Open Access Journal of Sports Medicine

Dovepress
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ORIGINAL RESEARCH

Effect of poor cooperation between coaching and medical staff on muscle re-injury in professional football over 15 seasons

This article was published in the following Dove Press journal:
Open Access Journal of Sports Medicine

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Background: Muscle injury is the most common type of injury in football. Previous research has focused on traditional risk factors (eg, age, injury history, muscle imbalance/inflexibility) contributing to muscle re-injury. The effect of poor cooperation between the coaching and medical teams on the risk of re-injury remains unexplored in the sports medicine football literature.

Purpose: Examine the effect of poor cooperation between coaching and medical teams on muscle re-injury in professional football.

Methods: Retrospective review of the medical files of 97 footballers of a professional team in Dubai over 15 consecutive seasons (2002–2017). Medical team recorded all injuries in each player's file. Data on the perceived level of cooperation between coaching and medical teams were available in the daily meeting notes from the head of the medical team. The level of perceived cooperation was ranked on a three-point Likert scale by the head of the medical team and depended on whether the coaching team accepted the player injury (excellent cooperation), brought some suggestion after discussion with the medical team (normal cooperation) or rejected it (poor cooperation).

Results: In total, 338 indirect muscle injuries (21 re-injuries) were recorded during 15 consecutive seasons., There was a significant increase in the mean number of total injuries (mean ± SE, 95% CI; 16±2, 12–21; $P<0.0001$), mean number of indirect muscle injuries (12±1, 95% CI 10–14; $P<0.0001$), and indirect muscle re-injuries (4±1, 95% CI 3–5; $P<0.0001$) during seasons with a poor perceived level of cooperation compared to seasons with a normal/excellent perceived level of cooperation.

Conclusion: Findings suggest that poor cooperation between coaching and medical teams may increase the risk of muscle re-injury in professional football. Future studies conducted in different clubs, leagues, countries, and even sports are required to further explore the effect of cooperation between coaching and medical teams on the risk of re-injury.

Keywords: football, muscle re-injury, interpersonal relations, return to sports, United Arab Emirates

Introduction

With the rapid evolution of modern professional football, the coaching and tactical aspects of this sport are creating more strenuous physical and mental demands on the athletes. A player who wants to optimize his performance must achieve a very high level of fitness during games and practices while preventing long- and short-term injury.[1] Football clubs must develop the required sports medicine infrastructure and foster medical teams that can comprehensively address all potential health issues an

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DovePress
http://doi.org/10.2147/OAJSM.S221292

athlete might encounter.[2] Injuries, specifically musculoskeletal injuries, that occur during training or competitive matches are the most common factor that limits performance among professional football players.[3] In professional clubs, muscle re-injury is often caused by competing interests and/or a lack of cooperation between coaching and medical teams. Establishing clear responsibility for athlete management and return to play protocols can be challenging when there is a lack of consensus and/or agreement between coaching and medical teams of the club. It is for this reason that the medical team will aim to implement several preventive rehabilitation programs in order to minimize the effect of risk factors contributing to muscle re-injury.[4] Previous injury, surgery, older age, lack of muscle flexibility, muscle imbalance, and training/match playing load history are common contributing risk factors for re-injury widely reported in the sports medicine literature.[5] Previous research has not assessed whether poor cooperation between the coaching and medical teams is an additional risk factor for re-injury. The primary aim of this study was to explore the effect of poor cooperation between coaching and medical teams on re-injury in a professional football club in the United Arab Emirates (UAE).

Methods

Study design and setting

Prospective longitudinal study nested within a larger ongoing project assessing the epidemiology of injuries in a professional football league club in the UAE. This study took place over a period of 15 consecutive seasons from 2002/2003 to 2016/2017 in a professional football club of Dubai (UAE) with the same club doctor, same senior physiotherapist, five physiotherapists, three rehabilitators, three masseurs (medical team) and nine different head coaches from seven different countries, each with their own backroom team (ie, assistant coach, physical coach, goalkeeper coach) (coaching team). All matches and training sessions were played on natural grass fields.

