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ANALYSIS OF ACUTE INJURIES INCURRED BY PLAYERS DURING THE 2001 MOI GOLDEN CUP SOCCER TOURNAMENT IN KENYA

BY

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A THESIS SUBMITTED TO THE DEPARTMENT OF PHYSICAL EDUCATION,
FACULTY OF EDUCATION IN PARTIAL FULFILMENT OF THE
REQUIREMENTS FOR THE DEGREE OF MASTER OF EDUCATION OF
KENYATTA UNIVERSITY.

Onywera, Vincent
*Analysis of acute
injuries incurred by*



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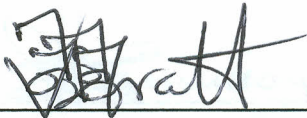
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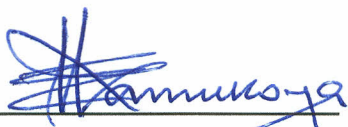
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ACKNOWLEDGEMENT

This thesis is dedicated to my late brother, Elijah Orwa Onywera. I would like to thank my parents, Mr. and Mrs. J. Onywera, for their support and guidance which enabled me to complete this work.

I would like to thank my friends for their support and help during this study in one way or another.

I would like to thank my supervisor, Mr. J. Onywera, for his support and help in pursuing this work.

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ACKNOWLEDGEMENT

My most sincere gratitude goes to my University Supervisors, Dr. E.K Wamukoya and Dr. W.W.S Njororai for their help and guidance, which enabled me complete this work.

I am deeply indebted to everyone who helped me during this study in one way or another.

I would like to thank Kenyatta University for awarding me a scholarship to pursue studies at masters level.

Special thanks to Mr. Andanje Mwisukha of Physical Education Department, Kenyatta University and Mr. Samwel Okumu of Moi High School -Kabarak for their moral support and encouragement.

Special thanks to my father, Mr. John Onywera and my mother Meresa Adhiambo, my wife Mary, son Fidel, brothers, Bernard, Cosmas, Denis, Emmanuel and my sisters' in - law for their financial support and encouragement throughout the study period.

Finally, I am indebted to the Kenya Football Federation for the support they gave me during the study season

ABSTRACT

This study involved the analysis of injuries incurred by players during the 2001 Moi Golden Cup Soccer Tournament. A total of twenty- four (24) matches were covered. A modified Soccer Observation Chart from the one developed by Asembo, Njororai and Wekesa (1995) was used to collect data for this study. Three-trained research assistants were used for collection of data. Each one of them collected data independently. An inter observer agreement was set at 90% for the various variables for purposes of inclusion in the analysis. Where there were differences of opinion, consultations with the team doctor/first aider was made.

The data collected were expressed in terms of frequencies and percentages. Chi-square was used to test the significance of various hypotheses in line with injuries incurred by players in the 2001 Moi Golden Cup Soccer Tournament with the objective of establishing the nature, anatomical distribution, contextual mechanism, aetiology, and time course of injuries in relation to tournament level, part of the field, teams (home/away, winning/losing) and players position among male Soccer players. The significant level for rejection and/or acceptance of the hypotheses was set at 0.05.

From this study, it was found that more injuries 44(43.14%) occurred in the preliminary phase of the tournament and first halves (67.6%) of the matches played. Forward players were more vulnerable to injuries compared to other positions. They suffered 35(34.3%) of the total injuries recorded during the study. The opponent caused the highest number 50(49%) of injuries. Most players 28(27.5%) were injured as a result of being kicked by another player. The offensive zone recorded more injuries 37(36.3%) compared to the defensive and construction zones, which recorded 35(34.3%) and 30(29.4%) respectively. Soft tissue injuries accounted for the highest percentage (79%) of injuries during the Tournament. Most players 17(62.96%), were substituted because of injuries in

the preliminary phase of the Tournament. Away teams registered more injuries 58(56.9%) than home teams 44(43.1%) while winning teams incurred more injuries 54(53%) than losing teams 48 (47%). Anatomically, the lower body was the most affected by injuries 67(65.7%) in this study.

Therefore, it is recommended that Kenyan Soccer Coaches should emphasize the need for proper physical conditioning and sportsmanship to reduce chances of their players getting unnecessary injuries. The Kenya Football Federation in liaison with the Government and Clubs should strive to improve and maintain Soccer pitches to avoid predisposing players to injuries.

Further studies in the same area with female teams, international tournaments, other sports, among others, are recommended.

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CHAPTER ONE

INTRODUCTION

1.0 Background to the Problem

The risk of injury is inevitable in any sporting activity involving an element of strength, power and endurance (Bond et al., 1988). It is vital that everyone involved in sport be aware of the serious problem of athletic injuries (Williams et al. 1994). The incidence of these conditions is rising at such an alarming rate that international bodies like the Sports Council of Europe, Federation of International Basketball Association (FIBA), Federation of International Football Association (FIFA), International Olympic Committee (IOC) and the World Health Organization (WHO), etc. have expressed the need for effective intervention measures to be implemented (Ekstrand, 1994; Renstroem, 1994). The incidence of sports injuries is now so high that training programmes need to be formulated in such a way that injury prevention is a primary objective (Reilly and Stirling, 1990). The first step in this process involves an empirical establishment of the extent of the problem of sports related injuries. The time-loss caused by such injuries is considerable (Reilly, 1981; Renstroem, 1994).

Part of the reason why injuries continue to be on the rise is the increasing demands of present-day training programmes and competitive schedules. Both training and competition are capable of producing changes in the athlete's body which, if not corrected, substantially increase the risk of injury (Ekstrand, 1994; Williams et al., 1994). The possible consequences of this range from an inability to complete competition schedule successfully up to serious and permanent damage to the athlete. Contact team sports have the highest injury rate, followed by fencing, cricket and cycling. Traditional combat sports, such as boxing and judo, have low injury rate, but when an injury occurs, it expands to being more serious and produces a longer lay-off time than the other sports (Weightman and Browne, 1975). In some contact sports, as many as 25% all injuries are due to

foul play, so the potential for prevention of such trauma by tighter control is vast (Davies and Gibson, 1978).

Many people who engage in physical activities do so neither well nor wisely. To enjoy physical activities, one has to be free from injury and illness. Yet disabilities in sports primarily stem from accidental causes. The athlete who spends months or years in strenuous conditioning programmes may lose in a matter of seconds the results of that effort through a sport injury. An injury to a key member of a team may destroy a chance for victory. Hazards to players must be controlled if sporting success is to be achieved (Lijsens, 1986).

In recent years the enormous growth of readily available sports equipment and facilities and the increased number of participants have far outstripped the controls designed to make play safe yet enjoyable and health promoting. The resultant injuries often handicap youth and adults when measured in days and years of lost time and loss of human productivity. It is evident that sports accidents are a major safety problem (Lijsens, 1986; Reilly, 1981).

The most common career-ending injury involves destruction of one or more of the major ligaments of the knee. Injuries to the knee result in more problems for athletic individuals than injuries to any other joint. Thus, the subject of the acute knee injury is all too frequently the focus of attention of the sports medicine community. As a result of increasing participation and level of competitiveness in both organized and unsupervised sporting activities, the number of individuals sustaining with injuries continue to rise (Johnson and Renstroem, 1990).

Irrespective of the nature, cause and mechanism, injuries are a serious hazard in many sports (Fox, 1981). Injuries hamper the players' performance both in training and competition, disrupt the conditioning process (Reilly, 1981) and prevent them from realizing their athletic potential (Reilly and Stirling, 1990). In soccer, for example, there is a lot of physical contact in the course of tackling or

contesting possession of the ball with opponents and this inevitably leads to injury of varying severity. A majority of injuries are unintentional, resulting from an error on the part of the player concerned or by another player. The error may lead to an injury. Intentionally inflicting injury on another player is severely punished both by the laws of the game and, where the evidence is clear-cut, by civil law (Reilly, 1981; Watson, 1986).

The majority of injuries to soccer players affect soft tissues (tendon and muscle) and joints. These occur predominantly in the lower limbs especially the knee and ankle joints. The muscle injuries are a combination of locomotor functions of running off the ball during play or bruising due to physical contact with other players. Soccer is not immune to trunk, head and upper limb damage. Back injury may be more disabling than lower limb muscle injury and facial damage can occur due to opponent's elbows or clashes of heads in contesting possession of the ball in the air (Reilly, 1981; Watson 1986; Morris, 1984).

Major breakthroughs in the scientific analysis and interpretation of the causes of sports injuries are anticipated from studies by individual physicians, and teams composed of physicians, trainers, coaches, physical educators and athletic directors. Findings from such studies, if used effectively, allow for the maintenance of meaningful records and statistics concerning sports injuries, their causes and their prevention (Requa et al., 1993). Many researchers agree that surveillance of injuries during training and competition assists in understanding their characteristics and goes a long way in helping to formulate effective, preventive treatment and rehabilitative measures (Ekstrand, 1994; Reilly and Hardikar, 1981; Renstroem, 1994; Wekesa, Asembo and Njororai, 1996b). Thus, there is need to undertake studies on soccer in Kenya with a view of formulating preventive and rehabilitative measures.

1.1 Statement of the Problem

Injuries have been identified as one of the factors that can adversely affect the performance of players and the overall performance of a team. Injured players tend to lose concentration, aggression, determination, confidence and the physical ability to play to their optimal level and expectation to win. In addition, injuries limit the players' capacity to execute their technical and tactical skills and thereby affect the entire team's performance. Sports injuries also have a lot of other negative effects on the health of the players. These effects range from minor ailments, permanent disabilities to death. Injuries also can cut short the career of many players. The cost of treating injured players is also increasing at an alarming rate. Unfortunately, despite attempts made to minimize injuries in various sporting activities, their occurrences are still a disturbing phenomenon in sports competitions.

In spite of all the above, there are few published studies on occurrences of injuries to players among soccer teams in Kenya. It is in light of this that the proposed study focused on analyzing the nature, anatomical distribution, contextual occurrences and aetiology of injuries in relation to the players' positions among Kenya's male soccer teams during the Moi Golden Cup tournament.

1.2 Purpose of the Study

The purpose of the present study was to analyze injuries incurred by players during the Moi Golden Cup tournament in Kenya in terms of their nature, anatomical distribution, contextual occurrence, and aetiology in relation to players' position.

1.3 Objectives of the Study

The objectives of the study were to find out: -

- (i) whether the winning team had more or less injuries compared to the losing team.

- (ii) the most frequent type of injury incurred by soccer players in Kenya.
- (iii) the most common causes of injuries among soccer players in Kenya.
- (iv) the playing positions which are most susceptible to injuries during soccer matches in Kenya.
- (v) the body parts most commonly affected by injuries among soccer players during a high level soccer match in Kenya.
- (vi) the stage of the tournament with highest occurrence of injuries.
- (vii) injuries incurred by home teams and away teams.
- (viii) the period of the match with the highest cases of injuries.

1.4 Research Hypotheses

The major hypothesis of the study was that there is a difference in the nature of injuries incurred by players of the winning and losing teams; the preliminary and final stage of the tournament; defensive, construction and offensive zones of play; upper and lower body injuries; first and second half of the matches; and home and away matches in the Moi Golden Cup Soccer Tournament in Kenya.

The specific sub-hypotheses included the following: -

- H₀₁ There would be no significant difference in the number of injuries incurred in the preliminary, second round and final phases of the tournament.
- H₀₂ There would be no significant difference in the injuries incurred by defenders, mid-fielders and forwards
- H₀₃ There would be no significant difference in the frequency of aetiological factors of injuries incurred during the tournament.
- H₀₄ There would be no significant difference in the frequency of injury mechanism during the tournament.
- H₀₅ There would be no significant difference in the number of injuries incurred in the offensive, construction and defensive zones of the field of play.

- H₀₆ There would be no significant difference in the nature of injuries incurred in the preliminary, second round and final phases of the tournament.
- H₀₇ There would be no significant difference in the number of players substituted because of injuries at the preliminary, second phase and final stage of the tournament.
- H₀₈ There would be no significant difference in the number of injuries incurred by the home and away teams.
- H₀₉ There would be no significant difference in the number of injuries incurred by the winning and losing teams.
- H₀₁₀ There would be no significant difference in the anatomical distribution of injuries amongst the trunk, head and lower limb during the tournament.
- H₀₁₁ There would be no significant difference in the number of injuries incurred in the first and second halves of the matches played during the tournament.

1.5 Conceptual Framework

Several personal factors combine to affect the level of performance of an individual and a team in the game of soccer. These include psychological preparation, technical and tactical preparation as well as physical conditioning. These factors complement one another in influencing athletic performance (Berger, Harre and Ritter, 1982; Harre, 1982).

Coaches must be as familiar with sports psychology as they are with team strategies and techniques. Once the coach understands the role of physiological variables in sports, he should also learn about the role of psychological variables (Lliewellyn and Blucker, 1982). Psychological constraints that affect sports performance include personality characteristics of players, level of anxiety, amount of motivation, fear, confidence, commitment to sport, aggression and cooperation (Bunker et al, 1985; Cox, 1985). Given the uniqueness of each

player and the different ways in which one has been socialized, it requires a discerning mind to be able to design programmes to fully develop individual personalities and a winning team (Singh, 1982). Successful athletes have certain personality traits or characteristics, which can be divided into two major categories, namely drive and emotional factors. Tutko and Richards (1971), identified these traits as drive, aggression, determination, responsibility, leadership, confidence, coachability, emotional control, mental alertness and trust. It is important to note that these drive and emotional factors can be adversely affected and weakened by any injury incurred by a player. An injured player tends to lose concentration, aggression, determination, confidence and the physical ability to play to his/her optimal level and expectation to win. In addition, injury limits a player's capacity to execute his/her technical and tactical skills and thereby affects the overall preparation of the entire team.

During pre-season training, a coach prepares a team physically, psychologically, technically and tactically. Technical and tactical preparation is very important since it is the one used and depicted during the actual play (Mal, 1982; Singh, 1982). However, the technical and tactical execution of skills can be adversely affected if a player is injured. When a player is injured, he/she is not able to apply his or her techniques and tactics effectively during a match. It is not possible also for a coach to plan strategies and tactics around an injured player (Watson, 1995). This is much more so in soccer, where the physical conditioning of players, mental readiness, technical and tactical understanding are vital elements.

The game of soccer demands proper physical conditioning in all its phases (Mal, 1982). The specific components that need to be developed in order to condition players physically are coordination, flexibility, endurance, speed and strength (Edwards and Campbell, 1982). Before securing a score in soccer, many actions and movements are executed by players. There is a lot of running, falling, tackling, jumping and turnings so as to evade opponents (Mal, 1982). To

accomplish all these motor activities, a player needs to have sufficient endurance, strength, speed, flexibility, balance and coordination (Mal, 1982). Several studies have been conducted in various sports to emphasize the importance of physical fitness in sports. These studies have been in rugby, hockey and handball (Asembo et al., 1995), soccer (Njororai 2000) and basketball (Akpata, 1997). Athletic performance improves after an athlete has conditioned his or her body in a regular and systematic programme of exercise. Additionally, conditioning makes the body less susceptible to injury. In times of prosperity such as we live in, the range of available sports and leisure activities is wider and more easily accessible to most people. It thus becomes a matter of some importance that the possible injury risks involved in participating in sports be identified and if possible addressed. Injury blights the lives of many soccer players and affects the fortunes of many teams (Reilly, 1996).

