund et al., 2016 [18]	Re-injury	A decreasing trend of on average 2.9% per year for re-injuries
Lubberts et al., 2017 [19]	Syndesmosis injury	An increasing trend of on average 0.3% per year for syndesmosis injuries
Lundblad et al., 2013 [20]	MCL injury	A decreasing trend of on average 6.9% per year for MCL injuries
Waldén et al., 2013 [26]	Ankle injury	A decreasing trend of on average 3.1% per year for ankle sprains
Waldén et al., 2016 [27]	ACL injury	A non-significant increasing trend of on average 6.0% per year for ACL injuries

ACL denotes anterior cruciate ligament; MCL denotes medial collateral ligament