

UNIVERSITY OF PRETORIA  
PHYSIOTHERAPY DEPARTMENT

LOWER LIMB INJURIES IN TEENAGE GIRLS PLAYING SOCCER

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## DECLARATION

I, Lindiwe L Mahlangu, declare that this research report is my own work. It is being submitted for the degree of Masters of Physiotherapy (Sports Medicine) at the University of Pretoria, Pretoria. It has not been submitted before for any other degree or examination at this or any other university.

L L Mahlangu

Signed on this .....day of ....., 2006.

## ABSTRACT

**Introduction:** The number of girls and women participating in all levels of soccer has risen greatly in recent years.

**Rationale for the study:** The injury risk is high in soccer, but little is known about the mechanisms by which these injuries occur.

**Objective:** To describe the types of injuries and the mechanisms sustained by teenage girls playing soccer.

**Design:** A descriptive study was done.

**Method:** An injury observation sheet was used to collect data over one week of interregional schools tournament that took place in August 2003, Rustenburg, North West province. For all injuries the following information was documented: type of injury, site of injury, mechanism of injury, cause of injury, part of field, time of ball in play and player position. The teenage girls playing soccer who participated in the USSASSA summer ball games tournament were used. The verbal player informed consent form which provided information on the rights of participants was also drawn and handed to all participants to familiarize themselves with contents prior to a game.

**Results:** Main findings in this study were that the ligament sprains accounted for the highest number (57%) of total injuries sustained by the teenage girls playing soccer. Contusions were the less common type of injury that affected teenage girls. Tackling was the mechanism responsible for most injuries (49%). Strikers were the players' positions associated with all types of injuries sustained in this study, 72% of strains, 56 %of strains and 45% of total contusions. Goal keepers were not affected by any of the lower limb injuries in this study.

**Conclusion:** Injuries sustained by teenage girls are minor in nature. Sprains and strains are the most common injuries affecting ankles and knees. Injury prevention program can have beneficial results if implemented at developmental stage of their carriers.

**KEY WORDS:** Teenage soccer, sports injuries, lower limb injuries, injury mechanisms.

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## LIST OF ABBREVIATIONS

|         |                  |
|---------|------------------|
| SK      | striker          |
| MD      | middle fielder   |
| DF      | defender         |
| GK      | Goal keeper      |
| PF      | player's factor  |
| PS      | playing surface  |
| RV      | Rule violation   |
| Eq      | Equipment        |
| Q angle | Quadriceps angle |

## LIST OF FIGURES

|   |    |
|---|----|
| 2.1 Comparison of male and female Q angle.....                      | 22 |
| 4.1 Type of injury as % of all injuries during the tournament ..... | 40 |
| 4.2 Ligament sprains distribution among players.....                | 41 |
| 4.3 Muscle strains distribution among players.....                  | 42 |
| 4.4 Contusions distribution among players.....                      | 43 |
| 4.5 Percentages of injury mechanisms in the tournament.....         | 44 |
| 4.6 Injury mechanisms and the resultant injuries .....              | 45 |
| 4.7 Correlation between players' position and injury types.....     | 46 |

## TABLE OF CONTENTS

|                            |     |
|----------------------------|-----|
| DECLARATION.....           | i   |
| ABSTRACT.....              | ii  |
| ACKNOWLEDGEMENTS.....      | iii |
| LIST OF ABBREVIATIONS..... | iv  |
| TABLE OF CONTENTS.....     | v   |

### **CHAPTER 1: INTRODUCTION, BACKGROUND AND ORIENTATION**

|                                  |   |
|----------------------------------|---|
| Statement of the problem.....    | 2 |
| Significance of the problem..... | 3 |
| Purpose of the study.....        | 4 |
| Research question.....           | 4 |
| Aims of the study.....           | 5 |
| Operational Definition.....      | 5 |
| Inclusion criteria.....          | 6 |
| Exclusion criteria.....          | 6 |
| Outline of study.....            | 7 |

### **CHAPTER 2: LITERATURE REVIEW**

|                               |   |
|-------------------------------|---|
| Introduction.....             | 8 |
| History of female soccer..... | 9 |

|  |    |
|--|----|
| Types of injuries in soccer players..... | 10 |
| Types of players.....                    | 16 |
| Laws of the game.....                    | 17 |
| Patho- physiology of soft tissue.....    | 17 |
| Muscle strain.....                       | 18 |
| Contusions.....                          | 19 |
| Muscle cramps.....                       | 19 |
| Ligament injury.....                     | 20 |
| Bone injury .....                        | 20 |
| Lower limb anatomy.....                  | 21 |
| Mechanisms by which injuries occur.....  | 23 |
| Summary.....                             | 27 |

**Chapter 3:                    METHODOLOGY**

|                            |    |
|----------------------------|----|
| Methodology.....           | 29 |
| Introduction.....          | 29 |
| Aim of study.....          | 29 |
| Research methodology.....  | 29 |
| Study design.....          | 29 |
| Population and sample..... | 30 |
| Settings.....              | 31 |
| Research method.....       | 31 |
| Data collection.....       | 31 |

|                              |    |
|------------------------------|----|
| Research instrument.....     | 32 |
| Ethical consideration.....   | 33 |
| Pilot study.....             | 34 |
| Settings of pilot study..... | 35 |
| Study design.....            | 35 |
| Methodology.....             | 36 |
| Results of pilot study.....  | 36 |
| Data analysis.....           | 37 |
| Conclusion.....              | 37 |

#### **Chapter 4: RESULTS**

|                             |    |
|-----------------------------|----|
| Introduction.....           | 38 |
| Demographic data.....       | 39 |
| Types of injuries.....      | 39 |
| Mechanisms of injuries..... | 43 |

#### **CHAPTER 5: DISCUSSION**

|  |    |
|--|----|
| Discussion.....                            | 48 |
| Main findings.....                         | 48 |
| Injury mechanisms.....                     | 52 |
| Player position versus type of injury..... | 53 |

**CHAPTER 6: CONCLUSION, LIMITATIONS AND RECOMMENDATIONS**

|                      |    |
|----------------------|----|
| Introduction.....    | 58 |
| Conclusion.....      | 58 |
| Limitations.....     | 61 |
| Recommendations..... | 62 |
| Bibliography.....    | 64 |
| Appendix 1.....      | 67 |
| Appendix 2a.....     | 76 |
| Appendix 2b.....     | 77 |
| Appendix 3a.....     | 78 |
| Appendix 3b.....     | 79 |
| Appendix 4.....      | 81 |

## **CHAPTER 1**

### **INTRODUCTION**

#### **Background and orientation**

The researcher, who was the physiotherapist of the under 19 women national soccer team at the time of the study, and she was also involved with the senior women national soccer team during the All Africa games 2004 in Nigeria, was intrigued by the number of injuries that these girls sustained during the tournament. It was on this ground that she wanted to establish what injuries are common and most importantly, the mechanisms involved.

Soccer players are reported to have the highest rate of injury among contact sports, as pointed out by Larsen et al [2003]. Considering the growth of soccer both nationally and internationally among females, it is important that injury prevention program is started at the developmental stage of teenage girls interested in soccer career.

Soccer is a sporting activity that demands a combination of endurance, fitness, running and discontinuous sprinting. The sport specific skills used in soccer include quick turns, pivots, jumps in air, and both forward and backward running [Ireland and Nattiv 2002]. These activities are accompanied with the increased risk of soft tissue injuries.

Sports injuries in soccer players are one of the most common injuries in modern western societies. Treating these sports injuries is often difficult because the mechanisms of these injuries are often not well understood, expensive to treat and time consuming for the player. Thus, finding preventive measures would require basic understanding of the most common injuries sustained by these teenage girls playing soccer. Basic understanding of common injuries will ensure

safe participation for soccer players [Parkkari and Kujala 2001, Hamzat et al 2004 and Olsen et al 2004].

Injuries in soccer players are relatively common and differ in severity depending on the nature of the game and level of experience of the players. Injuries in male soccer players have been studied extensively compared to those of female counterparts [Woods et al 2003, Bruns and Maffulli 2000, Hawkins et al 2001, Astride et al 2004, Larsen et al 2002, Delfico and Garrett 1998]. Since the introduction of female soccer, injuries sustained by this group have not been studied and therefore comparison is also not made with those sustained by male counterparts, regardless of the obvious anatomical differences existing between the two gender groups. According to Hawkins et al [2001] and Arnason et al [2004], about 82% of the total soccer injuries sustained are located on the lower extremities. The mechanisms of these injuries have not yet been confirmed. The one type of injury that received extensive attention is that of the anterior cruciate ligament injury in both males and females, [Woods et al 2003, Ireland and Nattiv 2002, Parkkari and Kujala 2001, Astrid et al 2004, Delfico and Garrett 1998].

### **Statement of the problem**

During the researcher's involvement with both the under 19 women national soccer team and senior women national soccer team in Nigeria, injuries sustained were so many that at some stages treatment sessions would extend into the midnight. At some other times the team medical doctor had to assist the physiotherapist once she was finished with her own consultations. The physiotherapist who was attached to under 23 male national soccer team was always reporting not to be busy. The statistic of the women injuries treated that time was not made because of

time pressure at the tournament. It was this increased number of injuries in women's camps that prompted for the study.

To render the most effective treatment and prevention strategies in minimizing soccer injuries, the researcher realized that basic understanding of the most common soccer injuries and their mechanisms is compulsory.

### **Significance of the problem**

Researcher could not find any study on women soccer injuries in South Africa. Available studies in soccer injuries were predominately in male soccer players internationally.

Knowledge of the most common types of injuries and understanding the mechanisms by which they occur will enable the medical personnel to ensure safe participation for the teenage girls by developing a preventative programs and give advice to these teenage girls, parents and coaches.

Understanding of the types of injuries sustained by the teenage girls will assist the physiotherapist in planning adequately for particular game and tournaments.

Most girls have not yet mastered the skill, are unfit and/or are consistently under pressure from coaches and parents to perform. Most coaches especially in South Africa are males. They therefore implement the male models in training these teenage girls. This may increase their risk to injury since they have less power in their muscles have less endurance. This consistent pressure and the anxiety to perform pre-

dispose them to injuries. Education on the injury prevention by physiotherapist will help to reduce the number and severity of injuries.

Therefore, findings obtained in this study would form a frame reference for developing a preventative program in soccer development programs. Soccer players would be better educated on prevention of their injuries. It will also assist team physiotherapists in planning adequately for a particular game or tournament if basic common injuries specific to age and sporting codes are known.

### **Purpose of the study**

The researcher was prompted by aforementioned problem to conduct an investigation into the types of injuries and the mechanisms involved in sustaining these injuries by teenage girls playing soccer.

This study therefore seeks to describe the types of lower limbs injuries and the mechanisms thereof as sustained by teenage girls playing soccer. It will also determine the correlation between injuries and players position.

The study was limited to lower limbs injuries since soccer is predominantly a game played using the lower limbs. Injuries to the lower limbs will therefore occur more than to any other site in the body.

### **Research question**

What are the types and mechanisms of lower limb injuries sustained by teenage girls playing soccer?

## **Aim of this study**

To investigate the types of lower limb injuries and their mechanisms as sustained by the teenage girls playing soccer

## **The objectives of this study are to:**

1. Determine the types of lower limb injuries sustained by teenage girls playing soccer.
2. Determine the mechanisms by which these injuries occur.
3. Determine the correlation between player's position and frequent injuries.
4. Make suggestions regarding preventative measures.

## **Operational Definitions**

Several important concepts that are central to this study are defined below

- Injury: For the purpose of this study, injury is defined as any player complaint resulting from tournament that required medical attention from medical (Giza et al 2003).
- Teenage girls: All girls playing soccer in the USSASSA summer ball game tournament in Rustenburg, August 2003.
- Tackling : Prevent an opponent from moving past with the ball
- Shooting : Kicking a ball with high velocity
- Sprinting : Running fast
- Twisting: Turning with one foot flat on the ground.
- Striker: In this study, striker refers to the player who plays upfront and gets preference in goal scoring.

- Middle – fielder: Play makers of the game and plays in the middle of the field.
- Defender: Players closest to the goal keeper, helping the goal keeper in prevention of the goal being scored. Last line of defense before the goal keeper.
- Goal keeper: Player guarding the goal post, preventing the opponent from scoring a goal if defenders failed.
- Strain: refers to a muscle fibers failing to cope with the demands placed upon them (Brukner and Khan 2000). Number of torn fibers determines the grade.
- Sprain: refers to a tearing of ligament fibers, number of torn fibers determines the grade.
- Contusion: in this study, it refers to the local soft tissue damage resulting from a direct blow with resultant bleeding.

### **Inclusion criteria**

- All the teenage girls that played soccer at the summer ball games tournament in Rustenburg, August 2003.

