

**THE EPIDEMIOLOGY OF SOCCER INJURIES  
SUSTAINED IN A SEASON OF A PROFESSIONAL  
SOCCER TEAM IN SOUTH AFRICA**

By

**Marc Anton Naidoo**

(2026917)

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Physiotherapy,

Department of Physiotherapy,

UNIVERSITY of the  
WESTERN CAPE  
University of the Western Cape

Cape Town, South Africa

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**Supervisor:**

Prof Julie Phillips

Department of Physiotherapy

University of the Western Cape, South Africa

## **ABSTRACT**

Literature has described soccer as the most popular sporting code in the world. South Africa heralds a registry of 1.8 million players. The purpose of the study was to conduct a detailed analysis of soccer injuries sustained in South African professional soccer team over one competitive season. The study utilized a questionnaire to collect quantitative data assessing age of players injured, playing position, site of injury, mechanism of injury, injury management, physiotherapy access and prevention measures which was administered by a physiotherapist at competitive matches. The study defined injury as any injury sustained during competitive matches where a player received medical attention. The study sample consisted of 26 male soccer players ranging from 17-39 years with a mean age of 23.77 years (SD=5.233). Injury prevalence was reported as 58% with a significance ( $p < 0.05$ ) in the ages of players injured compared to the non-injured. The majority of injuries were sustained by the 20-24 year old players coupled with midfielders being the most predominant position encountering injury (40%). The lower limbs were the most affected (67.1%) with the knee being reported as the most affected joint (21.4%). Defenders and midfielders were significantly more likely to sustain a lower limb injury compared to goalkeepers and forwards who were seen to incur more trunk injuries. The majority of injuries were the result of being tackled (27.2%). A significance was reported with mechanism of injury and playing position (Fisher's Exact=41.118,  $p < 0.05$ ). Injury management was predominantly self treatment followed by physiotherapy

treatment (30%). The main contributor to the decrease in physiotherapy treatment received by players the absence of the service at the club (65.7%) and financial reasons (54.3%). The results of the study confirm that many South African professional soccer players are prey to sustaining injury during one competitive soccer season. The study highlighted the need to start prevention efforts at club level in order to curtail the high injury prevalence at professional levels.



**DECLARATION**

I declare that “**The epidemiology of soccer injuries sustained in a season of season of a professional soccer team in South Africa**” is my own work, that has not been submitted for any degree for examination in any other university, and that all the sources I have used or quoted have been indicated and acknowledged by means of complete references.

**MA Naidoo**

Signature.....

November 2007



**Witness**

.....

Professor JS Phillips

## DEDICATION

To my mother, Charmaine Naidoo, who passed away in December 2004, an outstanding woman, and mother. Your life was your testimony. In your absence you continue to inspire and motivate. In the challenges of her ill health she bore testimony to God's abundant love and His ultimate purpose in our lives by often quoting this to friends, family and even strangers;

### The weaver

My life is but a weaving  
Between my Lord and me  
I cannot choose the colors  
He worketh steadily

Of times he weaveth sorrow  
And I in foolish pride  
Forget He sees the upper  
And I the underside

Not till the loom is silent  
And the shuttle cease to fly  
Shall God unroll the canvas  
And explain the reasons why

The dark threads are as needful  
In the weaver's skillful hand  
As the threads of gold and silver  
In the pattern He has planned

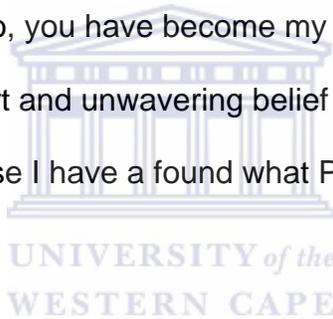
(Author unknown)

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A special thank you to my Dad, Professor Anthony Naidoo, you continue to be my hero and role model in life. Thank you for your constant nudging and belief in me through the good times and the bad. I appreciate your ability to always see

the bigger picture. You taught me that knowledge empowers but doesn't discriminate. Thanks for all the life lessons.

Finally to my twin brother, Nathan Naidoo, who has been my partner and best friend in life. Your support, love and tolerance will always be appreciated.

Finally to my friends and family..... Words seem inadequate to express feelings of appreciation to many, for years of support, encouragement and prayers. Thanks for your unwavering love.



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## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 INTRODUCTION TO THE CHAPTER**

The present study investigates the prevalence of injuries across an entire season sustained by soccer players of a team playing in the professional league in South Africa. In addition to tracking injuries related to player position and time of the season, the study will also assess where the site of injury was and what mechanism of injury (how the injury occurred) was involved during the injury and physiotherapy technique involved in the treatment. This chapter contextualises the rationale of the study highlighting the development of soccer locally and internationally as well as identifying numerous contributing factors resulting in injuries in this sport. The purpose of the study will be presented and the specific aims and objectives will be identified. The significance of the study lies in the need to understand the prevalence of injuries among soccer players and highlights the importance of prevention strategies. The chapter ends with the definitions of terms salient to the study and the abbreviations used in the thesis as well as an overview of the structure of the thesis and its progression.

## 1.2 BACKGROUND TO THE STUDY

One of the world's leading authorities on physical education history, Peter McIntosh (1976), has shown that the development of sport, during the pre-Christian era, was used as a method of preparing young people for war. This is very different from the motivation for participating in modern day sports activities.

In the 19<sup>th</sup> century, the general health of the population was gradually improving as a result of public health measures being introduced in European cities. People at that time were physically active in their everyday life. Walking was the principle mode of transportation and work involved manual labor. Thus until well into the 20<sup>th</sup> Century in most developing communities, individuals were generally physically active, even if they were not taking part in physical activity. As the Industrial Revolution evolved, ushering in the development and use of machinery to do the work of men, the working class was afforded more free time in which to indulge in sports (Williams, 1979).

The momentum of the sports movement was increased exponentially by Pierre De Coubertin, founder of the modern Olympic Games, at the end of the 19<sup>th</sup> century (McIntosh, 1976). As a result, more and more people today are participating in sport, whether for recreational or professional reasons. More so, it is no longer just a recreational phenomenon but a significant part of the community life in so-called developed countries (Williams, 1979). The author posits that sport enables people to meet within a defined and controlled situation,

thus allowing them to get to know each other as human beings, but without demanding other immediate changes or commitments. The significance in the South African situation is therefore quite apparent in that it breaches barriers previously dividing people on the basis of race, to now meet under the banner of a sporting code.

Football, called soccer in the United States of America, is the most widely played ball game in the world, and the most popular spectator sport (Patel, Stier, & Luckstead, 2002; Shepard, 1999; Metzl & Micheli, 1998). The New Britannica Encyclopaedia (2000) describes soccer as a game played between two teams consisting of eleven players. The objectives of the game are to propel a ball into the opposition's goal post by any means possible, except by the use of the player's arms. As more and more people began to take an interest in football, despite being frowned on by authorities, the rules of the game began to change and develop. In 1862 and 1863, numerous meetings of clubs in London, and surrounding countries agreed to print rules, and thus forming the Football Association. After football spread across the continents of Europe, it was agreed that an international organization was needed to manage the sport. In 1904, Belgium, Denmark, France and the Netherlands, Spain, Sweden, and Switzerland founded the Federation of International Football Association (FIFA) (The New Britannica Encyclopaedia, 2000). FIFA set out to organize a soccer world cup series, which would be scheduled every 4 years and played by various, international soccer teams. The first tournament was played in Monte

Video in 1930, and was won by Uruguay (The New Encyclopaedia Britannica, 2000).

Research describes soccer as a contact sport, moreover as a “collision sport” due to its overt physical nature (Fevre, 1998). McGarth and Ozanne-Smith (1997) described it as a vigorous, high intensity, intermittent ball and contact sport. From the elite and professional players representing their clubs and their country to the amateur playing at a recreational game, all players are susceptible to injury. In comparison to many other sports, soccer is a vigorous sporting activity with a relatively high injury incidence. This has been estimated to be between 17 -24 injuries per 1000 playing hours (Hagglund, Walden, & Ekstrand, 2005b) to the degree that Hawkins and Fuller (1999), Ekstrand, Walden, and Hagglund (2004) and Hagglund, Walden, and Ekstrand (2005a), aver that the football industry has a high risk of injury.

There have been a number of studies conducted in Europe and the United States that has examined the incidence of injury in youth soccer (Kibler, 1993; Schmidt-Olsen, Jorgensen, & Kaalund, 1991; Schmidt-Olsen, Bunemann & Lade, 1982; Sullivan, Gross & Grana 1980). The results suggested that most injuries were “minor” injuries and involved mostly the lower limbs. Major injuries, such as fractures and ligament sprains, were found predominantly in the ankle and the knee.

The influence of injuries on players and clubs is considerable. This ranging from being side-lined due to injury, time off playing, to medical and physiotherapeutic expenses, all of impacting team selection. Soccer injuries present a significant problem that could be significantly ameliorated were correct practices put into place to avoid injuries in the first place. In the English football leagues (in both Premier and Football League), the projected financial loss of output for the 1999/2000 season was £74.7 million (pounds sterling) given that approximately 10% of any squad was unable to train each week due to injury (Hawkins, Hulse, Woods, & Hodson, 2002). Additional injury costs could be included in the form of medical aid fees and increased insurance premiums.

**On 15<sup>th</sup> May 2005, in Zurich, Sepp Blatter, the President of FIFA announced that South Africa would host the 2010 Soccer World Cup, holding off the challenge from Morocco by 14 votes to 10, thus making South Africa the first African country to host the second biggest sporting event in the world, besides the Olympics. (The Associated Press, 2004). This is likely to spur on further interest in the game in a country where soccer is already heralded as the sport attracting the most participation at amateur and professional levels. With the resurgence will come the concomitant escalation in soccer-related injuries.**

While a large body of research has been conducted regarding the nature and prevalence of soccer injuries abroad, very little has been done locally or on the African continent to assess the status of injuries incurred at professional or

amateur levels. One isolated study, which assessed the epidemiology of soccer injuries in Rwanda and the need for physiotherapy intervention by Twizere (2004), concluded that ankle injuries accounted for 38.5% of all injuries with knee related injuries accounting for 26.7%. The most common mechanisms of injury identified were being tackled, collisions, landing, and overuse injuries. Another study conducted in Cape Town by Frantz, Amosun and Weitz (1999) at the South African inter-provincial under 20-soccer tournament also cited a high injury incidence. Jelsma, Dawson, Smith and Madzivire (1997) further conducted a study at the 6<sup>th</sup> All African Games to ascertain the injuries of various sporting codes including soccer.



### **1.3 PROBLEM STATEMENT**

There has been a dearth of research in Africa and more specifically in southern Africa, regarding the prevalence and type of soccer injuries sustained by professional soccer players. With the rapid emergence of professional teams competing at national and continental levels, a profile of soccer injuries of professional players can be very informative. This may inform preventative measures such as coaching and training regimes or rehabilitative physiotherapy intervention. As soccer-related injury expenses are a large problem nationally and internationally, there is a dire need to identify ways to prevent, ameliorate or reduce time-off due to injuries at team, clubs and country level of competition. The focus on prevention will allow coaches to field their best team for matches,

as well as allowing the team to practice and play more like a unit because the unit is not disturbed as frequently by injury. Physiotherapy focus will shift from rehabilitation to more of a training role i.e. plyometric and proprioception training which focuses on improving players over all performance.

#### **1.4 AIMS OF THE STUDY**

The primary aim of this study is to assess the prevalence of injuries tracked across an entire season sustained by professional soccer players of a 1<sup>st</sup> division soccer club and then to identify the need for physiotherapy intervention at professional league level.

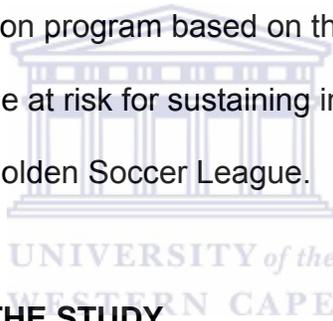


#### **1.5 OBJECTIVES**

The following objectives are articulated for the study:

1. To determine the prevalence of soccer injuries sustained among players of F.C. Fortune in the 2004/2005 season of the Mvela Golden professional soccer league;
2. To identify the sites, and mechanism of injuries sustained by players of F.C. Fortune during the 2004/2005 soccer season;
3. To determine if an association exists between the site of injury and the position of the player injured among players of F.C. Fortune;
4. To determine if an association exists between the position of injured players and the mechanism of injuries of F.C. Fortune ;

5. To determine if an association exists between injuries sustained and time during the season when the injuries occur in players of F.C. Fortune;
6. To determine the need for physiotherapy by players of F.C. Fortune during the 2004/2004 season in the Mvela Golden League;
7. To identify the treatment (physiotherapy and medical) received by the injured players with specific reference to physiotherapy management of F.C. Fortune during the 2004/2005 season;
8. Identify the current prevention measures undertaken by the players of F.C. Fortune during the 2004/2005 season;
9. To suggest a prevention program based on the results of the study for players of F.C. Fortune at risk for sustaining injuries during a season of soccer in the Mvela Golden Soccer League.



## **1.6 SIGNIFICANCE OF THE STUDY**

The results of this study will focus on the identification of factors which lead to the overall prevention of injuries incurred in soccer. Hawkins, Hulse, Wilkinsons, Hodson and Gibson (2001) and Van Mechelen, Hlobil, and Kemper (1992) described the preventative management of injuries as firstly identifying and describing the extent of the injuries incurred and secondly identifying the mechanisms involved in the injury occurrence. The information obtained from this process will be used to generate a comprehensive list of injuries sustained by players, possibly endemic, to F.C. Fortune. This list will highlight the extent and severities of injuries sustained by players and create more of an active

awareness of the need for preventative injury program. The study is also unique in that it will identify the need for physiotherapy management of these injuries and identify key factors of rehabilitation affecting the recover of players in South Africa. The study will hopefully establish baseline data of injuries sustained by professional players and lay the ground work for more comprehensive studies of its kind.

## 1.7 ABBREVIATIONS

The following abbreviations will be used in the thesis:

**FIFA:** Federation of International Football Association

**MCL:** Medial collateral ligament

**LCL:** Lateral collateral ligament

**RICE:** Rest, Ice, Compression, Elevation

**PRICE:** Protection, Rest, Ice, Compression, Elevation

**RICER:** Referral, Ice, Compression, Elevation, Rest

## 1.8 DEFINITION OF TERMS

The significant terms used in this study are defined below:

**Soccer:** This sport, also called football, is a game played between two teams consisting of eleven players. The objective of the game is to propel a ball into the

opposition's goal post by any means possible, except by the use of the player's arms (The New Encyclopaedia Britannica, 2000).

**Injury:** Injury can be defined as any physical incapacitation sustained in the course of the game that requires on field medical attention and/or renders the player unable unfit to complete the match/session (Emery and Meeuwisse (2006).

**Rehabilitation:** Rehabilitation is the intervention strategy, process or appliance utilized to return the athlete to participation in their respective sport as quickly as possible, while allowing the injured tissue to heal without compromising it by further injury (Mattaacola & Dwyer, 2002).

**Physiotherapy:** Physiotherapy, also called physical therapy, is a dynamic profession with an established theoretical and scientific base and widespread clinical application in the restoration, maintenance, and promotion of optimal physical function (American Physical Therapists Association, 2001).

## **1.9 OVERVIEW OF THE ORGANISATION OF THE THESIS**

The first chapter has highlighted the need for an epidemiological study of soccer injuries in the South African context. Sports development and its impact both nationally and internationally were discussed, highlighting soccer as the key focus of the study. The heuristic framework and the problem statement for this

study were also discussed. In addition, study objectives and significance were also expanded thus providing the research focus of the study.

Chapter two reviews pertinent literature in the field of sporting injuries. There exists a large and differential body of research that has contributed to this field and for this reason the literature review focuses mainly on the constructs pertinent to this study. In the first part of this chapter, soccer is looked at globally and then goes on to track its development in South Africa. Several epidemiological studies on soccer injuries are considered. As a consequence of the literature reviewed soccer injuries will be used to develop a theoretical orientation for the present study, namely, incidence, site, mechanism, burden of injury management of injuries and prevention of injuries.

In Chapter three the research method utilized in the study is described. The research problem and related hypotheses, sample used to gather the data from, the measuring instruments involved in the data gathering and the statistical methods used to analyze the data are presented.

Chapter four reports the results and outcomes of the quantitative data collected. The results included information related to the demographics, prevalence of soccer injuries, sites and mechanisms of injuries incurred and the association between site of injury and mechanism of injury. Further, associations between

injuries sustained and time during the season when the injuries occur will also be reported.

Chapter five provides an explication of the results of this study. The chapter unpacks the results and delineates the implications of the study, the limitations of the study and recommendations for future research.

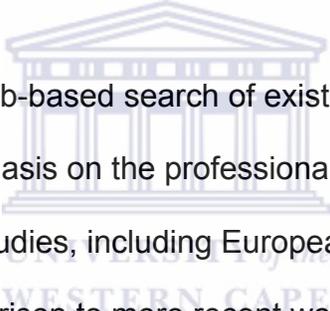
Chapter six provides a summary of the study and draws conclusions based on the findings. In addition recommendations based on the main findings of the study are made.



## LITERATURE REVIEW

### 2.1 INTRODUCTION

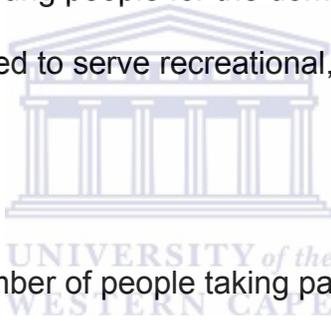
This chapter sources competency texts and journals studies in an attempt to review current thinking and research findings in the arena of soccer, more specifically soccer injuries. This chapter will delve into not only an analysis of literature but it will also attempt to link the researcher's topic of "the epidemiology of soccer injuries sustained in a season of a professional soccer team in South Africa" into the global context.



Initially a comprehensive, web-based search of existing soccer injury literature was performed with an emphasis on the professional population. The search encompassed all reported studies, including European journals and texts, which served as a basis of comparison to more recent work. Citations from the reference section in textbooks of sports medicine, family practice and other primary care specialties, orthopaedics, and general surgery were then identified. This was followed by a search of electronic data bases (MEDLINE from 1970 to 2007) and dissertation abstracts in all languages using the following subject terms: soccer injuries, football injuries and sport injuries. The search was then limited using the terms epidemiology, prevention, aetiology and control.

## 2.2 SPORTS IN A GLOBAL CONTEXT

The New Encyclopaedia Britannica (2000) cited sport as being an event used primarily for social interaction. An event used to showcase talent, skill and physical prowess. This source further suggests that initially most of the games revolved around a lot of running, throwing and jumping. This was due to the fact that most of the games were developed from basic hunting skills. One of the world's leading authorities on physical educational history, Peter McIntosh (1976), mooted that sport was developed during the pre-Christian era as an overt method of preparing young people for the dominant activity/ of war. In the 21<sup>st</sup> century, sport has evolved to serve recreational, professional and even commercial purposes.



“With the increase in the number of people taking part in sport and in the number of sporting contacts between different people and different countries, sport is no longer just a recreational phenomenon, but a significant part of community life in so-called developed communities. Sport enables people to meet within a defined and controlled situation, thus allowing them to get to know each other as human beings, but without demanding other immediate changes or commitments” (Williams, 1979, p. 2). The advent of the modern Olympic Games at the end of the 19<sup>th</sup> century has led to the exponential growth of the sports movement with more people engaging in sport for recreational or professional reasons.

Another impetus for the rapid proliferation of the sports movement has been that sport has been linked to healthy living and improved health. Regular physical activity has been shown to reduce the risk of premature mortality in general and of coronary heart disease, hypertension, colon cancer, obesity and diabetes mellitus in particular (Martinson, O'Connor & Pronk, 2001; Fletcher, Balady, Blair, Blumenthal, Caspersen, & Chaitman, 1996; Pate, Pratt, Blair, Haskell, Macera, & Bouchard, 1995). As postulated by Grubbs and Carter (2002), individual participation in adequate amounts of regular physical activity can improve health and prevent disease. Based on scientific evidence from various epidemiological, clinical, and physiological studies, Grubbs and Carter found that the health benefits of exercise are explicable in terms of favorable physiological, psychological, and biochemical changes and improvements in function. However, Hagglund, Walden and Ekstrand (2003) admonish that participation in sport also entails a risk of injury for all athletes, from the elite to the recreational level. Scandinavian studies have reported that sport injuries constitute 10-19% of all acute injuries seen in the emergency departments, and the most common types of injury are knee and ankle injuries (Bahr, Kannus, & Van Mechelen, 2003). Sport is therefore now no longer just a mere recreational activity. With the help of new communications and mass media technologies, sport is now considered to be a big, lucrative business providing high profile entertainment to the masses (Timpka, Ekstrand & Svanstrom, 2006). Athletes, with the help of trained personnel, now hone their skills in order to constantly push the borders of their performance, thus helping them to achieve results which help them to jump

higher, run faster, kick and hit harder just to mention a few. This ultimately leads to an increase in their popularity as an individual or collectively as a team. More importantly their earning potential also increases as a player or participant when they draw the masses to observe their participation in competitions.