Sports injuries place the future of top players in the balance and have had major financial consequences for athletes, teams, clubs and the country. The cost of sports injuries is rising at such an alarming rate that increasing investment in epidemiological studies, which eventually leads to prevention and treatment of such injuries, is highly welcome. Because of the high number of soccer injuries during matches, traumatology and epidemiology have become objects of major medical interest. The serious injuries are usually quantified in terms of their effects on the athlete. Some possible consequences of injuries include minor cases that are easily treated and managed followed by some form of permanent disability or in extreme cases death (Watson, 1995). The seriousness of other injuries is rated in terms of one of the following: amount and nature of disability sustained, implication for the long term health of the athlete, complexity of the treatment necessary and cost of treatment and after-care (Watson, 1995; Lijnsens, 1986). Sports injuries without long-term consequences are the most common type, and these are quantified in term of the number of days in hospital. During such a period, training and competition are impossible and physical activity is restricted. Various studies have been conducted by Roux et al., 1993 (South

Africa); Lindner et al., 1990 (Canada); Ellison, 1993 (Canada); Benjamin, 2000 (Montreal); Asembo et al., 1994 (Kenya); Sahlin, 1985 (Norway); Bruijn, et al., 1990 (Sweden); Hoshina, et al., 1970 (Japan); Castro et al., 1989 (USA) on sports other than soccer.

The studies by Kristian, et al., 1990 (Netherlands); Raschka et al., 1988 (Russia); Ekstrand, 1982 (Sweden); Tropp et al., 1985 (Sweden); Jorgensen, 1988 (Denmark); Inklaar et al., 1988 (Netherlands); Brunkner, 1989 (Australia); Almekinders, et al., 1984 (USA) and Eklund et al., 1983 (Norway) focused on soccer injuries in countries with different socio-economic and political background compared to Kenya. Asembo et al., (1995b) analyzed soccer injuries only in an international tournament in which Kenya's national soccer team participated. The studies did not focus on the analysis of injuries incurred by Kenya's male soccer teams from which the national team is selected. It is in the light of the above, that the present study analyzed the nature, anatomical distribution, contextual occurrences and aetiology of injuries in relation to the player's position among Kenya's male soccer teams in the Moi Golden Cup tournament.

The Moi Golden Cup Tournament was inaugurated in 1986 and named in honour of His Excellency the President of Kenya, Hon. Daniel Toroitich Arap Moi. It is played between June and October every year. The tournament is played on a knockout basis. The trophy for the tournament is donated by His Excellency the President. The finals of the tournament are held annually on the 10th of October. The winner of the Moi Golden Cup tournament qualifies to represent the country in the Africa Cup winner's tournament organized by the Confederation of Africa Football (CAF). The tournament is, therefore, very competitive. Being a knockout tournament, every team prepares diligently so as not to be eliminated. The preparation entails the physical conditioning, technical and tactical understanding and mental readiness. However, such preparations aimed at optimal performance (see figure one below) can be derailed with

injuries to players. This study therefore endeavored to establish the nature and impact of injuries to players during the 2001 edition of the Moi Golden Cup Soccer Tournament in Kenya.

Sports performance factors



Fig. 7. Sports performance factors and their effect on athletes on athletic performance

Sports performance factors

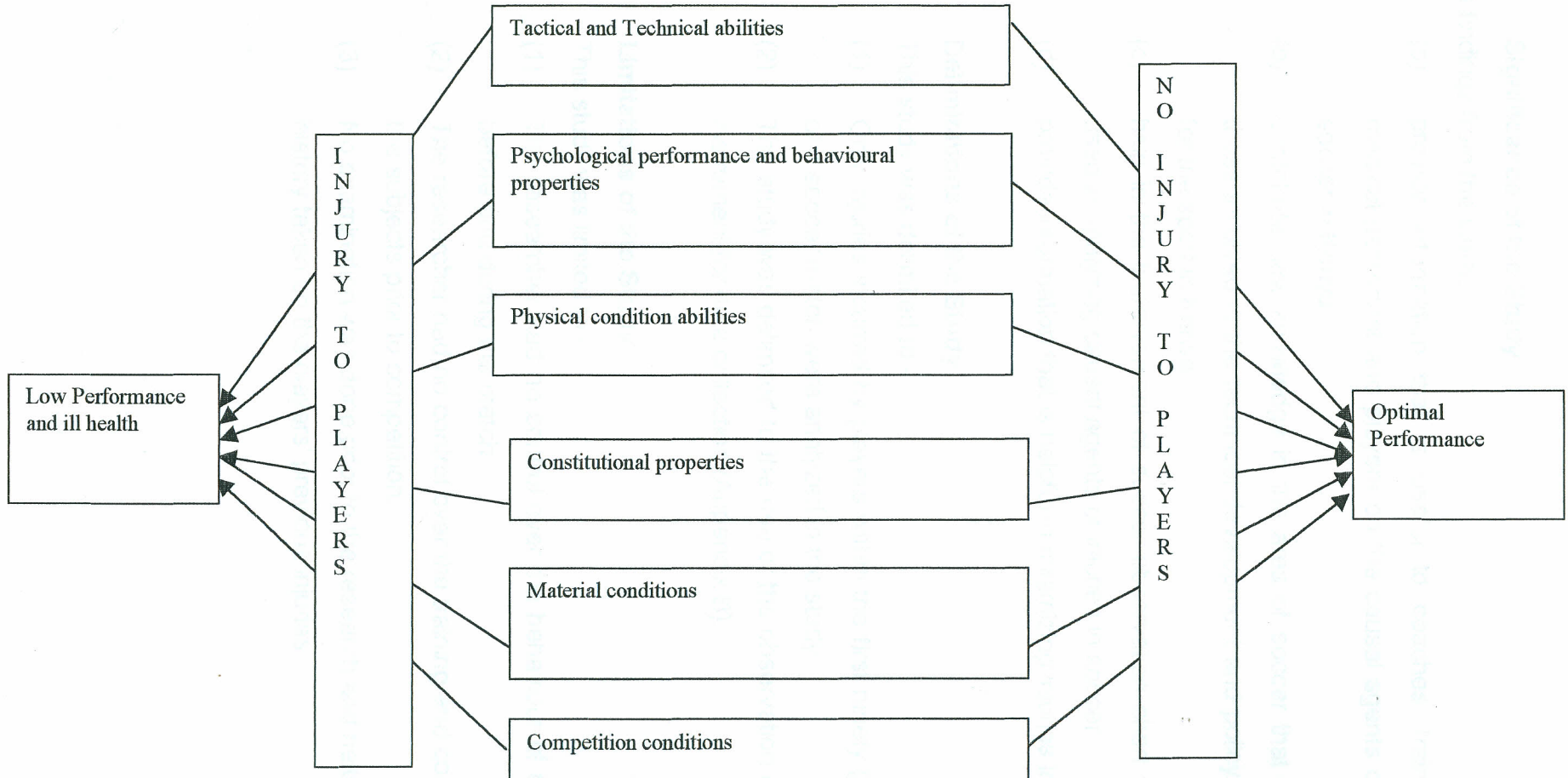


Fig. 1: Sports performance factors and the effects of injuries on athletic performance.

1.6 Significance of the Study

The findings from the study:

- (a) provide information that is useful to coaches, trainers, sports medical personnel and players on the causal agents of injuries in soccer in Kenya.
- (b) contribute new knowledge in the area of soccer that is useful to those involved in the technical development and policy formulation for the sport in Kenya.
- (c) help in the improvement of soccer observation chart that can be used in analyzing causal agents of injuries in soccer.
- (d) provide information that is helpful in minimizing injuries in soccer.

1.7 Delimitations of the Study

This study was delimited to:-

- (1) Only injuries incurred by players within the first ninety (90) minutes of a soccer match were analyzed in the study.
- (2) The study was delimited to the use of the observation chart as the instrument for data collection (Appendix B).

1.8 Limitations of the Study

This study was limited to:-

- (1) The researcher had no control over the behaviour of the subjects before and during the match.
- (2) The researcher had no control over the training and conditioning of the subjects prior to competition.
- (3) No examination was done prior to the research and neither was any history taken on the players' previous injuries.

1.9 Assumptions of the Study

This study was based on the following assumptions:-

- (a) The teams for the study were adequately prepared physically, technically, tactically and psychologically.
- (b) The referees were strict and followed the rules of the game.
- (c) The players were in sound physical conditions prior to the match.

1.10 Operational Definition of Terms

Acute injuries: These occurs as a result of single, sudden, episode of trauma such as a kick, fall, hit by ball among others.

Aetiology: Refers to the cause of an injury during Moi Golden Cup tournament for example opponent, ball and surface.

Away Match: This is a match played away from the designated home ground. In this case, a team visited another one in the competition according to the draw.

Chronic injury: These develop gradually over an extended period of use of the affected part. Examples include shin splints, runner's knee and others.

Contact Sport: Sports where players make physical contact, but not with the intent to produce bodily injury for soccer.

Epidemiology: The study of sports injuries involving the relationship of as many injury factors as possible.

Football Teams: Refers to the teams that participated in the 2001 Moi Golden Cup soccer tournament.

Home match: This is a match played at a team's designated home ground. It is where a team hosts others in the tournament.

Nature of Injury: Refers to the type of injury suffered by players during the tournament for example soft tissue injuries (contusion, laceration, and bruises), joint instability (sprain, dislocation) and fractures.

Parts of the Pitch: These refer to the three zones of play ,that is, Defensive zone, Construction zone and Offensive zone.

Site of Injury: This refers to the body's anatomical position where the injury has occurred for example head, leg, shoulder etc.

Sports Injury: This is a mishap occurring during the Moi Golden Cup tournament resulting in a temporary stoppage of the match and/or attention to the injured player by medical personnel.

CHAPTER TWO

REVIEW OF LITERATURE

2.0 Introduction

This chapter reviews literature related to the study and is organized under the following headings:

- (i) Classification scheme for sports injuries
- (ii) Aetiology of sports injuries
 - a) Intrinsic causes of sports injuries
 - b) Extrinsic causes of sports injuries
- (iii) Injuries in other sports.
- (iv) Injuries in Soccer

2.1 Classification Scheme for Sports Injuries

Various authors have listed several schemes for classifying sports injuries. Some physicians and athletic trainers categorize athletic injuries according to the particular participating group, such as women, young children, or older athletes (Haycock, 1981). Another classification scheme uses the term "acute" and "chronic." Acute injuries are generally very sudden and traumatic in nature. Chronic injuries occur over a longer period of time; and are a form of overuse or overstress injuries (Kraus, 1981). Another system of classifying athletic injuries is by the type of tissue, which is involved, such as the muscle tissue, ligaments, cartilage or tendons. These are also called soft tissue injuries (Morris, 1984). Another other classification system is based on the severity of the athletic injuries or the mechanism of the injury. Many sports medicine authors use anatomical regional approach to athletic injuries (Morris, 1984). They list a number or series of injuries which can occur to the anatomical part involved: foot and ankle injuries, lower leg, knee and thigh injuries and pelvis, injuries to the upper extremity including hand, elbow, wrist and shoulder as well as injuries to the head, face and neck (Klafs and Arnheim, 1981; O'Donoghue, 1976). This study only considered acute injuries pertaining to their anatomical distribution, types and their aetiology.

2.2 Aetiology of Sports Injuries

Injury frequency has increased drastically over the last 100 years in parallel with the development of sporting activities. Studies have been published analyzing occurrence of sports injuries (Krahl and Steinbruek, 1980) and speculations have been made about possible factors that may influence the occurrence of these injuries (Vulpen, 1989 ; Watson, 1995). The boundary conditions include external factors such as shoes, surfaces and equipment, and internal factors such as anthropometric factors, fitness levels and others (Lijsens, 1986).

A study of the causes of sports injuries is useful because it is the first step in the development of effective prevention programmes (Watson, 1986). The search for the cause of sporting accidents is no different from the search for the cause of any accident. For a long time, researchers have looked for factors of accident causation in industry, traffic and transportation, and in the home (Keller et al. 1987). Only recently have they become concerned with the occurrence of sports injuries. At the most basic level, the cause of all injuries is extremely straightforward. Injuries occur when the stress imposed upon part of the body is greater than it is able to resist leading to mechanical failure (Ekstrand, 1994; Albert, 1983).

2.3 Intrinsic Causes of Sports Injuries

Physique

A number of studies have demonstrated that athletes who are tall or overweight are more likely to suffer from injury (Watson, 1986; Lijsens, 1988; Taimela et al. 1990; Nicholl et al. 1992). This is an important finding as these two risk factors are extremely easy to identify. Individuals who fall into either of these categories should receive special attention in injury prevention programmes.

The relationship between somatotype and the risk of injury has been less investigated. Athletes rated at 5.5 or above in mesomorphy are more prone to

injury compared to sportsmen with lower mesomorphy scores because they have a higher center of gravity and this makes them unstable and susceptible to injuries (Watson, 1986).

Medical Defects

Many clinical defects make participation in certain activities unsafe, or require that special precautions be taken. This is more prevalent among older individuals. Body contact sports are unsafe in middle and old age and very strenuous activities are often unwise. Medical advice should be obtained before a new activity is started, particularly following a prolonged period of inactivity (Watson, 1986).

A number of medical conditions make certain types of physical activity dangerous at any age. Diseases of the nervous, respiratory, cardiovascular and musculoskeletal systems often cause serious problems. The absence of one of a pair of organs such as the eye, lung, kidney and others is a contra-indication for participation in any activity that is likely to place the surviving organ at risk. Individuals with medical problems should not be discouraged from participating in sports, but should be directed towards alternative forms of physical activities that carry lower risks (Ekstrand, 1994; Watson, 1986).

Other medical cases such as asthma, diabetes mellitus and epilepsy are commonly encountered in young sports people. They should not prevent participation, but special precautions are necessary. There is an increased risk of injury in diabetics because of hypoglycemia (Van Vulpen, 1989).

Age

The incidence of sports injuries in children has been well documented. Such conditions are rare below the age of 6 to 7. If girls and boys are combined, the incidence then rises with age until the end of childhood (Sullivan et al., 1980; Turz and Crost, 1986; Watson, 1984; 1986; 1995; Zaricznyl et al., 1980). The

injury rate for girls drops in the teenage years due to a decline in participation levels (Watson, 1986). The injury rate of boys in the final years at school is high – especially in those individuals who are involved in competitive sport. One of the more serious types of injury to young children is epiphysis fracture, which has the potential to disrupt growth. There is a dearth of information on the incidence of this injury but one French study found that 10% of sports-induced fractures were epiphyseal and that 12% of children admitted to hospital suffered angulation or shortening of limb due to this type of trauma. The majority of sports injuries to young children arise from falls and very few are due to contact with opponents, equipment or projectiles (Tursz and Crost, 1986; Backx, 1991). This is in marked contrast to the situation in adolescents where contact injuries are very common (Watson, 1986; Van Galen, 1988; Hoy et al., 1992).

Acute injuries are the norm in children and over-use injuries are rare. When a particular sport such as soccer is considered, the incidence of fractures, dislocations and contusions declines with age. Older players are more likely to suffer from over-use injuries such as tenosynovitis (Albert, 1983; Backous et al., 1988; McMaster and Walter, 1987; Sullivan et al., 1980).

Population studies from several different countries agree on the distribution of sports injuries with age (Lijnsens, 1987; Inklaar, 1986; DeHaven and Lintner, 1986; Van Galen, 1988). Approximately 40% of all injuries occur in individuals between the age of 10 and 19, with just over 30% in the 20 – 29 age group. Only 3 – 4% of injuries arise in children under 10. The type of injury sustained also varies with age. Fractures, dislocations and wounds tend to occur in young sportsmen and women while muscle strains, internal derangement of the knee and over-use injuries such as tenosynovitis, patellofemoral pain and other inflammatory injuries are more common in older individuals (DeHaven and Lintner, 1986; Keller et al., 1987).