### **Exclusion criteria**

- All the girls that were not taking part at the summer ball game tournament were excluded from the study.
- Injuries that were not sustained in the tournament were not considered for the study.

## **Outline of the study**

**In chapter one**, introduction and background of the study are presented. The overview of the research problem, aims, significance of the study and the motivation for the need to conduct the study were presented.

**Chapter two** comprises a literature review designed to determine the types of injuries, mechanisms and prevalence of soccer injuries both internationally and nationally.

**Chapter three** describes will discuss the methodology; study design, the instrument used, the method of data collection and interpretation.

**Chapter four** analyses and evaluates the data obtained.

**Chapter five** describes the discussion of results.

**Chapter six** provide the conclusion of the study. Recommendations and limitations of the study are included in this chapter.

**Chapter seven** contains all the Appendices, abbreviations and laws of the game.

Literature of all the studies conducted on soccer injuries and the mechanisms involved will be reviewed in the next chapter.

## CHAPTER 2

### LITERATURE REVIEW

#### Introduction

This chapter presents a literature survey which gives brief outline of history of soccer, the risks associated with soccer injuries, prevalence of soccer injuries, types of injuries sustained and their mechanisms.

The present literature search aims to establish studies conducted on soccer lower limb injuries, especially in women both nationally and internationally. Up to now, international information is heavily relied upon.

The aims of this chapter are the following:

To determine the history of women soccer in South Africa.

To determine what is described in the literature about types of soccer injuries in the lower limbs and their prevalence.

To determine what is described in the literature about how the injuries are sustained.

To determine what the literature says about the prevalence of soccer injuries among men, women and youth

To determine what the literature says about injuries and player positions.  
Is there a correlation?

To realize all the objectives above, a search for studies cited on MEDLINE and PUBMED that described the types and mechanisms of soccer injuries, with emphasis in the lower limbs was conducted.

Internationally, there are limited research articles on general female soccer injuries of the lower limbs, therefore male soccer injuries research articles were also considered. All research papers on soccer lower limb injury types and mechanisms that were conducted between 1985 and 2004 in both males and women were considered. The search was limited to English articles.

Soccer is the most commonly played sport in the world as described by Delfico and Garrett [1998] and the most rapidly growing sport nationally and internationally. According to Delfico and Garrett [1998], an estimated 18.2 million Americans now play the game of soccer. An observation by Bruns and Maffulli [2000] is that about 25% of 18.2 millions soccer players are girls aged between 8 and 16 years. They also found that 79% of children in the United Kingdom participate in professional soccer. In South Africa, no study has been done on teenage girls playing soccer.

### **History of female soccer**

Soccer in South Africa dates back to late 19th century. The first ever recognised club was Maritzburg County, which was started in 1872 Mazwai [2004]. The male national professional soccer league (NPSL) was formed in the 1970s, and was changed to the professional soccer league (PSL) in 1996. Nationally, female soccer was started in the early 1980's Mazwai [2004]. It has been gaining popularity since then, but to date there is no professional league for females in South Africa as yet. However, there are established regional and local teams participating in regional leagues such as Sasol, Vodacom etc. South Africa was formally re-admitted to international women's soccer in 1992. The National women soccer team played their first game a year later Mazwai [2004]. Female soccer is not getting the required attention from the sponsors thus the slow recognition According to the observation made by Mazwai

[2004] and Goga and Gongal [2003], female soccer is not getting the required attention from sponsors, thus the slow recognition.

### **Types of injuries in soccer players**

A number of studies have investigated the type, location and severity of injuries in male soccer players [Andersen et al 2004, Delfico and Garrett 1998, Giza et al 2003, Andersen et al 2004b, Fuller et al 2004, Moeller and Lamb 1998, Larsen et al 2003, Arni et al 2004, Olsen et al 2004].

Injuries in soccer range from severe bruises, muscle strains, ligament sprains, contusions and the more traumatic type, the fractures. According to Arendt and Randal [1995], ligaments sprains, contusions and muscle strains are by far the most common injury types sustained during the game of soccer. Fatalities from soccer related injuries are associated almost exclusively with traumatic contact with the goal post.

The majority of investigations of soccer injuries in prospective studies involve the lower extremity (74 % - 93 %). Much lesser percentages (64% - 86%) were found in retrospective studies [Fuller et al 2004]. According to experts such as Fuller et al [2004], the most common type of injury in male soccer players is contusions, followed by sprains and strains. It follows that the most common mechanisms studied is the physical contact between players, followed by foul play. Knowing the types of injuries and their mechanisms will form the basis for the formulation of the prevention program.

A prospective epidemiological study of an audit of injures in professional soccer player in English league by Hawkins at al [2001] found that sprains and strains were the major types of injuries. They were the most common types in their study and accounted for 66% of the total injuries.

The weakness in the study by Hawkins et al [2001] is that it failed to take risk factors into consideration despite the fact that it was done on professional soccer players with high exposure rate. The increased number of these injuries could have been influenced by the neglected factors.

Their injury definition, which was stated as one received during training or competition and which prevented the injured party from participating in the normal training and competition for more than 48 hours, not including the day of injury. The chance of worsening the minor injuries that did not satisfy their definition was great. The increase number of injuries seen could have been from re-injuring or worsening of a previous minor injury.

Bruns and Maffulli [2000] presented an overview of sports –related injuries of the lower limb in youth. The emphasis was on treatment. More severe types and overuse injuries were considered over the acute injuries, even though they found out that the acute injuries such as sprains, strains, contusions and laceration accounted for about 60% of all the injuries in their study.

#### Strengths of their study

- A thorough investigation of all possible injuries in all sports was done.
- It was intensive and well conducted study
- Treatment outline of the injuries described was presented
- Advice to study subjects and all involved in their straining and management was given and very clear.
- Most risk factors were addressed

## Weakness

Injuries were generalised to all sports.

Due to weakness of this study, injuries common to soccer players should still be identified to be able to draw a more sport specific prevention program.

## Conclusion

The researcher can safely conclude that injuries are more common in soccer compared to other sporting codes. The age of player, level of experience, exposure rate, nature of the tournament and gender will influence the nature of injuries.

The following section will outline the mechanisms often involved in injuries sustained by soccer players.

Knowledge of the incidences and prevalence of the injuries in soccer is necessary to understand the magnitude of the problem in soccer.

## Prevalence and incidences of soccer injuries

The rate of injury in male soccer players has been reported to be between 15 and 20 injuries per 1000 hours of play. This injury rate is higher for female soccer players than their male counterparts [Astrid et al 2004].

Yde et al [2003] conducted a prospective study on 302 adolescent players of the three ball games soccer, handball and basketball. They investigated the incidence, registered the injury pattern and analysed injury situation and mechanisms. The authors found the injury incidence highest in soccer (5.4) compared to handball (4.1) and basketball (3.0).

The study acknowledges the presence of increased injuries in soccer compared to the other ball games.

#### Strength in the study

It was conducted on a broad spectrum of age. Players' ages ranged from over 10 years to over 18 years.

#### Weakness

- They did not have girls participating in soccer like they had in the other two codes. This study would have formulated the base for the researcher.
- Injury types and mechanisms were not code specific but a total in three ball games.
- It was therefore difficult to understand the prevalence of injury in each code.

Astrid et al [2004] also conducted a prospective study on developing and implementing an easy to use injury reporting system on males playing soccer. This system was used to analyse incidences, circumstances and characteristics of injuries in twelve international FIFA tournaments. The authors found an incidence of 2.7 injuries per match. The drop in the incidence could have resulted from injury definition differences.

It can therefore be concluded from these studies that injury incidence (number of injuries per 1000 hours of play) is high in soccer compared to other ball games. The injury incidences in girls have however not been studied. Furthermore, the exposure rate which can influence the results was not taken into consideration in the above mentioned studies.

The studies above are in agreement that there is high prevalence of injury in soccer.

The researcher will undertake the present studies with knowledge that: yes, there are injuries in soccer but what are the types in teenage girls. The mechanisms outlined, are they similar to teenage girls?

The results of the studies included in report by Astrid et al [2004], have the following limitations:

They were all prospective studies. Cognitive biasness could have influenced the results. The minor injuries and other symptoms that did not necessarily inhibit the player from participation could easily have been left out. The injury definition in these studies is not the same and therefore makes generalization of findings difficult.

### **Risk factors associated with injuries**

The injury risk in soccer is high, but little is known about their mechanisms. Andersen et al [2004] is of the opinion that understanding the contribution of the individual risk factors for injuries in soccer will help in developing preventative programs for younger age groups.

Risk factors affecting soccer players include: muscle tightness, lack of adequate warm-up and stretching, lack of training, previous injury, and

joint instability from previous injuries, playing surface and equipment (soccer boots, shin guards and goal posts) can contribute. These factors are not adequately addressed by some authors like Andersen et al [2004], Metzen and Michel [1998] in soccer injuries epidemiology studies.

Soccer injuries can result from one or more of the following risk factors: the playing factor, playing surface, rule violation and / or equipment. Contribution of these factors to injury etiology and their interrelationship needs to be established.

Metzel and Micheli [1998] claim that soccer players have a high risk of soft tissue injuries to their legs. A number of factors have been identified as associated with injury in soccer players. In a single study of risk factors in football by Andersen et al [2004], they found that player's factor, playing surface and rule violation played an important role in contributing to injuries in players. However, player's factors which included age, flexibility, previous injury and relatively poor muscle strength showed to be associated with high rate of injury.

In one study involving males and females playing soccer, the highest injury rate was reported for the oldest girls (16-19) and the lowest rates were reported for the youngest girls (9-13) [Bruns and Maffulli 2000, Andersen et al 2004]. They also found that risk of injury does not seem to change consistently according to player position.

Therefore, in youth soccer, rule changes to reduce aggressive contact and increased ball control may have the potential to decrease injury rate as these athletes are still learning the skills and are still under parental and coaches' guidance.

Risk factors do play a role in injury cause and prevention, studies undertaken should also observe these risk factors and control them as far as possible.

The number and type of players participating in soccer game is consistent and makes the ruling of the game much easy. In the following section, players involved in single soccer game are outlines and their role defined. Different soccer game formations are also outlined.

### **Types of players**

According to the third law of the game (FIFA rules, appendix 1), a match shall be played by two teams. Each team shall consist of not more than eleven players, one of whom shall be the goal keeper.

Players are named according to their position in the field. They are strikers, middle fielders, defenders and a goal keeper. The strikers are forward players, with the sole responsibility of scoring goals. The middle field players connect the defenders and the strikers. They help the defenders to get the ball from the opponents and pass it to the strikers. They are the play makers of the game. The defenders are the players helping the goal keeper to guard the goal post. A particular formation of play is followed at any time of play. The coach decides on the formation that a team will play.

The most common formation type being the one-four-four-two (1-4-4-2). This means that one goal keeper, four defenders, four middle fielders and two strikers. There are other formations such as the one-four-three-three (1- 4-3-3) or the one-five-three-two (1-5-3-2) and one-five-four-one (1-5-4-1) being the most defensive formation. These formations are dependent on the type of competition and the strength of the teams or

strength of the opponents. These formations are subject to change without notice several times during a single match.

No records were found on the particular formation being responsible for the particular type of injury in soccer. This lack of information on the formations can be because the formations change all the time in one match depending on the strength of the opponents. The stronger the opponents the more often will the formations change.

### **Laws of the game**

The game of soccer is governed by twelve laws as set out by the Federation of International Football Association (FIFA). Details of these laws are outlined in the appendix 1 as stated in FIFA website ([www.fifa.co.za](http://www.fifa.co.za)).

For the player to understand the impact of the injury, it is important to understand the damage caused to the tissue involved during an injury. The physiology of these tissues injuries follows in the next section.

### **Patho-physiology of soft tissue injuries**

Soft tissue injuries such as muscle strains and ligament sprains are very common among females playing soccer. However, there are very few reports of incidence of particular type of injury in females playing soccer compared to males [Ireland and Nattiv 2002]. This section will summarise the known patho-physiology of this class of injuries. Special concerns for females playing soccer will be high-lighted.

There are two mechanisms of injuries commonly sustained by soccer players: the acute macro trauma and chronic micro trauma. The

mechanism will dictate the type of injury. The acute macro trauma occurs as an event. The tissues are normal, and then they are instantly abnormal and symptomatic following a physical disruption of the tissues [Brukner and Khan 2000, Ireland and Nattiv 2002]. Commonly, because soccer is a contact sport, acute injuries will result from physical contact among players. An acute injury will also occur as a result of acute tensile overload, such as an acute muscle strain. This type of injury will result from absolute overload, in that normal tissues will be overloaded by a sudden abnormal load.