## **2.3 THE DEVELOPMENT OF SOCCER**

### **2.3.1 Globally**

The origin of soccer dates back to as far as the 2<sup>nd</sup> century, with countries as far apart as Rome and China playing a ball game with elements of football, in which 2 teams kicked a round ball on opposite directions towards the opponent's goal post (The New Encyclopaedia Britannica, 2000). Soccer or football as it is sometimes referred to, is a branch of sport that has become one of the world's fastest growing and is currently heralded as the world's most popular sport (Metzl & Micheli, 1998; Shephard, 1999; Timpka, Ekstrand, & Svanstrom, 2006). In the United States soccer participation has been estimated to be between 12.5-18.2 million people, with an estimated annual increase in participation of up to 21.8% (Anderson, 2000). With well managed World Championships and international competitions, it also brings with it massive financial interest in many rich and developing countries. It therefore begins to become apparent why soccer's popularity has grown so much over the decades. As a result of soccer's popularity, it is now enjoyed in numerous countries, played on numerous different surfaces and in all kinds of climatic conditions, and played by both sexes.

The New Encyclopaedia Britannica (2000) suggests that football's popularity can be further contributed to the simple game rules and the ability to be played anywhere. It is played in all continents and in more than 150 countries. Besides registered leagues players and games, football is enjoyed by people playing in street games, parking lots, on school grounds, in parks, indoors, and even on beaches.

Soccer is a game that involves elements of running, jumping, kicking and heading the ball, as well tackling the opponent for the ball. Just like many other contact sports, soccer injuries are the result of direct forces/blows or from indirect mechanisms. The objective of the game is to propel a ball, weighing about 430g (15oz), into the opposition's goal post by any means possible, except by the use of the player's arms. The goalkeeper is the only person permitted to handle to ball with his hands and this is also only permitted in designated parts on the field, namely the goalie's box. The game is played between two teams consisting of eleven players consisting of 10 outfield players and one goalkeeper (The New Encyclopaedia Britannica, 2000; Kirkendall, 2000). The size of the field is routinely up to 105 m long and 68 m wide. The game is played in two periods of nominally 45-minute halves with a 15-minute intermission or rest period. Once the game gets underway, no time-outs are allowed, the clocked is stopped only at the referee's discretion. Substitution rules vary by league from very lenient to highly restrictive (Kirkendall, 2000).

As more and more people began to take an interest in football, despite being frowned on by authorities, the rules of the game began to change and develop. In 1862 and 1863, numerous meetings of clubs in London, and surrounding countries agreed to established rules for the game. These rules were printed forming the Football Association (The New Encyclopaedia Britannica, 2000). After football spread across the continents of Europe, it quickly led to the formation of an International Organization to manage the sport. This international organization was formed in 1904 when Belgium, Denmark, France, the Netherlands, Spain, Sweden, and Switzerland founded the Federation of International Football Association (FIFA). To promote the appeal of the sport, FIFA began to set up a soccer world cup series, which was to be scheduled every 4 years and contested by various, international soccer teams. The first tournament being played in Monte Video in 1930 produced the first soccer world cup champions, Uruguay (The New Encyclopaedia Britannica, 2000). In 2010 the world cup will be hosted by South Africa as the first African country to stage this prestigious tournament.

### **2.3.2 Soccer in the South African Context**

Soccer was played as a social sport in South Africa as early as the 19<sup>th</sup> century but was divided racially as a result of the social divisions at the time. Different leagues were formed in order to cater for different ethnic groups, namely The Football Association of South African (FASA) for white players, the SA Indian Football Association (SAIFA) for players of Indian heritage, the SA Bantu

Football Association (SABFA) for black players, and the SA Coloured Football Association (SACFA) for coloured players. South African soccer continued to be characterised by racial segregation during the era of Apartheid. This resulted in the denial of highly talented Black players from playing in major competitions or levels of competition because of their racial classification (News24, 2004).

By 1964 South Africa was suspended for the second time from FIFA due to its oppressive racist policies. In 1976, the Soweto uprising led to FIFA expelling South Africa formally from its organisation, thereby banning South Africa from competing with other international states that were affiliated to its organisation. After the political liberation in 1990, the previously racially divided soccer leagues merged in 1991 to form the South African Football Association (SAFA), no longer divided along the lines of race but rather on performance and skill (News24, 2004). A nation once divided, began to unite with sport as the medium.

The progressive intentions of SAFA can be gauged from its mission statement postulates (News 24, 2004):

1. Promoting and facilitating the development of soccer through sustainable infrastructural and training initiatives.
2. Engaging in pro-active dialogue with the government to generate a partnership in recognition of soccer as a national asset.
3. Creating an image as being a stable, progressive and innovative institution
4. Creating a mutually beneficial relationship with the corporate worlds

5. Contributing to Africa's ascendancy in world soccer through the hosting of major soccer events in Africa, while aspiring and striving to become a leading soccer nation.

Soccer's popularity in the "new" South Africa is becoming more and more apparent, having the largest amount of registered players than other codes of sport (in excess of 1.8 million), the highest television audience, and the greatest number of spectators (News24, 2004). The popularity and appeal of the sport in South Africa was increased exponentially when Sepp Blatter, the President of FIFA, announced on 15 May 2005, that South Africa would host the 2010 Soccer World Cup (The Associated Press, 2004). This helped to catapult South Africa into the history books, becoming the first African country to host the second biggest sporting event in the world, besides the Olympics.



## **2.4 EPIDEMIOLOGY**

### **2.4.1 Sports**

Epidemiology is defined as the study of the distribution and determinants of varying rates of disease, injuries, or other health states in human populations for the purpose of identifying and implementing measures to prevent their development and spread (Caine, Caine, & Linder, 1996). They further suggest that sports epidemiology can be either descriptive or analytical (Fig 2.1).

Descriptive studies answer questions such as: how many injuries, who is injured, where is the injury, when does the injury occur and what is the outcome/result of the injury. Analytical studies answer questions related to why the injuries occur and what caused the injury to take place.



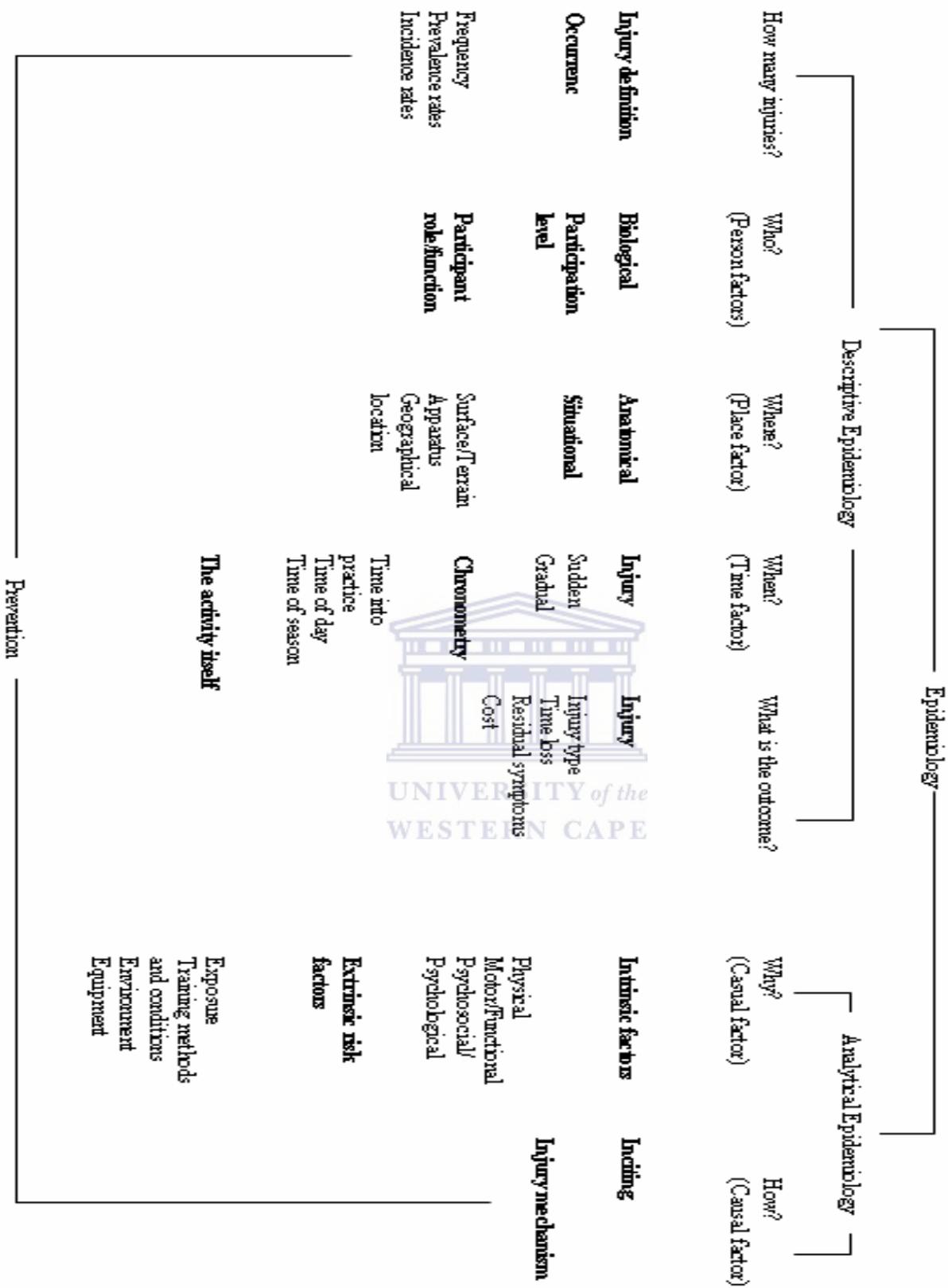
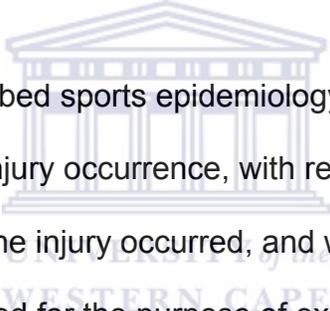


Fig 2.1 Sport Epidemiology (Sourced from Caine et al., 1996)

The growing popularity of sports and exercise is focusing attention on the injuries that may occur in addition to the health benefits (Tai-Seale, 2003; Terguson & King, 2002; Fentem 1994). Treating sports injuries may be expensive, hence preventative strategies and measures are required on economic as well as medical grounds (De Loes 1990; Sandelin, Santavirta, Lattila, Vuolle, & Sarna, 1987; Timpka et al., 2006). Several epidemiological surveys have outlined the frequency and types of injuries in various sports, but study comparisons are complicated by the different injury criteria used as well as by inconsistency in data collecting and recording (Brooks & Fuller, 2006).



Duncan (1998) further described sports epidemiology as being a process concerned with quantifying injury occurrence, with respect to who is affected by the injury, where and when the injury occurred, and what is their outcome. This information could then be used for the purpose of explaining why and how injuries occur and identifying strategies in order to attempt and prevent them from occurring.

Powell, Kohl, Caspersen, and Blair (1986) described descriptive epidemiology as the most commonly used research, published in sports injury literature at the time. This has not changed much since then, according to Hagglund, Walden, Bahr and Ekstrand (2005a). In this type of research the main aim is to attempt to quantify the occurrence of injury. The most basic measure of injury occurrence is a count of injured person. The two most commonly reported rates in the sports

injury literature are incidence and prevalence. According to Dawson and Trapp (2004), incidence rates refer to the number of new injures that occur in a population at risk over a period of time and is the most basic expression of risk. Prevalence rates refer to the total number of cases, new or old, that exists in population at risk at a specific period of time. Therefore prevalence and incidence rates are static and dynamic measures respectively.

#### **2.4.2 Soccer injuries**

As soccer's popularity increases, the probability of players or participants falling prey to injury is fairly pronounced. Soccer is a game that involves a combination of elements such as running, jumping, kicking and heading the ball, as well tackling the opponent for the ball. Just like many other contact sports, soccer injuries are the result of direct forces/blows or from indirect mechanisms. All soccer players are susceptible to a myriad of injuries ranging from head and facial injuries spinal and back injuries, chest injuries, abdomen and pelvis injuries, upper limb injuries and more commonly lower limb injuries. According to Hackney (1994), sports injuries are the result of both intrinsic and extrinsic factors. Intrinsic factors include the age, weight, sex, flexibility and strength of the athlete. Extrinsic factors include training methods, the surface played or practiced on, the equipment used (padding and footwear), and lastly the environmental factors. McGarth and Ozanne-Smith (1997) also cite pre-season conditioning as an additional factor influencing soccer injuries. In soccer, safety interventions and improved treatment of injuries and rehabilitation may help prevent future injury

(Hagglund et al., 2004; Ekstrand & Gillquist, 1983b; Ekstrand, Gillquist, & Liljedahl, 1983).

Emery and Meeuwisse (2006) defined injuries as any injury occurring in soccer that resulted in medical attention, the inability to complete a session, and/or missing a subsequent session. According to Hagglund et al. (2005a), there is a problem associated with epidemiological studies of football injuries related to the inconsistent manner in which injury is defined and data are collected and recorded. Further factors are differences in study design, data collection, injury definition, and observation period. Van Mechelen, Hlobil and Kemper (1992) and Inklaar, (1994a) have proposed that in order to allow comparison between different studies, injuries need to be defined in the same way. The Orchard Sports Injury Classification (OSICS) was designed in an attempt to standardize the collection of sports injury data. It was designed for practitioners who see sports injuries on a regular basis, is user-friendly, yet descriptive in nature containing a list of the diagnoses of injuries (Orchard, 1993). The NCAA Injury Surveillance System (ISS) defines a reportable injury as one that “occurs as a result of participation in an organized collegiate practice or game, requires medical attention by a team athletic trainer or physician, and result in restriction of the student-athlete’s participation for one or more days beyond the day of the injury”( National Collegiate Athletic Association, 2000).

According to Hagglund et al. (2005a), time loss definition of injury was the most practical for all playing levels and, as minimum, results on time loss injuries should therefore always be reported separately to allow for direct comparison between studies. Hagglund et al. (2005a) and Woods, Hawkins, Hulse and Hodson (2002) further suggested that the study period should include the entire season, with preseason and competitive season or over several seasons due to players' injury risk and pattern varying over the soccer season. These authors further suggest that injury information should go on a standard injury form ideally captured by a member of the medical team, i.e. doctor or physiotherapist. The form should include information regarding the date of the player's injury, injury type, location, severity as well as whether it was incurred during training or competition. Other information that can be added, depending on the study purpose is whether the injury occurred as the result of contact or non-contact, playing surface, weather condition, and injury mechanism.

A tissue injury definition, however, was described as the most objective method in determining whether an injury has occurred (Junge & Dvorak, 2000). This definition however is seldom used due to the high financial cost involved and is also not always practical. If objective examination is not carried out, an observer bias is however introduced.

Haggglud, Walden, Bahr and Ekstrand (2005b) voiced their concern when doing an epidemiological study where many observers were involved. They found that

the information was often not collected in a consistent fashion. They suggested that an instructional manual be created in order to describe various definitions used in the study. According to them, medical attention definition was not believed to be the most suitable, as this would include many minor injuries and incidents that are not significant for the overall injury risk. This would further introduce a bias between teams where medical attention are easily available and teams that do not have easy access to medical staff. They further suggest that as many players move to other clubs during the season or quit the team, their exposure and injury data should be included until the day that they leave and should be followed up for information for other necessary information.

Zemper et al. (1993) indicate two main categories when considering an injury besides the cause. The one is acute injuries, which refers to an injury, which occurs suddenly. The other is chronic injuries, which is an injury, which gradually worsens over time and usually occurs gradually or as a result of overuse.

## **2.5 PREVALENCE AND INCIDENCE OF SOCCER INJURIES**

Soccer is a robust contact game involving a combination of elements such as running, jumping, kicking and heading the ball, as well tackling the opponent for the ball. The nature of the game predisposes the player to a range of injuries as a result of direct forces/blows or from indirect mechanisms. Junge and Dvorak

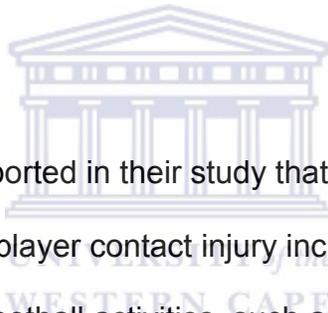
(2004) suggested that on average, every elite male soccer player incurs approximately one performance limiting injury every season.

Walden, Hagglund, and Ekstrand (2005) conducted a study to investigate the risk exposure, risk of injury, and injury pattern of footballers involved in the UEFA Champions League and international matches during a full football season. In their study they reported 658 injuries for 11 clubs throughout a season. A mean injury incidence of 9.4 injuries per 1000 hours was reported. These researchers further found that the risk of match injury was significantly higher in the English and Dutch teams than in the teams from France, Italy and Spain. Furthermore major injuries (defined as absence for more than 4 weeks) constituted 15% of all injuries.



Le Gall, Carling, Vandewalle, Church, and Rochcongar (2006) investigated the incidence of soccer-related injuries in elite French youth players at the Clairefontaine Football Centre over a period of 10 seasons using a cohort design. A total of 1152 injuries were documented by these researchers with 69.1% and 30.9% sustained during the training and matches, respectively. They further reported a total of 4.58 injuries per 1000 hours exposure time, 11.2 and 3.9 injuries per 1000 hours for matches and training respectively. They also concluded that injury incidence and the frequency of overuse disorders were highest early in the season.

Woods et al. (2002) conducted an audit in Britain of injuries in professional football over two competitive seasons. They reported that 17% of the total amount of injuries over the two seasons was sustained during the pre-season; the mean number of days absent was 22.3 days. They further reported that the younger age group was more likely to sustain a pre-season injury than more the older age group. Minor injuries, overuse injuries, and tendon related injuries were more likely to be sustained in the preseason compared to during the season. Hawkins and Fuller (1999), however, reported that 67% of the injuries in their study occurred during the competitive season, with an overall frequency rate of 85 injuries per 1000 hours.



Drawer and Fuller (2002) reported in their study that the contact nature of the soccer, resulted in player to player contact injury incidents accounting for 38.9% days absent, while specific football activities, such as running and shooting, were responsible for 46.5% of the days lost. The researchers also report that player to player contact was the major cause of ankle (61.9%) and knee (56.8%), thigh (71.3%) and lower leg (43.6%) injuries. It was also the responsible for 93.8% of contusions, 59.4% of sprains, and 55% of fractures.

## **2.6 SITE, MECHANISM AND SEVERITY OF SOCCER INJURIES**

### **2.6.1 Sites of injury**

As result of the game rules the majority of the injuries tend to occur in the lower limbs. The goalkeeper is more susceptible to a wider range of injuries due to the

fact that his role requires him to jump and dive at the feet of players to defend his goals and handle the ball with his hands (Williams, 1979).

### **Head and trunk**

Soccer is unique among sports because of the purposeful use of the unprotected head to control and advance the ball. According to Delaney and Drummond (2001), this skill places the head in a vulnerable position for injury. Although the intents of repeated blows to the head in soccer and boxing differ, some researchers suggest the collective effect of soccer heading may be similar to years of boxing (Asken, & Schwartz, 1998; Jordan, Green, Galanty, Mandelbaum, & Jabour, 1996; Sortland, & Tysvaer, 1989). Some investigators proposed chronic soccer heading might lead to neurocognitive deterioration (Master, Kessel, Jordan, Lezak, Troost, 1998; Master, Kessels, Lezak, Jordan, Troost, 1999). Other experts have suggested the soccer athlete be at no risk for neurocognitive damage from heading (Tysvaer, & Lochen, 1991). To date no researchers have provided definitive evidence for either side of the debate.

The nature of the game does makes players susceptible to direct blows to the head from a ball or from another player. When a free kick is awarded the defending team's players are required to stand a minimum of 9.1m (10 yards) away from the ball. A player standing closer than that is prone to be hit by the ball in their face or on the heads. Another method which results in many head injuries is when players contest for the ball in the air and accidentally clash heads with another player. Occasionally players, who put their heads too low to head a

ball, get kicked in the head by an opposing player. This injury often times tends to be more serious in nature. The goalkeeper when diving at the feet of players for a ball often will sustain a blow to his head or strike his head on the goal post or the ground. Delaney and Drummond (1999) mooted the use of helmets in soccer but concede its impracticality.

A study conducted by Covassin, Swanik, Sachs, Cross, and Brodie (1998) reported a total of 123 concussions which accounted for 7.0% of all male injuries in their study. The researchers reported that male soccer players were at a 17.7 times greater risk of suffering a concussion during games than in practices.

Common site of lacerations include the scalp, eyebrows and lips. Nosebleeds, nasal and cheekbone fractures, teeth damage are seen mostly as a result of a direct blow (Williams, 1979).

### **Upper limbs**

Not many studies have looked at the injuries sustained in the upper limbs among soccer players. This would most likely be due to the nature of the game and the minimal involvement of the arms in the game activity. The goalkeeper is generally the most susceptible to injury due to the nature of his position. Upper limbs account for a very small amount of soccer injuries. Kujula, Taimela, Antti-Poika, Orava, Tuominen and Myllynen (1995) found a prevalence of 12.1% for upper limb injuries in their study. This was corroborated by Twizere (2004) when

he reported an injury frequency of 11.4% in the upper limbs in his study among soccer players in Rwanda.

