EPIDEMIOLOGY AND MANAGEMENT OF BASKETBALL RELATED INJURIES IN RWANDA.

By

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ABSTRACT

Basketball continues to increase in popularity worldwide as a participation sport at all levels of play, from recreational to professional. Each year, more than 1.6 million basketball-related injuries are treated in hospitals, Doctor's offices and emergency rooms in North America. In Rwanda, basketball and volleyball are the second popular sports, following football. The aim of the study was to investigate the prevalence, mechanisms, nature and management of basketball related-injuries in Rwanda. The study design was retrospective survey over period of nine months. The study included all players of 12 teams. A structured self-administered questionnaire with closed-ended questions was used to gather information from basketball players. The questionnaire was adapted from the validated questionnaire used in a study on knee injury patterns among young basketball players in Cape Town. A response of 86.7% was obtained. The collected data were captured and analyzed by means of the Microsoft Excel package and SPSS. The associations between variables were evaluated by means of the chi-square test and 5% level of significance was used. The results were displayed using tables, bar chart, pie chart and graphs. All basketball players reported to sustain one or more injuries. The injury rate was 3.6 injuries per player per season. The injury prevalence was high during training (77%) compared to competition (23%). Ankle followed by fingers and knee were the most body parts involved. The most common mechanism of injury was landing badly. Self-treatment was a type of treatment mostly used by basketball players. The prevalence of basketball injury is high in Rwanda. The implementation of preventive strategies is of a paramount. A strong promotional campaign of physiotherapy services is needed, for adequate treatment and good rehabilitation of basketball players after injury.

DECLARATION

I hereby declare that "**Epidemiology and management of basketball related injuries in Rwanda**", is my own work, that it has not been submitted, or part of it, for any degree or examination in any other university, and that all the sources I have used or quoted have been indicated and acknowledged by means of complete references.

Signature: .....

MOUSSA HAKIZIMANA

SEPTEMBER 2005

Witness: .....

Prof. QUINETTE LOUW

DEDICATION

To my beloved wife ASSIA MAJORO, to my son ABDUL-RAZAQ H. and my daughter ISRA ISIMBI.

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ABBREVIATIONS

ACL: Anterior Cruciate Ligament

AGF: Association Génération sans Frontière.

APR: Armée Patriotique Rwandaise (Rwanda patriotic Army)

AROM: Active Range of Motion.

FERWABA: Fédération Rwandaise de Basketball.

ISAE: Institut des Sciences agronomiques et Elevage (High Institute of agriculture and animal husbandry).

KIE: Kigali Institute of Education

MTP: Meta-Tarso- Phalangeal

NCAA: National Collegiate Athletic Association.

OA: Osteoarthritis

ROM: Range of Motion.

QISU: Queensland Injury Surveillance Unit.

SPSS: Statistical Package of Social Science

UNICEF: United Nations children's fund

UNR: Université Nationale du Rwanda (Rwanda national university).

USA: United States of America

UWC: University of the Western Cape.

WHO: World Health Organization.

CHAPTER I

INTRODUCTION

1.1 INTRODUCTION

This study presents a description of basketball at all levels, in Rwanda and worldwide. This description attempts to explain how sports injuries and inadequate rehabilitation of injuries can affect the performance of basketball players. As background, the researcher presents the structure of the Rwandan Basketball Federation, the level of competition and the popularity of basketball in Rwanda and worldwide.

The rationale for this study was the researcher's observations and experiences regarding the lack of medical support for basketball players and the sports injury surveillance in Rwanda. The Rwandan Basketball Federation reportedly has inadequate basketball courts and inexperienced coaches. There is no sponsorship for the Rwandan basketball league (Rwandan Basketball Federation Report, 2003). In addition to these problems, the number of medical personnel is insufficient in Rwanda because of the 1994 genocide. To improve this problem the Rwandan government created Kigali Health Institute for the training of paramedical staff in different departments (Nursing, Dentistry, Physiotherapy, Laboratory and Radiology).

1.2. BACKGROUND OF THE STUDY

In Rwanda, basketball and volleyball are the second most popular sports, after football. The Rwandan Basketball Federation is composed of both male and female teams, which compete in first and second division leagues (Rwandan Basketball Federation Report, 2003). Basketball in Rwanda is largely amateur rather than professional.

Despite the lack of injury-prevalence studies, it is speculated that basketball injury prevalence may be high. The competition level of Rwandan basketball may be explained by the participation of Rwandan basketball teams at national as well as international level.

Basketball continues to increase in popularity worldwide as a participation sport at all levels of play, from recreational to professional (Zvijac & Thompson, 1996). Despite the popularity of basketball, there is a lack of information on the epidemiology of injuries. This lack of research may reflect the traditional view that basketball is a non-contact sport and is therefore expected to be safer than contact sports such as rugby (Louw et al., 2003). Although it is not considered a contact sport, basketball is a fast and aggressive game that has been shown to have a high frequency of injury (Meeuwisse, Sellmer & Hagel, 2003).

While the number and severity of injuries do not compare to football, a significant number of injuries do occur. As the sport grows in number of participants and in intensity, so does the number of injuries (Zvijac & Thompson, 1996). A set of sporting programmes such as protective and suitable equipment, appropriate surface as well as appropriate training, and adequate recovery have been designed as main components of injury prevention and rehabilitation (Brukner & Khan, 2003). In addition to the inadequate management of injuries, the poor socio-economic circumstances in Rwanda may influence the injury patterns of basketball players. However, no research into injuries among Rwandan basketball players has been conducted to date. The number of medical physicians, physical therapists and other medical personnel is very insufficient because of the Rwandan 1994 genocide. Thus most teams may not have medical personnel to care for players' health. The medical team should be composed of the coach, sports-medicine physician, physical therapist, dietician and sport psychologist.

Each of these healthcare specialists plays a unique role in the sports-medicine team. The coach should be familiar with their respective roles to utilize each team member appropriately (Tippett, 1990).