The chronic micro trauma type of injuries, which according to Ireland and Nattiv [2002] constitute about 85 % of the total soft tissue injuries, occurs as a result of processes occurring over time. This includes external factors such as an increased frequency and duration of training sessions and often, the biomechanical status of the player. This mechanism results from a failure of homeostasis of cellular activities and tissue constituents to maintain tissue integrity in the face of continued athletic demand [Ireland and Nattiv 2002].

### **Muscle strains**

Muscle strains are among the most common sporting injuries. Muscles are strained when some or all of the fibers fail to cope with the demands placed on upon them. Common muscles to be affected by strains are the hamstrings muscles, quadriceps muscles and gastrocnemius muscles. A muscle is most likely to tear during sudden acceleration or deceleration [Brukner and Khan 2000, Bruns and Maffulli 2000, Ireland and Nattiv 2002].

According to Ireland and Nattiv [2002] and Brukner and Khan [2000], muscle strains are classified into three grades, namely: A grade I strain,

when a small number of muscle fibers fail to cope with the demand placed upon them. It causes localised pain but no loss of strength. A grade II strain involves a significant number of muscle fibers with associated pain and swelling. Strength is reduced and movement is limited by pain. A grade III strain is a severe strain, involving a complete tear of all muscle fibers.

A number of predisposing factors in developing muscle strain includes inadequate warm-up, fatigue/overuse/inadequate recovery, muscle imbalance, faulty biomechanics, excessive muscle tightness, and insufficient joint ranges of motion or previous injury. Most of these factors are preventable.

## **Contusions**

According to Brukner and Khan [2000] muscle contusion is an extremely common injury in sport, especially in collision sports such as soccer, basketball and hockey. It usually results from a direct blow from an opponent or firm equipment such as the goal post.

A direct blow results in a local damage to the muscle with resultant bleeding. Contusions are relatively minor in nature in soccer players and do not limit participation in sport. Occasionally, however, a more severe contusion may result in a large amount of bleeding, especially if player continues with the game after sustaining the injury.

## **Cramps**

These are painful, involuntary muscle contractions that occur suddenly and can be temporary disabling. Cramps occur in any muscle but more common in the gastrocnemius and hamstrings muscles. Cramps are caused by dehydration, low potassium or calcium levels, inadequate carbohydrate intake or excessive tight muscles [Brukner and Khan 2000].

## **Ligament injury**

Ligament sprains, especially of the knees and ankles are the most common injury in soccer players, according to Bruns and Maffulli [2000]. On the ankle, it occurs frequently as an acute macro trauma, with the ankle inverting. This movement will sprain the lateral ankle complex. Ligaments sprains, just like muscle strains, are graded. The grading is determined by the number of fibers torn [Ireland and Nattiv 2002].

## **Bone injury**

Bone injuries common in sport range from stress fractures to more serious fractures. Stress fractures are a common injury to sports people. This micro-fracture, in both genders results from a repetitive physical loading below the single cycle failure threshold. The overloading which occurs through any of the two mechanisms, (I) the action of the muscle pull across the bone, and (II) the redistribution of impact forces results in an increased stress at a focal point in a bone [Garreth and Speer 2000, Ireland and Nattiv 2002].

Stress fractures may occur in any bone in the body. The most commonly affected bones are the tibia, metatarsals, fibula, tarsals, navicular, femur and pelvis. These types of injury are common in professional soccer players.

### **Lower limb anatomy**

Many factors have been outlined as the source of females' contributory factor to their injuries. Most are based on anatomical realities such as a narrow femoral notch in women, an increased quadriceps angle, (known as the Q angle). Increased ligamentous laxity, inadequate strength, muscle imbalance between the quadriceps and the hamstrings muscles strength (men tend to have more developed thigh musculature than females), and impaired neuromuscular coordination. All these form the intrinsic factors contributing to increased injury rate in females [Moeller and Lamb 1997, Ireland and Nattiv 2002, Fuller et al 2004].

Anatomic alignment differences, especially the Q angle, have been cited as the main cause of gender discrepancies in injury rate [Moeller and Lamb, 1997].

Figure 2.1 below illustrates the differences between the male and female quadriceps angle.

## Comparison of male and female Q angles

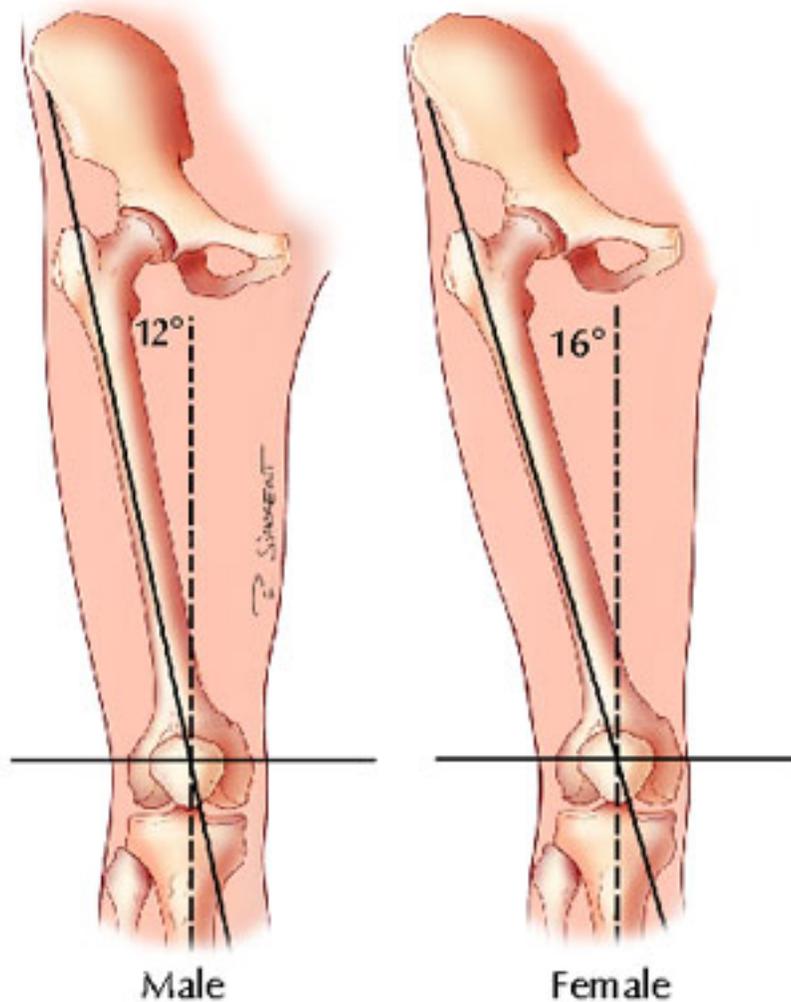


Figure 2.1: Comparison of male and female Q angle [Ireland and Nattiv 2002]

The Q angle as illustrated above is a measure of the angle between the quadriceps muscle on the front of the thigh and the patella tendon. This angle is greater in females measuring up to 17% compared to 12% in males. The difference is due to the shape of their pelvis, which is wider in females. Therefore, the female knee is made with a naturally greater angle between the femur and the tibia, predisposing it to greater stress. The pronated foot that is created by the increased Q angle worsens the tendency to injure the knee. This special feature is what drew most

investigators' attention to the knee and specifically the cruciate ligament injuries. The Q angle has a direct effect on the lower extremity alignment. The lower extremity alignment contributes directly to the forces and strains on the knee compartments, ligaments, and musculotendinous structures. The variable alignment differences between men and women have a direct effect on the biomechanical stresses felt by the ligaments about the knee and ankle [Ireland and Nattiv 2002]. Other anatomical features unique to females are: shorter legs that lower their center of gravity, less muscular thighs, increased general flexibility and less developed vastus medialis oblique muscles [Ireland and Nattiv 2002].

The type of injury is determined by both the mechanism of the injury and the patho-physiology in the involved tissue. Therefore, a discussion of the types of injuries in soccer players and their mechanisms will follow below.

### **Mechanisms of injuries**

Soccer is defined as a game of tackling, running shooting and dribbling. It is therefore obvious that injury will result from one or a combination of all these parameters [Giza et al 2003]. The mechanisms of injury outlined below were investigated, and their contribution to injury will be discussed below. They are: physical contact, tackling, foul plays, player to player contact and rule violation.

## **Physical contact**

Soccer is a contact sport. According to Andersen et al [2004a], up to 74% of the acute injuries result from the physical contact among players. Different levels of play such as professional, elite and amateurs have different injury mechanisms. The mechanisms also differ in age groups.

A number of injury mechanisms have been studied and emphasis has been placed on a few mechanisms such as tackling, player to player contact and rule violation [Fuller et al 2004, Giza et al 2003]. These are but a few of the mechanisms known to be responsible for injuries in soccer players. The results from studies about these mechanisms were not used to draw up the preventative programs, or for assessing the levels of risk involved or prevent or reduce the number of injuries, but were used to ensure that players are held accountable for their actions.

## **Tackling**

About 48% of the total reported soccer injuries resulted from being tackled [Giza et al 2003, Fuller et al 2004]. They identified a tackle, especially from behind as the most common mechanism causing injury. In a single female study by Arendt [1995], it was found that non-contact mechanisms were responsible for most injuries.

Tackling, (which is defined as any event that occurred during a normal course of the match and involved more than one player and where there is challenging for the ball possession) especially from behind is the primary mechanism for more than half of all the anterior cruciate

ligaments and most of the sprains in both ankles and knees according to Andersen et al [2004a].

In a retrospective male study of video recordings of 123 international matches in the three Federation Internationale de Football Association (FIFA) tournaments, player errors were assessed. Tackling was shown to be the primary mechanism of most injuries. A total of 8572 tackles were recorded and of these, 62% resulted in a player needing on the pitch medical attention [Fuller et al 2004]. According to Arnason et al. [2004], being tackled, as opposed to tackling is responsible for more than 60 % of the injuries in soccer players.

In a male study to quantify the frequency of injury in football as function of tackle parameter, Fuller et al [2004] found that player to player contact was responsible for nearly half of the total injuries in their post match reports. This finding has not been tested in female population.

### **Foul play**

In a prospective study to evaluate how violation of the laws of soccer contribute to injury, foul play was found to be responsible for more than 40% of all the acute injuries video-taped [Andersen et al 2004b]. Second to tackling, rule violation (foul play) has been proposed to be the most important cause of the injuries, especially in the lower levels of play as observed by Andersen et al [2004b], Hawkins and Fuller [1996] and Hawkins and Fuller [1998]. Foul play has claimed some casualties in professional and elite soccer players [Andersen et al 2004b].

## **Player-to-player contact**

In the studies of injury mechanisms conducted in males, it has been found that injuries resulting from player-to-player contact vary from 30% to 70 % between soccer in youth and elite players respectively [Astrid et al 2004, Fuller et al 2003]. This mechanism of injury remains responsible for more than 50% of the total injuries in soccer players as reported by Fuller et al [2004].

Though player to player contact is a risk factor in the majority of soccer players' injuries, the exact mechanisms of how the injury occurs, is still unknown [Giza et al 2003].

Only male studies on injuries sustained due to, rule violation, player to player contact and player error could be found [Arnason et al 2004, Fuller et al 2004, Giza et al 2003, Andersen et al 2004b,a]. These factors need to be established in the female population.

## **Rule violation**

Researchers are in agreement about rule violation as the principal cause of injuries in soccer players [Andersen et al 2004a, Fuller et al 2004, and Giza et al 2003]. In a study by Andersen et al [2004a] of Norwegian male professional football players during the 2000 league season, contribution of rule violation of the laws of the game to injury was evaluated. They concluded that less than one-third of the injuries identified on the video and about 40% of the incidences with high risk of injury resulted in foul being committed and a penalty awarded. In all the incidences that resulted in a penalty awarded, the player was injured.

If these results were used to change laws of the soccer game to protect players, a change in injury pattern and frequency would be seen. It is believed that most of the soccer injuries are not an accident but rather planned by the opponent to disrupt/disturb the opponent [Fuller et al 2004].

## **Summary**

The above studies were conducted in male soccer players. It is not conclusive if women soccer players will have the same mechanisms of injuries. What we know is that anatomically, there is a notable difference in lower limbs structures (refer to figure 2.1) that could influence the change in the manner women soccer players sustain their injuries [Ireland and Nattiv 2002].

In the studies reviewed, none had mechanisms of injuries in soccer players correlated to player's position. Only one [Yde and Nielsen 1990] study correlated injury type to players position and found the strikers to be most affected by ligaments sprains.

### Strengths of the articles reviewed

- Most injuries are to the soft tissue and occur most frequently in the lower extremities.
- There is general agreement on the most common types of injuries in the lower limb.

## Gaps in the literature

- Types of injuries outline in the literature do not confirm that they are the same for teenage girls. Most studies are concentrated on male professional soccer players.
- Studies are conducted through one or two seasons
- Different tournaments are used with different facilities
- Studies that investigate youth injuries are not specific to soccer.
- One study that had youth soccer did not have girls playing soccer.
- There is no study found comparing male and women soccer injuries despite the obvious anatomical differences
- The data available in the literature studied so far does not identify the causal factors leading to the injuries in women and girls soccer players.