Gender

All the population surveys carried out indicate a higher incidence of sports injury in males than in females. When the statistics are corrected for the greater exposure time of males, the difference between the sexes narrows, but men still have a higher risk of injury per 1000 hours of participation than women. There have been few, if any, studies of differences in the types of injuries sustained by males and females. In children, Watson (1986) found that girls suffered from more sprains of the ankle, while in boys, knee injuries were common.

Skill

Lack of skill in an activity can increase the risk of acute injury. It has been shown that inexperience increases the risk of injury in skiing and parachute jumping (Bouter, 1987; Steinberg, 1989). Poor technique is said to increase the risk of over-use injuries such as tendonitis and tennis elbow. Long simple- and choice-reaction times to visual stimuli are thought to predispose to sports injury (Taimela et al., 1990).

Psychological Factors

Psychological factors are likely to play an important part in the susceptibility to injury. However, the precise characteristics that predispose athletes to injury are far from clear. Williams et al., (1986) suggested that factors relating to anxiety and attention predispose endurance athletes to injury. But Bond et al., (1988) found that the results could not be replicated. Similarly, high scores on tests of 'Life stress' have been associated with injuries in footballers and students but the results do not seem to apply to other sports such as volleyball (Williams et al., 1986). It may be that more sensitive psychological tests are required, or perhaps different considerations apply to different sports.

Lijsens (1986) and Bouter (1987) both found that lack of caution and low trait anxiety resulted in risk-taking behaviour that led to accidents and injuries. For

example, skiers who are not afraid of injury were the ones most likely to become injured.

Together with foul play, recklessness is the major cause of injury in school sport (Watson, 1984; 1986). It occurs for two reasons: 'showing off' and because children lack the knowledge and experience to evaluate the risks involved in particular situations. Correction of this type of behaviour through programmes of education offers considerable potential for a reduction in the number of sports injuries.

Physical Fitness

It has been shown that adequate levels of static strength reduce the likelihood of sports injury. Isometric muscle contractions help to stabilize joints. Imbalance in the strength of opposing muscle groups predisposes athletes to strain injury of the weaker group. The most common example is weakness of the hamstrings in relation to the quadriceps, which has been shown to increase the risk of hamstring strain in football players (Lijsens, 1986; Van Vulpen, 1989).

Lack of flexibility is a major cause of injuries such as muscle strains and tendonitis. The association has been demonstrated empirically in soccer players (Ekstrand & Gillquist, 1983), rowers and track and field athletes (Watson, 1986), students (Lijsens, 1986) and badminton players (Jargensen and Winge, 1990). The latter study also found that a daily stretching programme reduced the incidence of over-use injuries such as tendonitis. Watson (1986) demonstrated a reduction in both acute and over-use injuries when flexibility was improved. A number of studies suggest that injuries due to lack of flexibility are a particular problem in older sports people.

Studies on the incidence of different types of injuries show that those that can be attributed to poor flexibility are among the most common. This suggests that

improving flexibility is likely to be one of the more effective methods of injury prevention.

In a 1986 study, Lijzens found that subjects with high levels of explosive strength were more likely to suffer from acute injuries than individuals with low scores. This was attributed to the fact that such subjects usually develop greater power during sports activities and thus being at greater risk of acute injuries. It is probable that a poor level of endurance increases the risk of injury by causing premature fatigue. This therefore prevents athletes from extricating themselves from potentially dangerous situations that they would otherwise be able to avoid (Watson, 1986; Morris, 1984).

The relationship between defects of body mechanics and the incidence of sports injuries has been studied by a number of groups. Some traditional views on the topic have been shown to be incorrect (Powell et al., 1986; Warren & Jones, 1987), but recent research demonstrates a link between specific defects and particular kinds of sports injuries. The results of an investigation carried out on footballers by Watson (1986), showed that the incidence of strains and over-use injuries was as high in players of body contact sports as it was in endurance athletes, and that a number of injuries were associated with defective body mechanics.

Other research findings reveal a greater incidence of sports injuries in athletes with the following conditions: a high 'q' angle, unequal leg length and foot mechanics (Klein, 1986; Shambough et al., 1991). Recent research suggests that deviations of posture are a more important cause of sports injury than poor flexibility (Steele and White, 1986; Shambough et al., 1991; Hennessy and Watson, 1993). There is a popular misconception that fat acts as a protection against blows and other contact trauma. There is no evidence to support this theory and excessive body fat actually increases the likelihood and seriousness of injuries such as sprains and those caused by falling. An adequate diet is

necessary for successful participation in sport, but there is no evidence that dietary modification is capable of reducing the incidence of injuries (Watson, 1986).

Preparation

Correct training is an important means of reducing the incidence of sports injuries. Training errors are a major cause of over-use injuries, and the most common include; over-training, insufficient rest periods, errors of technique, too sharp an increase in duration or intensity, use of unsuitable exercise, over-development of one area of the body or one aspect of fitness in relation to others etc (Watson, 1986).

A warm-up before competition or serious training enhances physical performance by producing a number of physiological changes in the body, including: rise in core and muscle temperatures, facilitation of neuromuscular function, increase in joint mobility and flexibility, increase in muscle blood flow, increase in aerobic metabolism, increase in the amount of oxygen extracted from blood, decrease in the production of lactic acid, increase in utilization of fats for aerobic metabolism, decrease in utilization of muscle glycogen, increase in maximum power output and increase in economy of movement (Gutin et al., 1976; Hetzler et al., 1986; Skinner et al., 1986; Robergs et al., 1991). The warm-up undertaken by many athletes does not adequately prepare them for participation in sports (Reilly, 1981; Watson, 1986), thereby predisposing them to unnecessary and costly injuries.

Poor hygiene may result in skin problems and other pathologies that have similar adverse effects on sports injuries. The most common conditions are: fungal infections like athlete's foot and jock itch, and plantar warts (verrucae) which are transmitted by a virus. Because of the use of communal changing and showering facilities, and the contact between players that takes place in some sports, the possibilities for the transmission of disease in sport are extensive and should be

taken seriously. Blood to blood contact between two injured players, or a person attempting to administer first aid, opens the possibility of the transmission of hepatitis or HIV/Aids (Reilly, 1981; Watson, 1986; Morris, 1984).

2.4 Extrinsic Causes of Sports Injuries

Footwear

Sports footwear is a topic that has received considerable attention from manufacturers and those responsible for marketing sports goods. Although modern sports shoes are much faster than the 'plimsolls' of former years, it is unfortunate that there have been few independent studies on the effectiveness of such equipment. The requirements of safety and enhancement of performance must be balanced against each other as footwear that maximizes energy return and unrestricted movement of the foot may increase the risk of injury (Smith and Bunch, 1986). Footwear must also be designed to suit particular sporting activities and to have the correct amount of friction with the surface on which it is used. Research has shown that unsuitable footwear is one of the major causes of injury in sports as diverse as Badminton and American football (Jorgensen and Winge, 1990; Mueller and Blyth, 1974). In the latter study, it was found that changes in boots resulted in a 22% reduction in sports injuries.

The role of different types of boots in the prevention of ankle sprains has not been conclusively demonstrated. Barrett et al., (1993) found no evidence that high-topped boots or boots with an inflatable air chamber were more effective in preventing injuries than lower-top shoes.

Most research has been done in the last 15 years in the field of running shoes, and this has yielded three main conclusions:

- (a) a running shoe should absorb and/or reduce impact forces;
- (b) a running shoe should provide mediolateral stability avoiding excessive pronation; and

- (c) a running shoe should provide guidance at take-off avoiding over-supination of the foot. These conclusions are widely supported in the literature (Watson, 1995), and can be applied and expanded to cover all sporting activities.

Protective Equipment

Proper protective equipment is a vital aspect of safety in many sports and can make a significant reduction in the incidence of injury. However, protective equipment must be properly designed, manufactured and maintained or the incidence of injury may actually increase. For example, it has been shown that incorrect adjustment of ski bindings is a major cause of injury (Johnson et al., 1980). Some manufacturers market equipment that has not been scientifically designed or evaluated, or sell it for purposes for which it is not suited. A number of successful legal actions have been brought against such companies (Watson, 1985).

Knee and Ankle Supports

Knee bandages have no effect in preventing injuries and even elaborate mechanical braces seem to be of doubtful value. Taping and the use of lace-up stabilizers appear to be more effective in the prevention of ankle sprains (Garrick and Requa, 1973; Rovere et al., 1988).

Kit

Sports kit needs to have the following characteristics:

- It should make the athlete look and feel good so that the individual performs at his or her best.
- It should allow necessary freedom of movement.
- It should offer protection.
- It should offer support.
- It should regulate body temperature appropriately. For warm-up and for some cold weather activities good insulating properties are

necessary in sports clothing. For endurance activities, particularly in hot weather, kit that facilitates heat loss is essential (Watson, 1985).

Playing Environment

Surface

One important factor with respect to load on the athlete's body and with respect to overload and injury problems is the playing surface. During each contact of the foot with the ground, the ground acts on the foot with a ground reaction force and the foot acts on the ground with a force of the same magnitude but in an opposite direction. These forces during landing and take-off can be quite different on different surfaces. Running on grass produces forces, which are different to forces generated while running on asphalt. As a matter of fact, these impact forces disappear completely on sand. It is speculated that these high impact forces are some of the causes of many injuries in running as well as in other sports (Watson, 1995). Slippery surfaces offer low friction and increase the chances of injury due to falling. Surfaces with moderate amounts of friction have the reverse effect and are safer. Paradoxically, many modern indoor and outdoor surfaces that have extremely high levels of friction produce an increased risk of injury. They do this because they anchor the athlete's footwear so firmly. This allows greater force to be developed and improves performance, but at the cost of an increase in over-use injuries, strains and sprains. Players eventually adapt to new types of surface but the risk of injury is increased if they alternate between different surface types (Ekstrand and Nigg, 1989). Surfaces and shoes need to be matched. In a study on American football, Mueller and Blythe (1974) found a 31% reduction in knee and ankle injuries as a result of improved playing surfaces and a reduction of 46% when both playing surfaces and boots were changed. Two studies of soccer attribute 25% of injuries to playing surfaces (Sullivan et al., 1980; Ekstrand and Gillquist, 1983).

Hard surfaces increase the likelihood of jarring injuries to the feet, legs and back skin. Shin splints are universally attributed to running on hard surfaces like roads.

They also increase the likely seriousness of a fall. Less-hard surfaces are gentle to the body but if too soft they absorb a significant amount of energy which reduces power output and increase fatigue (Watson, 1986). Uneven surfaces are an important cause of injury. They cause trips, falls, ankle and knee sprains and also lead to dangerous deviations of the ball in such games as hockey and cricket. Surfaces, therefore, can be selected specifically in order to reduce forces acting on the athlete's body. In many cases, the athlete does not have a choice in the selection of the surface. It is, therefore, very important that people who are responsible for the development of sports facilities know the possibilities of reducing forces through the appropriate selection of sports surfaces (Reilly, 1984; Watson, 1986; Morris, 1984).

Weather

Extreme temperature may affect the playing environment, in addition to causing direct injury to the athlete. High temperatures adversely affect some playing surfaces while frost makes grass and other outdoor surfaces dangerous for many sports. High winds may be dangerous in a number of adventure sports. Wind has a considerable chill factor, which in cold weather increases the risk of hypothermia. The hazard is greater in wet conditions because of the cooling effects of evaporation and because water reduces the insulating properties of most clothing (Morris, 1984; Watson, 1986).

People and Organization

Rule

Rules have an important influence on the incidence of sports injuries and should be formulated with safety considerations. For example, rule changes in American football resulted in a dramatic decrease both in cervical spine injuries and those that resulted in quadriplegia (Morris, 1984; Watson, 1995).

Opponents

Foul play is said to be responsible for one-third of injuries in soccer (Ekstrand and Gillquist, 1983; Keller et al., 1987) and is the most important cause of injury in school sport (Watson, 1986). Serious injury is more likely if there is a mismatch of age, size, physical maturity and experience between opponents (Morris, 1984).

2.5 Injuries in other sports

Studies have been conducted in various sports to emphasize the seriousness of sports injuries:

Asembo, et al. (1995a), conducted a study on the injury pattern during team handball competition in East Africa. This study investigated the nature, aetiology, mechanism and anatomical localization of injuries observed among male and female players during the tenth edition of the East and Central Africa Senior Clubs Championships held in Kenya. There were nine male and five female teams from Kenya, Uganda, Tanzania and Ethiopia which played nineteen and ten matches respectively leading to 52(77.61%) and 15 (22.39%) injuries. The commonest injuries were contusions (64.18%). Most injuries were caused by opponents (85.07%). Majority of them were due to collision (55.22%). The head suffered most injuries (59.24%) and many players got more injured while attacking than defending. In all, 56.75% of the injuries were observed in the second half. Generally, only 38.81% of the injuries led to a substitution.

Roux, et al., (1993) studied the epidemiology of rugby injuries in South African schools. The study found that rugby injuries showed specific trends with age, team level, playing position, time of season, anatomical site, type of injury and phase of play. They also found that speed and the competitive level of play might be the most important aetiological factors in the majority of rugby injuries. It

is noted that this study considered the epidemiology of injuries among amateur rugby players in South African schools.

Castro et al., (1989) did a comparison of intracompartmental pressure of the anterior tibial compartment during walking and running. In 32 recreational athletes (18 male, 14 female), the intracompartmental pressure of the anterior tibial compartment was measured during three different movement modalities. The age ranged from 18 to 57 years. There was no trauma of the lower extremity in history. No one took medication or suffered from a chronic disease. All volunteers had normal blood pressure and normal range of motion of the ankle and the knee joint. Their result presented replicable pressure values in relation to the going speed and replicable pressure curves in relation to the gait cycle. Describing the pressure curve in relation to the gait cycle, there was a minimum, a plateau and a maximum. The single frame analysis revealed a pressure minimum just before the initial contact of the heel. With heel contact, the pressure rises up to a plateau during midstand. The pressure value of this plateau depends on the going speed.

Lindner and Dennis (1990) studied injury predictors among Canadian female gymnasts' anthropometric and performance characteristics. The sample consisted of 68 female competitive gymnasts from three prominent private clubs who were subjects in a 3-year prospective epidemiologic injury investigation and were given a large battery of anthropometric and performance test. The subjects were grouped according to age and competitive level. The age range was divided into three intervals: below 10.5 years, designated as "9", between 10.6 and 12.5 years, designated as "11", and above 12.5 years, designated as "13". Two levels of competition were selected: Canadian Provincial levels 1, 2 and 3 combined, designated as "Low" and Provincial level 4 and National Elite level combined, designated as "High". Of this sample, 27 gymnasts sustained one or more injuries, while 41 remained injury-free during the surveillance period. The stepwise discriminate analyses showed that the characteristics that best

distinguished the two categories were age, body size and different measures of flexibility. Predictors for the injury variables were specific to the groupings and to the three injury measures. The variables that contributed to group classification and to injury prediction included age, body size, flexibility, training time, body fat and motor performance.

Asembo, Njororai and Wekesa (1994) carried out a study of hockey injuries in Kenya. The study investigated the aetiology, mechanism, type of injury, as well as the time course of the injuries in both male and female hockey during the season in 1994. A total of 7 matches for women and 10 matches for men were analyzed. The main aetiological factors were established as the opponent, the ball, stick and the ground. The major mechanisms were a hit and collision. Most of the injuries occurred when the players were running and tackling. There was no major difference between the pattern and frequency of injuries in male and female hockey.