1.3. MOTIVATION OF THE STUDY

The Rwandan sports-medicine association is a new association in our country, therefore, there is a lack of sports-medicine research. Furthermore, Rwandan basketball teams may experience inadequate management of injuries due to the insufficient number of medical personnel. Information about prevalence, mechanisms, and nature and treatment of basketball injuries may help to plan for primary prevention and to advocate for adequate treatment of related injuries in the future.

1.4. STATEMENT OF THE PROBLEM

There is currently no information on epidemiology of basketball-related injuries and their management in Rwanda.

1.5. AIM OF THE STUDY

The aim of this study is to investigate the prevalence, mechanisms, and nature and management of basketball-related injuries in Rwanda.

1.6. SPECIFIC OBJECTIVES

i. To identify prevalence of musculoskeletal-related injuries among basketball players in Rwanda over the 2004 basketball season.

ii. To identify the mechanisms and nature of basketball injuries regarding the first and second injuries sustained during the 2004 season.

iii. To determine the management of treatment of first and second injuries sustained during the 2004 basketball season.

1.7. SIGNIFICANCE OF THE STUDY

This study will be carried out in order to increase awareness of basketball players, coaches and managers about adequate physiotherapy management of their common injuries, for faster and safe recovery post injury and maintenance of their performance.

The results of the study will serve as a database for the Ministry of Youth, Culture and Sports, the National Olympic Committee and the Rwandan Federation of Basketball.

1.8. DEFINITION OF TERMS

EPIDEMIOLOGY: Is the study of the distribution and determinants of varying rates of diseases, injuries, or other health states in human populations for the purpose of identifying and implementing measures to prevent their development and spread (Caine, Caine, & Lindner, 1996).

BASKETBALL: Is a game played by two teams of five players, using a large ball which players try to throw into a high net hanging from a ring (*Oxford Advanced Learner's Dictionary*, 2000).

INJURY: An action in which the player received bodily harm necessitating stoppage of play or substitution; or display of an obvious disability, sustained during training or matches and causing a player to miss at least one training session or match (McKay, Goldie, Payne, Oakes & Watson, 2001).

PREVALENCE: Prevalence rates pertain to the total number of cases, new or old, that exists in a population at risk at a specific period of time (Caine et al., 1996).

1.9. SUMMARY OF CHAPTERS

Chapter one describes the basis of the present study. This includes the background of basketball in Rwanda and worldwide, the motivation of the study, the significance of the study and the aim and objectives of the study.

In chapter two, the literature reviewed highlights essential issues that need to be focused on. These include the prevalence and types of basketball sports injuries in Rwanda, as well as mechanisms and nature of those injuries. The costs and long-term effects of basketball injuries are also highlighted. The chapter further shows the risk factors and prevention strategies to counter basketball injuries. The chapter also shows the effectiveness of some physiotherapy modalities used to treat sports injuries. The health promotion of basketball players is also mentioned. The importance of epidemiology studies in sports injuries is reviewed.

In chapter three, an attempt is made to explain the methodological issues of the study, including study population and sampling, methods of data collection and the procedure of the study. A self-administered questionnaire survey was used in data collection. Descriptive statistics were used in quantitative data analysis. Finally, the chapter ends with issues of ethical consideration.

In chapter four, the presentation and brief description of the main results sremming from this study are given. The demographic characteristics of the Rwandan basketball players are reported. The prevalence of basketball injuries, most common body locations prone to injury, mechanisms, and nature of injuries are discussed. The treatment received by basketball players is also detailed. The chapter shows further the use of physiotherapy services by basketball players and possible reasons why players do not use physiotherapy services. Finally, the chapter shows the gender difference in basketball injuries revealed by this study.

In chapter five, the discussion stands on the interpretation of the current study findings, and the present study is compared with similar studies. An attempt is made to suggest how the problems revealed in the study can be resolved. Finally, the chapter ends by stating the limitations of the study.

The final chapter, entitled "Summary, Conclusions and Recommendations", summarizes, draws important results from the research and gives suggestions for future work or research.

CHAPTER TWO

LITERATURE REVIEW

2.1. INTRODUCTION

This chapter attempts to provide a review of the available literature directed specifically at basketball injuries, and a review containing any epidemiological data related to basketball was included in this chapter. The costs and long-term effects of basketball injuries as well as the gender differences in basketball injuries are also presented. The preventive strategies and the physiotherapy management of basketball injuries are mentioned. Finally, the importance of epidemiological studies is discussed. Table 2.1 presents the seven databases searches and terms used. All searches were limited to 1990-2005.

TABLE 2.1 Summary of Databases and Search terms used in this study.

Databases	Search terms
EBSCOHOST: - Academic search premier (1990-2005) - Medline (1990-2005) - CINAHL (1990-2005) - SportDiscuss (1990-2005) INFOTRAC: -Expanded academic search (1990-2005) SCIENCE DIRECT (1990-2005) SCIRUS (1990-2005)	Epidemiology, prevalence, types, mechanisms, nature, injuries, basketball, treatment, management.

Textbooks and manual searches were also used for additional information.

2.2. PHYSIOTHERAPY MANAGEMENT OF MUSCULOSKELETAL SPORT INJURIES.

Sports physiotherapy should surely rank as one of the most interesting, challenging and rewarding vocations available today (Zuluaga, Briggs, Carlisle, McDonald, McMeeken, Nickson, Oddy, & Wilson, 1995).

The role of the sports physiotherapist has expanded markedly over the past few years, reflecting in part the information explosion that has occurred within sports medicine (Zuluaga et al., 1995). Physiotherapists have an important role to play in the prevention of basketball injuries. More team and individual sports are now utilizing physiotherapists as support staff at training and competition venues, where their roles may vary greatly according to the sport, venue, country and availability of associated sports-medicine practitioners such as doctors, trainers, masseurs, and exercise physiologists (Zuluaga et al., 1995). There are many therapeutic techniques used in the treatment of sports injuries by physiotherapists such as manual therapy, electrotherapy, exercises, specific soft tissue mobilizations, rehabilitative exercises, and taping and bracing (Brukner & Khan, 2003). The physiotherapeutic management principles consist of referral, treatment, rehabilitation, prevention and health promotion of the athlete (McGonigle & Matley, 1994).