The aim of this subsection was to determine what is described in the literature about the types and mechanisms of soccer injuries, history of soccer in South Africa, prevalence of injuries in soccer players, and the risk factors associated with injuries in soccer.

The researcher concluded that:

- There is a need to investigate the types of injuries in teenage girls playing soccer.
- The injury mechanisms have not been tested in teenage girls.
- The mechanisms of injury have not been correlated to players' positions. This will be tested by this study.

## **CHAPTER 3**

### **METHODOLOGY**

#### **Introduction**

In the previous chapter, a discussion given on the history of soccer, prevalence of injuries in soccer, the risk factors associated with soccer, the types of injuries in male soccer players and the type of players involved in the game of soccer. This chapter deals with a discussion of the research methodology.

#### **Aim of the study**

To describe types of injuries and determine the mechanisms of these injuries as sustained by the teenage girls playing soccer during the United Schools Sport Association of South Africa (USSASSA) summer ball games in Rustenburg, August 2003.

#### **Research methodology**

#### **Study design**

A qualitative, descriptive survey was undertaken to collect data by means of direct scheduled observation by the researcher. Because this design describes the characteristics of a situation and may determine the frequency with which event occurs (Seaman 1987:172). The descriptive design requires a well documented research question, a defined population, and clearly defined subject of interest. The data that is obtained can be used to assess and justify current conditions and make plans for improving them (Cormack 2000:214). This design frequently

uses observation techniques. This study focused on the types of lower limbs of injuries and the mechanisms thereof as sustained by teenage girls playing soccer. This design was found to be appropriate to this study as it allowed systematic collection of data about the types of injuries and mechanisms (Cormack 2000:213).

Seaman (1998:184) outlined the advantages and the disadvantages of the descriptive design as follows:

The advantages of this study design are that:

- Broad range of data with richness of details that has not been available before is assembled.
- By describing, comparing and classifying data, the researcher gains holistic view of patterns and processes.

Disadvantages of descriptive study design:

- It is not easy to observe objectively.
- Because the procedure is not standardised, descriptive studies cannot be replicated or evaluated.

### **Population and sample**

According to Polit and Hunger (1995:250), a sample is group of members that form a portion of the population with similar interest and meet the criteria set out by the researcher, and this is representative of the population. The population targeted for this study was all the teenage girls playing soccer at the aforementioned tournament. This sample was representative of the teenage girls playing soccer as all the nine

provinces and their regions were taking part in the tournament. It was a USSASSA tournament so all the girls that were in the team were correctly aged for the study, they were all teenagers.

Therefore, a sample of convenience was used. This was determined by the permission granted by the general manager of USSASSA to conduct the study at the tournament. Letter of permission was faxed through to the researcher's office, copy enclosed. Three hundred primary and high school girls playing soccer (age range, 14 to 18 years, mean age = 16) from twelve regions (Gauteng South, Central Gauteng, Gauteng North, North West South, North West North, Western Province, Northern Cape, Limpopo, Free state, Namaqualand, KwaZulu Natal and Natal midlands) were observed over one week (August 2003) of competitive soccer participation.

### **The setting**

The study was conducted during the USSASA summer ball games in Olympia stadium, in Rustenburg August 2003. The researcher found it necessary to use this setting because it was a tournament of inter-provincial competitions that had soccer as the main sporting code and only and had teenage girls playing soccer. It was therefore more representative of the national teenage girls that were playing soccer.

### **Research method**

#### **Data collection**

To obtain data from the study sample, the researcher was present at all the matches during the tournament, with the injury observation sheet (Appendix 3). On the injury form, the name of the tournament, date,

match name for the involved provinces and tournament level appeared on the heading. The type, site or location, mechanism, time of the day, part of the field and treatment given all appeared in columns for the researcher just to fill in the code. The treatment was to justify injury according to the study definition of this study.

If the researcher was not clear as to the mechanism because of the angle of incidence, the player was asked to confirm the mechanism to control for biasness, the researcher followed up the player after game to check if information given before would not contradict. The researcher also assessed the injured part to see if the injury matched the mechanism that was described by the player.

Before all games started, the researcher explained the verbal informed consent form to all the participants. Those that were not clear were given individual attention. Then the verbal player informed consent form which provided information on the rights of participants was handed to all players to double check the information prior to a game. The verbal player informed consent has never been used before, but in this study it used instead of the written consent form as the recommendation from the ethical committee of the University of Pretoria since the information to be recorded was totally anonymous.

### **Research instrument: Soccer injury observation sheet**

The researcher observed and recorded the data on the soccer injury observation sheet during the game. The soccer injury observation sheet provided space whereby the following information was documented: type of injury, site of injury, mechanism of injury, cause of injury, part of field, time of ball in play and player's position. The information documented on

the injury observation sheet is similar to that in the literature [Fuller et al 2004 and Andersen et al 2004]. The response rate was 100% since the researcher was the sole observer during data collection of the study.

To control biasness by observer who was also the researcher, information on the soccer observation sheet was entered using codes (list of codes included in the appendix 2b) so that the researcher did not have to write anything. Also, not too much time is taken by writing down the incidence since soccer is the game of non stop action. Data was collected within one week of the tournament.

### **Ethical considerations**

In order to proceed with this study, permission was obtained from:

- The United School Sport Association of South Africa (USSASA) granted permission in writing (which was faxed through because of time constrains) to conduct the study at the summer ball games that took place in Rustenburg August 2003, North West Province ( letter included in the appendix 3a).
- The ethical approval (number S124/2003, included in the appendix 4) to conduct the study was granted by students' Ethics committee at the Faculty of Health, University of Pretoria.
- As the study did not require any personal details, no permission was needed from the parents or guardians. The students' Ethics committee of University of Pretoria recommended that a verbal consent should be entered into.

## **Pilot study**

The aim of the pilot study was to test the validity and reliability of the instrument (used in an unpublished study by for thesis of Dr Ramantsi) and also test whether the variable defined by operational study were observable (see appendix 2a).

An extensive study (Unpublished) on severity of female soccer injuries was carried by Dr Ramantsi on four of the SAFA interregional tournaments in 2001. This is where the injury information sheet was first used in South Africa. The information on the injury information sheet compared very well with that used by Fuller et al [2004]. The researcher who was the physiotherapist at the tournament, was also the assistant data collector in three of the tournaments

A pilot study was conducted with the under 19 women national soccer team practice sessions during their qualifying games for under 19 women soccer world cup in China, 2003. This group was chosen because it was a dress rehearsal that resembled the main study group but at a small scale. It tested for whether the variables defined by operational definition were observable (Seaman 1987).

There were no changes to be effected on the injury information sheet as it proved reliability.

## **Reliability**

Reliability measures whether the instrument consistently measures what it is supposed to measure (Polit and Hungler: 1995:337). It is concerned about the degree of consistency of the instrument and it is the main criteria for assessing the quality and adequacy.

## **Validity**

Validity refers to the whether an instrument measures what is designed to measure. Cross validation that promotes item sensitivity (De vos 1998:84) was done by having the assistant observer who was the team doctor at the pilot study. One assistant observer was used because of time between pilot study and the main study was limited.

### **Setting of the pilot study:**

Practice sessions of South African women soccer, under 19 were used for the pilot study. Practice sessions, which were twice a day were used. The second observer, who was the team doctor and present at all practice sessions, was used for cross validation of the checklist and minimized biasness by the researcher. Each practice session lasted for One hour twice a day i.e morning and afternoon.

## **Study design**

This study was designed as a qualitative research survey which involved the collection of data that was to provide account of injuries and the mechanisms of the South African under 19 women soccer team to the researcher. Observation schedules and check-list were used to gather information. The focus of the study was on describing the types of injuries and the mechanisms thereof of the aforementioned subjects. The qualitative descriptive research design was found to be appropriate to this study as this method (Burns and Grove 1997:250, Seaman 1987:169 and Polit and Hungler 1995:178) allowed observation and description of mechanisms of the injuries using the check-list.

## **Methodology**

Data was collected by researcher and the trained assistant who was a team doctor using soccer injury observation sheet (enclosed, appendix 2a) during practice sessions of the national under 19 women soccer team for their qualifying games (March through to May) for world cup in China in 2003. The camping period prior each game lasted four days. There were two practice sessions a day and one practice session a day before the game. The team had a total of seven practice sessions prior each official game.

The soccer injury observation sheet comprised a single page on which the following data on injury could be recorded. For all the injuries, the following data was captured:

- i. Type of injury
- ii. Injured body part
- iii. Time in the match
- iv. Mechanism of injury
- v. Player involved
- vi. Number of injuries in each practice session.

## **Results of the pilot study**

The main finding was that the soccer injury observation sheet was user friendly i.e all data required was easy to understand and capture. Even if more than one observer was to be used, there was little room for error.

## **Data analysis**

The soccer injury observation sheet information recordings were entered into computer Microsoft excel and then analysed descriptively. Percentages were calculated to describe the data.

## **Conclusion**

This chapter described the methods and procedures that were employed to conduct the study. The instrument used for data collection, the rationale for targeting of the population used as well as sampling procedure was discussed. Preparation and analysis of the data was also explained.

The following chapter will present the results.

## **CHAPTER 4**

### **RESULTS**

#### **Introduction**

The study was conducted over a period of one week in August 2003, in Rustenburg, North West Province during USSASSA summer ball games. The data was collected by the researcher. The information recordings were captured in Microsoft excel and percentages, bar graphs, tables were used for interpretations for more meaningful information.

The purpose of this study was to describe the type of injuries and the mechanisms involved in teenage girls playing soccer. It was also aimed at determining the correlation between common injuries and player's position. In order to this, teenage girls playing soccer at the USSASSA summer ball games tournament were targeted. The required information was obtained by means of the soccer injury observation sheet. Descriptive categories were used to obtain data required. The results will be presented in this chapter

Graphic and charts illustrating types of injuries, injury type and player positions mechanisms responsible and players position versus mechanisms are presented in this section and discussion of the results will follow in the next chapter.

## **Demographic data**

One hundred and sixty five (165) teenage girls playing soccer during USSASSA summer tournament in Rustenburg, August 2003, participated in the study. The participants were from nine provinces of South Africa and they were all playing soccer at school level. They were aged between 13 and 18 years. In total, 11 teams with 15 players each, 39 soccer matches were played.

In this one week tournament which consisted of 165 soccer players, of 39 soccer matches, produced a total of 214 injuries to the lower limbs only. Of these injuries, 57% (122) were sprains, 25% (53) were strains, 17% (25) were contusions and only 1% was a fracture to the tibia (refer to figure 4.1 below).

## **Types on injuries**

Below, figure 4. 1 represents the total injury types during the tournament. Sprains accounted for the highest number 57% (n=122) of injury type sustained by the teenage girls in the tournament. Strains accounted for 25% and 17% were the contusions. Fractures accounted for only 1% and it was to the tibia.

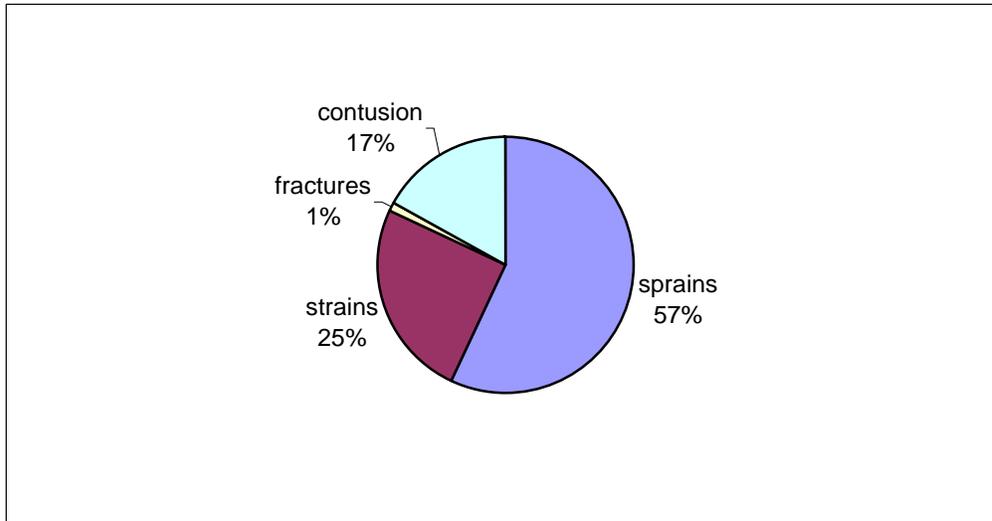


Figure 4.1: Type of injury as % of all injuries during the tournament

To find percentages, some times numbers had to be rounded off.