Benjamin, (2000) studied the occurrence of hockey injuries during the National Hockey League in Montreal in the 1999-2000 season. 810 cases of injuries were reported, which is 1.33 injuries for every roster spot. Only 42 players managed to play in all the matches, an average of 1.5 players a team.

Ellison (1993), conducted a study on basketball injuries in the Data base of the Canadian Hospitals Injury Reporting and Prevention Programme (CHIRPP). The study covered the period from April 1, 1990 to June 7, 1993 and was restricted to patients aged 5-19 years. Of 125, 690 records, 4% were classified as basketball injuries. Injuries associated with basketball were more likely to be incurred by males (67%). The number of basketball injuries peaked for males at age 14 and for females at age 13. Sprains and strains (49%) as well as fractures (25%) were the most common types of injuries. Fingers (37%) and ankles (23%) were the most common sites of injury. Finger injuries, typically the result of a collision with the ball and more common in females than males, decreased in proportion with

age. The proportion of ankle injuries, usually caused by overexertion, increased with age.

Sahlin (1985) carried out a study to analyze all head and facial injuries due to sports activities treated at the University Hospital in Trondheim- Norway during one year. Head and facial injuries represented 12% of all sports injuries. Three hundred and ninety three patients were included in the group of head and facial injuries. Skin lacerations and mild head contusions were the most common diagnoses. All 16% of the injuries were diagnosed as concussions and 20% sustained intracranial bleeding. 20% of the injured required hospitalization. Soccer, handball and alpine skiing were the most common activities leading to head and facial injuries while horse riding, alpine skiing and handball were the activities leading to the highest percentages of severe injuries as concussion or intracranial bleeding (Watson, 1986).

Brujin et al. (1990) carried out a study on the ossification in the patellar tendon following direct trauma in sports. They gave a history of two children with ossification in the patellar tendon following a contusion of this ligament. A 10-year-old female gymnast experienced pain on her right knee after a fall from a trampoline. Physical examination revealed tenderness and soft patellar. She could actively extend her knee with difficulty. She was treated by cylinder-cast immobilization with the knee in extension for two weeks, followed by progressive rehabilitation of the quadriceps. Ten weeks post-trauma she could still not resume her usual jumping training due to pain. Radiographs at this stage showed ossification in the patellar tendon, near the inferior pole of the patella and patella alta. Surgery was performed through mid line incision extending from the inferior pole of the patella to the tibial tubercle. The ossification in the patellar tendon was removed. At six months follow-up, she had returned to all normal activities and gymnastics. A 14-year old male gymnast experienced pain and swelling on his left knee after a fall on the springboard. Physical examination revealed hemarthrosis and tenderness at his patellar tendon. He could actively

extend his knee and there was no proximal displacement of his patella. Radiographs were normal. He was treated with an exercise programme under the supervision of a physiotherapist. At a follow-up 3 months later, he showed quadriceps atrophy along with proximally displaced patella. Radiographs at this stage showed massive ossification in the patellar tendon, ossification at the tibial tuberosity and patella alta. On his request the physiotherapist refrained from surgical reconstruction. He had already returned to all normal activities, without complaints.

Asembo et al., (1997), carried out a study to investigate the nature of injuries observed during the Safari Sevens International Rugby Tournament in Kenya. Sixty five matches played by twenty teams from Arabian Gulf (1), United Kingdom (3), Kenya (3), South Africa (2), Mauritius (1), re-Union (1), Scotland (1), Swaziland (1), Tanzania (2), Uganda (2), Wales (1), Zambia (1) and Zimbabwe (1) were observed and all injuries which led to either temporary stoppage of the game or the substitution of a player were recorded. The data was analyzed descriptively. A total of sixty-nine (69) injuries were recorded, the majority being soft tissue injuries with 52.17% being contusions. The most serious of all were dislocations (2.90). Anatomically, 35.79% affected the head, 33.34% the lower limbs and 20.29% the upper limbs. Slightly more injuries occurred in the defensive half of the field of play (53.62) than offensive half (46.38%). More injuries were caused by opponents (66.67%) and occurred frequently in the first half than in the second half.

Hoshina, et al., (1970) began a study of the spondylolytic neural arches in athletes. The study was to establish the incidence of scoliosis among rifle-shooters. After x-raying the cases of spondylolytic neural arches. Tomii and Yokoyama (1993) joined Hoshina et al. and continued the study. When the number of subjects totaled 1125, 234 (20.80%) athletes were found to have spondylolysis. This study did not consider whole body injuries. The study also focused on rifle shooters rather than soccer players. The current study focused

on analyzing acute injuries incurred by players during the 2001 Moi Golden Cup Soccer tournament in Kenya.

2.6 Injuries in Soccer

The basic elements of soccer involve running, turning, jumping, tackling, kicking and heading the ball (Reilly, 1981). The injuries, which occur in this sport, as in any other body contact game, result from direct blows or from indirect mechanisms (Watson, 1986). The rules of soccer do not permit outfield players to touch or control the ball with their arms or hands and so much of the trauma seen occurs to the lower limbs (Lijssens, 1986). The goalkeeper is in a separate category and his injuries tend to be more general, as he is allowed to use his hands and, in addition, his role often calls for diving at the feet of players thereby exposing more of his body to potential injury. Because of the international character of soccer, matches are played on widely varying surfaces and in all kinds of climatic conditions (Renstroem, 1994).

The incidence of injury in soccer is 37 – 40 injuries per 10 000 playing hours. Over 80% affect the lower limbs. Of these, the ankle and foot are most frequently injured, followed by the knee, quadriceps and calf strains and inguino - crural injury. Goalkeepers are at greatest risk, and foul play may be responsible for as many as 25% of all injuries. Serious head injuries are uncommon, despite the fact that a footballer may head a ball several thousand times throughout his career and it is frequently blasted at him with great force. Nevertheless, a condition resembling the punch-drunk syndrome has been observed in some football players due to recurrent minor head injuries sustained from heading the ball (Jorgensen, 1984; Weightman and Browne, 1975)

Both osteitis pubis and sacroillitis are well recognized long-term problems of footballers and the incidence may be as high as 70%. These conditions may be

caused by the use of lighter boots, which expose the player to the risk of side skids, with twisting of the sacrum and pelvis (Renstroem, 1994).

Non-fatal soccer injuries in athletes have been reported to occur in 2.6% of players per season and up to 5.2% of players in one large soccer tournament (Lijnsens, 1986). Injury rates per 1 000 player-hours range from 0.6 to 19.1 per 1000, depending on the level of play and the definition of injury. The male-female ratio of injuries overall is 1:2 for similar levels of exposure. However, selected injuries, such as fractures, occur with equal frequency in male and female players (Keller et al. 1987).

Studies comparing indoor with outdoor soccer injury rates indicate that indoor soccer players encountered injuries 6.1 times as frequently as outdoor soccer players with comparable hours of playing time. Higher injury rates in indoor soccer may be attributable to many factors, including the playing surface and collisions between players and the walls bordering the field of play. Differences between artificial turf and natural grass playing surfaces account for variable injury rates among adult soccer players playing outdoors. Injuries resulting from player-to-player contact vary from 31% to 70.3% of injuries in indoor soccer. In outdoor soccer, the percent of injuries resulting from player-to-player contact varies from 43% to 60.9% of injuries reported (Albert, 1983). In a study that recorded injuries from player-to-player contact, 48% of all injuries occurred during tackling. With the exception of a single study in which the goalie position accounted for a disproportionate of the total injuries recorded, the risk of injury does not seem to vary consistently according to player position (Keller, et al. 1987; Albert, 1983).

Selected rule changes in sports have been prompted by a desire to reduce the risk of injury. The decrease in cervical spine injuries in American football after the reduction in the use of the helmet for blocking (the "spearing" rule) is a commonly used example. In other sports, changes in equipment requirements

(e.g., helmets in youth ice hockey) and rules of play have provided mixed safety results (Lijisens, 1986). In youth soccer, rule changes to reduce aggressive contact leading to ball control may have a potential for decreasing injury.

Researchers have studied the relation of soccer injuries to age. Higher rates of injury occur in the older male (16 – 18 years). In age-matched players, relatively poor muscular strength has been shown to be associated with higher rates of injury (Watson, 1986). In one study involving male and female players, the highest injury rates were reported for the oldest girls (17 – 19 years), and the lowest rates were reported for the youngest girls (9 – 13 years) (Watson, 1986).

Fatalities from soccer-related injuries are associated almost exclusively with traumatic contact with goalposts. From 1979 to 1993, falling soccer goalposts accounted for 27 injuries, of which 18 were fatal (Reilly, 1994b). The mean age of the 27 subjects in this series was 10 years. Data from January 1993 through July 1994 documented 3 additional fatalities involving children killed by falling soccer goalposts. These findings have prompted specific recommendations from equipment manufacturers to ensure that soccer goalposts are adequately secured during play and when not in use (Reilly, 1994b; Lijisens, 1986).

The most common type of nonfatal soccer-related injury is soft-tissue contusion. Fractures are relatively uncommon, accounting for only 3.5% to 9% of the injuries (Watson, 1986). Other injuries, such as sprains, strains, contusions, fractures, dislocations, tendinitis, overuse injuries, and heat-related injuries, occur in soccer but are not unique to soccer or seen in disproportionate numbers among soccer players (Lijisens, 1986; Reilly, 1994b; Watson, 1986;).

In skeletally immature soccer players, calcaneal apophysitis, or Sever disease, is commonly observed. This repetitive traction injury to the calcaneal apophysitis is attributable to high levels of running in cleated shoes without adequate heel cushion or arch support. Once identified, this overuse injury can be treated by

reducing the amount of running and impact demands, improving calf flexibility, and using a heel pad or heel cup in the soccer shoe (Watson, 1986).

Kristian, et al. (1990), carried out a prospective study of epidemiology, concerning traumatology and economics of soccer injuries in Netherlands. During a month's period they examined and registered prospectively all soccer players attending the casualty ward or the in patient clinic with a soccer injury. The material consisted of 715 soccer injuries in 646 males and 69 females. The soccer injuries made up 39% of the total number of sports injuries, which were 1,839. One thousand eight hundred and ninety patients suffering from sports injuries were registered prospectively out of which 715 were football injuries (40%). Here the study period was too short (one month) and at the same time the study was done in Netherlands and it used a small sample. The current study focused on analyzing acute injuries incurred by players during the 2001 Moi Golden Cup Soccer tournament in Kenya.

Raschka, et al. (1988), studied the epidemiological characteristics of soccer injuries and proposed programmes for their prevention in Schleswing-Holstein. The study considered epidemiological aspects of both indoor and outdoor soccer. The accident-report-sheets of Schleswing-Holstein for the year 1988 were examined. As all soccer club-players have sports-insurance-coverage by collective agreements between the regional sports association and the ARAG-Sports-Insurance Company, the sportsmen were given a second sheet for the present study. This was based on 1,664 players (outdoor soccer: goalies n=84, others n=1,333; indoor soccer: goalkeepers n=29, others n=218).

The above study by Raschka et al., (1988) revealed that, in indoor soccer, 55.2% of the injuries were in parrying and blocking, 24.1% were contusion accidents, 10.3% were falls, 6.9% were ankle sprains and knee-joint distortions lead to 3.4%. For the others, the figures were: contusion – accidents 39.4%, ankle sprains 28.9%, knee – joint distortions 10.1%, spontaneous damage of

muscles or tendons 9.2%, hit by ball 5% while 2.8% of the injuries occurred while heading the ball.

For outdoor soccer the results were: goalkeepers: parrying and blocking 39.3%, contusions 38.1%, falls 10.7%, ankle sprains 8.3%, knee-joint-distortions 3.6%, others: contusion accidents 50.1%, ankle sprains 21.8%, knee-joint distortions 13.4%, heading accidents 7.4%, spontaneous damage of muscles or tendons 3.9%, hit by ball 2.2%. This study used secondary source of data, it also considered both outdoor and indoor soccer.

Wekesa (1995), carried out a one-year prospective study of soccer injuries in the 1992-1993 Kenyan national team. There were 32 injuries in the study period. The incidence of lesions was 1.78% per match or 1.1% per player. 43.75% of the injuries were contusions. 31.25% overuse and 25% sprains. 34.38% of the injuries affected the groin, 28.13% the knee and 25% the ankle. The right side of the body (65.63) suffered more injuries. The opponent (60%), ball (12%) and the ground (10%) were the causes. The activities during injury were running/dribbling (43.8%), tackling (18.8%) and heading (9.4%). Wekesa's (1995) study however, focused only on the injuries incurred by national team players. Apart from them being few, they were also chosen from teams that take part in the national league and Moi Golden Cup tournament.

Inklaar et al. (1988), carried out an experimental study on injury prevention in soccer in Netherlands. Two Dutch amateur soccer clubs were followed during the second half of the 1986-1987 competition and the first half of the 1987-1988 competition. More than 80% of the injuries were diagnosed as sprains, strains and contusions. During both periods of time, most injuries were sustained from the knee down to the foot. There were no significant condition effects.

Asembo et al., (1995b) carried out an investigation of injuries incurred in an international soccer tournament held in Kenya. A total of 13 matches involving

286 players were used. A total of 31 injuries were registered, representing an injury rate of 2.36 per match or 0.11 per player. The opponent was the main cause of injuries (87%). The major mechanisms were collision (25.8%) and heading the ball (16%). In this tournament, the lower leg and the head were mostly affected incurring 32% and 25.8% of the injuries respectively.. The midfielders suffered most injuries (48.4%) followed by the forwards (29%) and defenders (22.6%). About 68% of the injuries occurred in the midfield. The commonest injuries observed were contusions (80%) and sprains (9.67%). There were more injuries during the first half (17) as compared to the second (14) whereby the rate was highest in the 16th-30th minute. The sample used by Asembo et al.,(1995c) was too small.

Brunkner (1989), carried out a three-year study of soccer injuries among a top football team in Australia. The club's training squad consisted of 50 players of which 40 players were required each week to play in one of the club's two teams, a senior team and a reserve grade team. All the significant injuries were recorded and categorized on the basis of anatomical location and pathology. In 1987, 1988 and 1989 season, the total games missed due to injury were 173,107 and 207 respectively. The percentage of players missing each week due to injury during the seasons in 1987, 1988 and 1989 were 15.7%, 9.7% and 10.8% respectively. The lower limb sustained 30 injuries in 1987, 36 injuries in 1988 and 43 injuries in 1989. Fractures, dislocations, joint sprains, muscle tears, contusions, lacerations and hernia were observed during the study period. This study focused on only one team.

Almekinders et al. (1984), did a prospective study of factors associated with athletic injury. From 1984 to 1986, all freshmen entering the University of North Carolina Varsity soccer team underwent a preseason physical examination prior to the start of any practice session (n=133). At the same time, a history was taken regarding any significant musculoskeletal injuries up to that point. During the season following this pre-season testing, all athletic injuries and missed time

in the practices or games were recorded by the athletic trainer on a daily basis. When comparing all the physical parameters with the subsequent injuries during that season, very little difference was found between the group that remained injury free and the one that included those athletes with one or more injuries. This study focused on the aetiological factors only.

Eklund et al. (1983), conducted a study to evaluate late knee effects in former top-level soccer players in Sweden. 87 male randomly chosen former top-level soccer players aged 45-50 were studied together with 40 randomly chosen male controls of the same age group. The study included an interview although clinical examination and an objective evaluation of the laxity of the anterior cruciate ligament. 46 of the 87 players had sustained 55 knee injuries during their active careers. 33 were meniscal tears, 16 were ligament injuries, and 6 others. There were only 5 knee injuries in the control group of 40 (4 meniscal tears and 1 joint capsule injury). Eklund et al., (1993) considered only former top Swedish soccer players and the study was restricted to knee defects only.