2.2.1. EFFECTIVENESS OF PHYSIOTHERAPY TREATMENT FOR SPORTS INJURIES

2.2.1.1. Different designs and a sample description of effectiveness of treatment for sports injuries studies.

Eight studies on effectiveness of treatment were retrieved. Three were randomized controlled trials (37.5%), 2 were cases studies (25%), 2 were systematic reviews of RCT (25%) and 1 was a survey (12.5%). The sample size varied between 1 and 50,000 subjects.

The subjects were males and females. Of 8 studies, 5 measured the effectiveness of treatment of ankle injuries in sports. According to the literature, the ankle is the most common body part involved in basketball injuries. These studies are also related to basketball ankle injuries because the treatment approach to ankle injuries is the same for all ankle sports injuries. Table 2.2 summarises different designs and provides a sample description of the effectiveness of treatment from studies of sports injuries.

Table 2.2 Study designs and a sample description of studies on the effectiveness of treatment.

Author/s	Study design	Sample size+ Description
Bernier and Perrin, 1998	RCT	45 Subjects Males and females
Steiner et al., 1999	Case study	1 Male
Glosoe et al., 1999	Case study	1 Female
Hubbard et al., 2004	Systematic review of RCT	4 RCT
Bleakley et al., 2004	Systematic review of RCT	20 RCT
Toni et al., 2001	RCT	41 patients Males and females
Cooke et al., 2003	Survey	50,000 patients Males and females
Eiff et al., 1994	RCT	82 patients Males and females

2.2.1.2. Study aims and outcome measures of studies on the effectiveness of treatment.

Table 2.3 summarizes study aims and outcome measures of studies on the effectiveness of treatment of sports injuries, retrieved from the literature.

Table 2.3 Study aims and outcome measures studies of the effectiveness of treatment.

Author/s	Study aim	Outcome measures
Bernier and Perrin, 1998	To determine the effect of coordination & balance training program on proprioception of subjects with functional ankle instability.	Joint position sense, Postural stability/ postural sway.
Steiner et al., 1999	To enhance ankle tissue healing by Reducing gravitational force through a prescriptive exercise & unloading program	Ankle ROM, Max. pain-free isometric strength, Vertical force during unilat. squats, Unilat.hop time & distance.
Glosoe et al., 1999	To describe a protocol used in rehab of a grade 2 lat. ankle sprain.	Swelling, Ankle AROM, Gait analysis, Vertical ground-reaction force analysis.
Hubbard et al., 2004	To address the effect of cryotherapy on return to participation after injury.	Not mentioned
Bleakley et al., 2004	To assess the evidence based for cryotherapy in the treatment of acute soft tissue injuries.	Not mentioned
Toni et al., 2001	To investigate the effect of a specific joint AP mobilization on increasing pain-free dorsiflexion & 3- gait variables.	Pain, ROM in dorsiflexion, Stride speed, step length, Time.
Cooke et al., 2003	To determine current consultant practice in management of severe ankle sprains.	Response-rate of the questionnaire
Eiff et al., 1994	To determine which treatment for first time ankle sprain, early Mob. Or Immob., is more effective.	Pain, swelling, instability and time loss from work.

2.2.1.3. Main results of studies on the effectiveness of treatment

Table 2.4 summarizes the main results of studies, retrieved from the literature, on the effectiveness of treatment. The effectiveness of ultrasound therapy for treating people with pain, musculoskeletal injuries, and soft tissue lesions remains questionable (Wilkin, 2002).

Literature reviews of studies into the effectiveness of therapeutic ultrasound concluded that there is little evidence that active therapeutic ultrasound is more effective than placebo ultrasound treatment for pain and a range of musculoskeletal injuries or for promoting soft tissue healing (Robertson & Baker, 2001; Hubbard et al., 2004; Bleakley et al., 2004).

Table 2.4 Main results of studies on the effectiveness of treatment.

Author/s	Main results
Bernier and Perrin, 1998	1. Postural sway can be improved. 2. Balance +coordination should be part of rehab. protocols.
Steiner et al., 1999	Importance of specificity of training, consistency & dosage & progressive loading.
Glosoe et al., 1999	There is a quick return to sports after a short period of ankle immobilization.
Hubbard et al., 2004	Cryotherapy had a positive effect on return to participation
Bleakley et al., 2004	There was marginal evidence that ice plus exercises is most effective after ankle sprain.
Toni et al., 2001	AP mob. Improved pain-free ankle ROM & functional outcome of stride speed. Plus RICE decreases days of treatment
Cooke et al., 2003	Functional treatment is better than either immobilization or no treatment.
Eiff et al., 1994	Early mobilization allows earlier return to work and is more comfortable for patients.

2.2.1.4. Summary

A number of physiotherapy techniques/modalities have been proved to be effective in management of sports injuries. Despite the key role of physiotherapy in sports medicine, the effectiveness of some commonly used therapeutic modalities such as ultrasound remains questionable. Further randomized controlled trials are needed for more evidence on its effectiveness.

2.3. COST AND LONG-TERM EFFECTS OF BASKETBALL INJURIES.

2.3.1. COST OF BASKETBALL INJURIES

Numerous injuries, caused by sport, occur each year, resulting in decreased physical activity, work time lost, and substantial medical costs. Kraus and Conroy, in Murphy et al. (2003), estimated that 3-5 million injuries occur annually among competitive and recreational athletes in the United States alone. Each year, more than 1.6 million basketball-related injuries are treated in hospitals, doctor's offices and emergency rooms in North America (NCAA, Injury Surveillance System, 2000-2001).