### **Lower limbs**

Several researchers have identified the lower limb to be the most common site of injuries among soccer players at different levels of play (Emery & Meeuwisse, 2006; Faude, Junge, Kinderman, & Dvorak, 2005; Woods et al., 2005; Walden et al., 2005). Different studies have identified sites in the lower limb as the most common sites of injuries such as the thigh (Woods et al., 2002; Walden et al., 2005; Hawkins & Fuller, 1999), the knee (Faude et al., 2005; Arendt & Dick, 1995) and the ankle (Emery & Meeuwisse, 2006; Peterson, Junge, Chomiak, Graf-Baumann, & Dvorak, 2000). Drawer and Fuller (2002) were of the opinion that player to player contact to be responsible for the majority of injuries to the lower limb in soccer.

Blisters on the feet are the result of playing on ground that is hard and is often seen in the beginning of the season. It also occurs as a result of friction between the boot and the skin resulting in pressure (Williams, 1979).

### **2.6.2 SEVERITY**

Different definitions for severity of injuries have been documented in literature. Some researchers have defined injury severity depending on the time needed for recovery (Rahnama, Reilley, & Less, 2002), the cost of injury to the sport (Van

Mechelen et al., 1992), and the length of absence from training and or matches (Walden et al., 2005).

According to the “Injury Consensus Group” established under the auspices of FIFA Medical Assessment and Research Centre, injury severity is defined as “The number of days that have elapsed from the date of injury to the date of the player’s return to full participation in team training and availability for match selection” (Fuller, Ekstrand, Junge, Andersen, Bahr, Dvorak, Hagglund, & McCrory, 2006, p.84). According to the above-mentioned classification, there are five categories of severity. However some studies used four categories (Walden et al., 2005).



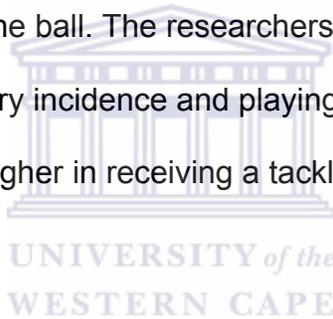
Soccer related injuries range from minor sprains and fractures, to more serious head, eye and neck injuries (Chomiak, Junge, Peterson, & Dvorak, 2000; Peterson et al., 2000). Most of the injuries in soccer can be classified as slight (0 days), minimal (1-3days), mild (4-7 days), moderate (4-28 days) and severe (>28 days).

### **2.6.3 MECHANISM**

Soccer injuries can be grouped into two categories namely indirect and direct injuries. Due to the fact that soccer is a contact sport, players are often subjected to direct blows to the body. These blows result in numerous injuries, such as contusion injuries and disruption in blood vessels within the soft tissue leading to

haematoma formation or bone fractures. Indirect injuries would result from forces generated within the musculoskeletal during the activity. These types of injuries usually are encountered in the early and late stages of the game due to inflexibility, in-adequate warm-up or fatigue.

Rahnama et al. (2002) identified 16 soccer related playing activities as possible mechanisms to injury; dribbling the ball, goal catch, goal punch, throw, heading the ball, jumping to head, kicking the ball, making a tackle, making a charge, passing the ball, receiving a ball, receiving a tackle, receiving a charge, shot on goal, set kick, and throw in the ball. The researchers found there to be an association between the injury incidence and playing action/mechanism. Injury incidence was found to be higher in receiving a tackle, making a tackle, and receiving a charge.



In the study done by Giga and Gongal (2003), the incidence rate of injuries due to aggressive tackles was cited as the most important factor contributing to severe injuries in the South African soccer community. These authors further stated that the uncontrolled aggression could be linked to psychological attitude to the game and opponents, foul play, poor training and poor physical facilities. Hawkins, et al. (2001) found 38% of injuries to be the result of contact with another player compared to 58% from a non-contact mechanism. Twizere (2004) also reported that 27.9% of injuries among Rwandan soccer players were the result of contact with another player. Twizere (2004) further reported that the

mechanism most responsible for injury occurrence during match play, in Rwanda, to be the soccer action of colliding with another player (15.4%) compared to the least likely cause as jumping (1.5%).

## **2.7 FACTORS INFLUENCING SOCCER INJURIES**

Most of the injuries encountered during soccer training or matches are accidental resulting from a player or by another player. This sentiment is supported by a study by Reilly and Sterling (1993) in which soccer players attributed 50% of their injuries to chance. However, factors related to or influencing soccer injuries can be divided into intrinsic and extrinsic factors. Inklaar (1994b) identified intrinsic risk factors are joint flexibility including pathological ligamentous laxity and muscle tightness, functional instability, previous injuries and inadequate rehabilitation. Extrinsic risk factors include the exercise load in soccer (competition and practice), inadequate equipment (shin guards, taping, and shoes), playing field conditions and foul play.

### **2.7.1 Intrinsic factors**

Peterson et al. (2000) have found a higher injury incidence in younger players, especially below the age of sixteen. A study by Giga and Gongal (2003) confirmed this with 60% of the injuries being sustained by players under the age of 20. Injuries have the ability to impact negatively in the life of a soccer player

and can affect the fortunes of many teams. Sanderson in Reilly and Williams (2003) cited David Beckham as an example when his foot was injured; it was sustained at a critical stage in Manchester United's season and a few weeks before the 2002 World Cup, triggering intense media interest – not surprising, given his pivotal role at the club level and in the national team. Therefore many players sustain injuries which trigger significant negative psychological reactions.

Muscle weakness and asymmetry where the concentric muscle and eccentric muscle ratio is improper are factors which lead to muscles failing during intense workouts. Specific strengthening exercises and monitoring of this strength is vital in preventing injuries resulting from the factors. Attention should be paid to eccentric as well as concentric contractions in training (Reilly & Williams, 2003).

A study in Sweden on personal factors such as joint stability, muscle tightness, inadequate rehabilitation and lack of training were factors contributing to 42% of all injuries observed (Ekstrand & Gillqvist, 1982). A flexibility-training programme was thus implemented over a complete season, which resulted in a decrease of injury incidence, thus highlighting the importance of flexibility. Stretching muscles affects flexibility short term. It can therefore be incorporated in warm up seasons further decreasing players risk for sustaining injury.

Sport participation rates and training intensities have both increased dramatically in recent years (Ninedek & Kolt, 2000). This has resulted in the increased psychological stress placed on all players but especially professional players.

Anderson and Williams (1988) linked athletic injury with stress levels, the latter triggered by such psychological factors such as trait anxiety, daily hassles and general personality disposition. Smith, Scott and Wiese (1990) reported that only those athletes low in coping skills and in social support demonstrated a significant relationship between life stress and injury. May and Pope (1995) suggested that athletes' experience of psychological stress has negative effects on their concentration and general emotional balance, with the implication that they are more injury-prone as a consequence.

A study conducted by Dollard and Miller (1950) over 50 years ago identified a type of player who might be susceptible or prone to injury as the ones who adopt an "approach-avoidance" attitude. On the one hand, the player seeks to approach the contest because of the possibility of reward, but on the other hand he wishes to avoid the contest because it offers a possibility of aggression or punishment, this may be in the form of injury. The anxiety and tension which are associated with such conflict can seriously affect the player's performance and increase the chance of real or imagined danger.

Moore (1967) has listed several conditions, which might identify the psychologically vulnerable athletes:

1. Discrepancy between ability and aggressiveness
2. Discrepancy between father and son in ability/aggressiveness
3. Uninhibited aggressiveness and/or feelings of vulnerability.

4. Excessive fear of injury
5. Extensive history of injuries
6. Concealment or exaggeration of injuries
7. Success phobia

When combined, physical and psychological fitness can have a liberating effect on an athlete. Several authors have long emphasized the need for cooperation among players, coaches, physical educators, trainers, physiotherapists, psychologists and physicians (Jackson, Jarrett, Bailey, Kausek, Swanson, & Powell, 1978; Ryde, 1971).



### **2.7.2 Extrinsic factors**

Rahnama et al. (2002) identified playing action as an extrinsic factor responsible for high injury risk. This was linked to contesting possession. Injury was highest in the first and last 15 minutes of the game reflecting the intense engagement in the opening periods and possibly the effect of fatigue in the closing periods.

Players seemed to sustain most of their injuries in the areas of the pitch where possession of the ball was likely to be contested, attacking and defending zones close to the goal. Ekstrand et al. (1983a) found that twice as many injuries occurred in soccer games as in practice. It also seems that the level of competition is very much influential in the incidence of injuries. According to Reilly and Stirling (1993), players exposed more to injury in the English Premier League were the highest in the First Team, next highest in the A and Youth team,

and the lowest in the Reserves matches. In this study injury was defined as not being able to train for two sessions on successive days.

Several studies (Blaser & Aeschllman, 1992; Inklaar, Bol, Schmiki, & Mosterd, 1996; Poulsen, Freund, Madsen, & Sandvej, 1991) found different results when assessing the correlation between the skill levels of a player with the incidence of injury. Lower skilled players were seen to have higher injury incidence according to the study conducted by Blaser and Aeschllman (1992). Inklaar et al. (1996) study concluded that higher skilled players were more susceptible to injury. While Poulsen et al. (1991) reported no difference in injuries related to skill level.

Emery and Meeuwisse (2006) found that the overall injury rate in indoor soccer over 20 weeks was 4.45 injuries per 1000 player hours. A similar cohort study on an outdoor 13 week soccer season found that the injury rate was 5.59 injuries per 1000 player hours. They concluded that there was no significant difference between injury rates in indoors compared to outdoors. They did however identify a higher injury risk in the most elite division in outdoor compared to indoor soccer.

Just like in many other field games, a contributing factor to injuries sustained is the environmental and climatic conditions. Muscles are believed to be more susceptible to injury in extreme heat or cold. Tendons on the other hand are prone to injury on hard surfaces. Players are often injured severely during

collisions when playing under inadequate lighting. Muscles are also stiffer in the morning and may be a contributing factor in the likelihood of injury in morning games (Williams, 1979). Reilly and Williams (2003) further emphasized the impact of the environment on players and cited the scheduling of games toward the evenings in order to avoid the hottest part of the day. He also included altitude as another environmental variable that can make supra-normal demands on soccer teams.

Sporting surfaces have also been identified as an influencing factor in injury prevalence. Brukner and Khan (2001) found that hard surfaces generate greater forces through the musculoskeletal system than a forgiving surface such as grass. Studies conducted in the National Football League (US) and the Australian Football League (Orchard, Seward, McGivern, & Hoods, 1999; Scranton, Whitesel, Powell, Dorner, Heidt, Losse, & Cawley, 1997) found that dry fields increased the risk of anterior cruciate ligament injury further highlighting that traction between the playing surface and the athlete's foot influence injury risk.

Brukner and Khan (2001) further state that soccer boots require all the features of a good running shoe in addition to features that will allow kicking and rapid changes of direction, particularly on soft surfaces. They have identified the construction of current soccer boots as inadequate with regard to supporting the

lower limb. They tabulated these problems and these are represented in Table 2.1.

Table 2.1 Problems associated with certain structural features of football boots

<b>Structural features</b>	<b>Associated problems</b>
Soft heel counter	Decreased rear foot support
Narrow sole (width)	Decreased stability
	Skin lesions – blisters
Curved shape	Decreased stability/poor fit
Rigid sole	Decreased forefoot flexibility
Shallow upper	Decreased upper foot flexibility
‘Stop’/cleat placement	Often at point of forefoot flexibility
	Sometimes causes pain under first metatarsophalangeal

(Brukner & Khan, 2001)

They describe the ideal soccer boot as one with adequate foot depth in the upper, have a rigid heel counter, have sufficient forefoot flexibility, have a wide sole, be slightly curved in shape and the ‘stops’ or cleats should be placed to allow adequate forefoot flexibility.

## 2.8 BURDEN OF INJURIES

Soccer is considered a lucrative career with players earning millions not only from their respective clubs but also from sponsorship deals and endorsements. The average club wages/ turnover ratio has increased phenomenally over the past decade; the total wages and salaries figure in the UK for the 1999/2000 season was 747 million (pound sterling) (Boon, Jones, Eaves, & Rawnley, 2001). These results lead many of our best national and continental players opting to play in Europe, because the salaries far exceed that offered in South Africa and Africa in general (The Economist, 2000). Hence the biggest burden of injuries is financial. These costs run into millions putting a drain on clubs. The first choice players who are injured and therefore unfit to play also add to costs. Their absence may also lead to a reduction in match attendances, and diminished prize money as a result of a lower league position, and/or an early competition exit (Woods et al., 2002).

Besides financial implications there are psychological implications as well. Injuries trigger significant negative psychological reactions. In a survey conducted by Troxel and Weiss (1986), fear, depression, rage, disbelief, tension and fatigue were found to be common emotional responses. On being injured, players who have been conditioned to train daily are forced to rest resulting in difficulty coping with the sudden enforced inactivity. Brewer (2001) noted that in some cases athletes have attempted suicides after falling into a post-injury

depression. He further commented that generally, feelings of depression and frustration could occur at all phases of a rehabilitation cycle.

## **2.9 REHABILITATION**

Reilly, Howe and Hanchard (2003) suggested that adequate recovery from injury depends on accurate diagnosis in the first instance, proper first aid and secondary treatment, a planned period of rehabilitation and a graded progress towards return to competition. Andrews, Harrelson, and Wilk, (1998) describe important goals for any rehabilitation programme: decreased swelling, pain and initial inflammatory response and protection of the joint so that a secondary inflammatory response does not develop from overly aggressive rehabilitation. Similarly, ROM, muscular strength, power, and endurance must be returned to re-injury levels so that full asymptomatic functional activities may be performed to the pre-injury level and beyond. The researchers go on to say that the effectiveness of the rehabilitation program after injury often determines the success of future function and athletic performance.

Freeman, Dean and Hanham (1965) were the first to report that exercise on a wobble board could reduce the incidence of instability after ankle sprains as measured with a modified Romberg test. Drugs such as non-steroid anti-inflammatory (NSAIDs) have analgesic, anti-pyretic and anti-inflammatory properties and thus have a role in the treatment of soft tissue injuries (Stankus, 1993).

## 2.10 INJURY PREVENTION

While some injuries can be prevented, and the risk of re-injury reduced, damage due to reckless play cannot be anticipated. Measures to prevent sports injuries form part of what is called the “sequence of prevention”. Van Mechelen et al. (1992) propose a theoretical framework for the prevention of sports injuries uses a four-step system including: establishing the extent of the sports injury problem, establishing the aetiology and mechanism of injuries, introducing preventative measures, and assessing the effectiveness of the preventative interventions (see Fig 2.2).

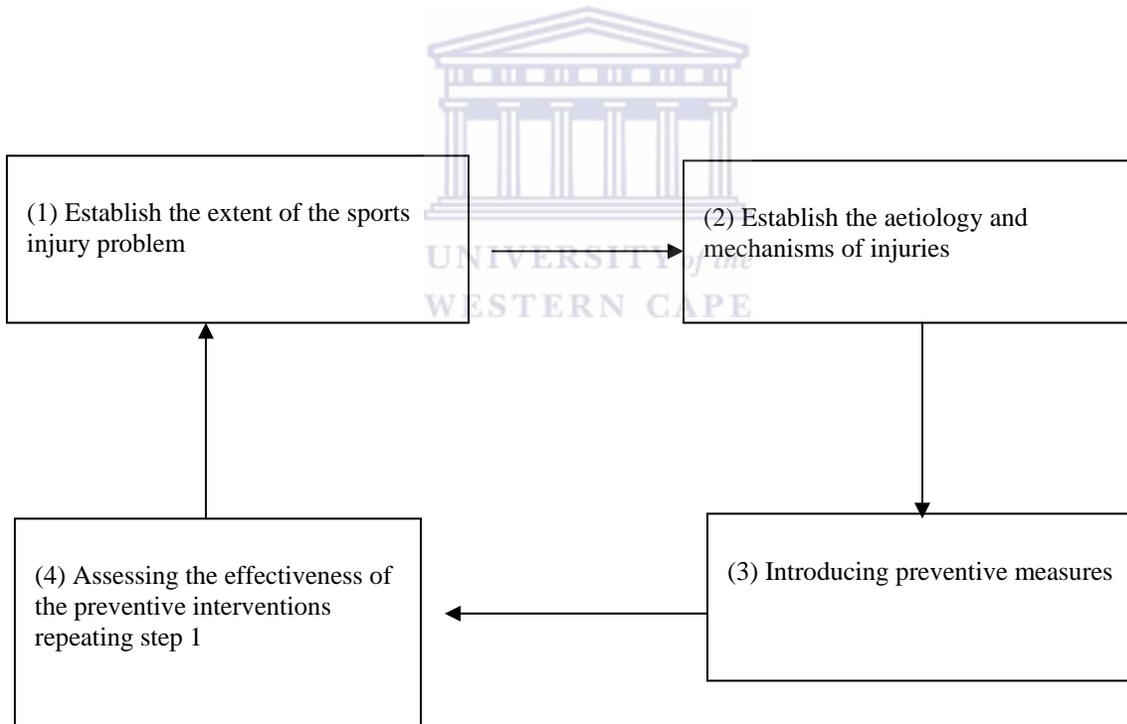
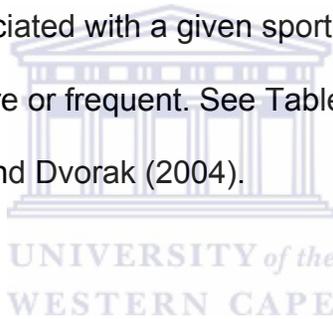


Fig 2.2 Sequence of prevention

Source: Van Mechelen et al. (1992)

A number of authors have discussed various possible soccer injury prevention measures. Junge, Rosch, Peterson, Graf-Baumann, and Dvora (2002) suggested a number of prevention measures including warm-up with more emphasis on stretching, regular cool-down, adequate rehabilitation with sufficient recovery time, proprioceptive training, good playing field conditions, and adherence to existing rules.

Junge and Dvorak (2004b) identified nine studies on soccer injury prevention. These authors stated that preventive programmes generally focused on the reduction of all injuries associated with a given sport or on a particular type of injury that is extremely severe or frequent. See Table 2.2 for a comparison of the studies reported by Junge and Dvorak (2004).



**Table 2.2** Studies on the prevention of injury in soccer (Junge, et al., 2004)

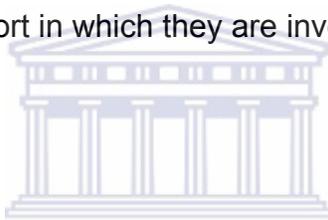
Study	Country	Intervention group	Control group	Sex	Age (y)	Type of injury	Intervention	Result
Ekstrand et al. (1983)	Sweden	6 teams	6 teams	M	17-37	All time-loss injuries	Multi-modal intervention programme	Fewer injuries in the intervention than in the control group
Heidt et al. (2000)	US	42 players	258 players	F	14-18	All time-loss injuries	Frappier Acceleration Training Program	Significantly lower incidence of injury in the trained than in the untrained group
Junge et al. (2002)	Switzerland	101 players	93 players	M	14-19	All injuries	Multi-modal intervention programme	Fewer injuries in the intervention than in the control group
Tropp et al. (1985)	Sweden	60 players and 65 players with previous ankle problems	171 players	M	Senior	Ankle injuries	Use of orthosis or ankle disk training	Both techniques reduce the frequency of ankle sprains in players with previous ankle problem
Surve et al. (1994)	South Africa	117 without and 127 players with previous ankle sprains	260 players	M	Senior	Ankle sprains	Instruction to wear a semi-rigid orthosis on the previously sprained or on the dominant ankle	A semi-rigid orthosis significantly reduced the incidence of recurrent ankle sprains in players with previous history of ankle sprains
Soderman et al. (2000)	Sweden	62 players	78 players	F	21 (mean)	Traumatic time-loss injuries of the lower extremities	Balance board training	No preventive effect on severe knee injuries or ankle sprains
Caraffa et al. (1996)	Italy	40 teams	20 teams			ACL injuries	Proprioceptive training	Significant reduction in ACL injuries
Hewett et al. (1999)	US	97 players	193 players	F	High school age	Serious knee injuries	Pre-season neuromuscular training programme	A trend towards a higher incidence in the untrained group than in the trained group
Askling et al. (2003)	Sweden	15 players	15 players	M	25 (mean)	Hamstring strains	Training with eccentric overload	Fewer injuries in the training than in the control group

ACL= anterior cruciate ligament; F= female; M= male

Various studies have been done to investigate the results of intervention programs to decrease the incidence of soccer injuries. These intervention programs varied from education and supervision of players and coaches (Junge et al., 2002); balance training (Caraffa Crulli, Projetto, Aisa, & Rizzo, 1996) and pre-season conditioning (Heidt, Sweeterman, Corlonas, Traub, & Tejkulve, 2000). All these studies showed a decrease in prevalence of soccer injuries from 21-87%.