Data collection and analysis

All injuries were recorded in the medical file of each player and records were retrospectively reviewed. From the 2002/2003 season until the 2016/2017, season data collection was completed by the same two medical personnel who had been employed at the club for a long time including the study period. The central data processing system of a professional football club in the UAE contained the names of 97 professional footballers during the 15 seasons this study took place over. Two researchers had access to the medical information in the system and extracted data regarding each injury diagnosed and recorded by the senior physiotherapist and the club doctor. Data on the perceived level of cooperation between the medical and coaching teams were available in the daily meeting notes from the head of the medical team (club doctor). Specifically, he would meet with the manager, head coach, and other coaching team members each morning to provide them with an update on player injuries and performance in order to prepare for practice which would take place during the afternoon or after sunset due to the weather conditions in the UAE (hot and dampness from June to September). Following the daily meeting, the head of the medical team would note the perceived level of cooperation with the coaching team on a three-point Likert scale from 3 "Excellent" (coaching team accepted the player injury and performance review and did not question the treatment/rehabilitation/return-to-play protocols for individuals players), 2 "Normal" (coaching team accepted the player injury and performance review following discussion of the treatment/rehabilitation/return-to-play protocols for individuals players), and 1 "Poor" (coaching team rejected the player injury and performance review and/or did not adhere to the treatment/rehabilitation/return-to-play protocols for individuals players). Perceived level of cooperation was summed from daily ratings and divided by the number of meetings to produce an integer score for the season. All data were processed on the club clinic main computer by using Microsoft Office software (Microsoft Corp., Redmond, WA, USA). The data were analyzed using IBM SPSS version 25 computer software program (IBM SPSS Inc., Chicago, IL, USA). Continuous variables are presented as mean ± standard error (SE) and categorical variables as the number and percentage. Independent *t*-tests were used to assess the difference in the mean number of injuries, number of indirect muscle injuries, and indirect muscle re-injuries between seasons with a poor perceived level of cooperation compared to seasons with a normal/excellent perceived level of cooperation between the coaching and medical teams. An alpha level of $P \leq 0.05$ and corresponding 95% CI were used to determine significance.

Informed consent and ethics

At the beginning of every season, each player had an administrative file that contained, among other things, a

non-objection agreement stating that their anonymous data would be made available to the medical staff for research purposes. The study was approved by the ethical committee of the FIFA Medical Centre of Excellence Dubai.

Results

A total of 97 professional football players (mean ± SD, age 26.0±5.5 years, body mass 72.0±9.3 kg, height 175.0 ±7.0 cm; 83 UAE national and 14 expatriates) sustained 959 injuries including 385 (40.1%) indirect muscle injuries over 15 consecutive seasons. Direct (post-contusion) muscular injuries were excluded from this study but muscle re-injuries represented 2.2% (N=15) of all recorded injuries and 3.9% of indirect muscle injuries (Table 1). Throughout the 15 seasons during which this study was conducted, nine different head coaches were employed by the club. These coaches were from seven diverse countries representing three different regions (Europe, Middle East and North Africa, and South America). Each coach had their own coaching team (at least one assistant coach, physical coach, goalkeeper coach). This diversity in personnel meant a great diversity in the approaches to football, training, player management, and the understanding of the relations between coaching and medical staff teams. During three seasons, 2005/2006, 2008/2009 and 2016/2017, relations between the coaching and medical teams were perceived as "poor" which corresponded to the same time period when the highest number of re-injuries was observed: a total of 14 versus 7 in the other 12 seasons (Table 1). A total of 14.4% (14/97) of these muscle injuries throughout these three seasons were re-injuries (Table 1). Meanwhile, in the other 12 seasons only 7/241 injuries where re-injuries, which corresponds to 2.9% of total muscle injuries. The mean total number of injuries (77 vs 61), indirect muscle injuries (32 vs 20), and indirect muscle re-injuries (5 vs 1) were higher during seasons with a poor perceived level of cooperation compared to seasons with a normal/excellent perceived level of cooperation (all P's<0.001) (Table 1). Specifically, there was a significant increase in the mean number of total injuries (mean ± SE, 95% CI; 16±2, 12–21; P<0.0001), mean number of indirect muscle injuries (12±1, 95% CI 10–14; P<0.0001), and indirect muscle re-injuries (4±1, 95% CI 3–5; P<0.0001) during seasons with a poor perceived level of cooperation compared to seasons with a normal/excellent perceived level of cooperation. Table 2 presents the site and severity of injuries related to the 14 occasions when the coaching team completely overruled the advice of the medical team. The most common type of first injury was to the adductor muscles (28.6%), biceps femoris (28.6%), and rectus femoris (28.6%) followed by the gastrocnemius (7.1%) and semimembranosus (7.1%; Table 2). The majority of re-injuries were grade II strains (85.7%) and with hematoma (64.3%; Table 2).