Finch and Owen (2001) reported that the costs of sports injuries can be classified in direct costs (costs of treatment, hospitalization and rehabilitation for sports injuries) and indirect costs of injuries including productivity losses and time spent in hospital. For elite sports participants, indirect costs can be very high as injury might force their temporary or permanent withdrawal from competitive sports from which they earn an income.Numerous studies found that ankle and knee injury types were more common than others (NCAA, 2000-2001; Larry, 1995; Zvijac & Thompson, 1996; Prebble et al., 1999). However, since the knee is the most complex and incongruent joint in the body, injuries are usually more serious, and frequently, surgery or hospitalisation is required (Louw et al., 2003). Knee injuries are common and account, in various sports, for 15-50% of all sports injuries. The cost of knee injuries is therefore a large part of the cost for medical care of sports injuries (Loes et al., 1999). Table 2.5 summarizes the costs of treatment in basketball injuries.

Table 2.5 Costs of treatment in basketball injuries.

Authors	Type of treatment	Cost of treatment	Country
De Loës, 2000	Medical treatment	US$ 1427 in males and US$ 1060 in females for basketball.	SWITZERLAND
Preyde, 2000	Massage therapy Soft tissue manipulation Remedial exercise and laser therapy	US$ 50 per session US$ 240 US$ 90	CANADA
Steele, 1999	Knee treatment	25% of total injury cost	AUSTRALIA
De Loës, 1990	Knee treatment	US$ 553	SWEDEN
Egger, 1990		Estimated the cost of sports injuries to be in excess of U$1 billion per annum.	AUSTRALIA
Hergenroeder, 1998		Estimated the cost to be US$ 1.3 billion in organized sports.	USA
AAOS, 1998		Estimated the total cost of basketball injuries to be over $ 6.62 billion in 1998.	USA
www.basketball.org.nz		The cost of basketball injuries was $ 1.4 million per year from 1997 to 2003	NEW-ZEALAND

2.3.2. LONG-TERM EFFECTS OF BASKETBALL INJURIES

Despite the health benefits of sports, sport also has adverse effects such as musculoskeletal injuries. Even though the absolute number of sports injuries is high, sports injuries are not usually severe, and consequent permanent disabilities are rather uncommon (Kujala, Orava, Parkkari, Kaprio, & Sarna, 2003).

Kujala et al. (2003) reported that former athletes have more degenerative changes in their joints and spines. The increased risk of developing premature osteoarthritis is strongly associated with the occurrence of joint injuries. In particular, power sports and team games (such as football, basketball, handball etc.) that include high risk for joint injuries and very high peak loads predict elevated premature lower limb osteoarthritis (Kujala et al., 2003).

Sports-related knee injury is the most common reason for a mild to moderate degree of permanent disability. Ankle injuries are not regarded as a common cause of long-term disability (Kujala et al., 2003). However, the risk of hip osteoarthritis is also increased among former athletes. Injuries to muscle and tendon are observed in many team sports. A typical partial muscle rupture usually heals well without causing long-term problems. However, repeated partial tears and total ruptures can lead to long-term problems (Kujala et al., 2003). The Achilles tendon is the most commonly injured tendon in running sports.

Shoulder region tendons, including rotator cuff, are commonly injured in sports such as tennis, basketball, volleyball, handball and throwers. Rotator cuff problems can be secondary to impingement or instability.

In the case of tendon injuries of the hand and wrist region, permanent disability is seen most commonly when the injury is not diagnosed and treated correctly during the first months (Kujala et al., 2003). Table 2.6 presents a summary of musculoskeletal sports injuries causing long-term problems.

Table 2.6 Examples of typical musculoskeletal sports injuries causing long-term problems in later life (Kujala et al., 2003)

Anatomical location	Injury	Problem causing pain and functional impairment later in life
Lower extremity		
Thigh	Total Hamstring tendon rupture	Weakness, pain and instability of the knee, chronic pain at posterior thigh due to neuromae of sciatic nerve branches
	Partial hamstring tendon tear/scar	Pain at ischial tuberosity and posterior thigh at rest and particularly during activity, tightness of posterior thigh
	Q-ceps muscle tear and contusion	Weakness and heterotopic ossification
Knee	Cruciate ligament tear	Instability, OA, limitations in daily activities
	Cartilage injury/intra-articular fracture	OA, stiffness
	Meniscal injury/surgery	Unilateral OA.
Ankle	Fractures	Decreased ROM, OA
	Ligament instability	Functional instability, limited dorsiflexion, OA
Foot	Stress fracture of navicular bone	pseudoarthrosis, talo-navicular OA
	Foot arch injuries/overuse	Flatfoot deformity
	First MTP joint injuries	Hallux rigidus
Upper extremity		
Shoulder	Recurrent luxations	Hypermobility, glenohumeral OA
	Rotator cuff tears	weakness, stiffness, OA
	Recurrent contusions	Glenohumeral and acromioclavicular OA
	Acromioclavicular luxations	OA.
	Humeral and glenoid fractures	Stiffness, OA
	Biceps tendon tear (long head)	Dropping of biceps mass, weakness
Upper arm	Fractures	Radial nerve lesion, OA
Elbow and forearm	Fractures(olecranon, radial head)	Limited ROM
	Ulnar collateral tear	Instability, OA.
Wrist and palm	Radius fracture	Deformity, carpal tunnel syndrome
	Scaphoid/lunatum fracture	Pseudoarthrosis, osteonecrosis
	Carpal ligament injuries	Instability, OA.
	Wrist tenosynovitis	Later chronic tenosynovitis, tendon tear with pain and decreased function.
Fingers	Mallet finger	Deformity, instability, OA
	Flexor tendon tear	Dysfunction, weakness
Back	Chronic repetitive bending, twisting and axial compression.	Disc degeneration, protrusion, spondylolysis, spondylolisthesis, spondylarthrosis
	Acute and stress injuries of vertebral end plates.	Increased cyphosis, disc disease, facet syndrome, Scheuermann's disease.
Pelvis and Hip	Cartilage injury to hip joint	Stiffness, OA
	Femoral collum stress fracture	Aseptic necrosis of caput femoris
	Inguinal injury	Chronic inguinal pain