Another important factor in prevention of injuries has been identified by Hawkins, Hulse, Woods and Hodson (2002). This was the appropriate and complete rehabilitation of existing injuries. They argued that approximately 17-30% of injuries can be attributed to incomplete recovery of previous injuries at the same site with secondary injuries tending to be more severe. Sanderson (2003) in Reilly and Williams (2003) suggested that the successful treatment of an injured player requires that support staffs are sensitive not only to the physical, but also to the psychological antecedents and consequences of injury. This includes giving the player full attention, emphasizing good communication and using motivation techniques to maximize the likelihood of compliance with the treatment process. Dvorak, Junge, Chomiak, Graf-Baumann, Peterson, Rosch, and Hodgson (2000) also confirmed that pre-existing joint or muscle pain has been identified as important correlates of injury. The rehabilitation of the soccer players should therefore continue to an advanced level of activity, designed to meet the specific demands of his sport. Mattaocola and Dwyer

(2002) rightfully stated that the goal of athletic rehabilitation is to return the athlete to participation as quickly as possible, while allowing the injured tissue to heal without compromising it by further injury. Athletes, however, are generally eager to return to normal participation in their sporting code and hence challenge the healing process by aiming to return to competition sooner (Schootman, Powell, & Albright, 1994). In the event of inadequate rehabilitation, the player is thus prone to re-injury of the affected area, incapable of performing at pre-injury standard, and predisposed to injuring another body part. It is for this reason that the physiotherapists working in the field of sport medicine should be knowledgeable about the sport in which they are involved, including the tactics of the game.



Various direct preventative measures have been identified such as better shoes, ankle wrapping, taping, or bracing. Brukner and Khan (2001) identified the need for taping/bracing in order to restrict undesired, potentially harmful motion and allow desired motion. Indirect measures include altering the environment through revised rules, changes in the sport environment (for example, improved playing fields) and instruction of coaches and trainers in methods of injury prevention (Barker, Beynnon, & Renstrom, 1997).

A research project was initiated by UEFA in 1999, which aimed to decrease the number of injuries and increase the occupational safety for the professional players. As a result of this project, several sport injury reporting systems were

developed (Junge, Dvorak, Graf-Bauman, & Peterson, 2004) although no system has been standardised.

Soccer players that are not physically fit are more prone to suffer from indirect muscle injuries. Flexibility training as well as strengthening training is essential in protecting muscles when certain movements are carried out during the game. Correct tackling techniques are also important in reducing the incidence of injury.

Brukner and Khan (2001) pay value to practitioners who can provide effective injury prevention advice and state that they are valuable members of the sports medicine team. They list several factors in the prevention of sports injuries. These include correct biomechanics; warm-up; stretching; taping and bracing; protective equipment; suitable equipment; appropriate surfaces; appropriate training; adequate recovery; psychology; and nutrition.

## **2.11 SUMMARY**

This chapter first sketched the historically context of the development of soccer internationally and locally in South Africa. Hereafter, this chapter reviewed pertinent literature about the field of sporting injuries, specifically relevant to soccer injuries. Various epidemiological studies on soccer injuries were considered to provide a framework for understanding the prevalence and incidence of soccer injuries, the site and mechanism of injury involved, and the severity of injuries. The review also focused on identifying the burden of injury

and how injury prevention and rehabilitation can play a major role in the physiotherapeutic management of soccer injuries.

The next chapter describes the research methodology of the study.



## **CHAPTER THREE**

### **METHODOLGY**

#### **3.1 INTRODUCTION TO THE CHAPTER**

In this chapter the purpose of the research, as stated in chapter one, is recapitulated to provide the background to the research questions of this study. Furthermore, the chapter describes the research design, the study population and the instruments used in the study. Lastly, the specific statistical methods used to analyze the data are described.

#### **3.2 PURPOSE OF THE STUDY**

The primary purpose of this study was to investigate the range and prevalence of injuries sustained by professional soccer players of a 1<sup>st</sup> division soccer club over the duration of an entire soccer season, namely the 2004/2005 season.

Specifically, this study seeks to identify the need for physiotherapy intervention in a preventative or treatment capacity against the epidemiological data obtained.

#### **3.3 RESEARCH QUESTIONS**

The present study was designed to explore nine research questions:

1. To determine the prevalence of soccer injuries sustained among players of F.C. Fortune in the 2004/2005 season of the Mvela Golden professional soccer league;

2. To identify the sites, and mechanism of injuries sustained by players of F.C. Fortune during the 2004/2005 soccer season;
3. To determine if an association exists between the site of injury and the position of the player injured among players of F.C. Fortune;
4. To determine if an association exists between the position of injured players and the mechanism of injuries of F.C. Fortune ;
5. To determine if an association exists between injuries sustained and time during the season when the injuries occur in players of F.C. Fortune;
6. To determine the need for physiotherapy by players of F.C. Fortune during the 2004/2004 season in the Mvela Golden League;
7. To identify the treatment (physiotherapy and medical) received by the injured players with specific reference to physiotherapy management of F.C. Fortune during the 2004/2005 season;
8. Identify the current prevention measures undertaken by the players of F.C. Fortune during the 2004/2005 season;
9. To develop a prevention program based on the results of the study for players of F.C. Fortune at risk for sustaining injuries during a season of soccer in the Mvela Golden Soccer League.

### **3.4 RESEARCH DESIGN**

In view of the present study's purpose, a descriptive, longitudinal design was utilised. This design was considered to be the most appropriate and practical to

meet the objectives of the study as injury risk and pattern vary over the soccer season. Hence, the decision to track the pattern of injury over the entire soccer season.

### **3.5 RESEARCH CONTEXT**

Sport has become an integral part of everyday life and has even become a lucrative profession for many skilled athletes. Soccer has been heralded as the most popular sport in the world with about 200 million players in 186 different countries registered with the International Federation of football Association, FIFA (Inklaar, 1994a). In South Africa soccer has advanced from decades of segregation, disadvantage and denial of highly talented players from major competitions on the basis of race, through democratic political transition, into a sport which is now recognised as one of the most popular national sports. Many local players are now playing in top international leagues further highlighting the talent found in our country.

At the time the study was conducted, professional soccer in South Africa is played under the auspices of the National Soccer League also known as the Premier Soccer League (PSL). The PSL is divided into two leagues. The top league in the country is the Castle Premiership whose annual champion qualifies for the Confederated African Football (CAF) Champions League. The second league (first division) is the Mvela Golden League. The First Division was initially divided into the Coastal Stream and the Inland Stream (geographically

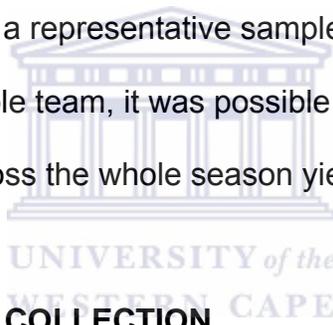
representing coastal and inland teams respectively) until 2004 when the two-stream league merged and ceased to exist and the First Division became a single national league. The league consists of 16 teams drawn from all over South Africa. The season commences in August and concludes in May of the following year. Each team plays the other teams twice, once at home and once at the opponent's home ground.

The winning team of this league attains promotion to the Castle Premiership while the last placed team of the Castle Premiership is relegated to the Mvela Golden League. The team finishing second-last in the Castle Premiership competes in a play-off with teams finishing 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> in the Mvela Golden League. The bottom two teams in the Mvela league get relegated to the Second Division and the two top teams from the Second Division are promoted to the Mvela Golden League. Therefore two teams are promoted into the Castle Premiership and two teams are relegated into the Second Division.

The current study investigated the pattern and prevalence of injury of professional soccer players in a large urban city, namely Cape Town, in South Africa.

### **3.6 STUDY POPULATION**

The Mvela Golden League consisted of 16 teams drawn from all over South Africa. The study was conducted on one first division male soccer club in this league, in South African. Two teams are based in Cape Town, F.C. Fortune and Vasco F.C.. Both teams were approached for the purpose of conducting the study but easy access was obtained only to F.C. Fortune. Participation in the study was voluntary. The study's population consists of the 26 male professional soccer players of the F.C. Fortune. While the sample represented 6.25% of the total 1<sup>st</sup> division soccer population, the sample itself consisted of the entire soccer team and hence was a representative sample of the universum. Because the sample included the whole team, it was possible to assess injury relative to each position as well as across the whole season yielding a rich range of data.



### **3.7 METHODS OF DATA COLLECTION**

To gather and record the data for the purpose of this study, a two-part data questionnaire was designed (see appendix 4). Below follows a brief motivation for the choice of instrument and its properties.

#### **3.7.1 Instrument**

The three part questionnaire measured demographic characteristics of the participants, site/s and mechanism/s of injuries sustained, medical management of these injuries and injury countermeasure. The first part includes questions

regarding demographics of the player participant such as age, position of player, date and place of game and game result. This information was deemed necessary for comparative purposes i.e. different position may reflect different injury patterns.

The second part of the questionnaire required information related to the injuries sustained such as the site of injury and mechanism of injury. This quantitative information was required for descriptive purposes. Site/s of injuries included: head, face, neck, shoulder, back, chest, upper arm, elbow, wrist, hand, finger, pelvis buttock, groin, hip, front thigh, back thigh, knee, shin calf, ankle, foot and toe. The mechanisms of injuries sustained included: tackling, being tackled, running, shooting, jumping, landing, heading, turning, collision, and overuse.

The third part of the questionnaire contained various types of information. Length of time the player was unable to attend/participate in training or matches, due to their injury, was looked at in order to assess severity. Management of injuries, both medical and non-medical methods, were reported with an emphasis on physiotherapy management. Accessibility to physiotherapy services and reasons for limited access were addressed to identify possible reasons for re-injury among players. The questionnaire also looked at the injury prevention programmes that players were involved in. This information included warm-up periods in training and matches, cool-down periods after training and matches, flexibility and strength training. .This information was important to understand the

current prevention and protocol being followed by players of F.C. Fortune in order to revise or develop a more specific prevention programme.

This closed ended questionnaire was adapted from the validated questionnaires used in a previous studies by Jelsma, Dawson, Smith, and Madzivire (1997) and Hawkins and Fuller (1998a) in which they investigated the prevalence of soccer injuries in professional soccer clubs and leagues. Other information pertaining to protective equipment and nutrition used by these researchers were not deemed necessary to the present study.

### **3.7.2 Validity and reliability of the instrument**

According to Polit, Beck and Hungler (2001), validity is the degree to which an instrument measures what it is purports to be measuring. Unlike reliability, validity of an instrument is extremely difficult to establish. Like reliability, validity has a number of different aspects and assessment approaches. To ensure validity of the instrument, the questionnaire was adapted from previous questionnaires in similar studies, namely Hawkins and Fuller (1998a) in Europe and Jelsma, Dawson, Smith, and Madzivire (1997) and Twizere (2004) both in Africa. Face validity refers to whether the instrument looks as though it is measuring the appropriate construct (Polit et al., 2001). Although there are no complete objective methods of assuring the adequate content coverage of an instrument, certain steps were taken to assure content validity.

The questionnaire was piloted before the final version of questionnaire was adopted for use in the study. The questionnaire was given to three physiotherapists of soccer teams at club levels in the Cape Town district. This was done to assess the validity and applicability of all the items for this population, its level of understanding and the period it takes to be completed. The time taken for the physiotherapists to complete the questionnaires of players at their clubs ranged from 10 minutes to three weeks. A focus group discussion with the three physiotherapists was further held to discuss content validity of the instrument and to see whether it was necessary to rephrase or change any of the questions. The questionnaire was also piloted with two soccer players to assess and ascertain construct validity. The results indicated that the instrument was relevant to the population and was easily used by the physiotherapists. Only a few grammatical changes were made. The final questionnaire was sent to an expert in the field of physiotherapy who has doctoral qualifications in this field and expertise in research methodology.

The study further utilized the process of triangulation (Bless & Higson-Smith, 1997) to improve reliability (inter-rater). Investigator triangulation focuses on collecting, analyzing or interpreting a set of data. In this study this entailed having injuries confirmed by the player, team's physiotherapist and at least one other member of the coaching support staff (doctor or paramedic) in order to establish a consensus with the regard to the body part injured and the mechanism of injury.

### **3.7.3 Procedure**

After ethical clearance from UWC's Research and Study Grant Committee, permission was sought from the management of F.C. Fortune who took ethical responsibility of informing the Mvela Golden League, and players. Then data were collected by a qualified physiotherapist (who was the researcher) during the 2004/2005-soccer season of the Mvela Golden League at competitive matches. The physiotherapist travelled with the team when playing away and also attended the matches played on their home ground. At each game, injuries sustained were identified and tabulated. Some of the data were gathered by the physiotherapist and medical staff (team doctor and/or paramedic) at the matches when players injured themselves pertaining to the body part injured and the mechanisms of the injury incurred. The physiotherapist/researcher conducted follow up interviews with the injured players at all team practices following the injury in order to obtain the rest of the information for the questionnaire relating to training sessions or games missed, type of treatment of injury, accessibility to physiotherapy, and injury countermeasure programmes.

### **3.8 DATA ANALYSIS**

Data analyses were performed using the Statistical Package for Social Science (SPSS) Base 14.0 for Windows. For descriptive analysis, data were tallied and frequencies computed for the respective variables. Prevalence tables are used to describe categorical data, while means and standard deviations are used to describe continuous data. The data were summarised using frequencies,

percentages and graphs. Inferential statistics in the form of cross tabulations using chi-square were computed to determine the associations between various variables (nominal data). Inferential statistics was reported as chi square, degrees of freedom, and p values. Alpha level was set at  $p < 0.05$ .

To calculate the statistical significance of data in this study, it can be assumed that injuries occur independently for any one participant and that the average number of playing hours was approximately constant for all participants.

### **3.9 ETHICAL CONSIDERATIONS**

Ethical clearance was obtained from the Senate Research Grant and Study Leave Committee of the University of the Western Cape (UWC) prior to the commencement of the study. Permission and written consent was also obtained from F.C. Fortune management and players. Consent was obtained from the participating organisations to allow the physiotherapist/researcher to access the players and the soccer club (Appendix 1). Written consent was also obtained from individual soccer players (Appendix 2) and parent/guardian for players under the age of 18 years (Appendix 3). The aim of the study was explained to the participants and they were assured that all information obtained will remain confidential and anonymous. Participants had the option to withdraw from the study at any stage. The researcher intends to disseminate the research findings and recommendations to the various stakeholders on completion of the study.

## **CHAPTER FOUR**

### **RESULTS**

#### **4.1 INTRODUCTION**

The results of the analysis of this research study are presented in this chapter. Firstly, the findings pertaining to the soccer players' bio-demographic characteristics are presented. Injury prevalence and injury mechanism are then presented under different headings, relative to the objectives of the study. The associations between numerous factors are also reported. The range of medical intervention is presented, with specific emphasis on physiotherapy management. The study also reports on factors of accessibility and physiotherapy need from the players' perspective. Finally the injury prevention measures undertaken by the team participating in the first division professional soccer league are highlighted.

#### **4.2 DEMOGRAPHIC DATA**

The team consisted of 26 soccer players who all participated in the study. The players were between the ages of 17 and 39 years old with the mean age being 23.77 years (SD=5.233). The team's median age was 23 years and modal age was 24 years. About 70% of the players were younger than 25 years old. Table 4.1 illustrates the ages and position of the 26 soccer players.

**Table 4.1** Distribution of players according to their ages and positions

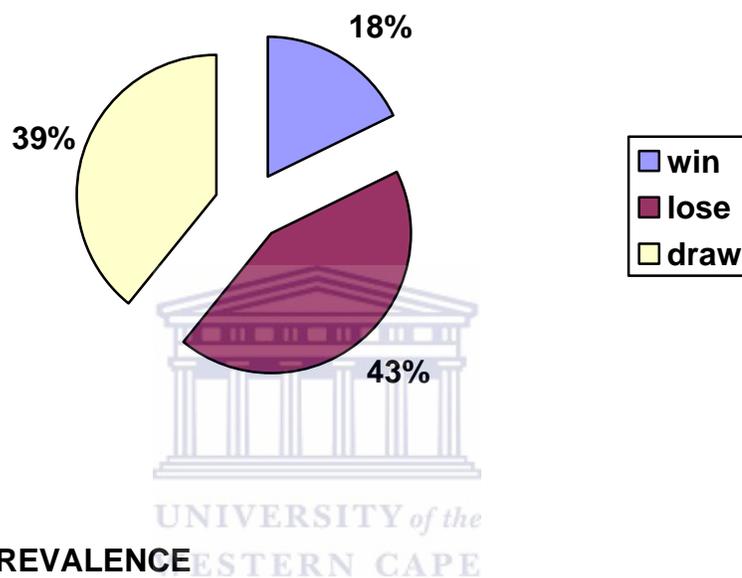
<b>Variable</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Age</b>		
17-19 years	3	11.5%
20-24 years	15	57.7%
25-29 years	5	19.2%
30-39 years	3	11.5%
<b>TOTAL</b>	<b>26</b>	<b>100%</b>
<b>Position</b>		
Goalkeeper	2	7.7%
Defender	10	38.5%
Midfielder	11	42.3%
Forward	3	11.5%
<b>TOTAL</b>	<b>26</b>	<b>100%</b>



The majority of the players were midfielders (n=11, 42.3%) and defenders (n=10, 38.5%). These positions both had a mean age of 23.1 years (SD= 4.888 and 4.557 respectively).

Of the 28 games played in the season, the game results were five wins (17.9%), 12 losses (42.9%), and 11 draws (39.3%) as illustrated in Figure 4.1.

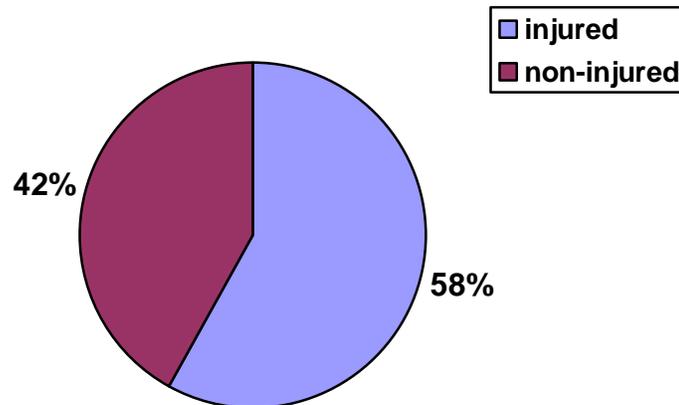
**Figure 4.1** Game results of season (n=28)



### 4.3 INJURY PREVALENCE

Injury prevalence was calculated from the total number of players in the team who sustained one or more injuries at any time, while participating in any competitive soccer activity during the season. According to the FIFA Injury Consensus Group, an injury was defined as “any physical complaint sustained by a player that results from a football match, irrespective of the need for medical attention or time-loss from football activities” (Fuller, et al., 2006). More than half (58%) of the team sustained an injury during the soccer season as illustrated in Figure 4.2.

**Figure 4.2** Distribution of injured and non-injured players (n=26)



The mean age of the injured players was 25.5 years (SD=5.591) and that of the non-injured players were 21.36 years (SD=2.803). The injured players were significantly older than the non-injured players ( $p < 0.05$ ).

A breakdown of the injury prevalence is presented in Table 4.2. An interesting statistic here is that 11 (42.3%) of the players did not incur any injuries during the season. Players who sustained more than one per game accounted for 42 % of the injured players.

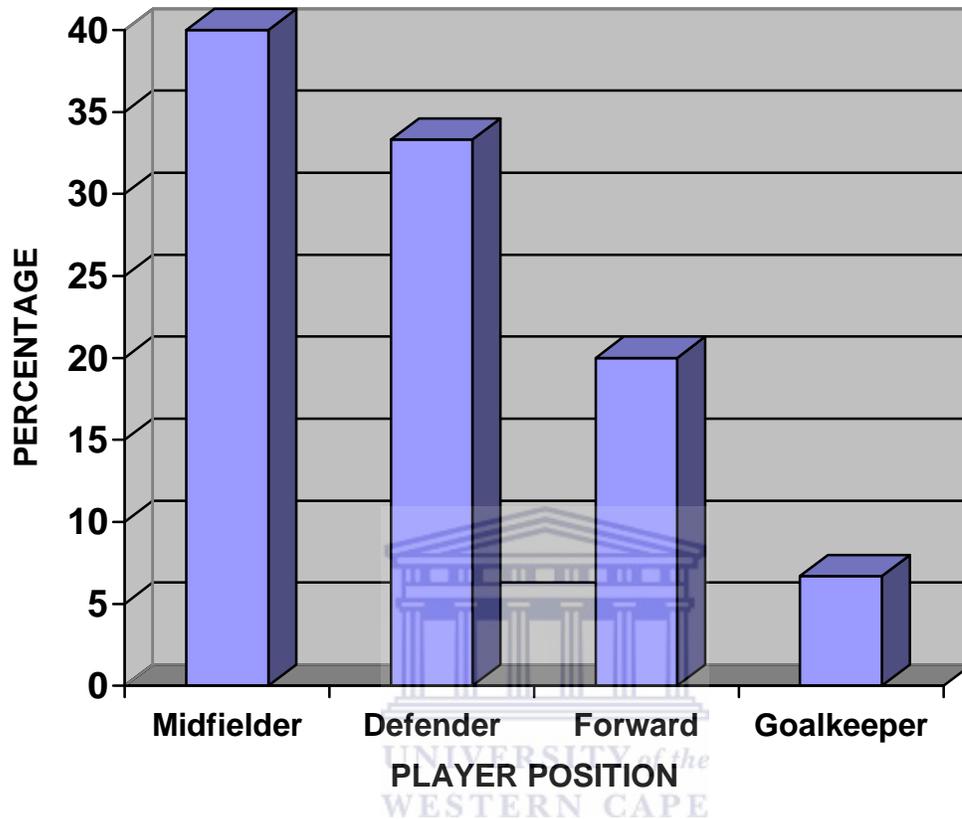
**Table 4.2** Number of injuries sustained per player

<b>Number of injuries</b>	<b>Number of players</b>	<b>Percentage</b>
0	11	42.3%
1	4	15.4%
2	3	11.5%
3	4	15.4%
4 or more	4	15.4%
<b>TOTAL</b>	<b>26</b>	<b>100</b>

Players were divided into four age categories, namely 17-19 years, 20-24 years, 25-29 years and 30-39 years. The majority of the injuries (n= 37, 53.3%) were sustained by the 20-24 year old category. No significant difference was found for injury prevalence according to age categories ( $\chi^2=9.874$ ,  $p>0.05$ ).