Summary

The above studies are examples of work done on the evaluation and analysis of sports injuries in various sports. It is important to note that the studies by Roux, et al., 1993 (South Africa); Lindner et al., 1990 (Canada); Ellison, 1993 (Canada); Benjamin, 2000 (Montreal); Asembo et al., 1995 (Kenya); Sallin, 1985 (Norway); Bruijn, et al., 1990 (Sweden); Hoshina, et al., 1970 (Japan); Castro et al., 1989 (USA) focused on other sports other than soccer.

The studies by Kristian, et al., 1990 (Netherlands); Raschka, et al., 1988 (Russia); Ekstrand, 1982 (Sweden); Tropp et al., 1985 (Sweden); Jorgensen, 1988 (Denmark); Inklaar et al., 1988 (Netherlands); Brunkner, 1989 (Australia); Almekinders, et al., 1984 (USA) and Eklund et al., 1983 (Norway) focused on

soccer injuries in countries with different socio-economic and political background compared to Kenya.

3.0 Introduction

The study by Asembo, Njororai and Wekesa (1995b) analyzed soccer injuries of the soccer teams in an international tournament in which only the Kenya's national soccer team participated. The study by Wekesa (1995) analyzed injuries incurred by the Kenyan national soccer team alone in a period of one year (1992 to 1993). These studies did not focus on analyzing acute injuries incurred by players of male soccer teams in Kenya from which the national team members are selected. This study therefore aimed at filling this gap by analyzing injuries incurred by players of Kenya's male soccer teams participating in the 2001 Moi Golden Cup tournament.

3.1 Study Population

The 2001 Moi Golden Cup tournament which was the focus of the study was held in Nairobi and was held from 19th to 25th November 2001. Therefore, the study targeted injuries that occurred in 36 matches played by 30 teams that competed.

3.2 Sample Size and Sampling Procedure

Thirty (30) matches were scheduled for the 2001 Moi Golden Cup tournament. To include the research study, forty (40) matches were selected. These matches represented 100% of the total population ($\frac{40}{30} \times 100 = 133\%$). Stratified random sampling procedure was used. This ensured that the teams in each and every stage of the tournament were represented in the sample in the same proportion that they existed in the population. The stratification was based on various socio-economic factors such as club's geographical location. All participants were interviewed and injuries that occurred were observed and analyzed.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter focuses on the description of the procedures involved in carrying out the study. It covers the location of the study, target population, sampling procedure, research instruments, data collection procedures and analysis techniques.

3.1 Location of the Study

The Kenya Football Federation determined the venues for the games at which the observation was done. The venues used included Nairobi, Mombasa, Nakuru, Kisumu, Eldoret, Naivasha, Kisii, Mumias, Chemelil and Meru. This represented the geographical spread of the game of soccer at competitive levels in Kenya.

3.2 Target Population

The 2001 Moi Golden Cup Tournament from where data for the study was gathered was played on a knockout basis. Therefore, the study targeted injuries that occurred in 30 matches played by 30 teams (see appendix A).

3.3 Sample Size and Sampling Procedure

Thirty (30) matches were scheduled for the 2001 Moi Golden Cup tournament. To manage this research, twenty-four (24) matches were selected. These matches represented 80% of the total population (i.e. $24/30 \times 100 = 80\%$). Stratified random sampling procedure was used. This ensured that the teams in each and every stage of the tournament were represented in the sample in the same proportion that they existed in the population. The stratification was based on various weekend fixtures to allow proper presentation from preliminaries. All quarter final, semi-final and final matches were observed and injuries analyzed.

3.4 Research Instrument

A Soccer Match Observation Chart (Appendix B) was used as the instrument for collecting data. The chart was a modified instrument of the ones that have been applied in the games of rugby and hockey (Wekesa et al., 1996a; 1996b) as well as Soccer (Asembo et al., 1995b). The chart sought the following information:

- (i) The name of the tournament.
- (ii) Date, time and venue of play.
- (iii) Home and away team.
- (iv) Tournament stage.
- (v) The nature, site, aetiology, mechanism, time, context, part of the field, players and team in relation to injury.
- (vi) The total number of injuries observed.
- (vii) Comments on scores.
- (viii) Name of observer, signature and date.

The principal researcher trained the assistants to ensure that their recording was consistently in agreement. The supervisors supervised the training. The training was done by observing pre-recorded videotapes of soccer matches and later used live matches drawn from the National Premier League in Nairobi. After the training process the research assistants together with the researcher piloted the research instrument. The pilot study used five matches of the 2001 Premier League to establish the validity of the research instrument and to further train research assistants. This helped in improving observation and recording data in "live" matches. The inter-observer agreement was set at 90%.

3.5 Data Collection Procedure

The researcher sought permission from the Kenya Football Federation to be able to collect data in the various stadia (Appendix C). The data collection was done by observing the sampled matches. The principle researcher and his assistants watched the sampled matches and recorded the targeted variables. The variables for observation included:

- (i) Nature, site, time and aetiology of injuries.
- (ii) Players substituted because of injuries.
- (iii) Part of the pitch where the injury occurred.
- (iii) Injuries incurred by the home and away teams.

Using the soccer match observation chart, the researcher and his assistants analyzed the flow of the game taking note of the above variables for both teams. As soon as an injury occurred, a tally was made in the appropriate column. In case of any doubt, the team doctor or trainer was consulted immediately after the match. Injuries that led to either temporary stoppage of the match or first aid attention were considered. The variables were analyzed using one word definitions to indicate the nature, site and aetiology of injuries, players substituted because of injuries, part of the pitch where the injury occurred, position of the injured player as well as whether the injury affected the home or away team.

3.6 Data Analysis

The data were computed in terms of frequencies, percentages and means. The computation of frequencies was used as a method of grouping or organizing raw data into a meaningful way for the ease of interpretation. Percentages provided a general summary of collected data. Being the best measure of central tendency, the mean was used as a single measure or score, which summarized or represented the data obtained (Baumgartner & Jackson, 1975; Kirkendall, Gruber & Johnson, 1980).

Tables, pie charts and bar charts were drawn to present the collected data. Tables are useful in organizing and summarizing the data (Kirkendall, Gruber & Johnson, 1980). Pie charts and bar charts on the other hand convey information about the score or data distribution (Baumgartner & Jackson, 1975; Kirkendall, Gruber & Johnson, 1980).

Chi-square was computed at 0.05 level of significance. The Chi-square is a nonparametric test of significance appropriate when the data are in the form of

frequency counts. It compares proportions actually observed in a study with proportions expected to establish if they are significantly different. The Chi-square test was to establish the difference in the number of injuries in different phases of competition; position of players; injury mechanism; nature of injuries; number of players substituted because of injuries among others. The Chi-square formula used in this study was:

$$X^2 = \sum \frac{(O - E)^2}{E}$$

Where

X^2 = chi-square score

O = Observed/Actual frequencies

E = Expected frequencies

Σ = Summation

CHAPTER FOUR

FINDINGS AND DISCUSSION

4.0 Introduction

This chapter presents the findings, interpretation and discussion of the data.

4.1 Research Hypotheses

The major hypothesis of the study was that there was a difference in the nature of injuries incurred by players of the winning and losing teams; the preliminary and final stage of the tournament; defensive, construction and offensive zones of play; upper and lower body injuries; first and second half of the matches; and home and away matches in the Moi Golden Cup Soccer Tournament in Kenya.

The specific sub-hypotheses included the following: -

- H₀₁ There would be no significant difference in the number of injuries incurred in the preliminary, second round and final phases of the tournament.
- H₀₂ There would be no significant difference in the injuries incurred by defenders, mid-fielders and forwards.
- H₀₃ There would be no significant difference in the frequency of aetiological factors of injuries incurred during the tournament.
- H₀₄ There would be no significant difference in the frequency of injury mechanism during the tournament.
- H₀₅ There would be no significant difference in the number of injuries incurred in the offensive, construction and defensive zones of the field of play.
- H₀₆ There would be no significant difference in the number of injuries incurred in the preliminary, second round and final phases of the tournament.
- H₀₇ There would be no significant difference in the number of players substituted because of injuries at the preliminary, second phase and final stages of the tournament.

- H₀₈ There would be no significant difference in the number of injuries incurred by the home and away teams.
- H₀₉ There would be no significant difference in the number of injuries incurred by the winning and losing teams.
- H₀₁₀ There would be no significant difference in the anatomical distribution of injuries amongst the trunk, head and lower limbs during the tournament.
- H₀₁₁ There would be no significant difference in the number of injuries incurred in the first and second halves of the matches played during the tournament.

4.2 Presentation of findings and discussion

This section deals with the findings of the study in line with the sub-hypotheses set out above.

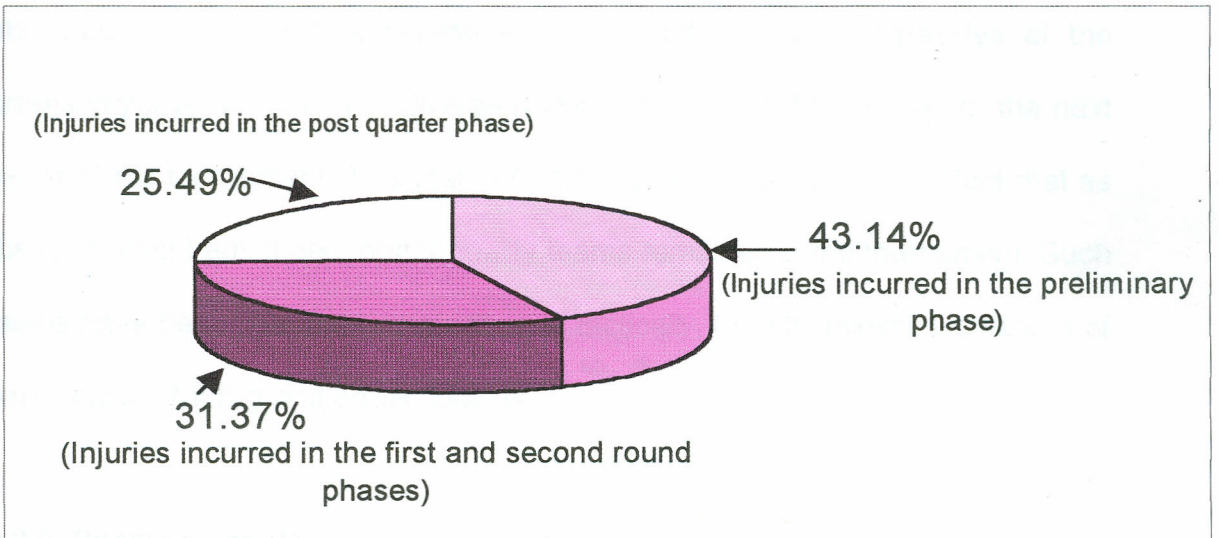
4.2.1 Injuries incurred versus phases of the tournament.

Table 1 summarizes injuries incurred at various phases of the Tournament. Most injuries 32(31.37%) occurred at the preliminary phase.

Table 1: Injuries incurred at various phases of the Tournament.

Phase	Preliminary phase	First and second round phase	Quarter final, semi-final and final phase	Total	Remarks
No. of injuries incurred	44 (43.14%)	32(31.37%)	26(25.49%)	102 (100%)	Not Significant
Total	44 (43.14%)	32 31.37%	26 25.49%	102 100%	

$P \leq 0.05$; $\chi^2 \geq 5.99$; $df = 2$; $\chi^2 = 5.002$

**Fig. 2: A summary of the injuries during the tournament**

The calculated χ^2 of 5.002 in Table 1 is less than the table value of 5.99 ($P \leq 0.05$). Thus the hypothesis that there is no significant difference in the number of injuries incurred in the preliminary, second round and final phases of the tournament is accepted. Therefore, there was no significant difference in the number of injuries incurred in the preliminary, second round and final phases of the tournament.

Figure two shows injuries incurred at various phases of the Tournament. Most injuries (43.14%) occurred at the preliminary phase while the post quarter phase incurred the least number of injuries (25.49%).

The high rate of injuries in the preliminary phase (43.14%) compared to 31.37% in the first and second round phase and 25.49% in the post quarter phase can be attributed to the fact that playing was more intense and aggressive at the preliminary level as teams of diverse qualities strove hard to qualify for the next round of the tournament. This state of affairs can also be due to the fact that as the tournament advanced, better quality teams remained in the tournament. Such teams have better players technically and tactically, thereby minimize chances of unnecessary fouling and erratic tackles.

4.2.2 Positions of play versus injuries

Positions of play versus injuries of soccer players are summarized in Table 2. Strikers were the most vulnerable to injuries 35(34.31%) while goalkeepers experienced the least number 8(7.34%) of injuries.

Table 2: Position of play versus injuries of soccer players during the tournament.

Position	Goal keepers	Defenders	Midfielders	Forwards	Total	Remarks
No. Of injuries incurred	8 (7.84%)	31 (30.41%)	28 (27.5%)	35 (34.3%)	102 (100%)	Significant
Total	8 7.8%	31 30.4%	28 27.5%	35 34.3%	102 100%	

$P < 0.05$; $\chi^2 \geq 7.85$; $df = 3$; $\chi^2 = 16.98$

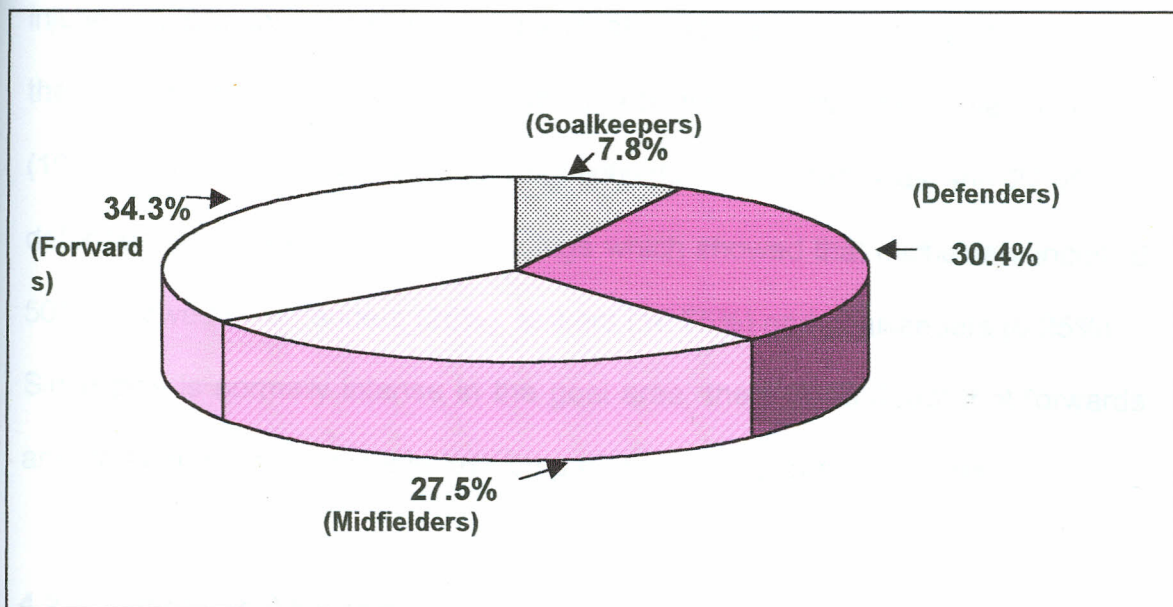


Fig.3: Position of play versus injuries of soccer players during the Tournament

Table 2 reveals that the computed χ^2 of 16.98 is greater than the table value of 7.81 ($P \leq 0.05$), thus the hypothesis that there is no significant difference in the number of injuries incurred by goalkeepers, defenders, mid-fielders and forwards is rejected. Therefore, there were differences in the number of injuries incurred by goalkeepers, defenders, mid-fielders and forwards. The position of play versus injuries is summarized in figure three. Forwards sustained most injuries (34.3%) followed by defenders (30.4%), midfielders (27.5%) and goalkeepers (7.8%).