Strains accounted for 25% of the injuries in the tournament while contusions accounted for the second lowest injury type. There was only one fracture to the lower limb in the whole tournament.

Of the 214 injuries, 63% (147) were sustained by strikers, 12% (26) by defenders, 25% (55) by middle fielders. Of interest to note was that goal keepers did not sustain any injuries to their lower limbs.

### Ligament Sprains

Types of injuries presented against the players affected are illustrated by the chart below.

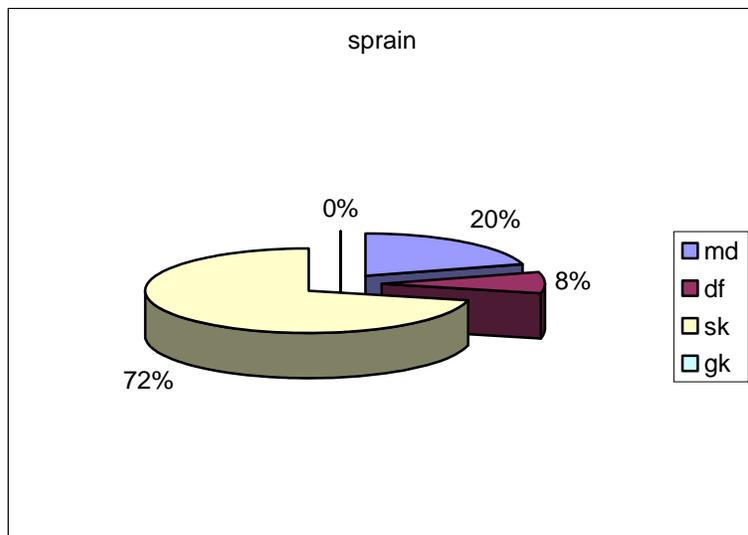


Figure 4.2: Ligament sprains distribution among players

Key :

sk : striker

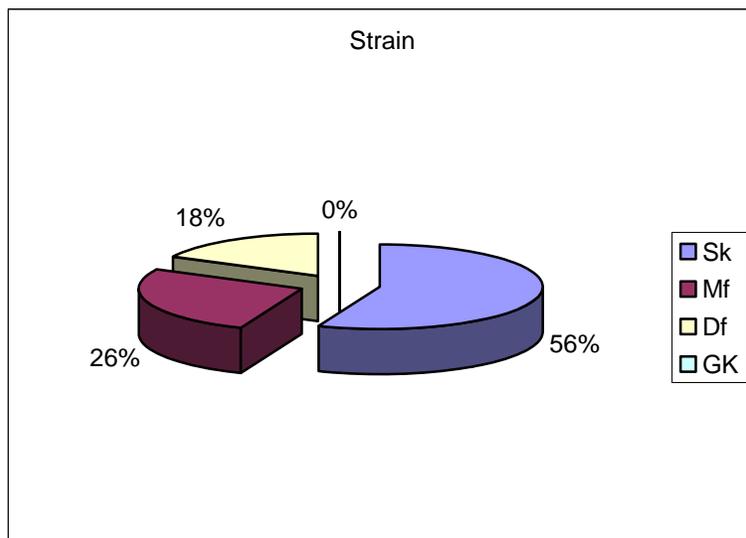
Mf : middle fielder

df : defender

gk : goal keeper

Strains are the next type of injuries that affected the strikers the most. The muscles affected by these strains were not documented (shortfall). Defenders are the least affected by this type of injury. More than 50% of all the strains were sustained by the strikers. Goal keepers were not affected by this type of injury during the tournament.

The graph below gives an illustration of muscle strain distribution among the players.



**Figure 4.3:** Muscle strain distribution among players

Key:

Sk = striker

Mf = middle fielder

Df = defender

Gk = goal keeper

## Contusions

According to Brukner and Khan, [2000] muscle contusion is an extremely common injury in sport, especially in collision sports such as soccer, basketball and hockey. It usually results from a direct blow from an opponent or firm equipment such as the goal post. Contusions sustained in this study were as a result of direct blow from the opponents. Goal keepers are the ones commonly getting the contusion injuries especially on their upper bodies from hitting against the goal post.

Figure 4.4 below depicts

Contusions were the lowest injury type second to fractures that affected different players. They were only 38, 17% of the 214 injuries. They were distributed as follows: Strikers 45% (32), 39% (15) by the middle fielders, 16% (6) by the defenders and nil by the goal keepers. There was only one striker who sustained a fracture to the tibia (refer to figure 4.1).

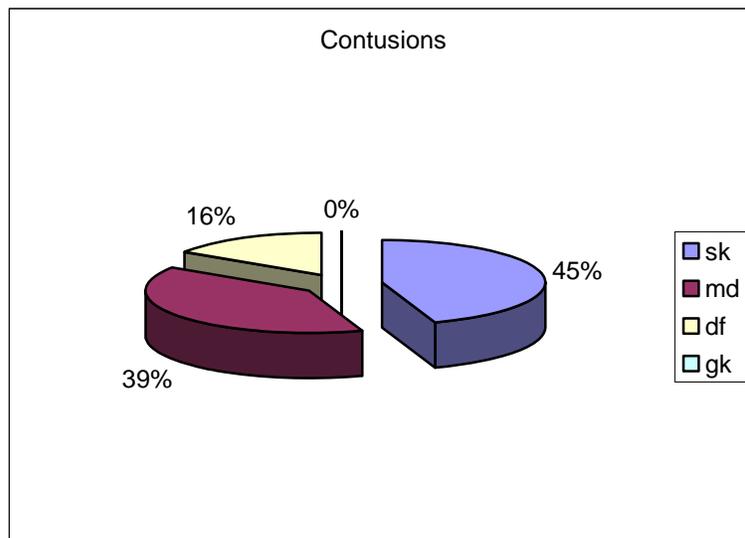


Figure 4.4: Contusions distribution among player positions

Key

df = defender

md = middle fielder

sk = striker

gk = goal keeper

### Mechanisms of injury

Mechanisms of injuries that were captured as responsible for injuries included tackling with 39% (85) injuries , shooting with 12%(27), sprinting with 10%(23), rule violation with 19%(41) and jumping with 1%(10) injuries .

In the chart below, tackling was responsible for the highest number of injuries. Most of the injuries that resulted from tackling were sprains then strains (refer to figure 4.6). Shooting accounted for the second most highest. It is followed by running and then collision and rule violation. Other mechanisms accounted for the least number of injuries that were insignificant.

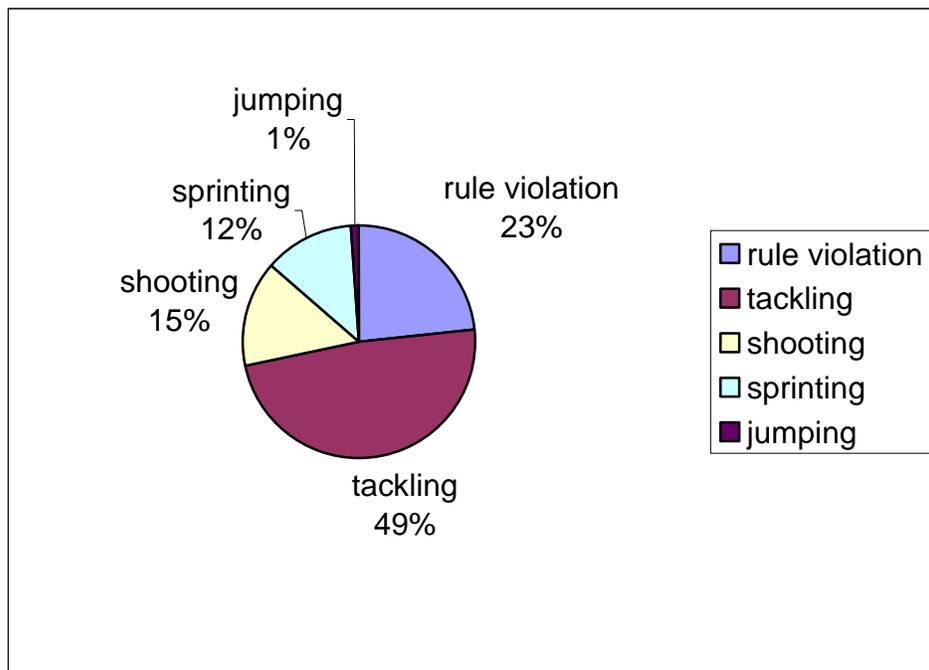


figure 4.5 : Percentages of injury mechanisms in the tournament

### **Injury mechanisms and their common injuries**

Injury mechanisms as relating to types of injuries sustained during the tournament are presented in the table below.

In figure 4.6 below, injury mechanisms and the resultant injuries that were sustained as a result are illustrated. It is interesting to note that shooting as a mechanism of injury accounted for more injuries than tackling. Ligament sprains are dominant in all the mechanisms.

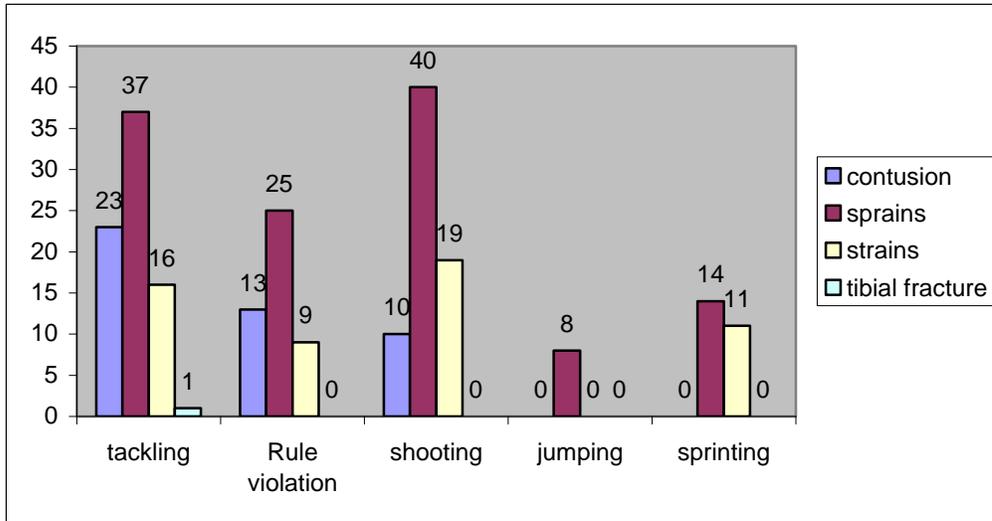


Figure 4.6: Injury mechanisms and the resultant injuries.

The figure above represents the distribution of injuries to their mechanisms. It is noted that some mechanisms did not claim any injuries that is, shooting was only responsible for highest number of sprains in the tournament. Shooting accounted for more injuries in comparison with other injury mechanisms in this study.

Figure 4.6 below depicts the percentages of player's position in relation to injuries sustained.

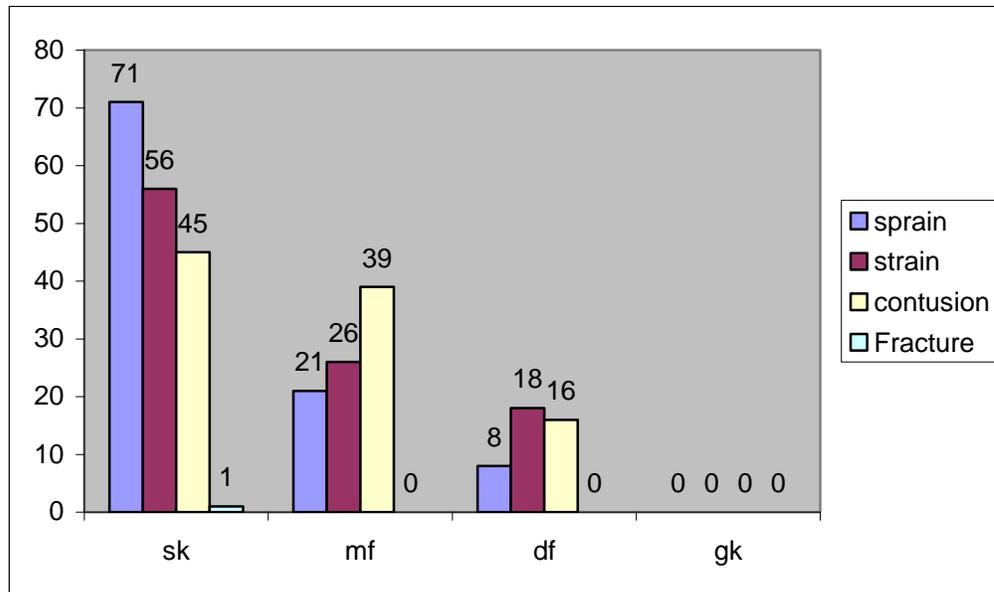


Figure 4. 7: Correlation between players' position and injury types

Key:

Sk: striker

mf: middle fielder

df : defender

Gk: goal keeper

Figure 4.2 above depicts injury distribution among deferent player positions. The strikers are most affected by all types of injuries, including the fractures. The goal keepers did not sustain any type of injury to their lower limbs in this study. Their (gk) common injuries are to head and the upper limbs; they were excluded as they were not for the scope of this study.