Discussion

Our study is the first to report that the total number of injuries, indirect muscle injuries, and muscle re-injuries might be affected by the level of cooperation between a coaching and medical and team in a professional football club. Despite earlier media reports[6,7] suggesting a possible link between a lack of coaching and medical teams cooperation and player re-injuries, the sports medicine literature has traditionally focused on conventional risk factors contributing to re-injury.[4,5] Longitudinal analysis of player injury data over 15 consecutive seasons illustrates that a lack of cooperation and consensus on player management between coaching and medical teams seems to be related to a higher number of re-injuries in professional football players at one club in the UAE. During the 2005/2006 season, the head coach systematically questioned and opposed the medical team's diagnosis and player management plan and refused to admit that the specific type of injuries (ie, two muscle contractures the second day after the game and three grade 1 strains) required treatment and/or rest. At the time, the head coach overruled the proposed treatment and rehabilitation plan proposed by the medical team and demanded that the players continued to train with the rest of the squad. Consequently, the injured players aggravated their injuries and had to complete a longer recovery period and this resulted in an increase in the time taken to return-to-play.

During the 2008/2009 season, the medical team experienced a further conflict with the physical coach which involved an injured player prematurely returning to the field during the re-athletization[8] phase without consulting the medical team for an injury review update. Subsequently, the player developed a re-injury.

During the 2016/2017 season, the coaching staff were continually pressuring the medical staff to reduce the return-to-train/play periods in order to get the players back to training/playing as soon as possible. The coaching team completely disregarded the re-injury prevention program during re-athletization and decided to immediately return the injured players back to practice with the main training squad without letting them workout gradually at the gym and the pitch

Table 1 Season, team, player, injury, and perceived level team cooperation data for a professional football club in the United Arab Emirates 2002–2017

Season	Player squad size	Mean age (years)	Total injuries	Indirect muscle injuries	Indirect muscle re-injuries	Perceived cooperation medical/coaching staff
2002/2003	22	27	65	22	1	Normal
2003/2004	22	25	63	19	0	Normal
2004/2005	23	24	62	20	0	Excellent
2005/2006[a]	23	25	79	31	5	Poor
2006/2007	22	26	63	20	2	Normal
2007/2008	23	25	62	21	0	Excellent
2008/2009[a]	23	25	75	33	5	Poor
2009/2010	25	26	60	21	1	Normal
2010/2011	22	24	53	22	0	Normal
2011/2012	23	25	57	19	1	Normal
2012/2013	23	25	62	20	1	Excellent
2013/2014	23	26	61	21	0	Excellent
2014/2015	26	25	59	19	1	Normal
2015/2016	26	26	61	17	0	Excellent
2016/2017[a]	23	25	77	33	4	Poor
All seasons		25	959	338	21	

Note: [a]Denotes a season when there was a change of head coach.

Table 2 Site and severity of injuries related to poor cooperation between coaching and medical teams when the coaching team completely overruled the medical team's advice

No. injuries (season)	1st injury	Re-injury	Club decision
5 (2005/2006)	1 Contracture of the *biceps femoris* 1 Contracture of the gastrocnemius 1 Grade I strain of the rectus femoris 1 Grade I strain of the biceps femoris 1 Grade I strain of the adductors	1 Grade I strain 1 Grade II strain with hematoma 1 Grade II with hematoma 1 Grade II strain 1 Grade II strain with hematoma	All coaching staff changed mid-season (poor technical results)
5 (2008/2009)	2 Contracture of the biceps femoris 2 Grade I strain of the adductors 1 Grade I strain of the rectus femoris	1 Grade I strain 1 Grade II strain with hematoma 1 Grade II strain with hematoma 1 Grade II strain 1 Grade II strain with hematoma	Physical (strength and conditioning) coach changed mid-season (decision of the head coach)
4 (2016/2017)	1 Contracture of the biceps femoris 1 Contracture of the semimembranosus 1 Contracture of adductors 1 Grade I strain of the rectus femoris	1 Grade II strain with hematoma 1 Grade II strain with hematoma 1 Grade II strain with hematoma 1 Grade II strain	All coaching staff changed mid-season (poor technical results)

following a managed and progressive workload. Re-injuries occurred at a more significant rate during this time period.

This study is nested within a larger ongoing project conducted by a multi-disciplinary research team involving the European College of Sports Physicians (ECOSEP)[9] and the FC Barça FIFA Medical Centre of Excellence[10] and that comprehensively assess the epidemiology of injuries in a UAE professional football club over the period of 15 consecutive seasons.[11] Our nested study found a significant difference in the number of muscle re-injury in the three seasons where cooperation was rated as "poor" between medical and coaching staff compared to the number of re-injury in the 12 seasons where cooperation was rated as "excellent/normal" (14.4% vs 2.9%; $P<0.001$). In accordance with the literature,[1–3,9,10,12] we have also found that muscle injury is the most common in professional football players, at least at one club in the UAE.