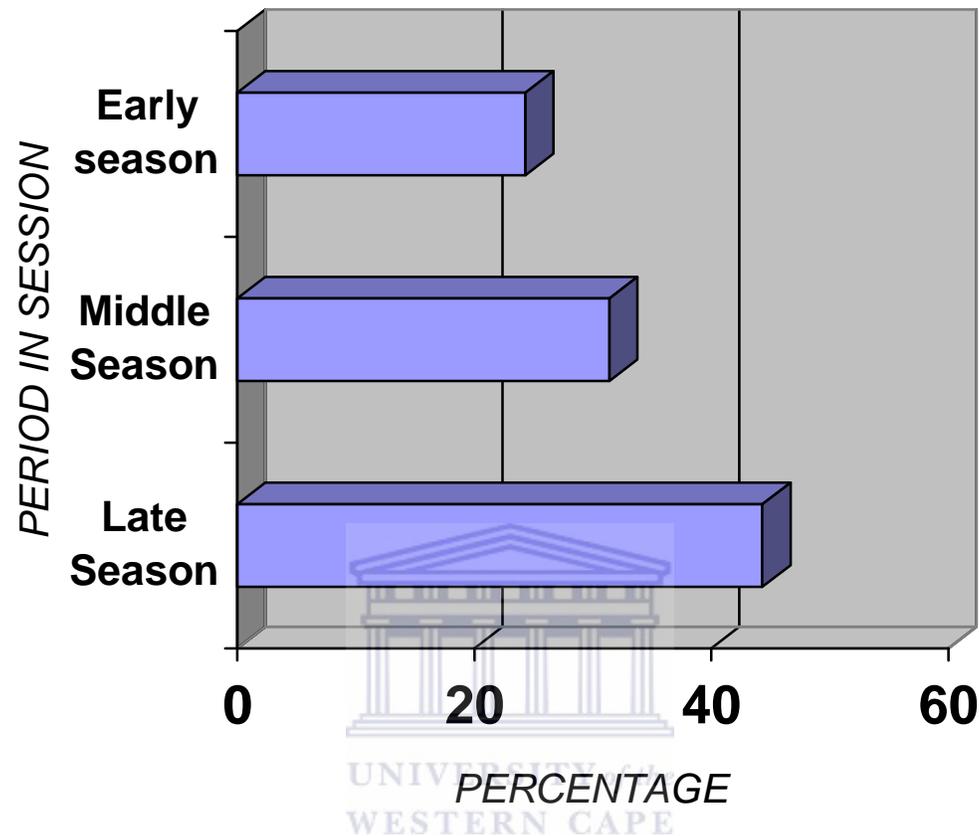
The majority of players sustaining an injury were midfielders (n=6, 40%) and defenders (n=5, 33.3%) as illustrated in Figure 4.3. No significant difference was found for prevalence of injuries according to playing position ( $\chi^2=2.536$ ,  $p=0.05$ ).

**Figure 4.3** Distribution of injury prevalence according to player position (n=15)



A total of 70 injuries were recorded for the entire season (28 games). The season was divided into early (game 1-9), middle (game 10-19) and late season (game 20-28). Of the injuries (n=70) that occurred over the season, 24.3% (n=17) occurred in the early season, 31.4% (n=22) middle season and 44.3% (n=31) in the late season as illustrated in Figure 4.4.

**Figure 4.4** Distribution of injuries according to the time in the season (n=70)

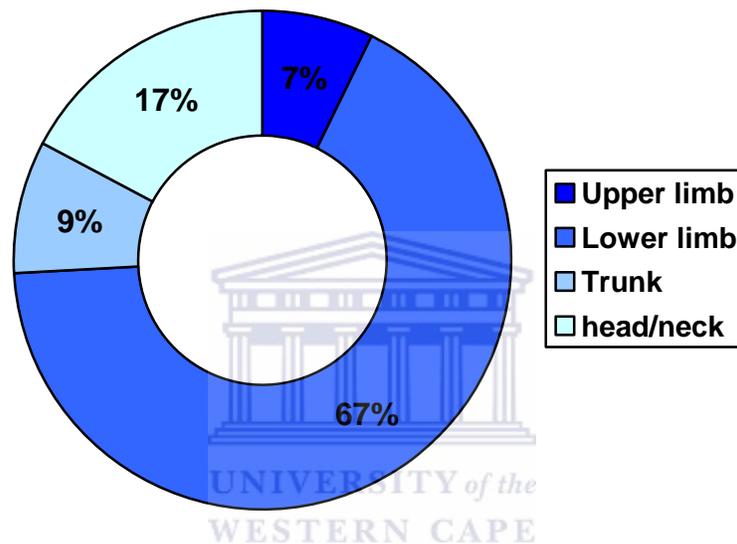


#### **4.4 SITES OF INJURY**

Injuries sustained were divided into categories as stipulated by the FIFA Injury Consensus Group (Fuller, et al., 2006). The researcher followed these guidelines as the number of injuries in the individual categories was too small for analysis purposes. These categories included head and neck (head/face, neck/cervical spine); upper limbs (shoulder/clavicle, upper arm, elbow, forearm, wrist, hand/finger/thumb); trunk (sternum/ribs/upper back, abdomen, lower back/pelvis/sacrum) and lower limbs (hip/groin, thigh, knee, lower leg/Achilles

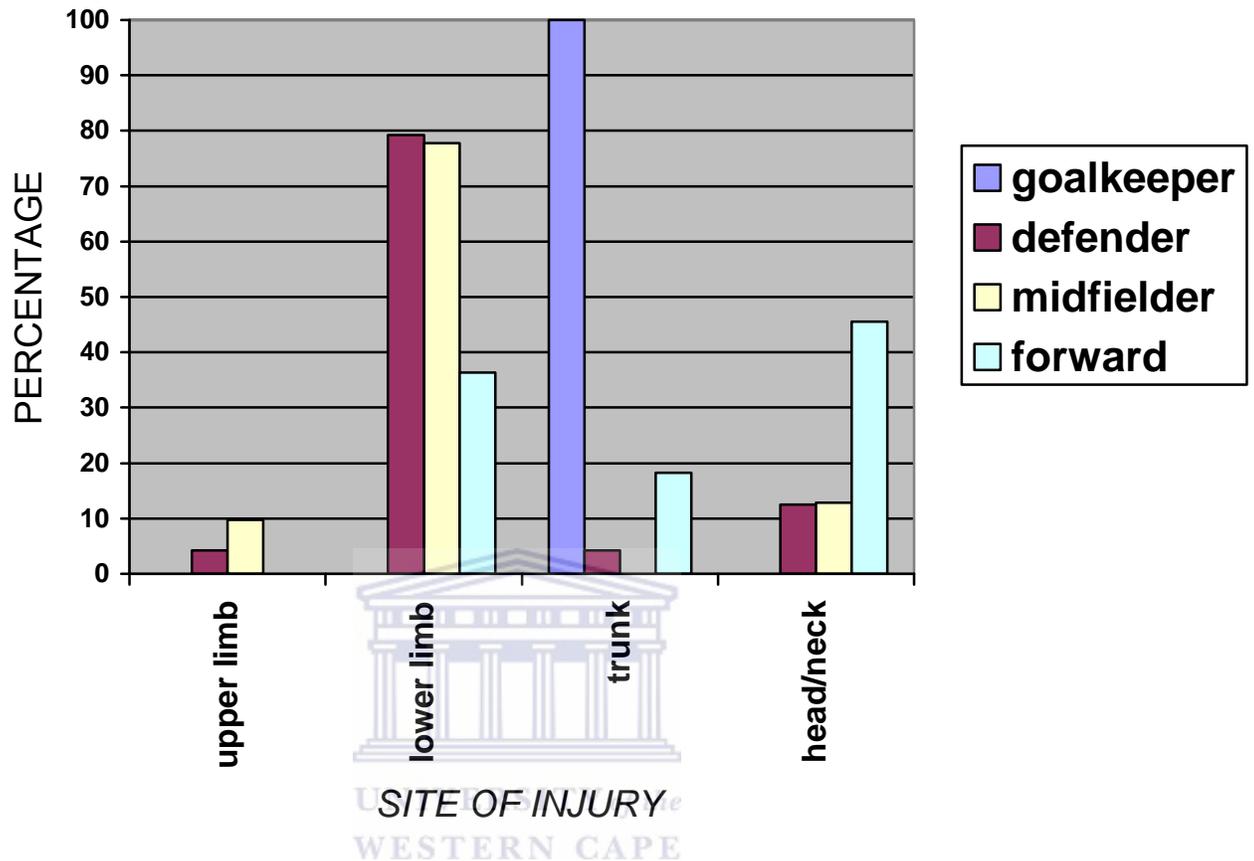
tendon, ankle, foot/toe). The majority of injuries (47, 67.1%) were sustained to the lower extremities followed by the head and neck (12, 17%) as illustrated in Figure 4.5.

**Figure 4.5** Distribution of injury incidence according to site categories (n=70)



Defenders (10, 79.2%) and midfielders (11, 77.4%) were significantly more likely to sustain a lower limb injury than goalkeepers (2, 0%) and forwards (3, 36.4%) ( $p < 0.05$ ; Fisher's Exact=12.549) as illustrated in Figure 4.6. Goalkeepers (2, 100%) were significantly more likely to sustain a trunk injury than forwards (3, 18.2%) and defenders (10, 16.7%) (Fisher's Exact=19.045,  $p < 0.05$ ). No significant association was found between upper limb and head/neck injury and player position ( $p > 0.05$ ).

**Figure 4.6** Site of injury according to playing position

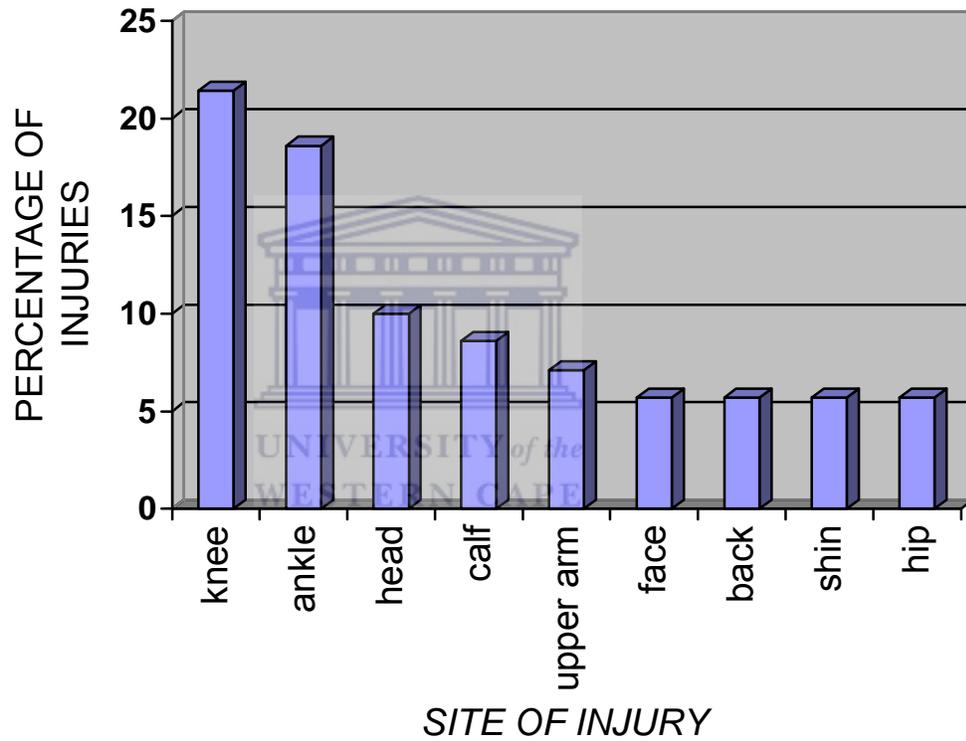


When the injuries were considered in their individual categories, it was found that the majority of injuries (n=70) were sustained to the knee (15, 21.4%), ankle (13, 18.6%), head (7, 10%) and the calf (6, 8.6%) as shown in Figure 4.7.

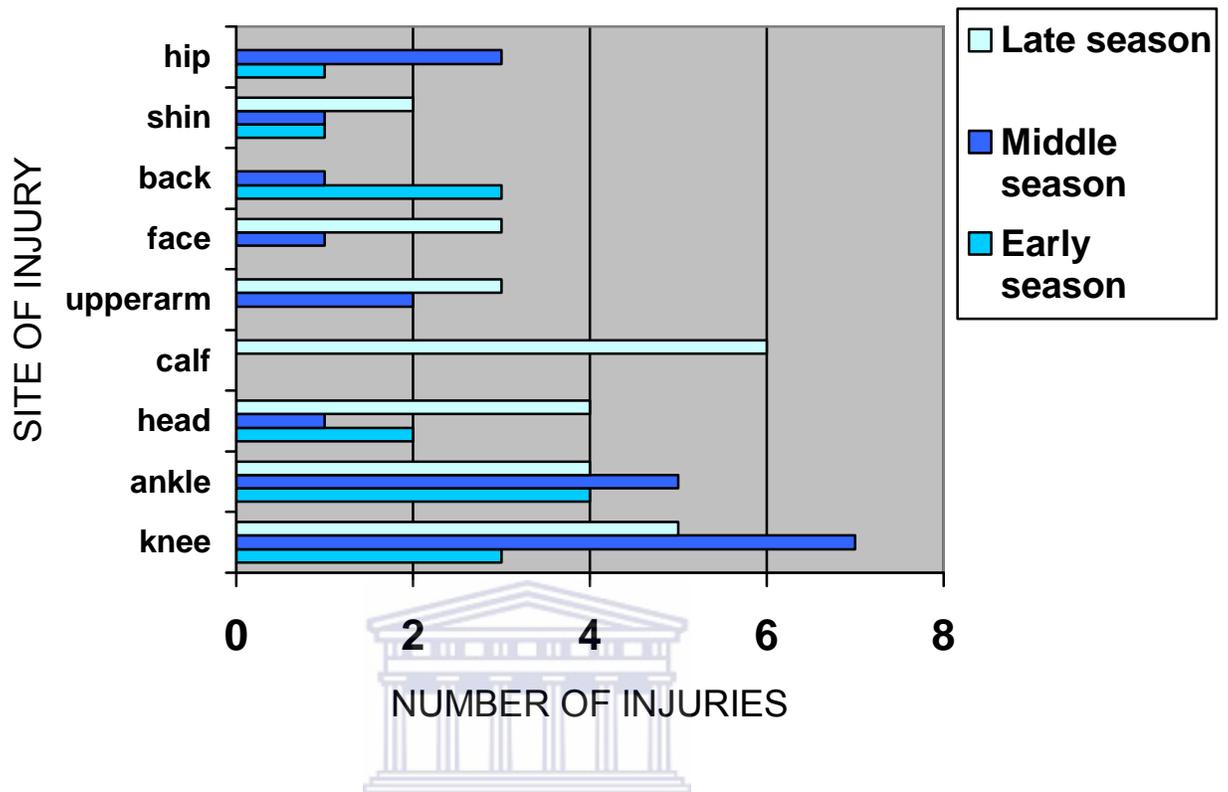
Furthermore ankle injuries (n=13) were found to be more prevalent among midfielder (9, 69.2%) followed by defenders (4, 30.8%). Knee injuries (n=15) showed a similar result with the midfield position accounting for nine (60%) of all knee injuries, followed by defenders with six (40%).

When considering the time of the season that injuries were sustained, most of the knee injuries (7, 46.7%) and ankle injuries (5, 38.5%) occurred during the middle part of the season as illustrated in Figure 4.8.

**Figure 4.7** Distribution of injuries according to site of injury (percentage) (n=70)



**Figure 4.8** Distribution of injuries according to period in season (n=70)



#### 4.5 MECHANISM OF SOCCER RELATED INJURIES

Table 4.3 lists the mechanisms by which the players were commonly injured during competitive matches. Players could indicate more than one mechanism for every injury. The majority of injuries (25, 27.2%) were due to being tackled followed by colliding with another player (23, 25%) and running (12, 13%).

**Table 4.3** Distribution of mechanisms of injuries

<b>Mechanism</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Tackled</b>	25	27.2%
<b>Collision</b>	23	25%
<b>Running</b>	12	13%
<b>Tackling</b>	11	12%
<b>Overuse</b>	7	7.6%
<b>Heading</b>	7	7.6%
<b>Landing</b>	3	3.3%
<b>Turning</b>	2	2.2%
<b>Jumping</b>	2	2.2%
<b>Shooting</b>	0	0%
<b>TOTAL</b>	92	100%

\* Players could choose more than one mechanism per injury

An association was found between the mechanism of injury and the player position (Fisher's Exact=41.118,  $p < 0.05$ ) as illustrated in Table 4.4. Defenders were significantly more likely sustain an injury due to tackling (10, 45%) when compared to midfielders (11, 3.2%). Midfielders (11, 61.3%) and forwards (3, 63.6%) were significantly more likely to incur an injury as the result of being tackled when compared to defenders (10, 8.3%). Goalkeepers (2, 66.7%) were significantly more likely to sustain an injury due to a collision compared to defenders (10, 16.7%).

**Table 4.4** Distribution of mechanisms of injury according to player position

<b>Mechanism</b>	<b>Goalkeeper</b>	<b>Defender</b>	<b>Midfield</b>	<b>Forward</b>
<b>Tackling</b>	0%	45.8%	3.2%	0%
<b>Tackled</b>	0%	8.3%	61.3%	63.6%
<b>Running</b>	0%	20.8%	12.9%	0%
<b>Landing</b>	33.3%	4.2%	3.2%	0%
<b>Heading</b>	0%	4.2%	12.9%	18.2%
<b>Collision</b>	66.7%	16.7%	6.5%	18.2%



#### **4.6 SEVERITY OF SOCCER INJURIES**

Injury severity was defined as “The number of days that have elapsed from the date of injury to the date of the player’s return to full participation in team training and availability for match selection” (Fuller et al., 2006, p 84). The severity of the injuries were grouped into five categories: slight (0 day), minimal (1-3 days), mild (4-7 days), moderate (8-28 days), and severe (>28 days). Slight injuries accounted for most (79.7%) of the injuries recorded for the team in the season as illustrated in Table 4.5. One severe injury was recorded for the team in the season.

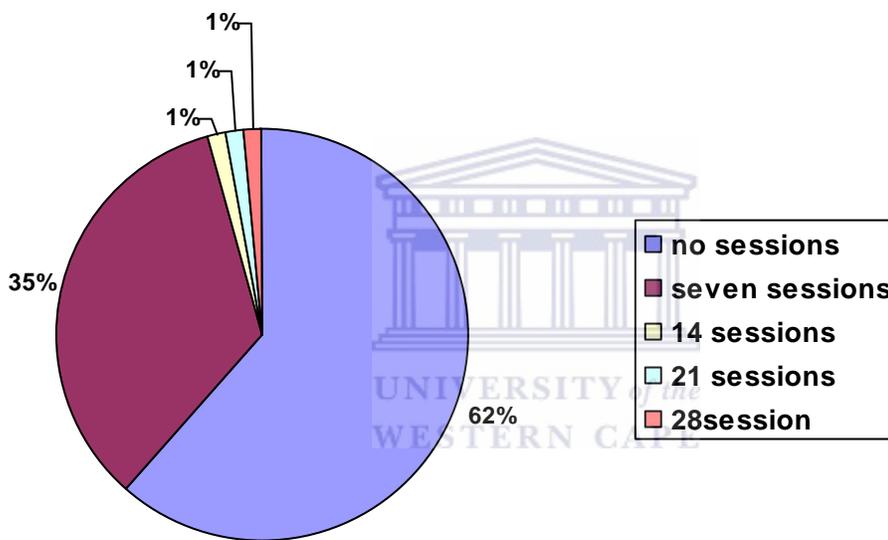
**Table 4.5** Distribution of injuries according to severity (n=70)

<b>Severity of injuries</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Slight</b>	55	78.6%
<b>Minimal</b>	10	14.3%
<b>Mild</b>	2	2.9%
<b>Moderate</b>	2	2.9%
<b>Severe</b>	1	1.4%
<b>TOTAL</b>	70	100%

The study looked at slight and minimal injuries for player's first and second injury and found it to be the most prevalent type of injury with 78.6% and 14.3% respectively when compared to mild and moderate injuries accounting for 2.9% and severe injuries accounting for only 1.4%. These slight injuries were further seen to occur more in the middle part of the season (37, 66.7%) when compared to the early (4, 8.3%) and late (14, 25%) parts of the season.