Findings from the study revealed that forwards were more vulnerable to injuries, 34.3%, compared to defenders who incurred, 30.41%, midfielders, 27.5% and finally goalkeepers 7.84%. The findings reflect the nature of the game of soccer

where forwards are subjected to ferocious tackles hence leading to frequent injuries. Additionally, goalkeepers are least involved in contact situations hence the fewer injuries sustained. However, the findings contrast with Asembo et al., (1994) findings of 48.4% injuries for midfielders, 29% forwards and 22.6% for defenders and Wekesa's (1993) findings which showed that midfielders incurred 50%, followed by defenders (25%), strikers (18.75%) and goalkeepers (6.25%). Since play is normally intense in the goal area, there is no doubt that forwards and defenders incur more injuries compared to other playing positions.

4.2.3 Aetiological Factors

Aetiological factors of injuries incurred by players during the tournament are summarized in Table 3. The opponent was the most frequent cause of injury 50(49%).

Table 3. Aetiological factors of injuries incurred by players during the tournament.

Aetiological	Ball	Opponent	Surface	Goalpost	Other	Total	Remarks
Frequency	15	50	27	1	9	102	Significant
	14.7	(49%)	(26.5)	(0.98%)	(8.82%)	(100%)	
Total	15	50	27	1	9	102	
	14.7	49%	26.5%	0.98%	8.82%	100%	

$P \leq 0.05$; $\chi^2 \geq 9.49$; $df = 4$; $\chi^2 = 71.34$

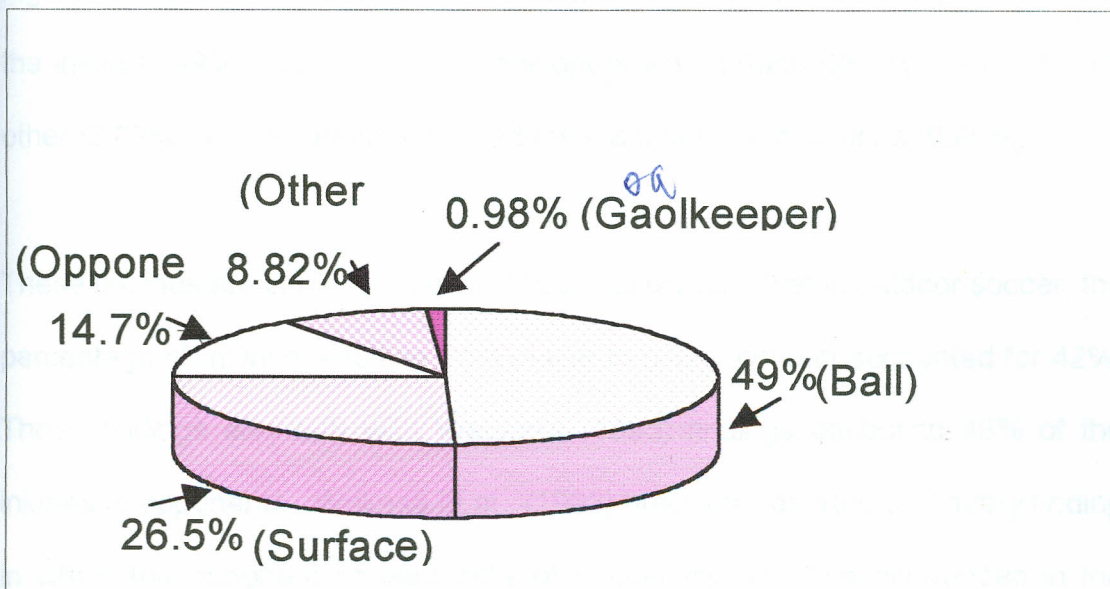


Fig. 4: Aetiological factors of injuries incurred by players during the Tournament

The calculated χ^2 of 71.34 is higher than the table value of 9.49 ($P \leq 0.05$). The hypothesis that there is no significant difference in the frequency of etiological factors of injuries incurred by players during the tournament is rejected. It is therefore asserted that there was a significant difference in the frequency of etiological factors of injuries incurred by players during the tournament.

During the tournament, opponents caused 49% of the injuries followed by the surface, 26.5%, ball, 14.7%, other, 3.8% and finally the goal post caused 0.98% of the injuries.

Figure four shows the aetiological factors of the injuries. Accordingly majority of the injuries (49%) were caused by the opponent, surface (26.5%), ball (14.7%), other (8.82%) and goalkeeper caused the least number of injuries (0.98%).

These findings are close to Albert's (1983) observation that in outdoor soccer, the percentage of injuries resulting from player to player contact accounted for 42%. These findings also tally with Watson's (1995) findings attributing 48% of the injuries to opponents. Wekesa et al., (1993) however, reported a contrary finding in which the opponent caused 70% of soccer injuries. The differences in the proportions of the injuries caused by opponents could be due to the different levels of tournament or competitions observed.

The injuries blamed on the individual may be due to inadequate poor officiating, rough play, inadequate warm-up or poor fitness. These factors are likely to cause injury (Ekstrand, 1994; Reilly and Stirling, 1990; Renstroem, (1994). Team coaches and trainers have a responsibility to educate the players on the routines of warming up and on efficient execution of soccer techniques to avoid potentially injurious contacts via tackles and collisions.

4.2.4 Mechanisms of injuries

The mechanisms of injury during the tournament are summarized in Table 4. Most injuries were as a result of being kicked by opponents 28 (27.5%).

Table 4: The mechanism of injuries during the tournament

Mechanism of injury	Hit by ball	Falling	Collision	Kicked by opponent	Hit by goal post	Other	Total	Remarks
Frequency	15	27 (26.5%)	22 (21.6%)	28 (27.5%)	1 (0.98%)	9 (8.8%)	102 (100%)	Significant
Total	15 (14.7%)	27 (26.5%)	22 (21.6%)	28 (27.5%)	1 (0.98%)	9 (8.8%)	102 (100%)	

$$P \leq 0.05; X^2 \geq 11.07; df = 5; \chi^2 = 23.8$$

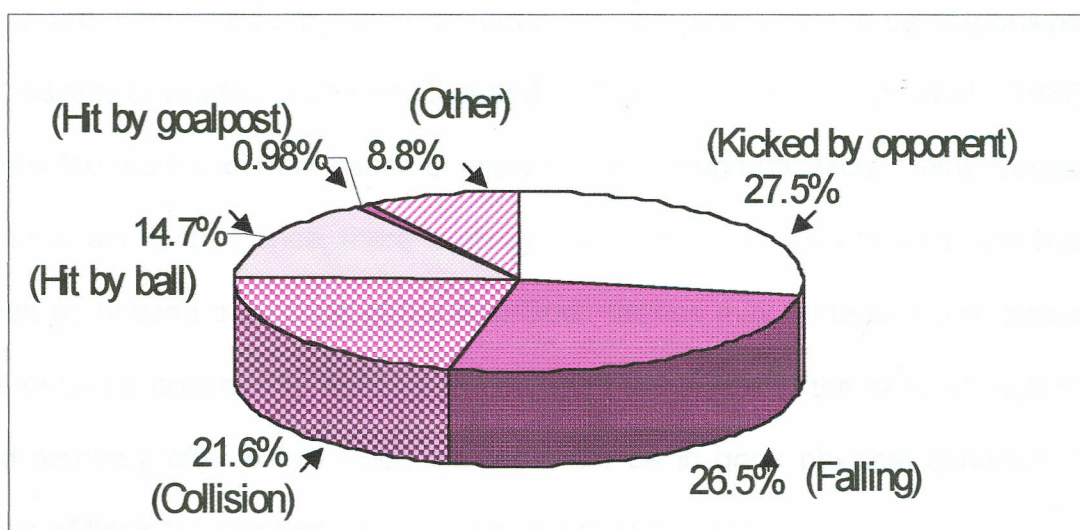
**Fig. 5: Mechanisms of injuries during the Tournament**

Table 4 reveals that the computed X^2 of 23.84 is greater than the table value of 11.07 ($P \leq 0.05$), thus the hypothesis that there was no significant difference in the frequency of injury mechanisms during the tournament is hereby rejected. It is therefore observed that, there was a significant difference in the frequency of injury mechanisms during the tournament.

In figure 5 the mechanisms of injuries to the players are presented. Most of the injuries (27.5%) occurred as a result of a player being kicked by the opponent.

The most frequent mechanism of injuries in this study was being kicked by the opponent (27.5%), followed by falling (26.5), collision (21.6%), hit by ball (14.7%), other (8.8%) and finally hitting the goalpost (0.98%). Asembo et al., (1995) noted that the opponent caused 37.8% of the injuries while the ball caused 16%. These are also consistent with Wekesa's (1995) findings, which attributed most injuries in soccer to foul play. Foul play is said to be responsible for majority of injuries in soccer (Ekstrand and Gillquist, 1983, Keller et al., (1987) and is the most important cause of injury in school sport (Watson, 1986). Soccer is a contact sport. Hence, there is always room for contact via tackles, which at times go beyond the scope of the law. Such tackles may be tactical and hence the need for coaches to adequately prepare their teams in the skills of tackling and recovery after a fall. Such players must be in good physical condition in terms of flexibility, strength and the necessary endurance.

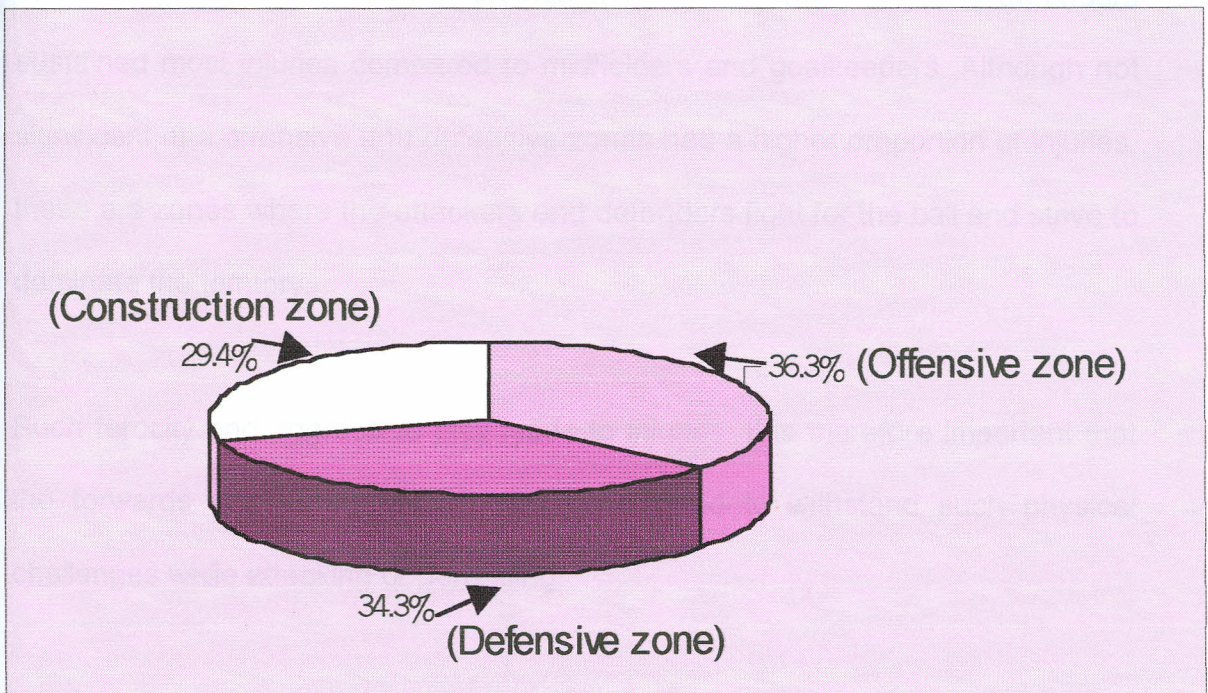
4.2.5 Distribution of injuries versus zones of the pitch

The distribution of injuries in relation to the three zones of the soccer pitch is summarized in table 5. Most injuries occurred in the offensive zone 37(36.3%) while construction zone recorded the least number of injuries 30 (29.4%).

Table 5: Distribution of injuries in relation to the three zones of the Soccer pitch

Zone	Defensive Zone	Construction zone	Offensive zone	Total	Remarks
Injury distribution	35 (34.3%)	30 (29.4%)	37 (36.3%)	102 (100%)	Not significant
Total	35 (34.3%)	30 (29.4%)	37 (36.3%)	102 (100%)	

$P \leq 0.05$; $\chi^2 \geq 5.99$; $df = 2$; $\chi^2 = 0.76$

**Fig 6: Distribution of injuries in relation to the three zones of the soccer pitch**

The calculated χ^2 of 0.76 is less than the table value of 5.99 ($P \leq 0.05$), hence the hypothesis that there is no significant difference in the number of injuries incurred in the offensive, construction and defensive zones of the field of play is accepted. Thus, the evidence was not enough to reject the null hypothesis, which

stated that there was no significant difference in the number of injuries incurred in the offensive, construction and defensive zones of the field of play.

The distribution of injuries in relation to the three zones of the soccer pitch is shown in figure six. The offensive zone recorded most injuries (36.3%) while the construction zone recorded the least percentage of injuries (29.4%).

The findings agree with earlier findings where the forwards and the defenders sustained most injuries compared to midfielders and goalkeepers. Although not significant, the offensive and defensive zones had a higher proportion of injuries, these are zones where the attackers and defenders fight for the ball and strive to dominate the territory.

Such ferocity and aggressive play leads to injuries. It is therefore important that the forwards and defenders be well conditioned to withstand such physical challenges while attacking or defending.

4.2.6 Number of injuries at different phases

Table 6 shows the nature and number of injuries at different phases of the tournament. Majority of the injuries affected soft tissues (79 77.5%) followed by injuries caused due to joint instability 22 (21.6%) and fracture 1 (0.98%).

Table 6: Number of injuries at different phases of the Tournament

NATURE OF INJURIES	PRELIMINARY PHASE	FIRST AND SECOND ROUND PHASE	POST QUARTER PHASE	TOTAL	REMARKS
Soft Tissue injuries					
Contusions	18	17	14	49	
Strain	2	-	-	2	
Bruise	5	2	2	9	
Abrasion	1	3	3	7	
Muscle cramp	2	4	4	10	
Laceration	2	-	-	2	
Sub-total	30	26	23	79	
Joint instability					
Sprain	8	5	3	16	
Dislocation	5	1	-	6	
Sub-total	13	6	3	22	
Fracture	1	-	0	1	
Sub-total	1	0	0	1	
Total	44	32	26	102	Not significant
$P \leq 0.05; \chi^2_{\geq 5.99}$	43.14%	31.37%	25.49%	100%	

$$df = 2; \chi^2 4.9$$

Table 6 reveals that the computed X^2 of 4.9 is less than that the table value of 5.99 ($P < 0.05$). The hypothesis that there was no significant difference in the number of injuries incurred in the preliminary, second round and final phases of the tournament is accepted. It is therefore, asserted that there is no significant difference in the number of injuries incurred in the preliminary, second round and final stages of the tournament. The high rate of injuries in the preliminary phase (43.14%) compared to 31.37% in the first and second round phases and 25.49% in the post quarter phase can be attributed to the fact that playing was more intense and aggressive at the preliminary level as teams of diverse qualities

strove hard to qualify for the next round of the tournament. This state of affairs can also be due to the fact that as the tournament advanced, better quality teams remained in the tournament. Such teams have better players technically and tactically; thereby minimize chances of unnecessary fouling and erratic tackles.