2.4. PREVENTION OF BASKETBALL INJURIES

2.4.1. PREVENTION OF BASKETBALL INJURIES

It is becoming increasingly apparent that sports can present a danger to health in the form of sports injuries. The extent of the sports injury problem calls for preventive action based on the results of epidemiological research (van Mechelen et al., 1992). Sports injury data are needed to guide injury prevention activities, to set and monitor sports safety policies and interventions, and as the basis of sports injury prevention research (Finch, 1997). Measures to prevent sports injuries form part of what is called the "sequence of prevention". The sequence of prevention is summarised in 4 steps: i) establishing the extent of the sports injury problem (incidence, severity and consequences), ii) establishing the cause, risk factors and mechanisms of injuries, iii) introducing preventive measures or programmes, iv) assessing the effectiveness and cost effectiveness of preventive measures by repeating step 1 (Parkkari et al., 2001; Chalmers, 2002). Prevention of basketball injuries is very important for the team (because it decreases the loss of key players and the team has consistent results) and for the players (because it helps to maintain their performance for longer and decreases medical costs and time loss) (http://w.w.w.basketball.org.nz/).However, many countries or governments do not recognise the prevention of sports injuries as a priority. One major reason for this is that considerably less is known about sports injuries and their risk factors than is known about other injuries such as falls, drowning and road trauma (Orchand, & Finch, 2002).

2.4.2. PREVENTION STRATEGIES

In the literature, several studies suggested different programmes or strategies for different sports. In basketball, prevention strategies are based on training, equipment, technique, hydration, environment and officials.

2.4.2.1. Training

Trained coaching staff can impact positively upon basketball injury prevention. Players should undertake a supervised pre-season screening or physical conditioning program that concentrates on cardiovascular fitness, muscular strength, flexibility and neuromuscular training.

Players should also remember to warm up for 10-20 minutes before every game or training session and cool down and stretch afterwards (Scanlan & MacKay, 2001; Hergenroeder, 1998; Osborne & Rizzo, 2003; Bahr, 2001).

2.4.2.2. Technique

Coaches should be able to provide safe information to players on the team regarding preparation, conditioning, and proper playing technique. Coaches should teach the correct technique for passing, jumping, landing and shooting. Practising good technique will improve players' performances and aid in the prevention of injury (Scanlan & MacKay, 2001; Hergenroeder, 1998).

2.4.2.3. Equipment

Basketball shoes designed specifically for basketball are ideal medium-tops. The medium-top shoes go to above malleolli level and enable free ankle-joint movement, and players should wear those shoes in training and competition. Players also should use mouth-guards for dental injury prevention.

The use of brace or tape (on ankle, wrist, elbow etc.) for extra support is essential. The use of protective eye goggles would help to prevent ocular injury (Scanlan & MacKay, 2001; Hergenroeder, 1998; Bahr, 2001).

2.4.2.4. Hydration

Proper hydration is recommended. Players should drink water before, during and after the game or training. Hydration maintains blood volume and cardiovascular function and ensures regulation of body temperature. Adequate hydration is therefore necessary for optimum training performance and recovery (Scanlan & MacKay, 2001; Hergenroeder, 1998).

2.4.2.5. Environment

Coaches and trainers should regularly check the playing surface and eliminate any potential hazards (wet areas, debris or obstacles). The safe environment helps to reduce accidents during training or competition (Scanlan & MacKay, 2001).

2.4.2.6. Officials

Proper officiating might play a significant role in injury reduction among youth participating in sports. Officials should strictly enforce rules to minimise potentially dangerous plays (Hergenroeder, 1998; Scanlan & MacKay, 2001).

2.4.3. STUDIES CONDUCTED TO ASSESS PREVENTIVE INTERVENTIONS

Research has revealed that strategies designed to prevent sports injuries can be effective. Preventive interventions that are effective enough to measurably alter injury profiles have included changes in rules or improvements in protective equipment (Parkkari et al., 2001). In preventive intervention studies, two randomized controlled trials were retrieved. Barrett et al. (1993) showed that there is no strong relationship between the

shoe type used and ankle sprains in basketball players, and Sitler et al. (1994) showed that the number of ankle injuries among the military cadet intramural group was significantly reduced with the use of ankle stabilizers. But, the severity of ankle injuries was not significantly reduced with ankle stabilizer use. In non-randomized controlled trials, Quinn et al., in Parkkari et al. (2001), reported that there was a reduction (51%) in the number of ankle sprains in individuals allocated these external ankle supports. In a study on the effect of three types of ankle braces on the prevention of dynamic forced ankle inversion, Ubell et al. (2003) found that all three braces tested decreased the probability of forced inversion at touchdown from a jump landing by nearly threefold. Tropp et al., in Parkkari et al. (2001), reported a reduction in ankle sprains on an ankle disc among those participating in balance and coordination training. Hewett et al. (1999) reported a significantly lower incidence of knee injuries among female athletes after a specific plyometric training programme, compared with untrained controls.

In a study on the effect of mouth-guards on dental injuries and concussions in college basketball players, Labella et al. (2002) found that mouth-guard users had significantly lower rates of dental injuries and dentist referrals than nonusers. But, there were no significant differences between mouth-guard users and nonusers in rates of concussions or oral soft tissue injuries. Several randomized controlled trials have been conducted to measure the effectiveness of preventive interventions in other sports such as soccer, American football, ice-hockey, skiing, etc.

2.4.4. HEALTH PROMOTION OF BASKETBALL PLAYERS

The World Health Organization (WHO, 1986) defines health as "a state of physical, mental and social well-being and not merely the absence of disease or infirmity" and defines health promotion as "the process of enabling people to increase control over and to improve their health". To reach a state of complete physical, mental and social well-being, an individual or group must be able to identify and to realize aspirations, to satisfy needs, and to change or to cope with the environment.