No significant association was found between player's positions and severity of injury. However player position seen to sustain the most severe injuries were midfielders (n=1, 100%). Moderate injuries were seen more in forwards (2, 100%). Minimal injuries were found to be more prevalent in midfielders (6, 58.3%) compared to defenders (3, 29.2%).

The number of missing days (time loss) measured the impact of injury on the sporting activity. The competition days missed ranged from seven days (one game) to 28 days (four games). The percentage of injuries resulting in a player being unable to play in a single game was reported as 24 (34.3%). Those players who missed two games (14 days), three games (21 days) and four games (28 days) each had a frequency of only one (1.4%) as illustrated in Figure 4.9.

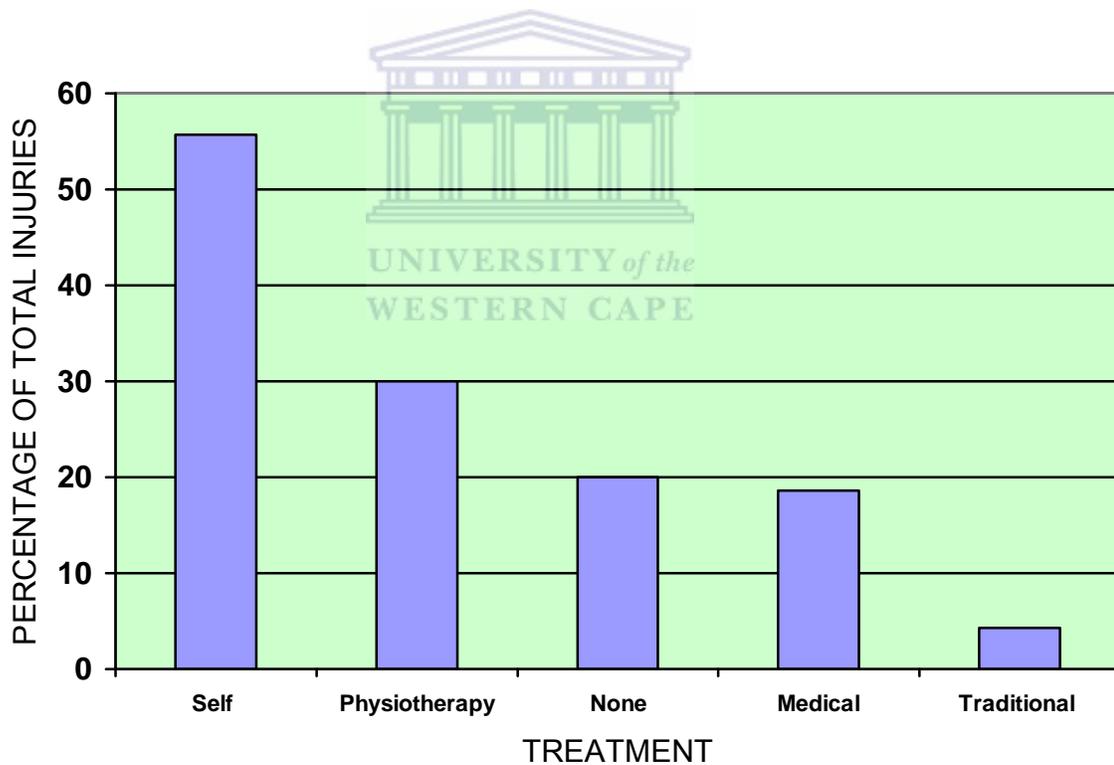


**Figure 4.9** Distribution of competitive sessions missed

#### 4.7 INJURY MANAGEMENT

Management of injuries was divided into five categories in the study: medical, physiotherapy, traditional, self and or no treatment necessary. Players could select more than one mode of management for each of their injuries. A little more than half of the injuries identified during the soccer season were managed by self-management (39, 55.7%). Physiotherapy management accounted for 21 (30%) of injury management as illustrated in Figure 4.10.

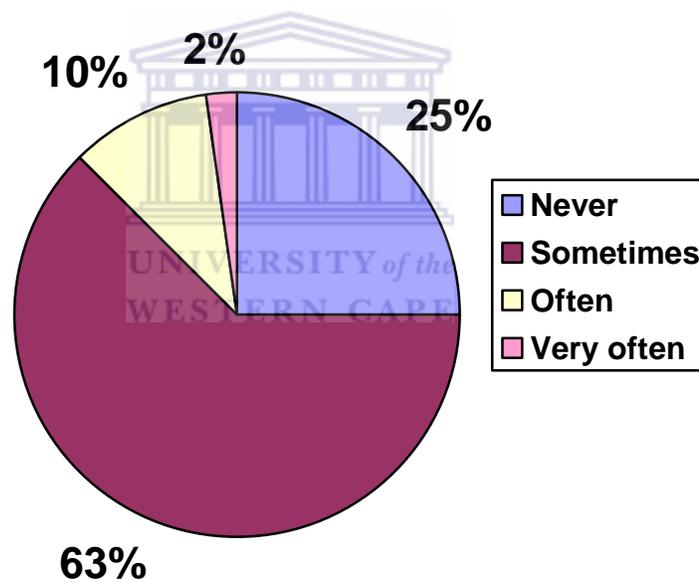
**Figure 4.10** Distribution of injury management (n=70)



\* Players could choose more than one management category

The players were asked to comment on accessibility of physiotherapy on both a personal and team level combined. Players rated the accessibility of physiotherapy services on a five-point Likert Scale. Most of the players (44, 62.5%) indicated that they “sometimes” had access to physiotherapy services, 18 (25%) “Never” had access to physiotherapy and one (2.1%) indicated that they “very often” have access to physiotherapy as illustrated in Figure 4.11.

**Figure 4.11** Distribution of access to physiotherapy

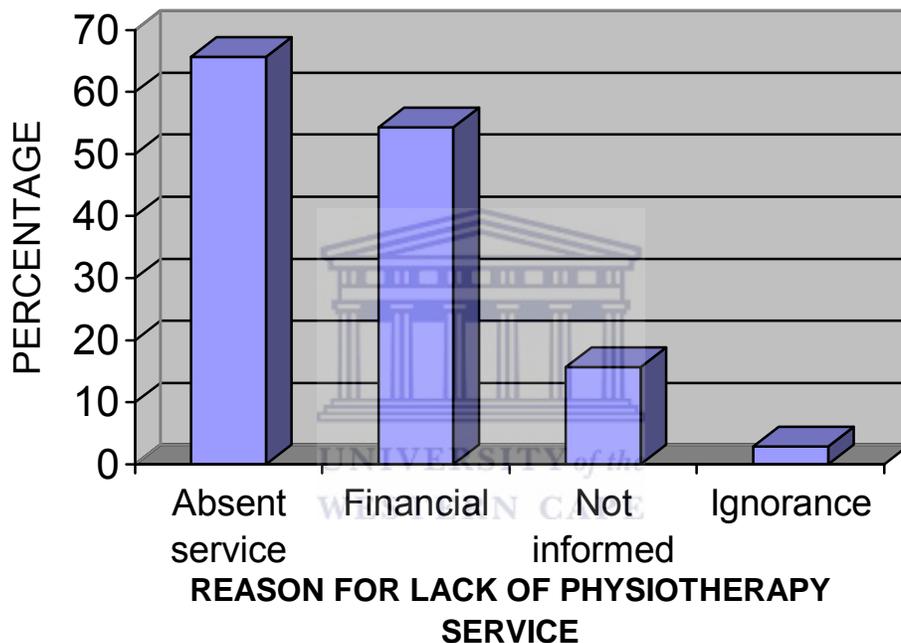


\* Player could choose more than one reason for accessibility

Reasons attributed to limited access to physiotherapy were divided into: financial, not being informed, absent service or ignorance. Reasons were recorded for every injury sustained by the player. For the majority of the injuries (65.7%), players indicated that the absence of service was their reason for limited access

to physiotherapy services. Financial reasons were indicated as a reason for no access to physiotherapy services for 54.3% of the injuries as illustrated in Figure 4. 12.

**Figure 4.12** Reasons for lack of physiotherapy services



Of the players that received physiotherapy treatment a number of different modalities were used. The options included: ice, compression, and elevation, exercise therapy, ultrasound, TENS, interferential, muscle stimulation, massage, heat treatment, stretching, joint mobilization, strapping, splinting, deep friction and crutch walking. More than one treatment modality could be indicated for each injury. Of the most frequently used physiotherapy modality used was ice (47, 67.1%) followed by elevation (21, 30%) and compression (18, 25.7%) as

outlined in Table 4.6. Two modalities, i.e. muscle stimulation and splinting, were not used on these players at any time during the season.

**Table 4.6** Distribution of modalities used to treat injuries

<b>Modality</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Ice</b>	47	67.1
<b>Compression</b>	18	25.7%
<b>Elevation</b>	21	30%
<b>Exercise therapy</b>	9	12.9%
<b>Ultrasound</b>	6	8.6%
<b>TENS</b>	1	1.4%
<b>Interferential</b>	4	5.7%
<b>Muscle stimulation</b>	0	0%
<b>Massage</b>	12	17.1%
<b>Heat treatment</b>	1	1.4%
<b>Stretching</b>	12	17.1%
<b>Joint mobilization</b>	1	1.4%
<b>Strapping</b>	5	7.1%
<b>Splinting</b>	0	0%
<b>Deep friction</b>	1	1.4%
<b>Crutch walking</b>	1	1.4%

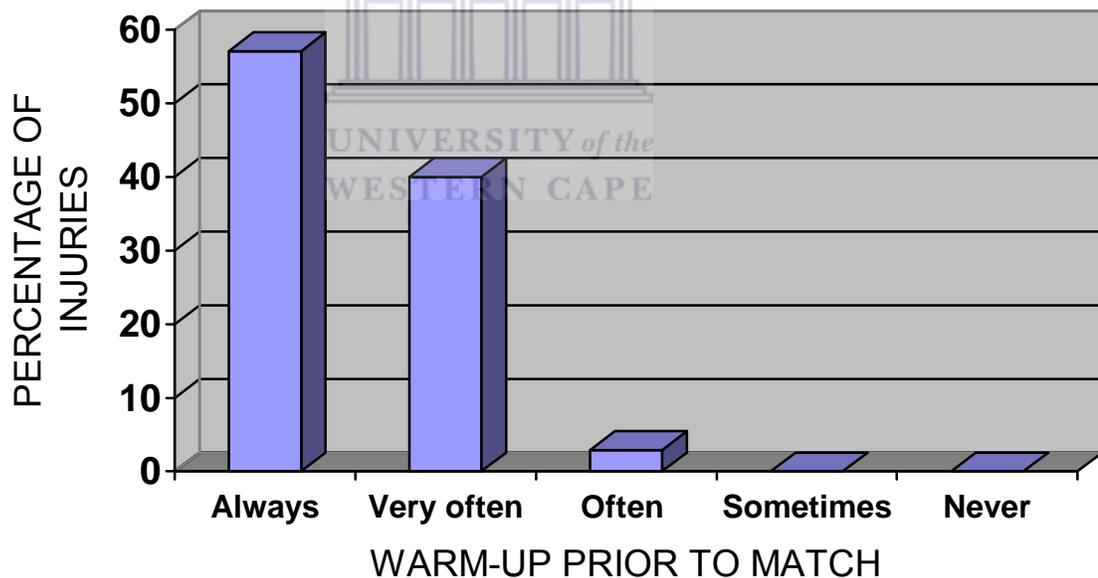
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\* More than one treatment modality could be indicated for an injury

#### 4.8 PREVENTION MEASURES

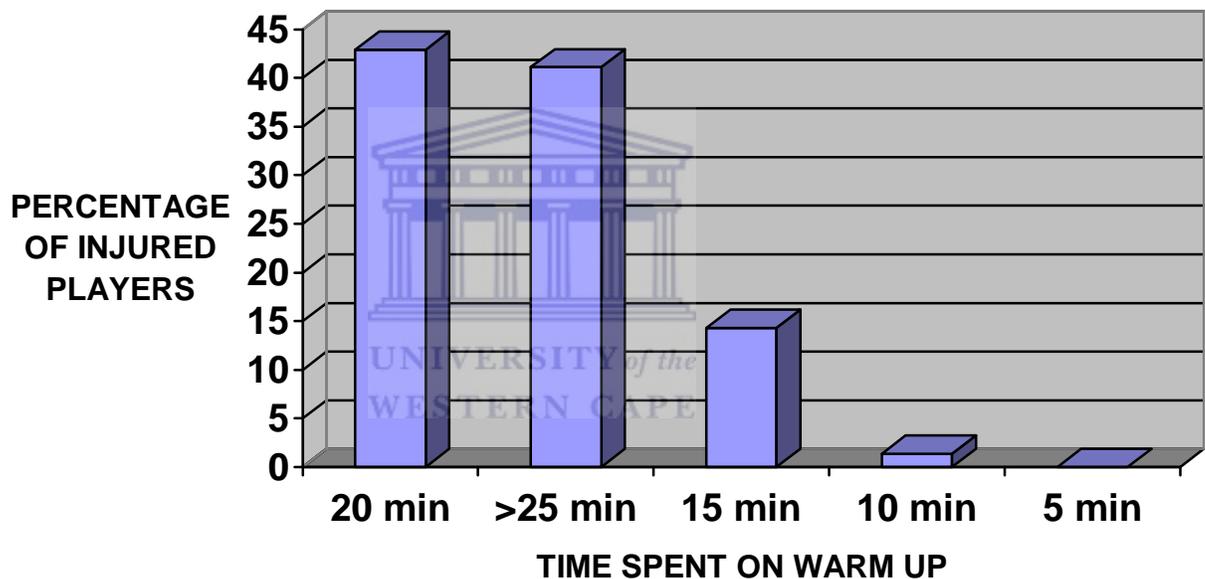
The study classified injury prevention into warm up prior to competitive matches, cooling down after competitive matches, flexibility training as a team and as an individual, and strength training as a team and as an individual. The warm up period prior to matches was rated on a five-point Likert Scale as always, very often, often, sometimes and never. More than half (57.1%) of the injured players reported that they “always” warmed up prior to matches while 40% reported warming up “very often”.

**Figure 4.13** Distribution of warm up prior to matches (n=15)



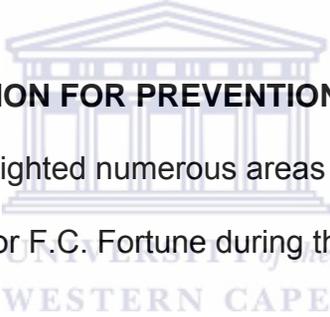
Prior to any sporting activity it is recommended to warm up for 15 to 30 minutes (Brukner & Khan, 2003). The majority of players (42.9%) indicated that they warmed up prior to matches for at least 20 minutes, while 41,4% warmed up for more than 25 minutes as illustrated in Figure 4.8.

**Figure 4.14** Distribution of time spent on warm up prior to matches



The cool down period after matches was also rated on a five-point Likert Scale as always, very often, often, sometimes and never. The majority of players (67.8%) indicated that they did not participate in any cool down session after the match while 27.1% indicated that they “sometimes” participated in cool down after matches.

Players could indicate whether they participate in flexibility and strength training both as a team and as individuals. More than half of the players (51.9%) reported that they undertook flexibility training at least twice a week with the team. As individuals, most players reported not participating (47.5%) or at least participating in flexibility training once a week (45.8%). Strength training was reported as not being performed as a team by (70%) of the players or at least once per week by 10% of the players. Individuals who undertook strength training once a week accounted for 22 % of the players compared to the 11.9% who undertook strength training twice a week.



## **SUMMARY AND IMPLICATION FOR PREVENTION**

The results of the study highlighted numerous areas of focus when addressing injury prevention of players for F.C. Fortune during the 2004/2005 professional season:

1. More than half of the players (58%) in the team sustained at least one injury over the 2004/2005 season
2. Older players were more susceptible to sustain an injury
3. Repetitive injuries during games accounted for 42% of the injured players
4. Player positions found to be the most affected by with injury were the defenders and the midfielders.
5. Most injuries occurred in the middle/late part of the season
6. Most of the injuries affected the ankles and the knees

7. The mechanisms found to be the most responsible for injuries were being tackled, colliding with another player, running and/or tacking another player.
8. Most of the players used self treatment when managing their injuries.
9. Physiotherapy access was limited mostly because of the absence of the service or financial reasons.
10. The majority of players indicated that they did not participate in any appropriate cool down session after matches, or adequate flexibility and strength training as a team or as individual players.

The results of the study are discussed in the next chapter, including the suggested injury prevention programme.

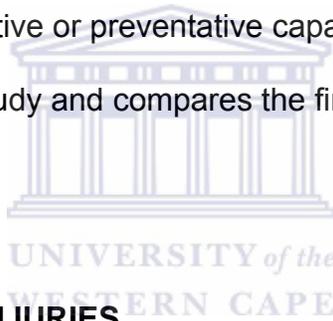


## **CHAPTER FIVE**

### **DISCUSSION**

#### **5.1 INTRODUCTION**

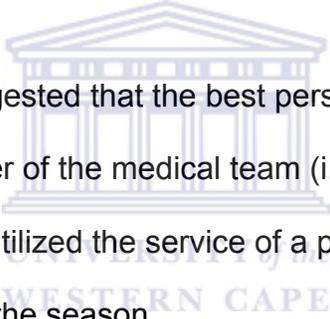
The aim of this study was to determine the prevalence of soccer injuries among a team of professional first division soccer players in South Africa tracked over one season. Furthermore the study aimed to identify the sites and mechanisms related to these injuries. Lastly the study also aimed at identifying the need for physiotherapy in a rehabilitative or preventative capacity. This chapter discusses the findings of the current study and compares the findings with similar published studies.



#### **5.2 PREVALENCE OF INJURIES**

The current study utilized a prospective descriptive design to establish the prevalence of soccer injuries sustained by players in a first division team. Various researchers in the field of soccer injuries encourage this type of design as it is not associated with the well known recall-bias found in retrospective studies (Hagglund et al., 2005a; Junge & Dvorak, 2000). In addition, players were tracked over an entire soccer season in order to ascertain the prevalence of soccer injuries and mechanism resulting in injury occurrence during competitive matches in the season. Researchers have advocated epidemiological studies over an entire season as injury prevalence may vary over the football season

(Hagglund et al., 2005a). These researchers recommend that injuries should be recorded on a standard report form that includes information about the date of injury, location, mechanism, and severity. Hence this study utilized a standardized questionnaire which extracted information regarding injury date, player position and age, site of injury, mechanism of injury, severity of injury, medical attention required, physiotherapy intervention and preventative measures utilized. Given that all the players' injuries were recorded for all games in the season, the study was fully representative thereby enhancing the generalisability of the results.



Hagglund et al. (2005a) suggested that the best person to be utilized for injury data collection was a member of the medical team (i.e. doctor or physiotherapist). The study utilized the service of a physiotherapist to collect the data at all the matches over the season.

The age of the soccer players in the current study ranged between 17-39 years which is similar to soccer teams in Europe (Parry & Drust, 2006) and England (Walden, et al., 2005) and in Rwanda, Africa (Twizere, 2004). The team's mean age was 23.77. More than half of the members in the team (57.7%) were between the ages of 20-24 years. Despite the wide age range in this team, the majority of the players in the team were young players. Twizere (2004) who conducted an epidemiological study on Rwandan soccer players, similarly found players in their first division clubs to have such a young mean age. Parry and

Drust (2006) found the mean age of the elite soccer players in their study to be slightly older 24. The low mean age in the study can be attributed to this being a recently established team that had been playing in the league for two years.

Although several authors have studied the pattern of injury in football, several inconsistencies exist with regard to study design and definition of injury, making it difficult to compare results between studies. Various definitions of injury have been used in the literature, such as: “injury occurring during a scheduled match or training session and causing the player to miss at least one training session or match” (Van Mechelen et al., 1992; Ekstrand & Tropp, 1990). Ekstrand, Walden, and Hagglund (2004) highlighted that when using “time lost” as a sport injury definition, it needs to be very sport specific as certain injuries could mean inability to participate in one sport but not another. Other researchers (Junge & Dvorak, 2000) have recommended the use of “tissue injury” definition but this was seldom used due to the cost implications involved. Fuller et al. (2006) defined injury as any physical complaint that results from a football match or training session irrespective of the need for medical attention or time loss from football activities. Further distinction was made between an injury that resulted in a player receiving medical attention, as a “medical attention” injury, and those resulting in the player being unable to participate in training/competition as a ‘time-loss’ injury. Other studies calculated injury prevalence with regard to a 1000 playing hours, using numerator and denominator data as this methodology takes into account of the exposure time at risk (Junge & Dvorak, 2000; Rahnama, et al., 2002; Van

Mechelen, et al., 1992). These definitional controversies limit the comparability of studies. For the purpose of this study FIFA Consensus Group's definition for injury was used. They identified injury as any physical complaint sustained by players as the result of a football match (Fuller, et al., 2006). This was deemed most appropriate as it allowed the researcher to gather a larger pool of data as opposed to data only from players forced stop a match as a result of injury.

