JPRM
Journal of Preventive and Rehabilitative Medicine

2020; 2(1): 61-67
PublishedOnline:01/10/2020
(https://journals.unza.zm/index.php?journal=medicine)
DOI: 10.21617/jprm2020.220

ISSN: 2415-038X (Print)

RESEARCH ARTICLE Open Access

Retrospective Review of Injury Patterns Among Ghanaian Footballers During the 2009-2010 League Season

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Abstract

To cite this article:
Larwch M, Quartey J, Kwakye SK. Retrospective Review of Injury Patterns Among Ghanaian Footballers During the 2009-2010 League Season. *Journal of Preventive and Rehabilitative Medicine,* Vol. 2, No. 1, 2020, pp. 61-67. doi: 10.21617/jprm2020.220

Background
The increased popularity of football in addition to the physical and mental demands placed on players increase the risk of soccer injuries. We set out to identify injury patterns among footballers involved in selected Glo sponsored Ghana premier league games during the 2009/2010 season.

Methodology
Digital video compact discs (DVDs) of thirty randomly selected 2009/2010 matches were acquired for the study from the Ghana Football Association. A Samsung DVD player and television set were used to playback and watch the matches. The researchers stopped the video immediately an injury occurred and the disc was then put in slow playback movement whilst the occurrence of injury was recorded on an injury report form. All statistical analyses were performed using SPSS version 20.

Results
A total of 139 injuries were recorded during the study with an average injury incidence of 4.63±1.99 injuries per match. Tackling attempts (51.1%) was the predominant mechanism of injury with the ankle (26.6%) being the most injured body part. There was a significant association between player position and number of injuries suffered (p=0.038) and a significant association observed between player position and severity of injuries (p = 0.042). The uses of icepack (34.5%) and vapocoolant spray (32.4%) were the most common first aid treatment for the injuries sustained.

Conclusion
The study indicated that professional football players in Ghana are exposed to high injury risks as evident by the relatively high injury incidence.

Keywords: *Football, footballers, playback, injuries, digital video compact discs*

Received: *18 April 2019* ***Accepted:*** *04 August 2020* ***Published:*** *1 October 2020*

Introduction

Football, the most popular sport in the world, is a complex contact sport that demands physical, physiological, technical, and tactical skills while also being associated with a considerable risk of injury [1, 2]. The Federation of International Football Association (FIFA) has expressed its' concern about the demands placed on the modern-day footballer and translation of these physical and mental demands into injuries [3]. The overall level of injury to professional footballers is estimated to be about 1000 times higher than in industrial occupations generally regarded as high-risk. Professional footballers experience between 13 and 35 injuries per 1000 competitive player-hours, mostly resulting from player to player contact including tackling, being tackled, and collisions, and the remainder (non-contact) arise from actions such as running, shooting, turning and heading the ball [4,5].

Information from player medical report forms suggest that contact injuries represent 40 –74% of all acute injuries, mainly as a result of tackling duels. Thus, tackling attempts involving players during a game is thought to pose a substantial injury risk [5, 6, 7]. Description of in-game injuries has historically been collected from players and medical personnel using a post-game injury report form. With injuries normally happening at a fast pace and under stressful conditions, relying on players or team physicians to provide details and events leading to an injury may not be the best practice [5, 8, 9]. In order to study past games and plan match tactics, most elite coaches use video analysis of games. Similarly, post-match video analysis of games presents the opportunity to accurately describe events leading to injury occurrence and the mechanisms associated with injuries, eliminating the recall bias associated with using injury report forms [9, 10].

Team physicians, physiotherapists and athletic trainers would require basic understanding of the most common pattern of injuries in their sports in order to ensure safe participation for athletes. This is essential as a thorough understanding of the causes and mechanisms of soccer injuries, body parts injured and form of treatment applied could help in the overall administration of the game [11]. The most common single injury is sprained ankle [12]. Torn ligaments in the ankle and knee are the most common injuries that require a long recovery period [12]. Cryotherapy or icing has been shown to be the commonest sideline treatment in most sports including football [13, 14].

To minimize the number of injuries, associated costs, and the early retirement of professional football players, and to provide a safe and healthy sports environment, preventive programmes are recommended. These preventive programmes require information on injury and the risk of injury associated with different aspects of the game [15]. Despite the popularity of the game of football in Ghana, there is a dearth of literature about football injuries and their causative mechanisms. This study therefore seeks to identify the injury pattern among male footballers involved in selected 2009/2010 Glo Premier League games in Ghana.