Physiotherapy could promote the health of basketball players by enabling them to increase control over their injuries through information, educational programs and advice on appropriate rehabilitation. The information and educational programs should focus on different groups including team managers, coaches, officials and players (Timpka & Lindqvist, 2001). Timpka and Lindqvist suggested that in education the emphasis should be put on the role of safety norms and rules (protective equipment, training, officiating, warming up and stretching before a game or training) in injuries prevention. Individual advice should be given on rehabilitation and how to avoid injury in the future. Timpka and Lindqvist (2001) found that the prevention programs based on evidence-based promotion of fair play and use of protective equipment reduced the rate and severity of injuries in team sports. Physiotherapists could also advocate for the implementation of other preventive strategies. Health promotion is thus not just the responsibility of the health sector, but goes beyond healthy lifestyles to well-being (WHO, 1986).

2.5. EPIDEMIOLOGY OF BASKETBALL INJURIES

2.5.1. THE IMPORTANCE OF EPIDEMIOLOGY IN SPORTS

Epidemiology is the study of the distribution and determinants of varying rates of diseases, injuries, or other health in human populations for the purpose of identifying and implementing measures to prevent their development and spread (Caine et al., 1996).

Sport and active recreation injuries are a public health problem and a significant proportion requires treatment from the healthcare sector (Finch et al., 1999). Basketball continues to increase in popularity worldwide as a participation sport at all levels of play, from recreational to professional (Zvijac & Thompson, 1996). Despite the popularity of basketball, there is a lack of information on the epidemiology of injuries, especially in Africa. Epidemiology data are needed to guide injury prevention activities and to monitor sports safety policies and interventions (Finch, 1997). No study has exhaustively researched the epidemiology of Rwandan basketball players' injuries in order to assess the scope of the problem and recommend guidelines regarding most common injuries, adequate treatment and rehabilitation.

2.5.2. RISK FACTORS OF BASKETBALL INJURIES

Sports injuries are multi-risk phenomena with various risk factors interacting at a given time. In brief, factors associated with injury proneness can be classified into extrinsic and intrinsic risk factors. Extrinsic risk factors include type of sports, level of competition, exposure time, position in the team, skill level, type, amount, frequency and intensity of training, playing surface, weather conditions, time of season, human factors (team mates, opponents, referee, coach, and spectators), shoe type, and use of tape or brace. Intrinsic risk factors include age, sex, previous injury, physical fitness, body size, limb dominance, flexibility, muscle strength, imbalance and reaction time, anatomical alignment,

inadequate rehabilitation, foot morphology, ligamentous instability, motivation, and stress coping (Murphy et al., 2003; Parkkari et al., 2001; De Loës et al., 2000; Zvijac & Thompson, 1996; Bahr & Holme, 2003). Table 2.7 summarizes the extrinsic risk factors of basketball injuries, and table 2.8 summarizes the intrinsic risk factors of basketball injuries.

Table 2.7 Extrinsic risk factors of basketball injuries.

Author (s)	Extrinsic risk factors	Findings
Murphy et al., 2003; Messina et al.,1999	Level of competition	Injury incidence is greater during competition than in training sessions
Hosea et al., 2000	"	Basketball players doubled their risk for sustaining an ankle injury at intercollegiate level compared with interscholastic level.
Hosea et al., 2000	Skill level	Twofold increased incidence of ankle injury at the collegiate level (high skill level) compared with high school (low skill level)
Milgrom et al., 1991; Barrett et al., 1993	Shoe type	No association between ankle injury and shoe type.
McKay et al., 2001	"	There is association between ankle injury incidence and shoe type.
Murphy et al., 2003; Beynnon et al., 2002	Bracing and taping	Use of ankle taping or braces decreases the incidence of ankle injury.
Quinn et al., 1997	"	51% reduction of ankle sprains in individuals allocated these external ankle supports.
Murphy et al., 2003; Beynnon et al.,2002	Playing surface	More injuries may be incurred on artificial turf than on other surfaces, because of its stiffness and the increased frictional force at the shoe/surface interface.

Table 2.8 Intrinsic risk factors of basketball injuries.

Author (s)	Intrinsic risk factors	Findings
Murphy et al.,2003; NCAA, 2000-2001; AAOS, 2002; McKay et al.,2001; Hewett, 2000; Messina, 1999; Powell & Barber-Foss, 2000; Wojtys et al.,1998	Sex/Gender	Female athletes incur substantially more knee injuries than male athletes, specifically ACL sprains.
McKay et al., 2001; Milgrom et al., 1991; Murphy et al., 2003	Previous injury and inadequate rehabilitation	There is increased risk for lateral ankle lig. injury after suffering a prior ankle injury.
Barrett et al., 1993; McKay et al., 2003; Witvrouw et al., 2001	Flexibility	There is association between knee laxity and knee injury, muscle tightness and injury.
McGuine et al., 2000	Postural stability	Athletes with postural sway (diminished balance) showed a sevenfold increase in ankle sprains compared with those with normal balance.
Lombardo et al., 2005;	Anatomical alignment	Intercondylar notch stenosis was not identified as a risk factor for an ACL tear.
Murphy et al., 2003		No agreement about the characterization of abnormal alignment or the methods of measuring it.
Barrett et al., 1993	Foot morphology	No significant relation between foot type (neutral, cavus, hyperpronator) and ankle injury was found.

2.5.3. BODY LOCATION AND INJURY TYPES

2.5.3.1. Body location of basketball injuries

The upper and lower extremities, spine and trunk, and oral and maxillofacial areas are classified as anatomical locations of injuries occurring in basketball.