When correlating injury type to positions of players in the field, 71%(87) of the total sprains were sustained by the strikers, 21%(25) by the middle fielders, 8%(10) by the defenders and nil by the goal keepers (Refer to figure 4.6 above).

## **Shortfall**

Correlation between mechanisms on injury and the players in different positions was not done. This data would be helpful for physiotherapists planning an injury prevention program.

## **Summary**

Graphic representation and main findings were presented in this chapter. Analysis of the presented data is presented in the next chapter.

## **CHAPTER 5**

### **DISCUSSION**

#### **Introduction**

All contact sports have an inherent risk of injury and soccer is no exception.

This chapter aims to analyse and explain results reported in chapter 4, as well as compare them to the results by other researchers.

The objectives of this study were to determine the types of lower limbs injuries sustained by teenage girls playing soccer. Also, to determine the mechanisms of these injuries, and the correlation between player's position and frequent injuries. Finally to make suggestions regarding preventative measures will be given.

#### **Main findings**

- Sprains (57%) and strains (25%) were the most common type of the injury sustained by teenage girls playing soccer in this study.
- Tackling accounted for highest number (49%) of injuries.
- Strikers were the players' position affected by all types of injuries the most, sprains (71%), strains (56%) and contusions (45%).
- Middle fielders were affected by contusions (39%) the most and defenders were affected by strains (18%) the most.

What are the types of lower limb injuries sustained by teenage girls?

The sprains accounted for 57% (n=214) of the total injuries of the tournament. This finding is in agreement with what other researchers such as Fuller et al [2004], Hawkins et al [2001], Astrid et al [2003] and Yde et al [2003] found in their male soccer players but contradicts findings by Fuller et al [2004] who found contusions to be the most common injury in their retrospective study of injury causation factor in international football.

Of the total sprains, 64% (78) were to the ankles and 36% (44) were to the knees. The distribution of the sprains to ankles and knees in this study contradicts findings by Hamzat et al [2004] who found the knee to be having the highest number of sprains in three different soccer tournaments in professional male soccer players. The differences can be attributed to: 1. the sample selected in the study were amateurs, they were therefore inexperienced and not highly skilled. 2. The playing surface was not of professional standards as the fields were often used for community activities more than for soccer purposes and finally , not all players had full soccer boots and that could have contributed greatly to more injuries.

Sprains contribution among players showed that strikers were affected the most. This finding is in agreement with those of Yde et al [2001] in the study comparing injuries in different ball games in youth. When correlating positions of players to injuries, the researcher found strikers to be affected by all types of injuries. The findings could be influenced the responsibilities given to them by their coaches that winning the game depended on their capabilities of scoring. They are therefore at high risk

because the defenders of the opposing team will do any thing to stop them from scoring a goal.

The findings by Ireland and Nattiv [2002] and Andersen et al [2004] that female players are more likely to sustain more serious injuries to their knees than to ankles were contradicted by findings in this study in that injuries were minor in nature and that there were more ankle injuries than knee injuries. The reason for this is not known but could be attributed to incentives and skill level in this group. There were no incentives in this group compared to incentives in male tournaments. The only incentive in this tournament was that a player had a chance to be selected to play in the national team.

Data in figure 4.1 reveals that strains were the second largest type of injury sustained by teenage girls playing soccer. The most affected muscle group was the quadriceps. According to the researcher's opinion, the contributing factor was thought to be their biomechanical build. Women are thought to be quadriceps dominant [Ireland and Nattiv 2002]. This means that they placed more strain on their quadriceps muscles and if they were not match fit they could have injured their muscles. In other studies cited in the literature, the most common muscles affected by muscle strained were the hamstrings muscles, followed by the adductor muscles, quadriceps muscles and lastly the gastrocnemius muscles [Orchard 2001, Bjorn et al 1998].

The players most affected by this type of injury were once again the strikers. This could be because strikers are always on the run in search of the ball or running towards the goal post to score. Therefore, they had to be fit and well conditioned in order to be able to keep up with the pace of the match throughout the tournament.

The hamstring cramps/pull in this study, which accounted for less than two percent of the total injuries, occurred mainly in the second half of the playing time, towards the end of the tournament. This was suspected to be the result of increased fatigue as was observed by the researcher on players.

Of interest was that, the goal keepers were not affected by this type of injury. The nature and location of the injuries commonly affecting the goal keepers were excluded them from this study. The lack of stretching regime before and after each game that the researcher observed, could be responsible to most of these injuries.

Contusions occurred in 17% of the total injuries. This injury type accounted for the least number of injuries in the study after only one fracture to the tibia. These findings are in line with findings in other studies conducted in males playing soccer as cited by Giza et al [2003] and Astride et al [2003] but contradicted the findings by Fuller et al [2004] in other male studies.

In this study, the area commonly contused was the thigh from being hit by the ball and miskicks from opponent. These were the least type of injury that affected the teenage girls playing soccer. Most of the contusions resulted from rough tackles or miskicks, from the opponent. According to results on figure 4.4, it shows that the goal keepers were not subjected to this type of injury in this study. The location of the injuries in this study excluded the goal keepers' contusion as they are often contused on their arms from hitting against the goal posts.

Lacerations are rare in the lower limbs. The location of injuries in this study excluded them as they often occur on the face or head from simultaneous heading.

The sample selected for this study was an amateur group, some did not have appropriate equipment such as proper soccer boots. The two factors may have contributed to increased injuries.

### **Injury mechanisms**

Tackling accounted for more injuries (49%) in this study. This finding is in line with findings in other studies conducted in males playing soccer [Andersen et al 2004, Yde and Nielsen 1990, Fuller et al 2003, and Giza et al 2003]. This findings could have been influenced by the fact that these girls were amateurs, their soccer skills are not yet well developed compared to other studies in males playing soccer. In elite soccer players, tackling leading to injury is a deliberate move, while in this study according to the researcher; it was a genuine attempt to win the ball. However, this study contradicts what has been found by Woods et al [2003], who pointed out that foul play, (known as playing factor in this study) is the most important cause of injury at the lower level of play.

Other mechanisms that were found to be responsible for injuries in this study were as illustrated in figure 4.5. These findings are a clear indication that these were amateur players and their lack of skill contributed to injuries. Shooting a ball accounted for more injuries than sprinting and jumping mechanisms in this study. Injuries from shooting are not common, the skill level (which was low) and poor judgment for the angle for shooting safely in the population of this study could be responsible for the increased injuries from this mechanism. Shooting is

not a mechanism extensively studied, as there no literature found. It was therefore difficult to draw a conclusion on it as injury mechanism.

Shooting and running/sprinting have claimed the highest numbers of injuries in this study compared to findings in male studies. According to researcher observation, professional soccer players usually do not sustain injury from this mechanism.

### **Player position versus type of injury**

The players which have sustained the highest number of injuries are the strikers in all injury types. The frequent injuring of the strikers could be due to pressure put on them by the management. Strikers carry the mandate to score goals. This group of players will carry the mandate at all cost, and injuring themselves in the process.

The researcher observed that the defenders, in their attempt to stop the ball, would tackle in a more dangerous way, injuring the strikers in the process (refer to figure 4.6). This finding could be influence by the belief most coaches have that attacking is the best defense mechanism. The coaches will therefore instill it in their players.

Of interest to note is that, the goal keepers were not affected by all these injuries. This finding could have been influenced by the location of the injuries of this study. The researcher's observation was that the goal keepers often have injuries to their shoulders from the fall from diving for the ball. Other injury location would be their heads from hitting against the goal post in attempt to stop the ball from being scored. So, none of the injuries of the lower limb affected them. Goal keepers were not

excluded from the study but the nature and location of their common injuries excluded their common injuries, as the study concentrated on the lower limbs injuries only.

The only factor that has received some attention from investigators in the literature is the rule violation [Fuller et al 2004, Andersen et al 2004]. The impact that these injury mechanisms have on the soccer players warrants an attention from investigators to decrease the number of injuries associated with them.

Therefore, risk factors that needed attention from the coaching staff in the order of priority were the playing factor and the rule violation. Unfortunately, not much can be done about the playing surface at the time of the game. The sporting bodies should inspect the playing grounds prior to approving them for hosting tournaments. Changing these factors will lessen the number of injuries sustained by soccer players.

Of interest to note was that, according to the results above, goal keepers were not affected by any of the injury types in this study. These results could have been influenced by the specific location of the injuries in this study, the lower limbs. This finding does correlate with findings by Junge et al [2004] and Arnason et al [2004] in male studies. They found that the incidence of injuries to goal keepers is the same as for other players in the field, but their location is mainly to head, shoulders, wrists and fingers.

Goal keepers are unique, in many ways. Their frequent diving makes them prone to shoulder and elbow injuries. This may explain the absence of the goal keepers' statistics in all the injury types presented in this study.

The researcher observed that equipment had an influence on the results of the game though. The regions that were less equipped in as far as the soccer boots were concerned, lost all their games as the players were afraid to tackle or fight for the ball from the booted opponent. Most of the injuries occurred towards the end of the game. This is speculated to be due to the fact that these girls were getting fatigue as they normally play one game per week. In the tournament setup, they sometimes played up to two games a day and they had at least played a game every day. There was no literature found on the effects of fatigue on soccer players.

In summary, the types of injuries observed among players in this study pointed that the strikers are more at risk of being injured compared to others players in the same game. This finding is not comparable to other studied that did not find any compelling evidence to suggest that player position could be associated with specific injury [Moeller and Lamb 1997, and Ireland and Nattiv 2002].

The injury mechanisms affecting players in specific positions were not correlated with injuries. Correlating the injury mechanism to type of injury and players position, could have helped to identify which players are more at risk from which injury mechanisms and the type of injuries. Knowledge of this interrelationship of factors will help in identifying players that are at increased risk and prevention strategies will be more direct.

The relative lack of physical fitness in females playing soccer compared to males playing soccer is suspected to be the main possible cause increased injuries in teenage girls in this study [Ireland and Nattiv 2002].

Flexibility in women, increased ligaments laxity in women and lower limb muscle strength imbalances of more than 15 % were associated with increased injury rate in women studies as cite by Ireland and Nattiv [2002].

The lack of research in South Africa on soccer injuries is surprising considering the increasing popularity of soccer nationally and world wide. The lack of research regarding preventative strategies that are in use at present also raises a concern. The presently used method are not evidence based. According to Olsen et al [2004], without adequate research, the health care profession cannot know which practices are effective at reducing the risk of soccer injuries.

Encouraging the enforcement of policies governing the game of soccer in girls can bring about good behaviour in the field and thus lessening the injuries. Enforcing rules of the game by the sporting bodies such as South African Football Association (SAFA) can bear fruit in injury prevention especially if started at developmental level. Educational injury awareness programs by team physiotherapist, development and evaluation of present injury prevention strategies can help in reducing the number of injuries sustainable by soccer players.

### **Strengths of the study**

Through nature of sport, there are certain types of injuries that prevail in soccer. In this study, the types of injuries that are sustained by teenage girls playing soccer were confirmed. The mechanisms of the injuries were described and correlation between the players frequently injured and the common injury types were identified.

A number of strengths and limitations were identified during this study. The major strength of this study is that it has never been conducted in South Africa. It will therefore form a base line for future research

The sample in this study was representative of the teenage girls playing soccer as it was schools inter-regional tournament. These girls also participate at club level in their respective provinces.

The research report is concluded with chapter six. The value of findings of this study is discussed. Recommendations are included in this chapter.

## CHAPTER 6

### CONCLUSION, LIMITATIONS AND RECOMMENDATIONS

#### INTRODUCTION

In this chapter, conclusions drawn using significant information extracted from findings of this study are presented. Recommendations will be highlighted and conclusions drawn from the study will be presented.

The aims of this study were to determine the types of injuries in the lower limbs, their mechanisms and the correlation between player's position and frequent injuries.

#### Conclusion

The main findings of this study were that the ligament sprains and muscle strains (57% and 25% respectively) were the most common injury types among all players. The strikers were the players who were mostly injured compared to middle-fielders, defenders and goal keepers

Injury mechanisms that were found to be accountable for most injuries in this study were tackling (49%), rule violation (23%), shooting and running for 15% and 12% respectively. Strikers were found to be associated with all types of injuries.

Knowing the types of injuries and their mechanisms will form the basis for the formulation of the prevention program for the teenage girls playing soccer.