Materials and Methods

The study was conducted on registered football players of sixteen teams involved in the 2009-2010 Glo Premier league in Ghana. The Ghanaian premier league is a double round competition with home and away matches between 16 teams with a total of 240 games played during the regular season and majority of the games video recorded. A randomized sampling method was used to acquire digital video compact discs (DVDs) of 30 matches from the Ghana Football Association. The recorded matches available were numbered based on home and away bases from one to the last number on a piece of paper. The numbered match papers were placed in two bowls depicting home and away. Fifteen papers were picked from each bowl without replacement and analyzed for this study.

An injury report form designed for data collection was used to record the observed injuries. The content validity of the injury report form was tested before being used for the study. The form included information on; site of injury on the player, cause(s) of injury, severity of injury, player position, first aid rendered, area of pitch where injury occurred as well as period of season and game (first or second half) during which injury occurred.

A Samsung DVD player and television set were used to playback and watch the 30 selected matches. The DVDs were analysed by

researchers and two recruited assistants with observations agreed upon by all 4 investigators before they were recorded. An injury occurrence was defined as any situation where there was a stop in play by the referee, with one or more players lying on the pitch for more than 15 seconds and appeared to be in pain or required medical treatment. The 15-second time frame was adopted because that allowed enough time to avoid players intentionally lying on the pitch to either rest or waste time [6]. The researchers stopped play immediately an injury occurred and the disc was then put in slow playback movement while all the actions leading to the occurrence of the injury were recorded on the injury report form including which half of the game and whether the injury occurred in the first, middle or late phase of season. Injury severity was classified as mild, moderate or severe. A minor injury occurred when the player received "first aid" on the field of play (but without any additional treatment on the sideline); a moderate injury was when the player received treatment off the field of play but continued for the remainder of the game and a major injury was when the player received treatment and left the field for the remainder of the game [12]. The research data was collected (playback of matches) over a period of eight weeks.

Descriptive statistics of frequency distributions, pie charts, bar charts and percentages were used to represent the data obtained. Chi-square analysis was used to test for association between player position and number of injuries suffered, player position and severity of injuries, period of match and number of injuries sustained. Z-test for two proportions was also used to test for significant difference between the proportions of mild, moderate and severe injuries sustained. All statistical analyses were performed using SPSS version 20 and only results with p-values $\leqslant 0.05$ were presented as statistically significant.

Results

One hundred and thirty-nine (139) injuries were recorded from a total of 30 games watched as presented in Table 1. The average injury incidence per game was 4.63 ±1.99, with number ranging from two to eight injuries per game. Of the 139 injuries, each player position (goalkeeper, defender, midfielder and striker) was affected. Midfielders sustained majority (46.8%) of the injuries recorded while the least (12.9%) were sustained by goalkeepers as shown in Table 2 and there was a significant association between player position and the number of injuries suffered (p=0.038).

Out of the 139 injuries recorded during the season, 100 (72%) occurred in the second halves of games, affected most players and body parts except goalkeepers and the head of which 28 (47.5%) and 15 (25.4%) were ankle and knee injuries respectively. There were 69 (50%) of injuries during the latter part of the season as compared to 45 (32.4%) in the mid and 25 (18%) during the early part of season. Classification of severity of injuries sustained showed that, majority (82%) of the injuries recorded were minor. Moderate injuries accounted for 11.5 % of the injuries and severe injuries (6.5%) were the least type of injuries seen. Z-test for two proportions (Table 3) showed a significant difference between the proportions of mild injuries and moderate injuries (p=0.001), mild injuries and severe injuries (p=0.001) whiles that of moderate injuries and severe injuries was not statistically significant (p=0.692).

Table 1: Summary of injury incidence per game

GAME	NUMBER OF INJURIES
Berekum Arsenal versus RTU	6
Kotoko versus Berekum Arsenal	6
Hearts of Oak versus RTU	2
Kessben FC versus RTU	5
Aduana FC versus Hasaacas	5
Heart of Lions versus Liberty Professionals	2
Hasaacas versus Eleven Wise	2
Bechem Chelsea versus RTU	8
Asante Kotoko versus Wa All Stars	7
Hearts of Oak versus Asante Kotoko	5
Aduana FC versus Ashanti Gold	3
Hearts of Oak versus Great Olympics	2
King Faisal versus Asante Kotoko	2
Heart of Lions versus New Edubiase	7
Asante Kotoko versus Bechem Chelsea	2
Ashanti Gold versus Hearts of Oak	4
Heart of Lions versus Ashanti Gold	4
Berekum Arsenal versus RTU	6
Aduana FC versus Great Olympics	2
Kessben FC versus New Edubiase	4
Asante Kotoko versus RTU	7
RTU versus Liberty Professionals	6
Hearts of Oak versus Ashanti Gold	6
Eleven Wise versus Aduana FC	5
RTU versus Hearts of Oak	7
Ashanti Gold versus New Edubiase	5
Liberty Professionals versus Hasaacas	2
King Faisal versus Great Olympics	5
Wa All Stars versus Berekum Arsenal	4
New Edubiase versus Kessben FC	8
TOTAL	139