4.2.7 Nature of injuries incurred by players during the tournament

A total of 102 injuries were recorded during this study. Contusions caused 48%, followed by muscle cramps (9.8%), bruises (8.8%), abrasions (6.9%) and finally lacerations and strain each led to 1.9%. Sprains accounted for 15.6% while dislocation caused 5.8% of the total injuries. Fractures caused 0.98% of the injuries.

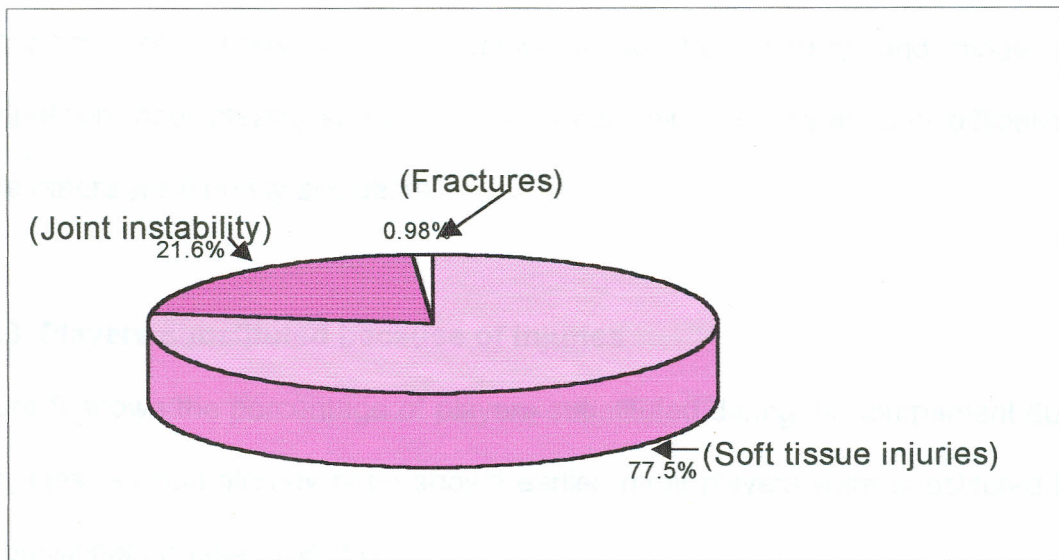


Fig 7: Nature of injuries during the Tournament

Figure seven summarizes the nature of injuries during the tournament. Soft tissue injuries accounted for the highest percentage (77.5%) of injuries. Since the researcher targeted eight matches per tournament phase the findings above are therefore logical.

In total soft tissue injuries led to most injuries (70%). These findings are close to Inkaar et al., (1988) who recorded 80% soft tissue injuries in soccer. However, Ellison's (1993) findings of 49% sprain, 25% fractures and 17% distortions are contrary to these findings. The findings also tally with Asembo et al., (1994), Ellison (1993) and Watson (1986) who reported more serious injuries such as dislocations and fractures. The diversity in the findings could be due to differences in the definition of each injury and the method of observation.

Occurrence of injuries could be attributed to the intensity and mode of competition, poor playing surfaces, poor conditioning as well as poor officiating while others were purely accidental.

4.2.8 Players substituted because of injuries

Figure 8 shows the percentage of players substituted during the tournament due to injuries. As had already been shown earlier, most players were substituted in the preliminary phase 17(62.96%).

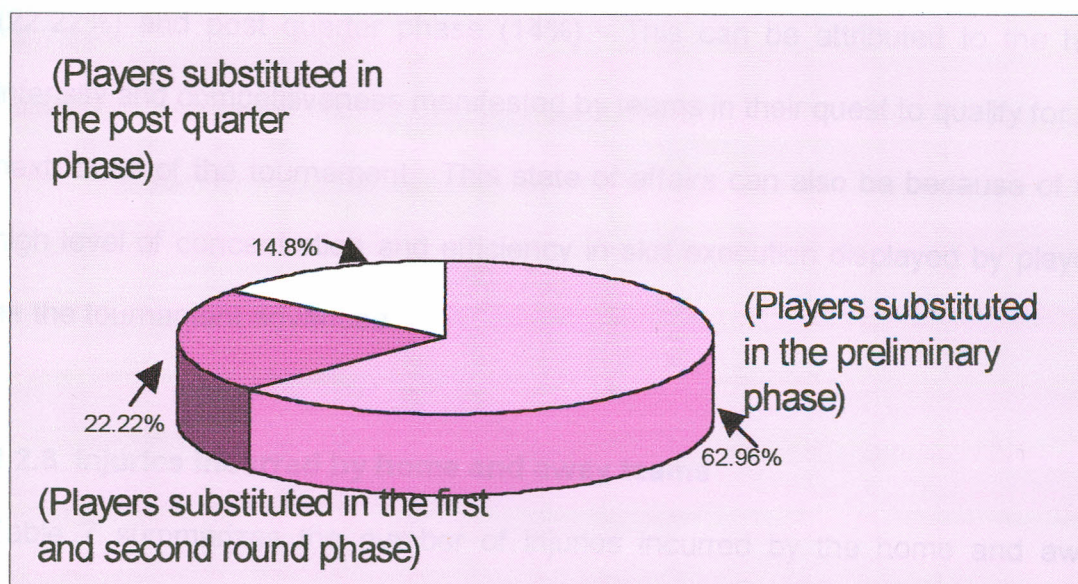


Fig. 8: Players substituted because of injuries during the Tournament

The calculated χ^2 of 10.9 is higher than the table value of 5.99 ($P \leq 0.05$). Thus the hypothesis that there is no significant difference in the number of players substituted because of injuries in the preliminary phase, first and second round phases and post quarter phase is rejected. It is asserted that there were significant differences in the number of players substituted because of injuries in the preliminary phase, first and second round phase and the post quarter phase.

Players substituted because of injuries are shown in Figure eight . Most players (62.96%) were substituted at the preliminary phase.

This study found that most players were substituted because of injuries at the preliminary phase (62.96%) compared to the first and second round phase

(22.22%) and post quarter phase (14%). This can be attributed to the high intensity and competitiveness manifested by teams in their quest to qualify for the next round of the tournament. This state of affairs can also be because of the high level of concentration and efficiency in skill execution displayed by players as the tournament advanced.

4.2.8 Injuries incurred by home and away teams

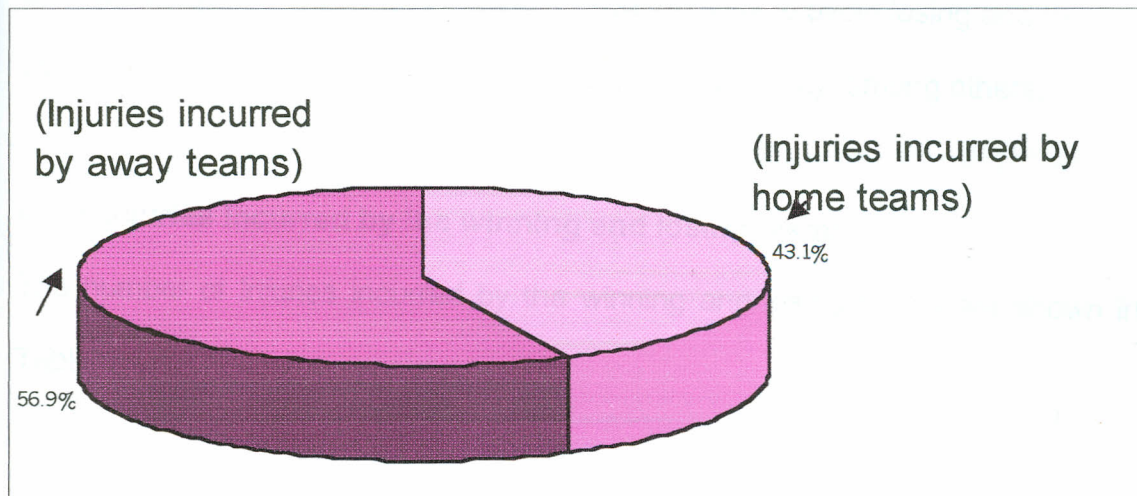
Table 7 summarizes the number of injuries incurred by the home and away teams.

Table 7: Number of injuries incurred by the home and away teams.

Teams	Home teams	Away teams	Total	Remarks
Injuries				
Soft tissue injuries	37	41	78(76.5%)	Not significant
Joint instability	7	16	23(22.5%)	
Fracture	—	1	1(0.98%)	
Total	44 43.1%	58 56.9%	102 100%	

$P \leq 0.05, X^2 \geq 3.84; df = 1; \chi^2 = 1.92$

Fig. 9: Number of injuries incurred by the home and away teams during the Tournament



The calculated X^2 of 1.92 is less than the table value of 3.84 ($p \leq 0.05$). Thus, the hypothesis that there is no significant difference in the number of injuries incurred by the home and away teams is not rejected. The hypothesis that there were no significant differences in the number of injuries incurred by the home and away teams is therefore upheld.

Figure nine shows the number of injuries incurred by the home and away teams. Away teams incurred most injuries (56.9%) while home teams sustained the least percentage of injuries (43.3%).

Away teams incurred more injuries (56.9%) compared to home teams, which incurred less injuries (43.1%). This trend of injuries can be attributed to the fact that away teams usually play under a lot of tension and anxiety caused by an

unusual environment. Secondly, since home teams feared losing and disappointing their supporters, they play aggressively to avoid losing and thereby causing more injuries to the away teams due to rough play, among others.

4.2.9 Injuries incurred by the winning and losing teams

The number of injuries incurred by the winning and losing teams are shown in Table 8.

Table 8: Number of injuries incurred by the winning and losing teams

Teams Injuries	Winning teams	Losing teams	Total	Remarks
Soft tissue injuries	43	36	79	Not significant
Joint instability	11	11	22	
Fracture	-	1	1	
Concussion	-	-	-	
Total	54 53%	48 47%	102 100%	

$$P \leq 0.05, \chi^2 \geq 3.84; df = 1; \chi^2 = 0.36$$

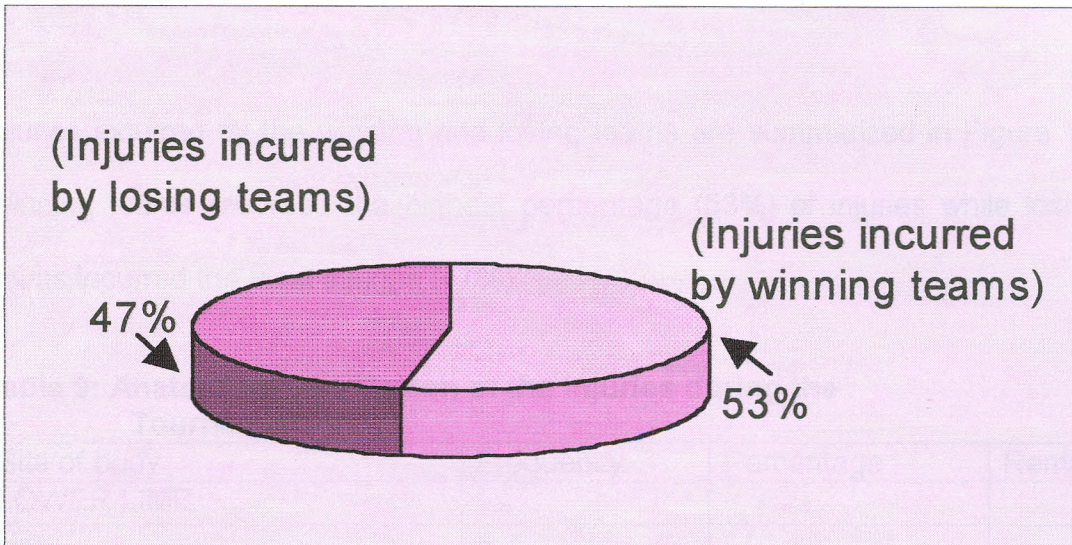


Fig.10: Injuries incurred by the winning and losing teams

Table 8 reveals that the computed X^2 of 0.36 is less than the table value of 3.84 ($P \leq 0.05$). The hypothesis that there is no significant difference in the number of injuries incurred by the winning and losing teams is not rejected. The evidence was not enough to reject the null hypothesis, which stated that there was no significant difference in the number of injuries incurred by the winning and losing teams.

This research found that winning teams incurred more injuries (53%) compared to losing teams, which incurred only 47% of the total injuries. This state of affairs could be attributed to the fact that winning teams tend to have a high ball possession compared to losing teams. This therefore predisposes the winning teams to injuries as the losing teams battled to get the ball from them (Njororai, 2000).

Injuries incurred by the winning and losing teams are summarized in Figure 10. Winning teams recorded the highest percentage (53%) of injuries while losing teams incurred the least injuries (47%).

Table 9: Anatomical distribution of the injuries during the Tournament

Site of body	Frequency	Percentage	Remarks
LOWER LIMB			
Hip	5		
Thigh	25		
Knees	8		
Lower leg	19		
Ankle	10		
Total	67	65.7%	
TRUNK			
Back	2		
Chest/Rib area	1		
Abdomen	01		
Total	4	3.9%	
Upper limb			
Shoulder	3		
Elbow	4		
Wrist	3		
Palm	4		
Total	14	13.7%	
HEAD			
Forehead	5		
Chick	1		
Backhead	2		
Parietal	9		
Total	17	16.7%	
TOTAL	102	100%	Significant

$P < 0.05$; $\chi^2 \geq 7.7$; $df = 3$; $\chi^2 = 93.3$

The calculated χ^2 of 93.6 is higher than the table value of 7.81 ($P \leq 0.05$). The hypothesis that there is no significant difference in the distribution of injuries amongst the lower limbs, trunk, upper limbs and the head is rejected. It is, therefore, found out that there was a significant difference in the distribution of injuries amongst the lower limbs, trunk, upper limbs and the head.

Anatomically 65.7% of the injuries affected the lower body (below the hip) while 34.3% affected the upper body. These findings tally with Asembo et al., (1995) who observed that 60.43% of the injuries affected the lower body while 39.51% affected the upper body and Wekesa et al., (1993) who also found that 60% and 40% of injuries affected lower and upper body respectively. The lower limb suffered 67.5%, which is closer to the 55% observed by Wekesa et al., (1993), 42.35% observed by Asembo et al., (1995) and 43% observed by Raschka et al., (1988). The above findings support Watson's (1995) observation that the lower limbs are the commonest sites of injuries in soccer.