The findings on types of injuries in this study have highlighted the seriousness of the injuries in teenage girls playing soccer. Though minor in nature, if not attending aggressively on time, we may see an early exit of young players in the soccer career. The injury mechanisms still need to be tested and clarified.

The reason why strikers are affected by all types injuries need to be investigated. If winning the game is dependent on the strikers, then preventative measures need to be drawn up as a matter of urgency to have the teenage girls developing to their full potential.

The findings in this study have shown that soccer injuries are often minor in nature; it is therefore possible to prevent them. The findings on injury mechanisms indicate that there is a need for more specific information about mechanisms such as tackling, rule violation and foul playing. Detailed information specific to these injury mechanisms in girls should be identified.

In this study, shooting has accounted for more injuries than in other studies in males soccer players. This clearly points to the lack of skill in kicking techniques. Some skills such as shooting can be taught and be mastered by these girls to prevent further injuries. The value of staying injury free as much as possible in sport should be re-enforced and encouraged.

It is clear that at present, the present laws of the game are not doing much to deter soccer players from violating these laws. The sporting body should consider the recommendation that a cautionable offense, where a yellow card is awarded, an automatic temporary ten minute expulsion from the game is implemented. This, according to Andersen et

al [2004] have given some positive result in that it gives the player the cooling off time while the opponents are given an advantage.

In practice

Preventative strategies or programs are required urgently to have a significant impact on injuries. The health care providers, especially physiotherapist should continue to educate players, coaches and parents on the value of stretches before and after each game. The coaches should be encouraged to have pre-season conditioning as it prepares the muscle for the hard work ahead and thus decrease injuries.

Until specific injury mechanisms are identified in females, suggesting specific preventative strategies to soccer is not going to be easy.

As physiotherapist involved in sports, the onus is on us to create a climate where athletes would be safe and comfortable to participate in the game of soccer without fear of injury.

The injuries in soccer are mild but can be career threatening if not aggressively treated. The increased number of ligament sprains and muscle strains (57% and 25% respectively) demonstrated in this study highlights a need for physiotherapist to come up with preventative programs for these injuries.

More research is needed in injuries of females playing soccer, considering the rate at which the sport is growing compared to available literature nationally, especially the mechanisms and risk factors. At the moment, international data is heavily relied upon.

## Limitations

The researcher acknowledges that this study had its limitations and shortfalls, they will be outlined below.

- The weight and skill level of participation in soccer. It is known that soccer is a contact sport and weight have major effect on the game of soccer. Some of the provinces had players that are involved at national team level compared to some who only played soccer at school during extra mural activities in the soccer season.
- Data capturing had the limitation that because of the anonymous nature of the injury observation sheet, players that were captured more than once for the same or different injury were not identifiable. Therefore it was not known if we had re-injured players captured or one player having had all the injuries.
- One of the factors overlooked in this study was the exposure rate. Some players were more frequently used than others. The injury patterns were not established in this study.
- The use of the video recordings may give more information on mechanisms of injury than visual observation on the field. Soccer is a game of non-stop action; it is therefore easy for one observer to miss on some incidences.
- The menstrual cycle of these teenage girls playing soccer was not taken into consideration even if it was proved by a number of authors that women playing soccer were more susceptible to

traumatic injuries during the premenstrual and menstrual periods compared to women in the post menstrual cycle [Ireland and Nattiv 2002].

- Other limitations of the study are that some of the regions did not play all their scheduled games. In some of the games regions did not show up for their scheduled matches. The punishment was very mild as they were playing a round robin system and all they had to lose were the points for that game only. It is therefore not known how many more injuries could have been captured from the matches that did not take place. The reasons for the match cancellation were not clarified to the researcher.
- Sprains and strains could not be graded as required in clinical practice since injuries were only observed and the researcher was not involved in the treatment/management of the injuries.

## **Recommendations**

Based on the main findings in this study on the numbers of injuries sustained by the teenage girls and the limitation the study has, the following recommendations are made:

- Only two data bases were consulted for the literature search, more data bases could mean a more comprehensive literature review and a more comprehensive study could be conducted.
- A video based analysis can give more accurate mechanisms and more injuries would be picked compared to observation method.
- The injury mechanisms have all not been tested in female population. Therefore, testing these mechanisms will help the

physiotherapist in drawing up their education on prevention program for our female soccer population.

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## **Appendices**

### **Appendix 1**

#### **LAWS OF THE GAME**

##### Law 1 - The field of play

###### Dimension

It is stipulated that the field of play shall be rectangular in shape. In international matches the dimension of the field of play shall be: maximum 110m x 75 meters; minimum 100 x 64 meters. In all cases the length shall exceed the breadth.

###### Markings

The field of play shall be marked with distinctive lines, not more than 12cm in width in accordance with the plan. The longer boundary lines being called the touch line and the shorter boundary, the goal-line. A flag on the post not less than five feet high and having a non-pointed top shall be placed at each corner. The center of the field of play will be indicated by a suitable mark and a circle with a ten yard radius be marked around it.

###### Goal-Area

At each end of the field of play two lines shall be drawn at right-angles to the goal-line, six yards from each goal-post. These shall extend into the field of play for a distance of six yards and shall be joined by a line drawn

parallel with the goal-line. Each of the spaces enclosed by these lines and the goal-line shall be called the goal area.

#### Penalty-Area

At each end of the field of play two lines shall be drawn at right-angles to the goal-lines, 18 yards from each goal-post. These shall extend into the play field for a distance of 18 yards and shall be joined by a line drawn parallel with the goal-line. Each of the spaces enclosed by these lines and goal-lines shall be called the penalty-area. A suitable mark shall be made within each penalty-area, 12 yards from the mid-point of goal-line, measured along an up-drawn line at right angles thereto. These shall be called penalty kick (PK) marks. From each PK an arc of a circle, having a radius of ten yards shall be drawn outside the penalty area.

#### The Corner-Area

From each corner-flag post a quarter circle, having a radius of one yard, shall be drawn inside the field of play.

#### The Goal posts

The goals shall be placed on the center of each goal-line and shall consist of two upright posts equidistance from the corner flag and eight yards from apart (inside measurement), joined by the horizontal cross bar. The lower edge of the cross bar shall be 8 feet from the ground. The width and the depth of the cross bar shall not exceed 12cm. The cross bar and the goal-posts shall have the same width. <sup>Footnote</sup>{Nets may be attached to the posts, cross bar and the ground behind the goals. They should be appropriately supported and be placed as to allow the goalkeeper enough room to move about.

## Law 2 - The ball

The ball shall be spherical, the outer casing shall be of leather or approved materials. No materials shall be used in its construction which might prove dangerous to the players.

## Law 3 - Number of players

A match shall be played by two teams, each consisting of not more than eleven players, one of whom shall be the goalkeeper. Substitutes may be used in any match played under the rules of an official competition under the jurisdiction of FIFA, confederations or National Associations. Substitutes may be used in any match provided that the two teams have reached an agreement on a maximum number, not exceeding five. The referee shall be informed about such agreements prior the game. Any of the other players can change places with the goalkeeper, provided that the referee is informed before such a change is made, and provided that the change is done during the stoppage of the game. The player replaced shall not take further part in the game.

## Law 4 - Players' equipment

The basic compulsory equipment of a player shall consist of jersey or shirt, shorts, stockings, shin guards and soccer boots. A player shall not wear anything which is dangerous to the other players. The shin guards shall be covered completely with stockings shall be made from suitable material (rubber, or polyurethane substance) and shall afford a reasonable degree of protection. The goalkeeper shall wear colours distinguishing him/her from the other players and from the referee.

## Punishment:

For any infringement of this law, the player at fault shall be instructed to leave the field of play by the referee, to adjust his/her equipment or obtain any missing equipment. When the ball next ceases to be in play, the player shall be allowed to back in the field of play if he/she already corrected the equipment.

## Law 5 - Referees

A referee is appointed to officiate in each game. Their authority and the exercise of the powers granted to them by the laws of the game commence as soon as they enter the field of play. The authority of penalising extends to offenses committed when play has been temporarily suspended, or when the ball is out of play. They are given authority to enforce the laws and punish those that do not observe them.

## Law 6 - The linesmen

Two linesmen are appointed per game; their duty is to (subject to referee's decision) indicate:

When the ball is out of play.

Which side is entitled to a corner-kick, or a throw in?

When substitution is desired.

## Law 7 - Duration of the game

The duration of the game is two equal periods of 45 minutes each, unless otherwise mutually agreed upon, subject to the following:

1. Allowance is made in either period for all time lost through substitution, transport from the field of the injured players, time-wasting or other causes, the amount of which is a matter for the referee's discretion.
2. Time is extended to permit a PK being taken at or after the expiration of the normal period in either half.
3. If a match has been stopped by the referee, before the completion of the time specified in the rule, for any reason stated in law five, it must be replayed in full unless the rule of the competition concerned provides for the result of the match at the time of such stoppage to stand.

#### Law 8 - The start of play

At the beginning of the game, choice of the ends and the kick-off is decided by the toss of a coin. The team winning the toss shall have the option of choice of ends or the kick-off. The referee having given the signal, the game starts by a player taking a place kick (i.e. kick at the ball while it is stationary on the ground in the center of the field of play) into his/her opponents' half of the field of play. Every player shall be in his/her own half of the field and every player of the team opposing that of a kicker remains not less than eleven meters from the ball until it is kicked-off. The ball is not deemed in play until it has traveled the distance of its own circumference. The kicker shall not play the ball a second time until it has been touched or played by another player.

After a goal has been scored, the game is restarted in the same manner by the player of the team losing the goal. After half time, when restarting the game after half time, ends are changed and the kick-off is taken by the player of the opposite to that of the player who started the game. A goal is not scored directly from a kick-off.

## Law 9 - Ball in and out of play

The ball is out of play:

- i) When it has wholly crossed the goal line or the touch line, whether on the ground or in the air.
- ii) When the game has been stopped by the referee.

The ball is in play at all other times from start of the game to finish including:

- i) If it rebounds from the goal post, cross bar or corner-flag post into field of play.
- ii) If it rebounds off either the referee or the linesmen when they are in the field of play.
- iii) In the event of a supposed infringement of the laws, until a decision is given.

## Law 10 - Method of scoring

As provided by these laws, the goal is scored when the whole ball has passed over the goal-line, between the goal-posts and under the cross bar, provided it has not been thrown in, carried or intentionally propelled by hand or arm by the player of the attacking side, except in the case of a goalkeeper who is within his/her penalty area. This law has no variants.

The team scoring the greater number of goals is the winner. There should be no goals or equal number of goals scored by the opponents. If equal number of goals is scored, then the match shall be termed a draw.

A goal cannot be in any case allowed if the ball is prevented by some outside agent from passing over the goal-line. If this happens during normal course of play, other than at the taking of penalty kick, the game must be stopped and the ball must be dropped.

#### Law 11 - Off-side

This is one of the most crucial laws and sometimes very confusing. A player is off-side if nearer to his/her opponents' goal-line than the ball, unless:

- i) the player is in his own half of play, or
- ii) player is not nearer to his /her opponents' goal-line than at least two of his opponents.

A player is only declared off-side and penalised for being in the off-side position, if at the moment the ball touches the ground or is played by, one of his team mates, he is, in the opinion of the referee:

- i) Interfering with the play or an opponent, or
- ii) Seeking to gain an advantage by being in the position.

However, a player is not declared off-side by the referee:

- i) Merely because of his being in the off-side position, or
- ii) If he receives the ball direct from the goal-kick, a corner-kick or a throw in.

If a player is declared off-side, the referee awards an indirect free kick [IFK], which is taken by a player of the opposing team from the place

where the infringement occurred. The off-side is not judged at the time the player receives the ball, but at the time the ball was released.

## Law 12 - Fouls and misconduct

A player who intentionally commits any of the following offenses:

- i) Holds an opponent
- ii) Pushes an opponent
- iii) Jumps at an opponent
- iv) Charges an opponent in a violent or dangerous way
- v) Strikes or attempts to strike an opponent or spits at him/her
- vi) Handles the ball
- vii) Trips an opponent
- viii) Kicks or attempts to kick an opponent

A player committing any of the above fouls, shall be penalised and a direct free kick (DFK) is awarded. The DFK is taken by the opposing team from the place where offense occurred, unless the offense is committed by the player in his opponents' goal-line, in the case a free kick is taken from any point within a goal-area.

Should a player of defending team intentionally commit a one of the above fouls within the penalty-area, the player shall be penalised by penalty kick.

A penalty kick is awarded irrespective of the position of the ball, if in play, at the time an offence within the penalty-area is committed.

A player committing any of the following offences:

- i) Playing in a manner considered by the referee to be dangerous.