Clinical and practical implications of study findings

The most fundamental task of medical staff in professional sport is to limit the number and severity of injury or re-injury through the development of preventive programs which aim to minimize risk factors. Despite these efforts, when the muscle injury occurs, athlete management requires an in-depth collaboration between coaching and medical teams. This collaboration is critical especially during the phase of re-athletization before the player can resume normal training with the core player group. During this key phase, the player must undergo a very specific, managed, and progressive strengthening program in order to prevent the risk of re-injury. The implementation of prevention programs as well as the management of the re-athletization phase requires a high level of collaboration between both the coaching and medical teams. A significant part of these two steps occurs both in the gym and on the field. Some coaches prefer to take control of the re-athletization without any supervision of support from the medical team and claim to manage the player's workload in order to prevent re-injury.[13] We refer to as re-athletization[8] as "re-adaptation" in the muscle-injury guide of FC Barca.[10] It is the phase of transition between the medical department and the field for a progressive return to practice with the group. It is based on a very precise criteria of progressive load management set by the medical team to prevent the re-injury.[14] The scientific literature addressing the risk factors for muscle re-injury is quite underdeveloped and primarily focuses on traditional athlete-level risk factors without considering the role of poor cooperation between coaching and medical staffs as one of these risk factors.[15,16]

Strengths and limitations

To the best of our knowledge, our study is the first to 1) report the number of indirect musculoskeletal injuries among professional footballers in the UAE over 15

consecutive seasons and 2) study the effect of poor cooperation between coaching and medical teams on injuries (ie, total, indirect muscle, and re-injuries) in professional football over 15 consecutive seasons. Despite the strengths and novelty of our study, findings are from one professional football club in the UAE and future studies conducted in different clubs, leagues, countries, and even sports are required to further explore the effect of poor cooperation between coaching and medical staff on risk of re-injury. Finally, the level of cooperation was a subjective measure ranked on a three-point Likert scale by the head of the medical team based on their perception on the level of cooperation between the coaching and medical staff. Future studies may want to employ novel anonymous data collection tools and involve additional members from the coaching team, medical team, players, and possibly other club staff to rate the perceived level of cooperation. Such study designs would provide 360-degree data collection and an average score on the level of cooperation could be used to explore the effect of coaching and medical team cooperation on injuries.

Conclusion

This study provides preliminary evidence that poor cooperation and coordination between coaching and medical staff in a professional football club may be one of the important risk factors for muscle re-injury. A lower number of total injuries, indirect muscle injuries, and re-injuries were observed during the seasons when cooperation between the coaching and medical teams was rated as "excellent" or "normal." These findings suggest that coaching staff should work closely with the medical team during the re-athletization phase to understand the importance of managed, monitored, and progressive return-to-train workload programs. Early signs of a muscle injury must be carefully monitored (like in the case of muscle contractures) and addressed in a very short period of time (usually no longer than 48 hrs) in order to avoid the aggravation of the injury which would result in a longer recovery period. It is important to bear in mind that some players may not accurately report the level of pain experienced due to many reasons, which contributes to the under-estimation of the injury in its earliest stages. Finally, it is important that communication, trust, and cooperation remain optimal between coaching and medical staff in order to limit the risk of re-injury and thus allow the club to perform at a high level athletically and from a financial perspective as well.

Consent statement

The football club approved the use of the de-identified data for this research project and provided consent for publication.

Data sharing statement

All relevant data are within the paper. Access to the raw data is legally governed by the football club and FIFA Medical Centre of Excellence Dubai (UAE). Data may be available after application and agreement with the corresponding author and FIFA Medical Centre of Excellence Dubai (UAE). In addition to this application, an existing or new approval from the ethical committee of the FIFA Medical Centre of Excellence Dubai (UAE) may be required. Details on this procedure are available from the corresponding author.

Acknowledgment

The authors would like to thank the football club for approving the study and all of the players and staff who were involved in the study.

Author contributions

MG conceptualized the study and coordinated the design, collection, analysis and interpretation of data. MG, XV, and NM prepared the data, TL analyzed the data, and all authors contributed to data interpretation. MG and TL drafted the manuscript and XV, NM, and RP critically reviewed and revised the manuscript. All authors reviewed and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

Disclosure

The authors report no conflicts of interest in this work.

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