The vast majority of injuries incurred during basketball are to the lower extremities. Ankle injuries are the most prevalent, followed by injuries to the knee (NCAA, 2000-2001; Larry, 1995; Zvijac & Thompson, 1996; Prebble et al., 1999). Apart from the lower extremities, occurrence of injuries is next highest to the lower back and then the hand and wrist. The ocular and maxillofacial injuries have been documented in numerous injury surveillance system reports. The ocular injuries sustained in basketball are due to blunt trauma from fingers and elbows of other players (Zvijac & Thompson, 1996).

2.5.3.2. Types of injury

The majority of injuries occurring in basketball at various levels are most often sudden-onset injuries. The most common injury types are muscle strains, ligament sprains, contusions and fractures. Dislocations, abrasions and laceration are also reported (Zvijac & Thompson, 1996; Cassel, Finch & Stathakis, 2003; Prebble, Chyou, Wittman, McCormick, Collins, & Zoch, 1999).

Table 2.9 Types of injuries identified in basketball studies.

Authors/years	Types of injuries
Zvijac & Thompson, 1996	
Cassel et al., 2003	Sprains/strains, bruising, fracture, inflammation
Prebble et al., 1999	Sprains, strains, fractures, contusions, laceration
Larry, 1995	Sprains, strains, and fractures
McKay et al., 1995	Sprains, strains, fractures, bruise, laceration, dislocation

2.5.4. SEVERITY AND NATURE OF BASKETBALL INJURIES.

2.5.4.1. Severity of basketball injuries

In the literature, the severity of injury is determined by different criteria such as nature of sports injury, activity lost, sporting or working time lost, duration and nature of

treatment, cost of treatment, permanent damage, impairment and disability (Parkkari, Kujala, & Kannus, 2001; van Mechelen, Hlobil, Kemper, 1992). The comparison of injury severity data across studies is further limited by the absence of indicators such as "grade" or "degree" of injury, where applicable (Caine et al., 1996). Table 2.7 summarizes the criteria of injury severity in some basketball studies.

Table 2.10 Criteria of injury severity identified in basketball studies.

Authors	Criteria of injury severity
McKay et al., 1996	Duration of absence from competition and treatment sought.
Gomez et al., 1996 and Messina, 1999	Treatment required: Surgery or hospitalization was characterized as severe.
McKay et al., 2001	Trivial: no games/trainings missed and no treatment sought Minor: 1 week of absence and require professional treatment Substantial: absence of 1-2 weeks Major: absence of 2-5 weeks Severe: absence of more than 5 weeks.
Louw et al., 2003	i) Able to continue the game post injury ii) Injury required first-aid before continuing the game iii) Injury required medical consultation after injury iv) Injury resulted in loss of game or practice play.
Beachy et al., 1997	Minor, mild, moderate and severe. The definitions of those criteria were not given in this study.

2.5.4.2. Nature of basketball injuries

According to Jones et al. (2000), the nature of basketball injury is described by a list of symptoms and presentations such as bruising, aches, severe pain, muscle strains, giving away, etc.

2.5.5. MECHANISMS OF BASKETBALL INJURIES

The majority of injuries at the high school and recreational levels are sustained during practice. However, college and professional basketball players are injured more frequently during competition (Zvijac & Thompson, 1996; Kujala et al., 1995).

Jumping, bumping, landing and making a lateral pivot while running are the major mechanisms of the injuries (De Benedette, 1991; Hewett, 2000; McKay, Goldie, Payne, & Oakes, 2001; Jones, Louw, & Grimmer K., 2000). Other injuries result from catching the ball (can cause fracture or dislocation of fingers or thumb or strain of MCP joint), violent twisting and turning movements, which can injure the knee, and defensive rebounding and falling to the floor (Cynthia T., 1990). Reports of indirect mechanisms of injury (events of injury not related to a specific trauma) may identify insidious or overuse injury. Overuse injury resulting from repetitive sub-acute trauma has been reported for elite young athletes (Jones et al., 2000).

Table 2.11 Mechanisms of injuries in basketball studies.

Authors/years	Mechanisms
De Benedette, 1991	Landing, jumping, bumping
Hewett, 2000	Landing, lateral pivot while running
McKay et al., 2001	Landing badly, sharp twist & turn, collision, tripping, sudden stopping
Jones et al., 2000	Tripping, landing badly, contact with another player and falling
Louw et al., 2003	Landing badly, bumping, falling, pain, tripping, overuse
Meeuwisse et al., 2003	Contact with another player, ball contact
Pebble et al., 1999	Contact with another player, collisions, contact with the ball.
Yde et al., 1990	Shooting, ball contact, running.

2.5.6. PREVALENCE OF BASKETBALL-RELATED INJURIES

Sport-related injuries are of concern internationally, as they have a significant social and economic impact on society. The prevalence of basketball injuries is high compared to other sports and differs depending on how it was calculated in different studies. Table 2.12 summarizes studies on the prevalence of basketball injuries.

Table 2.12 Studies on the prevalence of basketball injuries.

Authors/year	Prevalence
Mark et al., 2000	Basketball injuries accounted 10% of all injuries.
Larry, F.E., 1995	Basketball injuries accounted 4% of all injuries.
QISU, 2000	Basketball injuries accounted 7.1% of all injuries.
Louw et al., 2003	Injury prevalence = 40.6%.
Lindqvist et al., 1996	Basketball injuries accounted 10.9% of all injuries.
Moreira et al., 2002	Injury prevalence = 64.7%.
Casell et al., 2003	Basketball injuries accounted 17.5% of all injuries.
Messina, D.F., 1999	injury rates are 0.56 for boys and 0.49 for girls
Kujala et al., 1995	Injury prevalence = 56.0%.
Meeuwisse et al., 2003	Injury prevalence = 44.7%.
Gomez et al., 1996	Injury rate is 0.49 per athlete per season
McKay et al., 2001	Injury rate is 18.3 per 1,000 participations
Prebble et al., 1999	Basketball injuries accounted 19% of all injuries.
Yde & Nielsen, 1990	Injury incidence is 3.0 per 1,000 playing hours
Hickey et al., 1997	Injury incidence is 3.1 per 12 months
Maffulli et al., 1996	Basketball injuries accounted 15% of all injuries.
De Loës, 1995	injury rates are 3.5 for male and 4.9 for female per 1,000 hours