Data presented by Junge and Dvorak (2004) indicate that, on average, every elite male soccer player incurs approximately one performance limiting injury every season. The results of the current study revealed that 58% of the players in the team sustained an injury during the season. This result was slightly lower than the results reported by various other studies ranging from between 65% and 91% of players incurring injuries during a season (Hagglund et al., 2003; Hawkins et al., 2001; Hawkins & Fuller, 1999). This may be due to the relative youth of the players. The mean age of the injured players was older than the mean age of the non-injured players. There were two players who were in their late thirties and this affected the mean ages of the injured players. The results however indicate that older professional players are likely to incur more injuries than their younger counterparts.

The current study found that the age category, 20-24 years, sustained the most injuries (53.3%) during the season. A similar trend was observed by Woods et al. (2002) who reported younger age groups (17-25years), were more likely to

sustain injuries than more experienced players (26- 35+ years) in their study. Possible reasons for this could be that younger players are more inexperienced thus sustaining more injuries. In addition, younger players are inclined to be more daring and robust in their tackling setting themselves up for more injuries. When participating in competitive matches at professional level, there is a need for effective coaching and instruction regarding injury prevention in this age category in the South African context.

Another reason for these findings may be related to the level of skill involved. Correlation of skill level with incidence of injury has yielded mixed results in previous studies. Inklaar et al. (1996) reported a significantly higher incidence of injury in the high level players, whereas Blaser and Aeshllmann (1992) found a higher incidence in low level players. In contrast, Poulsen et al. (1991) found no difference in incidence related skill level. In the current study all were professional players. Very little injury statistics exist for professional footballers in South Africa (Giga & Gongal, 2003).

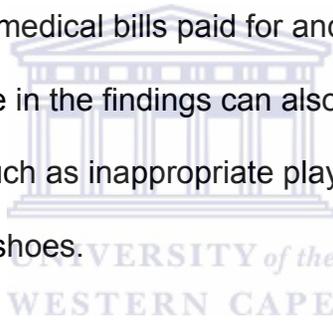
For the season, the team's overall results were five wins, 12 losses and 11 draws. More injuries were seen in the games that were lost (40%) and drawn (41.4%) compared to the games that were won (18.6 %). Similar findings were reported by Ekstrand, et al. (2004) in their study among a national Swedish team in which the injury risk was twice as high when the team lost a match. The above mentioned authors attributed this to a number of reasons, amongst others the

fact that the best team is selected to play, thus the team is weakened if anyone is injured. Furthermore teams that need to win or draw a match often play more intensely and thus increasing their risk for injury.

Playing positions found to be the most prevalent for injury in the current study were midfielders (40%), followed by defenders (33.3%). This was in contradiction to the results of Hawkins and Fuller (1999) who reported forwards to sustain the most injuries in the European Championship, English Premier League and the English First Division. These researchers further reported a higher injury incident rate among defenders in the 1994 World cup finals intimating that higher competitive games exact a higher toll on midfielders. It must be noted that the formation adopted by the team's coach might be at play here. With a more defensive formation, more players are drawn into the midfield or defender positions even players designated as forward players. Comparison of this study with Hawkins and Fuller (1999) should be with caution as our sample size was small compared to that of the four leagues studies as well as the players playing at a higher competitive and professional level than that of the team used in this study. Additionally the contrast in the findings from the current study could be due to the dominantly offensive style adopted for the team that tended to play with three forwards.

The study revealed a total of 70 injuries during matches across the season. This is a high prevalence rate when compared to Ekstrand and Karlsson (2003) who

reported 31 injuries sustained over 57 training sessions and competitive matches. Comparison again is compounded by the fact that injuries were not tracked in training sessions. However this could be explained by the difference in injury definition used in both studies as well as the difference in socio-economic backgrounds of players. The remuneration-incentive system adopted by clubs may be a factor in this regard. The club draws the majority of its players from working class communities and operates on a no-play no-pay policy. This may lead to players continuing to play despite being injured thereby further increasing their risk for re-injury as opposed to players playing for more financially well-off clubs where they have their medical bills paid for and are entitled to full pay despite injury. The difference in the findings can also be explained to some environmental risk factors such as inappropriate playing surfaces, inexperienced coaching and inappropriate shoes.



Data were also analyzed to ascertain whether there were differences in incidents of injury at different times of the season. The findings of the current study indicated the distribution of injuries to be more towards the later part of the season (44.3%) followed by the middle (31.4%) than in the early part (24.3%). The incidence of injury has previously been reported to vary over the different periods of the playing season (Anglietti, Zaccheriotti, De Biase, 1994; Ekstrand, 1982; Lewin, 1989; Sandelin, Santavirta & Kiviluoto, 1985) with peak injury rates reported to occur after preseason training and mid-season breaks and during match intensive periods. Hawkins and Fuller's findings (1999) were similar to

those in the current study with the highest injury frequency rate (IFR) to be found towards the end of the season followed by the start of the season and then the middle of the season. White, Emery, Kane et al. (1988) provided some explanation for these findings positing that there was a loss of fitness during the closed end of the season and that this had a potential impact on players performance. The decrease fitness also renders players less able to withstand the stresses placed upon them as the season progresses. This is supported by the results of the current study which showed a progressive increase in the number of injuries as the season progressed.

### **5.3 SITES OF INJURY**

Direct injuries will inevitably occur in soccer because the game is a physical contact sport. As they contest for possession of the ball, players are often subjected to direct blows to the body, some inadvertently, others deliberately intended to hurt, intimidate or incapacitate the player. Indirect injuries result from forces generated within the musculoskeletal system during physical activity.

These types of injuries usually are encountered in the early and late stages of the game due to inflexibility, in-adequate warm-up or fatigue (Inklaar, 1994b). In the current study injuries were divided into upper limb, lower, and trunk. This was consistent with numerous other studies (Faude et al., 2005; Giza, et al., 2005; Hawkins & Fuller, 1999; Walden et al., 2005; Woods et al., 2002). The study found a frequency of 67.1% when considering lower injuries which was very similar to the 60% found by Giza et al. (2005). This was however relatively low

when compared to Faude et al. (2005), Woods et al. (2002), Walden et al. (2005) who all found a high injury incidence of between 80-89%. This can be explained by the increase in physical contact and competitiveness of players in the South African context, with a result of injuries being found not only in the lower limbs but spread all over the body. The knee and ankle were the most common body part affected by injuries which is similar to other studies done more than 10 years ago (Engstrom, Johansson, & Tornkvist, 1990; Ekstrand & Gillquist 1983a). The study's findings were also on par with more recent studies (Rahnama et al., 2002; Heidt et al., 2000; Faude et al., 2005) who all found the knee to be the most affected joint followed by the ankle. Studies conducted by Twizere (2004), Hawkins and Fuller (1999) found the most affected joint to be the ankle followed by the knee. Frantz et al. (1999) also found similar results however comparison should be with caution as all of their participants were adolescence. The study further reported that midfielders were more prone to injuries when compared to other playing positions (69.2%). This can be attributed to the large number of midfielder in the team (n=11) compared to forwards (n=3). Alternatively , when considering the amount of games lost and drawn, one can predict that forwards were not as active in the game compared to the midfielders and defenders hence less injuries were found in that position.

The Chi-square statistic assessing the association between the site of injury and the playing position of players in the current study, found a significant association with midfielders and defenders being more likely to sustain lower limb injuries

than goalkeepers and forwards. On the other hand goalkeepers and forwards were seen to be more likely to incur upper trunk injuries than midfielders and defenders. These associations can be attributed to the fact that besides soccer being a game predominantly played with the lower limbs each position performs a particular responsibility in the team. Midfielders and defenders were responsible for defending “their” territory and set up play for the forwards. These are positions that come into full contact with the opposing players the most. The goalkeeper is responsible for protecting the goal areas and is required to stretch, jump, dive and defend the goal with any part of his body. This makes him susceptible to a myriad of injuries not only to the trunk but also to their upper and lower limbs. The forwards, in turn, are responsible for scoring goals. This puts them in the opposition’s territory most of the time which is protected by the opposing team’s defense. This puts them on the receiving end of a lot of pushing and shoving.

#### **5.4 MECHANISM AND NATURE OF INJURY**

Rahnama et al. (2002) identified 16 soccer related playing activities as possible mechanisms to injury; dribbling the ball, goal catch, goal punch, throw, heading the ball, jumping to head, kicking the ball, making a tackle, making a charge, passing the ball, receiving a ball, receiving a tackle, receiving a charge, shot on goal, set kick, and throw in the ball. The study adapted the mechanisms for injury as Rahnama et al. (2002). The subsequent results revealed that the most common mechanism cited for soccer injury were being tackled (27.2%) followed

by colliding with another player (25%). Running and tackling was also reported with a frequency of 13% and 12% respectively. The results of the study concurred with the findings of Rahnama et al. (2002) who's findings cited being tackled as the predominant mechanism when analyzing 10 games of the 1999/2000 English Premier League. This is however low when considering the high proportion of ankle injuries as the result of being tackled reported by Giza et al. (2003). These findings were disparate with those of Twizere's study (2004) in which he reported the mechanism most responsible for injury occurrence during match play, in Rwanda, to be the soccer action of colliding with another player (15.4%) compared to the least likely cause of jumping (1.5%).

As some playing actions i.e. tackling, being tackled and collision have been identified as being at a higher risk for injury than others, more attention should be paid to these by the coaches when planning training, by the referee when officiating a match, and by the players who may also need to practice avoidance maneuvers to protect themselves in such instances (Rahnama et al., 2002). Proactive initiatives to improve player discipline could have a positive impact on the game of soccer (Parry & Drust, 2006) further highlight the immense responsibility of refereeing.

An association was found between the mechanism of injury and player positions in the current study. Defenders were seen to incur more injuries as the result of tackling a player, compared to midfielders and forwards who were more likely to

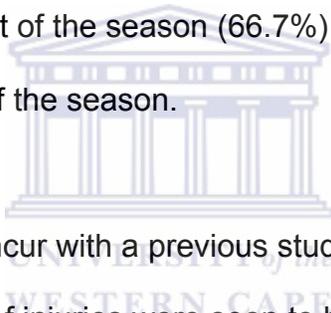
be injured as the result of being tackled. Rahnema et al. (2002) also found there to be an association between the injury incidence and playing action/mechanism. These researchers reported that injury incidence was found to be higher in receiving a tackle, making a tackle, and receiving a charge. This association is similar to that found in the current study and can be explained by the different roles that each position has and thereby places the player in situations where they are prone to specific mechanisms of injuries compared to other positions.

In a South African study, Giga and Gongal (2003) found the incidence rate of injuries because of aggressive tackles to be the most important factor contributing to severe injuries in the South African community. They speculated that the uncontrolled aggression could be linked to psychological attitude to the game, displaced aggression, foul play, poor training and poor physical facilities (Giga & Gongal, 2003).

## **5.5 SEVERITY OF INJURIES**

Fuller et al's definition (2006, p. 84) was adapted in this study to determine severity of injury: "the number of days that have elapsed from the date of injury to the date of the player's return to full participation in team training and availability for match selection". In contrast, van Mechelen et al. (1992) define injury severity in terms of the cost of the injury sustained in the sport suggesting that there are direct and indirect financial implications associated with the injury. Direct costs pertain to all the costs incurred with regard to medical treatment.

Indirect costs refer to the loss of productivity as a result of the injury. In the current study, the severity of injuries was observed only in competitive matches. Severity of the injuries was grouped into five categories: slight, minimal, mild, moderate, and severe. The study reported slight injuries to account for most (79.7%) of all the injuries in the study. No severe injuries were recorded for the team in the season. The study looked at slight and minimal injuries for player's first and second injury and found it to be the most prevalent severity of injury with 88.9% prevalence when compared to moderate, major and severe injuries that all each only accounted for 3.7%. These injuries were further seen to occur more in the middle part of the season (66.7%) when compared to the early (8.3%) and late (25%) part of the season.



The findings of the study concur with a previous study of Rahnama et al. (2002) who found that the majority of injuries were seen to be minor injuries, but are higher than the sub-elite and adolescent players reported in Ostenberg and Roos (2000) and Soderman, et al. (2001). As a result of the severity of different injuries, team management tends to limit access to physiotherapy only to those who acutely needed the treatment. This affected the answers to the question on accessibility and therefore resulted in players responding differently through the season. This can be linked to the amount of re-injuries found by the players and therefore the team management needs to be made aware of the effects of selected rehabilitation on only certain injuries over the season.

## 5.6 MANAGEMENT OF INJURIES

The study reported that self-treatment was the preferred injury management adopted by players in the team. This can be explained by the fact that, since no physiotherapist is employed to work full time at the club, players have no other choice but to self-treat or pay for the service themselves. This is not always a possibility due to low socio-economic circumstances, hence the prevalence of self-treatment. Of those players who can afford physiotherapy treatment (30%), this was limited to short sessions and often led to incomplete rehabilitation of injuries due to the team requiring the player or because of the financial burden placed on the player as the result of not participating in games. This current practice is far from the goal of athletic rehabilitation which is to return the athlete to participation as quickly as possible, while allowing the injured tissue to heal without compromising it by further injury (Mattaacola, & Dwyer, 2002). Brukner and Khan (2003) postulated that all musculoskeletal injuries require active rehabilitation. They concurred with Mattaacola and Dwyer, (2002) as to rehabilitating the athletes in order to allow them to return to the sport with full function in the shortest possible time. Athletes however are generally eager to return to normal participation in their sporting code and hence challenge the healing process by aiming to return to competition much sooner than the lay person (Schootman, et al., 1994). This could be seen to be the case in the study.

The high percentage of self treatment used by the South African soccer players could also be attributed to high cost of medical and physiotherapy treatments compared to the economic status of many of these players and teams. This is further compounded by the fact that the players receive minimal medical assistance at team level because of budget constraints. There was one player who reported the use of traditional treatment (4.3%); traditional treatments include the use of herbal medicine, cutting of the skin, etc. administered by traditional healers. There is, however, no scientific evidence to the effectiveness of traditional treatment, although some players continue to use this as it is the most affordable. These practices were seen by the WHO (2002) to be unsafe practices which could lead to infection or fatal side effects on players. The inappropriate management of soccer injuries may be the reason for the recurrence of injuries reported by many of the players. Reilly, Howe and Hanchard (2003) suggest that adequate recovery from injury depends on accurate diagnosis in the first instance, proper first aid and secondary treatment, a planned period of rehabilitation and a graded progress towards return to competition. This can only be done with by engaging the services of qualified medical personnel. Team budgets in South Africa need to cater for this or players need to take onus of their responsibility for their health.

The results of the study revealed that 42.9% of players reported only sometimes having access to physiotherapy. However, 17.1% of soccer players reported not receiving physiotherapy at all. The high percentage of players who occasionally

and who never had access to physiotherapy could be because of financial problems, soccer players not being aware of the services or unaware of the effectiveness of physiotherapy services, or the absence of the service at the club. This highlights the need for education of stakeholders at various levels in order to address the issues of ignorance and tackle the right of access of player to such a valuable service.

The main reasons for players not receiving physiotherapy was that of the soccer club not offering the service (65.7%) followed by financial reasons (54.3%). Despite a physiotherapist being at games, he was not there to treat players after games. Similar reasons were reported by Twizere (2004) who reported financial reasons as being the most predominant. This seems to be a problem in Africa where clubs are bound by financial constraints and cannot afford to pay for the services of a physiotherapist, impacting the adequate rehabilitation of players. In South Africa and especially in the Western Province this is seen to be an unsupported fact due to there being two primary health care hospitals rendering physiotherapy services to members of the community who can not afford to pay privately for health care. This poses a great risk for re-injury hence Hawkins et al. (2002) emphasised the importance of appropriate and complete rehabilitation. He suggested that approximately 17-30% of injuries can be attributed to incomplete recovery of previous injury at the same site.

A minority of players reported not being informed as a reason for not receiving physiotherapy. Could this be due to the fact the perceptions of players regarding physiotherapy as not only being massage therapy are changing? A physiotherapy promotion campaign among soccer players would greatly increase the general awareness of players in a South African context.

The physiotherapy treatment techniques used in the study similarly covered the three stages of injury countermeasures namely primary, secondary and tertiary as reported by Twizere (2004). The study reported that a physiotherapist was present at all games and managed players' injuries acutely. This can account for the high-frequency of ice treatment (67.1%) being used on players. Secondary physiotherapy treatment was an uncommon occurrence for many player post match injury incident due to reason mention earlier. Therefore many other modalities were not used frequently as in other studies such as Twizere's (2004) who found massage to be the most predominant modality used (13.2%) followed by ice (12.1%) during competitive matches. Brukner and Khan (2001) reported that ice applied immediately after injury resulted in the reduction of pain and caused local vasoconstriction, thus reducing the bleeding and subsequent inflammation. They reported that it further reduced the metabolic rate of tissue lowering the demand on oxygen and nutrients. This method was therefore considered to be the best modality post injury as it facilitates normal inflammatory process yet decreases the damage to tissue as the result of swelling further

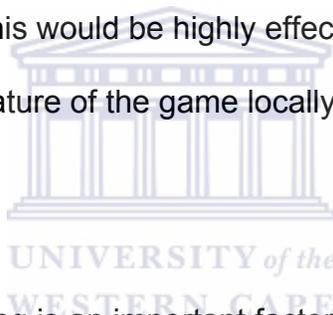
justifying its high frequency use post acute injury and in the South African sporting environment.

## **5.7 IMPLICATIONS FOR APPLICATION**

Measures to prevent sports injuries form part of what is called the sequence of prevention (Van Mechelen, et al., 1992). This included all measures aimed at reducing the occurrence of injury or re-injury. The study classified injury prevention as all measures undertaken by players before a match and after a match as well as flexibility and strength training undertaken as individuals and collectively as a team. Prior to games the majority of players (57.1%) reported to warm up always and 40% often, before games. Brukner and Khan (2003) suggested that warm-up sessions prior to any sporting activity should be between 15 and 30 minutes. Of the players in the team, 84.3% reported to warm up for a period of 20 to more than 25 minutes before matches which was in the time parameters set out by Brukner and Khan (2003). However, exact techniques during warm-up exercises were not assessed in the study. Awareness therefore needs to be created among coaches and players regarding the importance not only of the warm-session but also the quality of the session. Ignorance of the benefits of cool-down was seen in the response to the players where almost 70% of the players reported never cooling down after matched. This leads one to conclude that it was not something undertaken by the team collective as only

27.1% reported that they sometimes cool-down. This again highlights the ignorance of the training staff and players.

The small amount of physiotherapy treatment received by players leaves one to question the level of readiness for match play of these players. According to Drawer and Fuller (2002), the probability of injury and re-injury could be reduced if the sports science and medical team measured each player's level of fitness and physical condition when they were fully fit and used these values as benchmarks to assess a player's level of recovery during an injury treatment and rehabilitation programme. This would be highly effective in a South African context given the physical nature of the game locally further contributing to injury prevention.



Flexibility and strength training is an important factor in injury prevention as it prepares the necessary joints and muscles for the range or load required in the time frames urged upon them. These were investigated by asking players how often they were performed both individually and collectively as a team. More than half of the injured players reported undertaking flexibility at least twice a week with the team however less than half reported undertaking the flexibility training as individuals. This they said was also only done occasionally. Sadly this highlights two problems in flexibility training. Firstly, due to an injury prevalence of 58% one can conclude that the flexibility training done collectively as a team between matches is either poorly administered or not being done long enough.

Twizere (2004) reported that many players arrived late for training thereby missing flexibility training in Rwanda. The study was limited in this regard as it did not look at training sessions and subsequent time of arrival of players.

Strength training was reported to be even less frequent than that of flexibility training with 70% of the players reporting not training collectively as a team. Therefore injuries related to lack of strength or fatigue can be attributed to the prevalence of such a low focus from the coaching staff and individuals of strength training. Drawer and Fuller (2002) reported that more effective coaching with regard to proper tackling skills was one method of injury prevention. They further identified appropriate education for players about the personal and third party consequence of poor tackling techniques. Referees were also targeted as ways of injury reduction by ensuring that they control players and use more stringent penalties for players causing injuries as the result of foul play. These are all methods of injury prevention which need to be address in professional soccer in South Africa.

## **5.8 PREVENTION PROGRAM**

Several authors have discussed possibilities for prevention such as warm-up with emphasis on stretching, regular cool-down, adequate rehabilitation with sufficient recovery time, proprioceptive training, protective equipment, good playing field conditions and adherence to the existing rules. Prevention programs generally focus either on the reduction of all injuries associated with a given sport or on a

particular type of injury that is extremely severe or frequent. Due to the majority of soccer injury literature being descriptive in nature there is a lack of depth found usually when conducting analytical studies. This has been resulted in little confidence in the effectiveness of injury prevention measures. Thus the following discussion should be viewed with caution. Based on the finding of the study, the following prevention regime should be adopted in order to assist with injury prevention of players of F.C. Fortune.