Table 2: Injury incidence with respect to player position

PLAYER POSITION	NUMBER OF INJURIES	X^2	P-value
GOALKEEPERS	18		
DEFENDERS	26		
MIDFIELDERS	65	9.76	*0.038
STRIKERS	30		
TOTAL	**139**		

Table 3: Z-test analysis of injury severity

SEVERITY OF INJURY	Z-value	P-value
MILD VRS MODERATE	5.933	*0.001
MILD VRS SEVERE	5.109	*0.001
MODERATE VRS SEVERE	0.396	0.692

Of the 139 injuries seen, a total of 114 (82%) mild injuries were recorded of which midfielders (44.7%) and strikers (21.9%) were the most affected while goalkeepers (13.2%) were the least affected. Midfielders and strikers were the only player positions that suffered moderate injuries, accounting for 68.25% and 31.25% respectively. The total number of severe injuries recorded were equally distributed among goalkeepers (33.33%), defenders (33.33%) and midfielders (33.33%). Chi-square analysis showed significant association between player position and the severity of injuries suffered (p=0.042) (Table 4). Majority (74.8%) of all the injuries recorded were as a result of tackling attempts and collisions. Tackling attempts 71(51.1%) were however the most common mechanism of all injuries while the rest 33 (23.7%) was collisions injuries. Injuries sustained as a result of being hit by the ball were the lowest recorded. The various mechanisms of injuries sustained are summarized in Table 5.

Tackling attempts (51.1%) and collisions (23.7%) were the two most common mechanisms leading to the occurrence of mild injuries seen. The moderate injuries sustained were most frequently as a result of collisions (43.8%) followed by tackling attempts (31.3%). The results further show that, a sudden turn or twist (four injuries), tackling attempt (three injuries) and awkward landing (two injuries) were the only mechanisms that resulted in severe injuries (Table 5).

Table 4: Severity of injuries with respect to player position

PLAYER POSITION	SEVERITY OF INJURY					
	MILD	MODERATE	SEVERE	TOTAL	X^2	P-value
GOALKEEPERS	15	0	3	18		
DEFENDERS	23	0	3	26		
MIDFIELDERS	51	11	3	65	5.342	*0.042
STRIKERS	25	5	0	30		
TOTAL	114	16	9	139		

Table 5: Injury severity with respect to mechanisms of injury

CAUSE OF INJURY	SEVERITY OF INJURY			
	MILD	MODERATE	SEVERE	TOTAL N (%)
TACKLING ATTEMPT	62	5	3	71 (51.1)
COLLISION	26	7	0	33 (23.7)
AWKWARD LANDING	17	1	2	20 (14.4)
HIT BY BALL	6	1	0	7 (5.0)
SUDDEN TURN/TWIST	2	2	4	8 (5.8)
TOTAL	114	16	9	139 (100)

Lower extremity (hip, groin, thigh, knee, shin, calf and ankle) injuries formed the highest proportions of injuries recorded, with the ankle (26.6%) being the most injured anatomical site (Figure 1). The results also show a high incidence of head (16.5%) and knee (15.8%) injuries recorded as depicted in Figure 1.

Injured players mostly received first aid treatment on the field of play with cryotherapy, either as icepack (34.5%) and/or vapocoolant spray (32.4%). A combination of vapocoolant spray and passive stretch (15.1%) was also a common treatment method used.

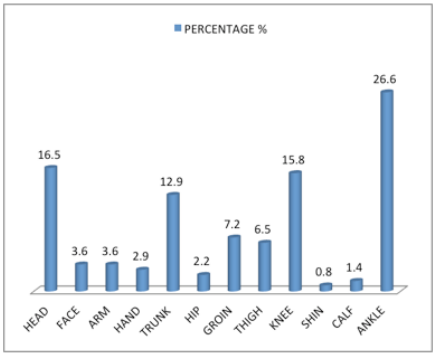

Figure 1: Bar chart showing the anatomical distribution of injuries sustained

Discussion

This study which sought to identify the injury patterns involved in the Ghana premier league revealed an overall incidence rate of 4.63±1.99 injuries per match which appears higher than incidence rates reported in other studies [1, 2]. This high injury incidence rate may be as a result of the poor nature of pitches as well as inappropriate equipment used during matches in the Ghana premier league. Most of the pitches used were hard and dry hence were not suitable for the traditional studded boots used by the footballers, predisposing them to injuries. Most of the players observed did not also wear shin guards, which are used to protect specific parts of the lower limbs from sustaining injuries during tackles. The high injury incidence may also be as a result of the diving tackles undertaken by some players due to the competitive nature of the league. Additionally, most of the injuries occurred during the second halves of the games and the latter part of the season probably due to fatigue and other reasons indicated earlier.