- ii) Charging fairly, i.e. with the shoulder, when the ball is not within playing distance of the players concerned and they are definitely not trying to play it.
- iii) When not playing the ball, intentionally obstructing an opponent, i.e. running between the opponent and the ball, or interposing the body so as to form an obstacle to an opponent.
- iv) When playing as a goalkeeper within the player's own penalty-area.

Charging the goalkeeper except when the player:

- i) is holding the ball
- ii) is obstructing the opponent
- iii) has passed outside the goal-area

A player is sent off the field of play and shown a red card, if, in the opinion of the referee, the player is:

- i) guilty of violent misconduct
- ii) guilty of serious foul play
- iii) uses foul or abusive language
- iv) guilty of a second cautionable offense after having received a caution.

**Appendix 2a**

**A SOCCER INJURY OBSERVATION SHEET**

| <b>NAME OF THE TOURNAMENT: SAFA WOMEN 'S INTERPROVENCIAL</b> |      |                        |                            |                         |                 |                   |           |
|--|------|------------------------|----------------------------|-------------------------|-----------------|-------------------|-----------|
| <b>DATE:</b>   |      | <b>TIME OF THE DAY</b> |                            |                         | <b>WEATHER:</b> |                   |           |
| <b>MATCH:</b>  |      |                        |                            | <b>VS</b>               |                 |                   |           |
| <b>GAME NO:</b>  |      |                        |                            | <b>TOURNAMENT LEVEL</b> |                 |                   |           |
| <b>TIME BALL IN PLAY: 1<sup>ST</sup> HALF</b>                |      |                        | <b>2<sup>ND</sup> HALF</b> |                         |                 | <b>EXTRA TIME</b> |           |
| NO.  | TYPE | SITE                   | CAUSE                      | MECHANISM               | TIME            | PART OF THE FIELD | TREATMENT |
| <b>FIRST HALF</b>  |      |                        |                            |                         |                 |                   |           |
| 01.  |      |                        |                            |                         |                 |                   |           |
| 02.  |      |                        |                            |                         |                 |                   |           |
| 03.  |      |                        |                            |                         |                 |                   |           |
| 04.  |      |                        |                            |                         |                 |                   |           |
| 05.  |      |                        |                            |                         |                 |                   |           |
| 06.  |      |                        |                            |                         |                 |                   |           |
| 07.  |      |                        |                            |                         |                 |                   |           |
| 08.  |      |                        |                            |                         |                 |                   |           |
| 09.  |      |                        |                            |                         |                 |                   |           |
| 10.  |      |                        |                            |                         |                 |                   |           |
| 11.  |      |                        |                            |                         |                 |                   |           |
| 12.  |      |                        |                            |                         |                 |                   |           |
| 13.  |      |                        |                            |                         |                 |                   |           |
| 14.  |      |                        |                            |                         |                 |                   |           |
| 15.  |      |                        |                            |                         |                 |                   |           |
| <b>TOTAL NO OF INJURIES:</b>                                 |      |                        |                            |                         |                 |                   |           |
| <b>SECOND HALF</b>   |      |                        |                            |                         |                 |                   |           |
| 01.  |      |                        |                            |                         |                 |                   |           |
| 02.  |      |                        |                            |                         |                 |                   |           |
| 03.  |      |                        |                            |                         |                 |                   |           |
| 04.  |      |                        |                            |                         |                 |                   |           |
| 05.  |      |                        |                            |                         |                 |                   |           |
| 06.  |      |                        |                            |                         |                 |                   |           |
| 07.  |      |                        |                            |                         |                 |                   |           |
| 08.  |      |                        |                            |                         |                 |                   |           |
| 09.  |      |                        |                            |                         |                 |                   |           |
| 10.  |      |                        |                            |                         |                 |                   |           |
| 11.  |      |                        |                            |                         |                 |                   |           |
| 12.  |      |                        |                            |                         |                 |                   |           |
| 13.  |      |                        |                            |                         |                 |                   |           |
| 14.  |      |                        |                            |                         |                 |                   |           |
| 15.  |      |                        |                            |                         |                 |                   |           |
| <b>TOTAL NO OF INJURIES:</b>                                 |      |                        |                            |                         |                 |                   |           |
| Total no of injuries observed:                               |      |                        |                            |                         |                 |                   |           |
| Comments:  |      |                        |                            |                         |                 |                   |           |
|  |      |                        |                            |                         |                 |                   |           |
| Name of observer:  |      |                        |                            |                         |                 |                   |           |

**Appendix 2b**

**SITE OF INJURY**

Hip & Groin - L1

Groin - L2

Thigh -L3

Knee - L4

Shin / Leg - L5

Ankle - L6

Foot - L7

**TYPE OF INJURY**

Strain A

Sprain B

Contusion C

Laceration D

Fracture E

Dislocation F

Tendinitis G

Other H

**MECHANISM OF INJURY**

Tackling - TL

Shooting - ST

Sprinting / Running - R/S

Twisting - TT

Hit ball - HB

Collision - CS

Falling - FL

Other - O

**POSITIONS**

Striker - SK

Midfielder - MI

Defender - DF

Goalkeeper - GK

Appendix 3a

Head Office : P.O. Box 15043 Esselenpark 1626  
House No. 3 Esselenpark  
Telephone : (011) 391 6945  
Facsimile : (011) 391 6951/1175  
E-mail : [themba.ussasa@freemail.absa.co.za](mailto:themba.ussasa@freemail.absa.co.za)  
Web Site : [www.ussasa.com](http://www.ussasa.com)



12 May 2003

Miss Lindi Mahlangu  
Suite 815  
Louis Pasteur Medical Centre  
374 Prinsloo & Schoeman Street  
Pretoria

Dear Miss Mahlangu

**APPLICATION TO CONDUCT RESEARCH ON WOMEN SOCCER**

Thank you for your interest in our sector, school sport.

This serves to confirm that USSASA hereby gives you permission to conduct research as per your letter.

We are hosting the USSASA Ball Games from the 01 - 04 July 2003 in Rustenburg North West Province. We have advised our Football Committee as well as the Local Organizing Committee of your intention.

The contact persons for your assignment are the following:

|                 |   |                                 |
|-----------------|---|---------------------------------|
| USSASA Football | : | Mr. Isaac Arendse 083 785 9643  |
| NOWESSA LOC     | : | Mr. Barry Matemane 082 661 5768 |

Thanking you in advance.

**ALEX SEKATI**  
**ACTING GENERAL MANAGER**

**MISSION**

**To promote affordable School Sport for all learners in the Republic of South Africa through mass participation and striving for excellence in order to work towards**

## Appendix 3b

# LINDI . L . MAHLANGU

PHYSIOTHERAPIST  
BSc [ PHYSIO ] U.W.C  
PR.NO : 7227280

SUITE 815  
LOUIS PASTEUR MED. CENTRE  
374 PRINSLOO & SCHOEMAN STR.

P.O.BOX 13681  
THE – TRAMSHED  
0126

TELEFAX : [012 ] 320 – 4964  
CELL : 082 655 4878  
E-mail : lindim01@telkomsa.net

The Manager

USSASA Head Office

Request to collect data for research

I hereby request permission to collect data for a research project from the upcoming USSASA summer ball games in Rustenburg, August 2003

The research is for masters degree in physiotherapy in sports (Mphyst: Sport) which is registered with university of Pretoria. The research does not involve talking players away from their schedules.

Data will be collected by observation during the game of play.

Permission from the university of Pretoria ethics committee will depend on your approval.

### **Aims of Study**

To investigate the types of injuries and their mechanisms as sustained by the teenage girl playing.

### **Objections**

1. Determine the type of lower limb injuries sustained by the teenage girls playing soccer
2. Determine the mechanism by which injuries occur
3. Determine the correlation between player's position and frequent injuries
4. Make suggestions regarding preventive measures.

## **Instrument**

Injury observation sheet will be used by the research to observe injuries during each game.

Method of data collection:

Researcher will collect data by herself, by observing the soccer players during each game, Identifying describing injuries as they occur. Data collection will be the duration of tournament.

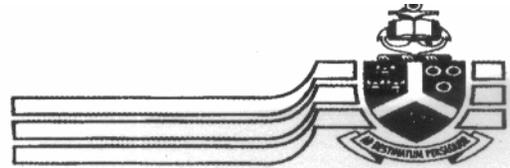
I hope my application will be favorably considered.

Thank you

Yours faithfully

L.L. Mahlangu  
Researcher

## Appendix 4



### University of Pretoria

Faculty of Health Sciences Research Ethics Committee  
University of Pretoria

Tel (012) 339 8619 Fax (012) 339 8587

E Mail [dbehari@med.up.ac.za](mailto:dbehari@med.up.ac.za)

Soutpansberg Road Private Bag x 385

MRC-Building Pretoria

Level 2, Room 20 0001

Date: 25/06/2003

Number : S124/2003  
Title : Lower limb injuries in teenage girls playing soccer  
Investigator : L Mahlangu, Dept of Physiotherapy, University of Pretoria (SUPERVISOR: AJ VAN ROOIJEN)  
Sponsor : None

**This Student Protocol has been considered by the Faculty of Health Sciences Research Ethics Committee, University of Pretoria on 24/06/2003 and found to be acceptable.**

|                           |  |
|---------------------------|--|
| Prof P Carstens           | BLC LLB LLD (Pret) Faculty of Law  |
| Prof S.V. Grey            | (female) BSc (Hons); MSc; DSc: Deputy Dean   |
| Prof C B Ijsselmuiden     | MD; DTM & H; DPH ;FFCH (GM); MPH; School of Health Systems and Public Health         |
| Prof V.O.L. Karusseit     | MBChB; MFGP (SA); M.Med (Chir); FCS (SA): Surgeon                                    |
| Dr M E Kenoshi            | MB,CHB; DTM & H (Wits); C.E.O. of the Pretoria Academic Hospital                     |
| Prof M Kruger             | (female) MB.ChB.(Pret); Mmed.Paed.(Pret); PhdD. (Leuven)                             |
| Dr N K Likibi             | MB.BCh.; Med.Adviser (Gauteng Dept.of Health)  |
| Miss B Mullins            | (female) BscHons; Teachers Diploma;  |
| Snr Sr J. Phatoli         | (female) BCur (Et.Al) Senior Nursing-Sister  |
| Prof H.W. Pretorius       | MBChB; M.Med (Psych) MD: Psychiatrist  |
| Prof P. Rheeder           | MBChB; M.Med (Int); LKI (SA); MSc (CLIN.EPI): Specialist Physician                   |
| Reverend P Richards       | B.Th. (UNISA), M.Sc. (Applied Biology) (Knights), M.Sc (Med) (Wits), TechRMS, DipRM: |
| Dr L Schoeman             | (female) Bpharm, BA Hons (Psy), PhD  |
| Dr C F Slabber            | BSc (Med) MB BCh, FCP (SA) Acting Head; Dept Medical Oncology                        |
| Prof J.R. Snyman          | MBChB, M.Pharm.Med: MD: Pharmacologist   |
| Prof De K. Sommers        | BChB; HDD; MBChB; MD: Pharmacologist   |
| Dr R Sommers              | (female) MBChB; M.Med (Int); MPhar.Med   |
| Dr TJP Swart              | BChD, MSc (Odont), MChD (Oral Path) Senior Specialist; Oral Pathology                |
| Dr S.J.C.Christa v/d Walt | (female) D. Cur, M.Ed, Department of Nursing   |
|                           | <b><u>Student Ethics Sub-Committee</u></b>   |
| Mrs E Ahrens              | (female)B.Cur  |
| Prof S Meij               | (female) DScTHED;MSc   |
| Prof P. Rheeder           | MBChB;M.Med(Int);LKI(SA);MSc (CLIN.EPI): Specialist Physician                        |
| Dr R Sommers              | SECRETARIAT (female)MBChB; M.Med (Int); MPharMed                                     |
| Dr S.J.C.Christa v/d Walt | (female) D. Cur, M.Ed, Department of Nursing   |
| Mrs N Lizamore            | (female) BSc(Stell), BSc (Hons) (Pret),MSc (Pret) DHETP (Pret)                       |
| Prof R S K Apatu          | MBChB(Legon); PhD(Cambridge)   |
| Prof P Carstens           | BLC LLB LLD (Pret) Faculty of Law  |
| Dr S I Cronje             | DD (UP) – Old Testament Theology   |
| Dr M M (Mimi) Geysler     | (female) BSc; MBChB; BSc HONS (Pharm); Dip PEC; MPraxMed                             |

**PROF J R SNYMAN**

MBChB, M.Pharm.Med MD: Pharmacologist  
CHAIRPERSON of the Faculty of Health Sciences Research

**PROF P. RHEEDER**

MBChB; M.Med (Int); LKI (SA); MSc (CLIN.EPI): Specialist Physician  
CHAIRPERSON of the Faculty of Health Sciences Research