### **5.8.1 Players**

Individual player factors are often related to soccer injuries and can be prevented through correction in training and condition. The current study highlight some of the following factors: 1) More than half of the players (58%) in the team sustained at least one injury over the 2004/2005 season; 2) Older players were more susceptible to sustain an injury; 3) Player positions found to be the most affected by with injury were the defenders and the midfielders; 4) Most injuries occurred in the middle/late part of the season; 5) Most of the injuries affected the ankles and the knees; 6) The mechanisms found to be the most responsible for injuries were being tackled, colliding with another player, running and/or tacking another player; 7) The majority of players indicated that they did not participate in any appropriate cool down session after matches, or adequate flexibility and strength training as a team or as individual players.

Ekstrand (1994) suggest that a preseason examination, besides a routine history and physical examination, included measurements of flexibility and muscle strength so that any deficiencies can be corrected. He further suggests that correction of training, warm-up, cool-down and stretching techniques. It is against this backdrop that we request that all players be screened prior to commencement of preseason training so that players with deficiencies, picked up in the screening, can be given additional exercises. Flexibility exercises should be included in the warm-up and cool-down with specific emphasis on the lower extremities. This is something that many players felt was neglect in training sessions and matches. This would also assist in decreasing the percentage of team players injured during the season. The older players may need to be re-educated in various aspects of the ever changing game of soccer. Techniques change over time and inability to adapt to these changes could be the reason why many older players are getting injured. Therefore education regarding tackling safely, shooting the ball and running, various techniques in defending and attacking would assist in decreasing the high incidence of injuries incurred as a result of these mechanisms and player position. Most of the injuries were also seem towards the later part of the season suggesting that players were no longer as physically fit as they were in the beginning of the season, no longer as flexible or as strong. We therefore would suggest that there be weekly focus on these factors i.e. strength training, flexibility training and cardiovascular endurance.

### **5.8.2 External environment**

The use of proper equipment is a valuable injury prevention measure. This would include playing shoes, shin guards, playing fields and even rule changes.

Various authors (Ekstrand & Gillquist, 1982; Greene & Hillman, 1990; Shapiro, Kabo, Mitchell, Loren & Tsepter, 1994) agree to the importance of shock-absorbent, anatomically shaped shin guards that cover a large area of the lower leg will prevent injuries to the shin. Coaches and players again need to be educated regarding the importance of these above factors in preventing injuries.

### **5.8.3 Health and support system**

Ekstrand and Gillquist (1982), when investigating injury mechanisms in soccer found that a minor injury was often followed within two months by a major one of the same area and the same type. Re-injuries are frequently an indication of neglect in the rehabilitation of the initial injury and premature return to play. The current study similarly found 42% of the injured population succumbing to re-injury during the season. It therefore suggested that players, coaches and management be educated regarding the importance of injured players being accessing rehabilitation services at the clubs expense. This especially because of the fact that most injured players cited the lack of physiotherapy rehabilitation services at the club and/or financial reason limiting access to these services.

It is with these suggestions that we draw to a close the discussion on prevention. The last chapter will focus on the recommendations and implications of the study as well as the limitations associated with the study.



## **CHAPTER SIX**

### **RECOMMENDATIONS AND LIMITATIONS**

#### **6.1 INTRODUCTION**

The main purpose of this research was to identify the prevalence of injuries with regard to their site and mechanisms of injuries endemic to players in a South African professional soccer team. The study also attempted to identify associations with relation to playing position, injury site and mechanism and time in the season. The results of this study were presented in detail in Chapter Four and described Chapter Five. In this concluding chapter, a summary of the findings are discussed, and this is followed by recommendations for future research based on the findings of the study. Finally limitations of this study are presented.

#### **6.2 SUMMARY OF THE STUDY**

The potential risk for injury among soccer player has become a topic of concern internationally and locally. Soccer has fast become the fastest growing sport in the world and attracts the most players. Concurrently there is likely to be an increase in the number of players injured in the game of soccer. This study fills a lacuna in providing important baseline data on the epidemiology of soccer injuries in a professional soccer team in South Africa tracked across a full season. The results present a pattern of injury prevalence that concurs in the

main with other major international studies. The study further highlights the need for effective interventions on various levels.

This study of 26 professional male soccer players has shown that the incidence of injury in a professional soccer team in South Africa is similar to existing literature on male injuries. The findings of the study revealed that there was moderately high injury prevalence among players (58%). The quantitative data obtained through a physiotherapist attending matches and documenting injuries, highlighted the physical nature of soccer and its subsequent predisposition to injury. It has been argued that by better understanding the factors causing injuries, a more comprehensive prevention program can be developed and implemented (Van Mechelen et al., 1992). That the prevalence of injury occurred more with the younger players, indicates the need for more effective coaching and instruction regarding injury prevention in this age category. There is also the need for stricter refereeing in the South African context to keep the exuberance and energy of youthfulness under control. Teams with a younger mean age can be expected to attract more injuries.

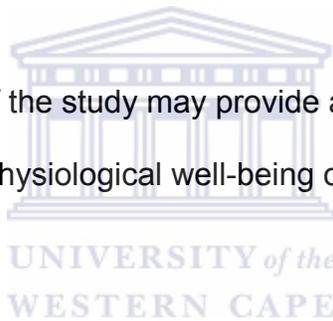
The results of the study accentuate the importance of more comprehensive analysis of the injury patterns in these professional players to enable the creation of prevention protocols for professional, amateur and youth soccer in South Africa. This should include following more teams at a professional level during the same season to establish comparable data.

The study revealed the knee to be the most commonly site of injury and being tackled by another player was seen to be the most common mechanism of injury. The progression of the season seemed to highlight the fatigue of the players as more and more injuries were seen. Of the injuries that did occur, the majority of them were seen to be slight to minimal injuries and therefore its impact on teams and individuals was minimal compared to major injuries.

The present study found that few injured players had access to the adequate rehabilitation services following injuries. Players reported low physiotherapy accessibility and highlighted financial reasons and the absence of the service at club level to contribute to mostly to this fact. Physiotherapy treatment techniques were also reported on as being a very basic service and the most commonly used modality was that of ice treatment. Various other researchers have shown the effectiveness of this treatment technique but it still highlights the need for players to participate in a more comprehensive physiotherapy treatment regime in order minimize the occurrences of re-injury. The study brings attention to the fact there is a lack of epidemiological studies of soccer injuries in South Africa at all levels of play. It further has heightened the need for physiotherapy intervention not only in this team but also in the league. Physiotherapeutic expertise should be a sine qua non for professional soccer in South Africa.

Another objective of the study was to identify the prevalence injuries with regard to their site and mechanisms of injuries endemic to players in a South African professional soccer team. While the results are not generalisable being specific to the team under study, the findings indicated that there was a statistical significance between injury prevalence, player position and factors related to period in the season. Examination of injury prevalence over the past 20 years has led the researcher to believe that the current data are not excessively high or low. It is likely that this team's injury profile reflects that of other teams in the same professional league.

In conclusion, the findings of the study may provide a step towards a conceptual framework focusing on the physiological well-being of professional soccer players in South Africa.



### **6.3 RECOMMENDATIONS**

The results of the study have suggested several recommendations for future work:

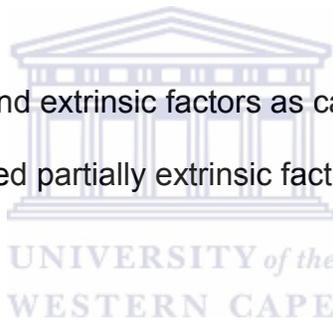
1. Multiple strategies are needed to deal with health and economic consequences of soccer injuries among players in a professional soccer league.
2. The availability of physiotherapy expertise at professional level should be assessed given the prevalence data generated by this study.

3. The lack of comprehensive rehabilitation following injury should be addressed at both a club and league level in order to curb the prevalence of a high injury frequency.
4. Referees should also be educated with regard to the health and economic implications of excessive foul play in matches and should govern matches with more severe punishment to players who infringe upon the rule of the game.
5. Additional research is needed to evaluate the prevention programme in order to assess the effectiveness of such a programme.
6. A more comprehensive study on the prevalence of injuries is needed on players participating in soccer in the entire professional league in order to gain insight to on the entire sample.
7. Players who participate in soccer at this level need to be educated with regard the implication of returning to sporting activities before fully recovering from injuries. They also need to be informed of the importance of participating in prevention programmes.
8. This study should be replicated in the Premier Soccer league where the stakes are much higher.

## 6.4 LIMITATIONS

The results of the present study should be interpreted in the light of the following limitations.

1. The soccer players' questionnaire did not assess the playing hours and exposure times: hence this limited the present study when calculating prevalence and incidence, as these factors are calculated in other studies. It also affected the way in which injuries are defined and expressed in the study.
2. The intrinsic factors and extrinsic factors as casual factors of soccer injury occurrence approached partially extrinsic factors and not all approached intrinsic factors.
3. The comparison of the studies results to other studies is made difficult due to the nature and adopted definitions of injury prevalence.
4. The study identified injuries during competitive games but failed to investigate the prevalence of injuries during training sessions. Other studies report more injuries occurring during training.
5. The study did not look at protective equipment, which was a recommended by FIFA in 1990. The study conducted by FIFA revealed



that there was a considerable low injury incidence count in players who wore shin guards (Hawkins and Fuller 1998). Taping and bracing was also seen to have beneficial results. When used it reduced unnecessary movement at joints and thereby reducing the severity of injuries. This is, however, very expensive and is a luxury that teams with small budgets can not afford. Drawer et al. (2002) further recommended that a club's financial resources should be used efficiently in order to reduce the overall risk to clubs and players.

6. Current study was limited to a single professional soccer club and a multi-site study would improve validity.

As the country gears up to host the 2010 World Cup, the onus is on the national soccer administrators and team managers in the professional leagues to ensure that their valuable resources, their players, have the necessary preventative and rehabilitative resources to forestall or recover appropriately from injuries sustained in the game. This study underscores the need for physiotherapists to be part of the coaching staff of professional soccer teams in South Africa.

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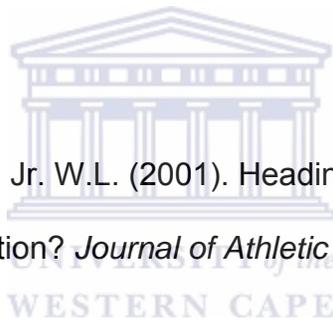
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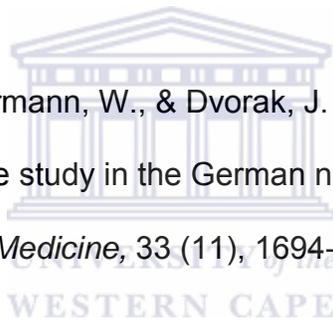
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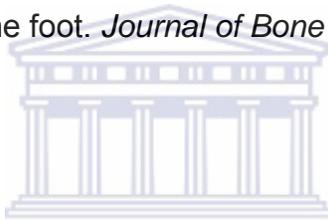
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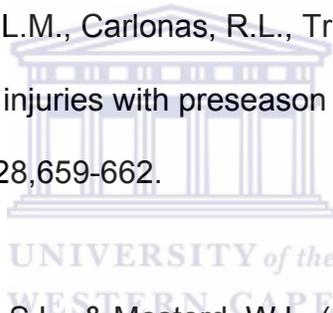
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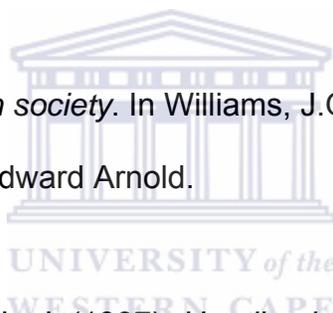
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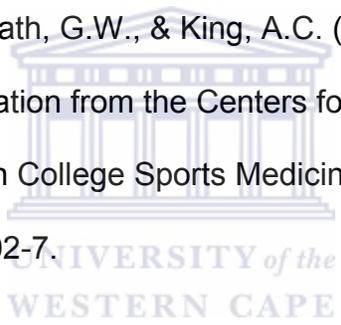
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**Appendix 1**

Date:

The management and coaching staff  
Soccer club

Dear Sir/ Madem

RE: The epidemiology of soccer injuries sustained in a season of season of a professional soccer team in South Africa

A research project concerning the epidemiology of soccer injuries sustained in a season of season of a professional soccer team in South Africa is currently being undertaken. The principal researcher is Mr. Marc Naidoo of the University of the Western Cape. Permission from the Higher Degree Committee has already been obtained.

The aim of the project is to determine the prevalence and pattern of soccer injuries sustained by players participating in a professional team over the period of on season. The information required is information pertinent to the player's age and position, site of injury, mechanism of injury, management of injury and injury prevention measure undertaken prior to injury. Administration of the questionnaires will be administered by a trained physiotherapist.

I hereby wish to request permission from your club for participation in the above mentioned project. The results will be made available to you as soon as they have been analyzed. The cooperation from both coaches and players will be appreciated. Once again, thank you and I hope that I will receive a positive response from your club.

Yours sincerely

.....  
Marc Anton Naidoo

## Appendix 2

Date:

Player  
Soccer club

Dear Sir

RE: The epidemiology of soccer injuries sustained in a season of season of a professional soccer team in South Africa

A research project concerning the epidemiology of soccer injuries sustained in a season of season of a professional soccer team in South Africa is currently being undertaken. The principal researcher is Mr. Marc Naidoo of the University of the Western Cape. Permission from the Higher Degree Committee has already been obtained.

The aim of the project is to determine the prevalence and pattern of soccer injuries sustained by players participating in a professional team over the period of on season. The information required is information pertinent to the player's age and position, site of injury, mechanism of injury, management of injury and injury prevention measure undertaken prior to injury. Administration of the questionnaires will be administered by a trained physiotherapist.

I hereby wish to request permission your for participation in the above mentioned project. Strict confidentiality will be observed regarding all information that you give. You will also be treated with the utmost respect at all times. You have the voluntary right to consent or withdraw from the study at any time. Please complete the section below if you give permission and return it to your coach.

Yours sincerely

.....  
Marc Anton Naidoo

**Appendix 3**

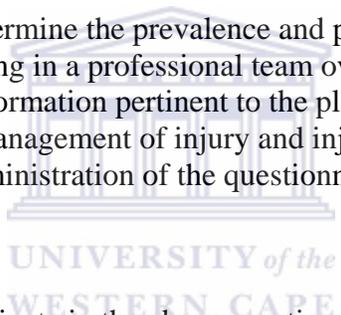
Date:

Dear Parent/Guardian

RE: The epidemiology of soccer injuries sustained in a season of season of a professional soccer team in South Africa

A research project concerning the epidemiology of soccer injuries sustained in a season of season of a professional soccer team in South Africa is currently being undertaken. The principal researcher is Mr. Marc Naidoo of the University of the Western Cape. Permission from the Higher Degree Committee has already been obtained.

The aim of the project is to determine the prevalence and pattern of soccer injuries sustained by players participating in a professional team over the period of on season. The information required is information pertinent to the player's age and position, site of injury, mechanism of injury, management of injury and injury prevention measure undertaken prior to injury. Administration of the questionnaires will be administered by a trained physiotherapist.



Your child is expected to participate in the above mentioned project. Strict confidentiality will be observed regarding all information that you give. You will also be treated with the utmost respect at all times. Your child will have the voluntary right to consent or withdraw from the study at any time. Please complete the section below if you give permission and return it to the coach.

I ..... (parent/guardian) hereby give permission for  
..... (child's name) to be included in the research  
project

.....  
Signature

.....  
Date

Yours sincerely

.....  
Marc Anton Naidoo

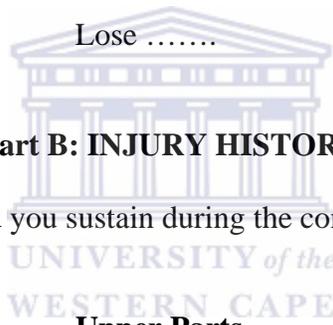
**ASSESSMENT TOOL**

**Part A: IDENTIFICATION**

1. Player ID no.: .....
2. Player age: .....
3. Player position:  
Goalkeeper ..... Defender ..... Midfielder ..... Forward .....
4. Date of Game: ..... (dd/mm/yyyy)    5. Game Sequence .....
6. Place of game:  
Home ..... Away .....
7. Game result:  
Win ..... Lose ..... Draw .....

**Part B: INJURY HISTORY**

1. What injury to your body did you sustain during the competitive game? (One or more injuries are possible)



**Upper Parts**

Head: \_\_\_    Face: \_\_\_    Neck: \_\_\_    Shoulder: \_\_\_    Back: \_\_\_  
Chest: \_\_\_    Upper arm: \_\_\_    Elbow: \_\_\_    Wrist: \_\_\_    Hand: \_\_\_  
Finger: \_\_\_

**Lower Parts**

Pelvis: \_\_\_    Buttocks: \_\_\_    Groin: \_\_\_    Hip: \_\_\_    Front thigh: \_\_\_  
Back thigh: \_\_\_    Knee: \_\_\_    Shin: \_\_\_    Calf: \_\_\_    Ankle: \_\_\_    Foot: \_\_\_  
Toe: \_\_\_

2. Which was the injury mechanism in the following? (One or more than one mechanisms are possible)

**Competitive session**

Tackling: \_\_\_ Tackled: \_\_\_ Running: \_\_\_ Shooting: \_\_\_ Jumping: \_\_\_

Landing: \_\_\_ Heading: \_\_\_ Turning: \_\_\_ Collision: \_\_\_ Overuse: \_\_\_

3. How many training seasons and/or games did you miss as a result of your injury?

0: \_\_\_ 1: \_\_\_ 2: \_\_\_ 3: \_\_\_ 4: \_\_\_ 5: \_\_\_ >5: \_\_\_

4. How have did you treat your injury? (One or more answers are possible)

Medical: \_\_\_ Physiotherapy: \_\_\_ Traditional: \_\_\_ Self treatment: \_\_\_ None: \_\_\_

5. I f physiotherapy, what kind of treatment or advice did you receive following injury?  
(One or more answers are possible)

**Physiotherapy treatment**

Ice/cold: \_\_\_ Compression: \_\_\_ Elevation: \_\_\_ Exercise Therapy: \_\_\_  
Ultrasound: \_\_\_ TENS: \_\_\_ Interferential: \_\_\_ Muscle Stimulation: \_\_\_  
Massage: \_\_\_ Heat: \_\_\_ Stretching: \_\_\_ Joint Mobilization: \_\_\_  
Strapping: \_\_\_ Splinting: \_\_\_ Deep Friction: \_\_\_ Crutch Walking: \_\_\_

**Advice**

Rest/no sport activity: \_\_\_ Limited sport activity: \_\_\_ Full sport activity: \_\_\_

6. How long have you been unavailable for training or competition matches because of injury?

**Training Sessions:**

	2-3 days	4-7 days	1-4 weeks	>4weeks
First injury:	—	—	—	—
Second injury:	—	—	—	—
Third injury:	—	—	—	—
Fourth injury:	—	—	—	—
Fifth injury:	—	—	—	—

**Competitive matches:**

	2-3 days	4-7 days	1-4 weeks	>4weeks
First injury:	—	—	—	—
Second injury:	—	—	—	—
Third injury:	—	—	—	—
Fourth injury:	—	—	—	—
Fifth injury:	—	—	—	—

7. Did you get access to physiotherapy services when required after injury?

Always (100%): \_\_ Very often (75%): \_\_ Often (50%): \_\_ Sometimes (25%): \_\_ Never (0%): \_\_



8. If no access to physiotherapy services, what were the reasons? (One or more reasons may be selected)

Absent service: \_\_ Financial: \_\_ Not informed: \_\_ Ignorance: \_\_

9. Do you think that physiotherapy treatment was needed for your injuries?

Always (100%): \_\_ Very often (75%): \_\_ Often (50%): \_\_ Sometimes (25%): \_\_ Never (0%): \_\_

**PART C: INJURY COUNTERMEASURES PROGRAMMES**

1. Do you have a warm-up prior to:

**Training:**

Always (100%): \_\_ Very often (75%): \_\_ Often (50%): \_\_ Sometimes (25%): \_\_ Never (0%): \_\_

**Competition:**

Always (100%): \_\_ Very often (75%): \_\_ Often (50%): \_\_ Sometimes (25%): \_\_ Never (0%): \_\_

2. How long is your warm-up period?

**Prior to training:**

5 mins: \_\_ 10 mins: \_\_ 15 mins: \_\_ 20 mins: \_\_ >25 mins: \_\_

**Prior to matches:**

5 mins: \_\_ 10 mins: \_\_ 15 mins: \_\_ 20 mins: \_\_ >25 mins: \_\_

3. Do you participate in cool-down after competitive matches?

Always (100%): \_\_ Very often (75%): \_\_ Often (50%): \_\_ Sometimes (25%): \_\_ Never (0%): \_\_

4. Do you undertake flexibility training? (not included as part of warm-up or cool-down)

**Times per week as part of a team session:**

0: \_\_ 1: \_\_ 2: \_\_ 3: \_\_ >3: \_\_

**Times per week as extra individual work:**

0: \_\_ 1: \_\_ 2: \_\_ 3: \_\_ >3: \_\_

5. Do you perform/undertake strength training in the gym?

**Times per week as part of a team session:**

0: \_\_ 1: \_\_ 2: \_\_ 3: \_\_ >3: \_\_

**Times per week as extra individual work:**

0: \_\_ 1: \_\_ 2: \_\_ 3: \_\_ >3: \_\_

**THANK YOU VERY MUCH**