4.3.1 Injuries in the first and second halves

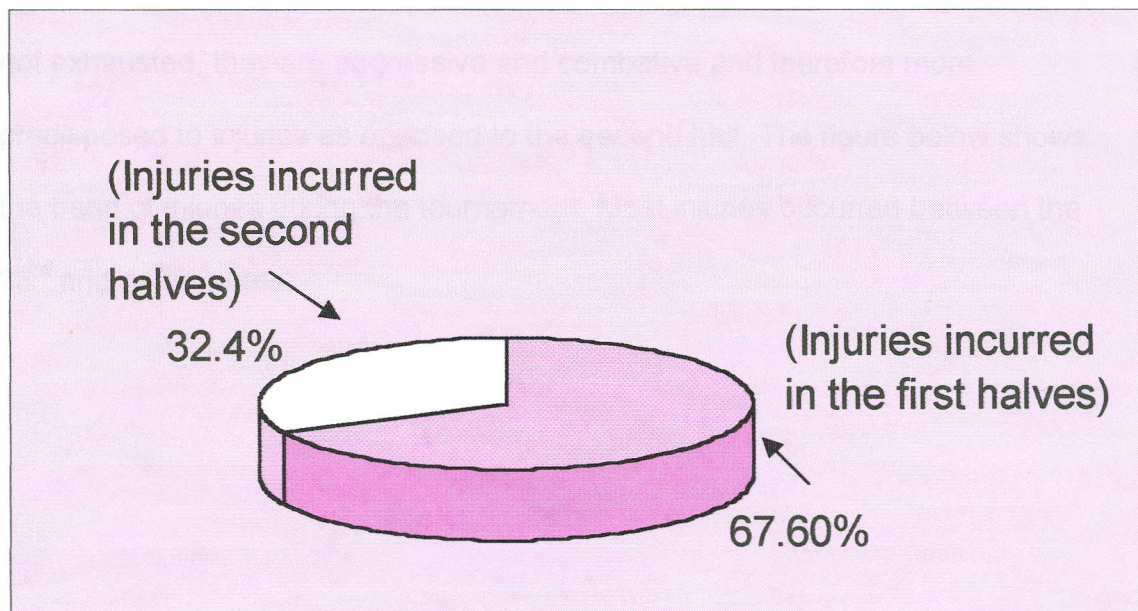
Table 10 summarizes the number of injuries incurred in the first and second halves of the matches played during the tournament. Sixty nine (67.6%) injuries were incurred in the first half compared to thirty three (32.4%) in the second half.

Table 10: Number of injuries incurred in the first and second halves of the matches played during the tournament

Level of Match	First half	Second Half	Total	Remarks
No. of injuries	69 (67.6%)	33 (32.4%)	102 (100%)	Significant
Total	69 67.6%	33 32.4%	102 100%	

$P < 0.05$; $\chi^2 \geq 3.84$; $df = 1$; $\chi^2 = 12.8$

Fig.11: Injuries incurred in the first and second halves of the matches



played during the Tournament

Table 10 reveals that the computed X^2 of 12.8 is greater than the table value of 3.84 ($P \leq 0.005$). The hypothesis that there is no significant difference in the

number of injuries incurred in the first and second halves incurred in the first and second halves of the matches played during the tournament. More injuries occurred in the first half (67.6%) compared to the second half, which registered (32.4%), injuries. These findings tally with Asembo et al., (1994) who observed more injuries in the first half (17%) and 14% in the second half. Injury rates were highest between the 26th and 44th minute contrary to Asembo et al., (1994) observation of 16th and 30th minutes. Figure eleven shows injuries in the first and second halves of the matches played during the tournament. First halves recorded the highest percentage (67.60%) of injuries.

Injuries tend to occur to players in the first half because at this time; players are not exhausted, they are aggressive and combative and therefore more predisposed to injuries as opposed to the second half. The figure below shows the trend of injuries during the tournament. Most injuries occurred between the 33rd and 44th minutes.

(a) Trend of injuries in the first half of the tournament

(b) Trend of injuries in the second half of the tournament

CENTRAL

SUMMARY OF FINDINGS AND RECOMMENDATIONS

3.0 Introduction

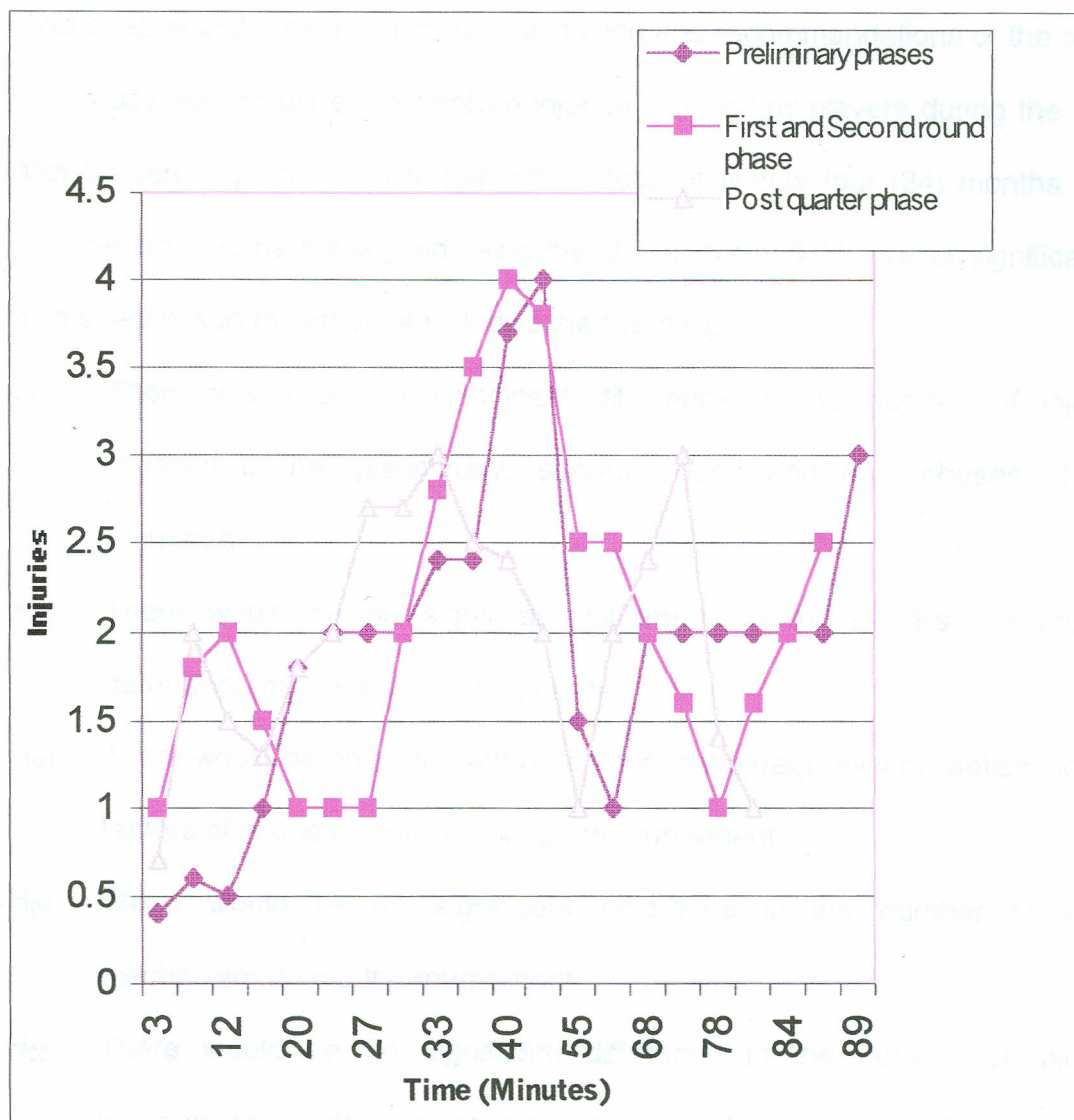


Fig. 12: Trend of injuries in the various phases of the Tournament

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter includes a summary, conclusion and recommendations of the study.

The study was designed to analyze injuries incurred by players during the 2001 Moi Golden Cup Soccer Tournament. A total of twenty four (24) months were covered and the data analyzed using the chi-square at 0.05 level of significance.

The specific sub-hypotheses included the following: -

H₀₁ There would be no significant difference in the number of injuries incurred in the preliminary, second round and final phases of the tournament.

H₀₂ There would be no significant difference in the injuries incurred by defenders, mid-fielders and forwards.

H₀₃ There would be no significant difference in the frequency of aetiological factors of injuries incurred during the tournament.

H₀₄ There would be no significant difference in the number of injury mechanism during the tournament.

H₀₅ There would be no significant difference in the number of injuries incurred in the offensive, construction and defensive zones of the field of play.

H₀₆ There would be no significant difference in the number of injuries incurred in the preliminary, second round and final phases of the tournament.

- H₀₇ There would be no significant difference in the number of players substituted because of injuries at the preliminary, second phase and final stages of the tournament.
- H₀₈ There would be no significant difference in the number of injuries incurred by the home and away teams.
- H₀₉ There would be no significant difference in the number of injuries incurred by the winning and losing teams.
- H₀₁₀ There would be no significant difference in the anatomical distribution of injuries amongst the trunk, head and lower limbs during the tournament.
- H₀₁₁ There would be no significant difference in the number of injuries incurred in the first and second halves of the matches played during the tournament.

5.1 Summary of the Findings

From the study it was found that there was no significant difference in the number of injuries incurred by players in different positions of play. Forwards had significant more injuries compared to midfielders, defenders and goalkeepers.

It was also noted from the study that there was a significant difference in the frequency of aetiological factors of injuries during the tournament. The opponent caused most injuries while the goalpost caused the least number of injuries.

On mechanism of injury, it was observed from the study that there was a significant difference in the mechanism of injury during the tournament. Being kicked by the opponent was the most frequent mechanism of injury while being hit by the goalkeeper was the least.

There was a significant difference in the number of players substituted at different phases of the tournament. There were more substitutes in the preliminary phase and least substitutes at the post quarter phase.

It was also determined from the study that there was a significant difference in the anatomical distribution of injuries during the tournament. The lower body part (hips and below) incurred most injuries followed by the head and the trunk respectively.

Lastly, the study showed that there was a significant difference in the number of injuries in the first and second halves of the matches played during the tournament. The first halves had more injuries compared to second halves.

5.2 Conclusions

From the findings of this study, the researcher concluded that most injuries occurred in the preliminary phase of the 2001 Moi Golden Cup Soccer tournament in Kenya. The high rate of injuries at the preliminary phase can be attributed to the fact that playing was more intense and aggressive at the

preliminary level as teams of diverse quantities strove hard to qualify for the next round of the tournament.

Secondly, it was concluded that forwards were most susceptible to injuries compared to the defenders, midfielders and goalkeepers during the tournament. Since play is normally intense in the goal area, there is no doubt that forwards and defenders incur more injuries compared to other categories of players.

It was also noted from the study that the opponent was the major cause of injuries in the tournament compared to the ball, surface, goalpost and other aetiological factors.

The main mechanism of injury during tournament matches was being kicked by the opponent followed by falling, collision, hit by ball, other mechanisms and lastly being hit by the goalpost.

Most players were substituted as a result of injuries at the preliminary phase of the tournament. However, less injury related substitutions were made at subsequent stages of the tournament. This state of affairs may be explained in the light of the high level of concentration and efficiency in skill execution displayed by players as the tournament advanced.

It was also concluded that away teams incurred more injuries than home teams during the tournament. This is because away teams usually play under a lot of tension and anxiety caused by an unusual environment.

Winning teams incurred more injuries than losing teams during tournament. Most injuries affected the lower body parts in the tournament. This state of affairs could be attributed to the fact that winning teams tend to have a high ball possession compared to losing teams. This therefore predisposes the winning teams to injuries as the losing teams battled to get the ball from them.

More injuries were in the first halves of the matches during the 2001 Moi Golden Cup Soccer Tournament. Injuries tend to occur to players in the first half because at this time, players are predisposed to injuries as opposed to the second half.

5.3 Recommendations

Based on the findings of this study the following recommendations which have implications for policy changes as well as further research are made:-

(a) Policy changes

The Ministry of Home Affairs, Heritage and Sports through its department of sports and in liaison with the Ministry of Local Government should ensure that soccer fields are maintained regularly to keep them in good condition. This will reduce chances of Kenyan players getting injured due to the bad state of the

fields. During this study it was noted that soccer fields were the second highest cause of injuries leading to 26.5% of the total injuries recorded.

Secondly, the Kenya Football Federation (KFF) should ensure that soccer rules and regulations outlined by the Federation of International Football Association (FIFA) are adhered to during soccer tournaments in Kenya. This will help to minimize injuries, which may be caused by rough and unsportsmanlike play. In this study the opponent caused 49% of the total injuries.

Also, the Government through the Kenya National Sports Council and the Kenya Football Federation should ensure that only qualified coaches and trainers handle teams to avoid situations where players sustain injuries due to poor preparation including lack of warm-up.

(b) Suggestions for further research

Based on the findings of this study, the researcher suggests that further research needs to be done to analyze acute injuries incurred by Kenyan female soccer players.

Secondly, there is need to analyze injuries by players during regional soccer tournaments. This will enlighten us on the trend of injuries incurred by players from different countries.

Further research should also be done to determine the socio-economic consequences of injuries among soccer players.

There is also need to investigate treatment and rehabilitation of injured Kenyan soccer players.

A similar study needs to be done on school going Kenyans to find out the trend of injuries among young Kenyans.

Lastly, a similar study needs to be done on the Premier league tournament to get a more national and representative trend of soccer injuries in Kenya.

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APPENDICES

APPENDIX A: THE 2001 MOI GOLDEN CUP TEAMS

Coast Stars
 Mombasa heroes
 Securicor
 Wazee wa Kazi
 Shabana
 Telkom
 Utalli
 Afya United
 Kenyatta Hospital
 Kenya Pipeline
 Kisima
 Transcom
 Ulinzi Stars
 Chemelil Sugar
 AFC Leopards
 Mathare United
 Nzoia Sugar
 Mumias Sugar
 Sher Agencies
 Sony Sugar
 Mahakama
 Umri
 KCB
 Brookebond
 Panpaper
 Nanyuki Top Life
 Gor Mahia
 Yessets
 Oserian Fastac
 Tusker FC

APPENDIX B: SOCCER MATCH OBSERVATION CHART

NAME OF TOURNAMENT:									
DATE:		WEATHER			TIME OF MATCH:				
MATCH:		VS							
GAME NO:				STAGE OF TOURNAMENT:					
TIME BALL IN PLAY:		1ST HALF:		VENUE:					
No	Nature	site	Time of injury	Aetiology	Players substituted because of injuries	mechanism	Part of the pitch where the injury occurred	Player's position	Team (Home/Away)
1									
2									
3									
4									
5									
Total					_____				

Number of injuries observed at the end of the match _____

Number of injuries for losing team _____

SECOND HALF:					WEATHER:				
No	Nature	site	Time of injury	Aetiology	Players substituted because of injuries	mechanism	Part of the pitch where the injury occurred	Player's position	Team (Home/ Away)
1									
2									
3									
4									
5									
Total					_____				

Total Number of Injuries Observed at the end of the match _____

Number of injuries for losing team _____

Number of injuries for away team _____

Number of injuries for home team _____

Comments _____

Name of Observer _____

Signature _____

Date: _____

APPENDIX C

Kenyatta University,
Department of Physical Education,
P. O Box 43844,
Nairobi.
2nd April 2001.

The secretary general,
Kenya Football Federation,
P. O Box 40234,
Nairobi.

Dear Sir,

RE: REQUEST FOR ACCESS TO STADIA

I am a student in Kenyatta University taking Masters of Education course and specializing in Physical Education.

I intend to analyze injuries incurred by players during the 2001 Moi Golden Cup Soccer Tournament.

The proposed study will cover a total of 24 matches and I will have three research assistants per match. The purpose of this letter, therefore, is to request you to grant my assistants and me free access to the stadia where the various matches of the tournament will be played.

I hope that my request will meet your most favourable reply and co-operation.

Thank you.

Yours faithfully,

ONYWERA VINCENT OCHIENG

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