Football injuries mostly affect the lower limbs and the head [2, 5, 8] and this anatomical distribution was similar to the injuries revealed by this study, with the ankle being the most affected site. The ankle is the main point of contact during possession of the ball hence most susceptible to injuries during tackles. Ankle injuries are frequently caused by sharp twists or turns, which are components of dribbling and change of direction, which are all an integral part of football. Most of the footballers observed did not use ankle supports and straps that protect the ankle joint. This observation was made when players had to take off their boots and socks to expose their bare skins for treatment purposes. The incidence of head injuries as a result of head to head contact (when two players attempted to head the ball simultaneously) was also a common observation of this study.

The outcome of the study showed a significant association between player position and number of injuries suffered. Midfield and striking were the most vulnerable playing positions to injuries and is consistent with previous studies [1, 12]. The high injury risk among midfielders and strikers could be due to the fact that these are the playing positions that are mostly involved in attacking play and have the most possession of the ball and hence most vulnerable to contact injuries. It was observed that, goalkeepers sustained the least number of injuries and lends credence to other studies [1, 12], which indicate that goalkeepers sustain fewer injuries than other players. It could thus be interpreted that, goalkeepers tend to sustain fewer injuries because their hands, which are mostly used in play are properly protected in padded gloves. Goalkeepers do not also have much contact with the ball during play, hence are less susceptible to tackles. The results of this study are therefore suggestive that playing position is an influential factor to injury incidence.

Due to the competitive nature of the Ghana premier league, it is not surprising that tackling attempts and collisions were the most common causes of injuries identified. The aggressive nature of players when they jostle for a loose ball or try to get possession of the ball may be responsible for the high magnitude of tackling attempts that lead to injuries. The lower extremities were the most injured during tackling attempts as players were probably not able to respond quickly enough to avoid the impact of such rapid and unpredictable movements. Awkward landing by players was the commonest non-contact injury mechanism observed in this study. The hard and dry nature of most of the pitches used for the league games could be a contributing factor to this observation. Players often jump and land during activities such as heading, shooting and goalkeeping. The impact from inappropriate landing on the hard and dry pitch could therefore translate into injuries. The other non-contact injury mechanism seen was a sudden turn or change in direction by players. This may be due to insufficient time-taken for warm up exercises by the players before matches, which invariably prevents muscles to fully stretch suddenly, thus exposing the players to injuries. On the other hand, increased frictional force between the cleats of a player's boots and the surface of the pitch produces a large torque when twisting and turning, which may also could have led to injury [2].

The standard choice of treatment for sideline management of football injuries is cryotherapy in the form of icepack and vapocoolant spray [22, 23]. Cryotherapy immediately following an injury relieves pain and muscle spasm and may decrease the

severity of bleeding and inflammatory response. Vapocoolant spray and ice massage is therefore encouraged in the sideline management of injuries as it prevents progressive weakness, stiffness and pain inhibition of function. The study could however not ascertain the professional credentials of those rendering the first aid as most Ghanaian premier league teams do not employ the services of physiotherapists.

Conclusions

This study showed that professional football players in Ghana are exposed to high injury risks as evident by the relatively high injury incidence premier league games. The injury risk may however be different for each player position and the number of injuries suffered. The study further showed that majority of the injuries suffered were due to contact, most of which were tackling attempts. This study provides information for developing preventive programmes for footballers of the Ghana premier league. It is therefore recommended that a similar study be conducted on a larger scale including test for association between type of injury and causative mechanism to probably identify other factors leading to injuries and subsequent time loss from participation for amelioration purposes.

Declaration

Acknowledgement

We are grateful to the Ghana Football Association for making the DVD's of selected matches available for analyses.

Disclosures

Funding Source: None

Conflict of interest: There is no conflict of interest to declare

Author contributions

ML and JQ contributed to the study design and collected data. ML, JQ and SK analysed data obtained. SK sourced and reviewed relevant literature. ML, JQ, and SK wrote and also reviewed the manuscript for important intellectual content. ML, JQ, and SK revised the draft version and approved the final version of the manuscript for submission.

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