2.5.6.1. Definitions of injury

There are many definitions of sports injury in the literature (Chalmers, 2002). Table 2.13 summarizes different definitions used in studies on basketball sports injury published since 1990. These are generally operational definitions developed for a particular study and are couched in terms of inclusion criteria, such as inability to continue participation or requiring medical treatment. Often, some level of severity is implied in these definitions, such as the amount of time lost from participation or the level of treatment provided, be it first aid, emergency care, or hospital admission (Chalmers, 2002). Finch (1997) stated that the published sports injury reports are often difficult to interpret and compare with other published data because of different data collection methods and/or analysis methods. Standardized data collection methodologies including definitions are crucial for improving the comparability and interpretation of published data.

The international consensus on appropriate definitions would greatly assist the collection of comparable and reliable sports injury data (Finch, 1997). Meeuwisse and Love, in Chalmers (2002), suggested the use of a flexible definition of injury at the data collection phase of a study and then refining it at the analysis stage. This would involve using broad inclusion criteria and then collecting sufficient additional information, such as time lost due to injury, to permit various definitions of injury to be applied. This will not be practicable in some situations but may offer a way forward. A standard definition of sports injury which allows the interpretation and the comparison of sports injury data is not available.

Table 2.13 Definitions of sports injury according to different studies and authors.

Authors/year	No of studies	Definitions
Mark et al., 2000	1	Incident occurred while playing sport and resulting in missing a game or training, leaving the field of play or seeking medical or first aid attention.
Larry, F.E., 1995	1	An injury incurred while the victim was playing basketball or practicing basketball skills, in a formal or informal context.
Louw et al., 2003	1	One that occurred during practice or competition resulting from a traumatic incident. In addition the definition also encompassed overuse type of injuries not initiated by a specific traumatic event but causing symptoms such as pain and swelling while or after playing basketball.
Moreira et al., 2002	1	Incident causes the removal of player in the playground or absence for one or more days in training.
Messina, D.F., 1999; Gomez et al., 1996	2	One that occurred in an organized practice or game resulting in loss of time from practice or competition, necessitated the consultation of a physician, or involved the head or face.
Kujala et al., 1995; Hickey et al., 1997; De Loës, 1995.	3	Injury examined by a physician and reported to a national sports insurance company.
Meeuwisse et al., 2003	1	Any injury resulting in one or more complete or partial sessions of time loss or any concussion or transient neurologic neck injury.
McKay et al., 2001	1	An action in which the player perceived bodily harm had been sustained, necessitating stoppage of play, substitution or a display of obvious disability.
Yde & Nielsen, 1990	1	An incident occurring during a match or training in the club, causing the player to miss at least one match or one training session.
Maffulli et al., 1996	1	Event causing the athlete to miss a practice session or a match for at least 48 or 72 hours.

2.5.6.2. Sample population of prevalence studies

In most of the studies, the samples were very large and varied from 16 to 621,691 subjects. In most cases, the age is organized in interval variables. The minimum age is 4 years and the maximum age is 56 years. Table 2.14 summarises the sample population of prevalence studies.

Table 2.14 Sample population of prevalence studies

Authors/year	Sample size	Description	Age groups
Mark et al., 2000	1512	Male and female	9-56 years
Larry, F.E., 1995	4966	Male and female	5-19 years
QISU, 2000	9031	Male and female	5-24 years
Louw et al., 2003	458	Boys and girls	14-17 years
Lindqvist et al., 1996	41,000	Male and female	9-25 years
Moreira et al., 2002	16	Male	17-31 years
Casell et al., 2003	70,000	Male and female	4 years and over
Messina, D.F., 1999	1863	Boys and girls	14-18 years
Kujala et al., 1995	621,691	Male and female	15-34 years
Meeuwisse et al.,2003	318	Males	5-19 years
Gomez et al., 1996	890	Girls	14-18 years
McKay et al., 2001	10,393	Male and female	18-35 years
Prebble et al., 1999	6,000	Male and female	5-55 years
Yde & Nielsen, 1990	302	Boys and girls	10-18 years
Hickey et al., 1997	49	Female	16-18 years
Maffulli et al., 1996	238	Boys and girls	10-16 years
De Loës, 1995	350,000	Male and female	14-20 years

2.5.6.3. Study designs of prevalence studies

A variety of study designs including cross-sectional, prospective and retrospective cohort studies, case reports, and case series were employed to assess prevalence. Well-conducted cohort studies are strong designs. Most cross-sectional studies have been descriptive in nature and have been attempted to generate prevalence rate estimates for particular injury types, or for proportions of various injury types and locations. Cross-sectional studies have limitations in providing evidence for a cause-and-effect relationship because they do not provide direct evidence of the sequence of events and have inferior statistical power (Caine et al., 1996).

Most of prevalence studies reviewed were cross-sectional, 15 out of 17 studies (88.2%). Of 15 studies, 12 were prospective surveys and 3 studies were retrospective surveys. The other 2 studies were cohort studies (11.8%). Table 2.15 summarises different designs of prevalence studies.

Table 2.15 Study designs of prevalence studies.

Authors/year	No of studies	Study design
Mark et al., 2000; Meeuwisse et al., 2003	2	Cohort study
Larry, F.E., 1995; QISU, 2000; Casell et al., 2003; Lindqvist et al., 1996; Moreira et al., 2002; Kujala et al., 1995; Gomez et al., 1996; McKay et al.,2001; Prebble et al., 1999; Yde and Nielsen, 1990; De Loës, 1995; Messina et al., 1999.	12	Prospective survey
Louw et al., 2003; Hickey et al., 1997; Maffulli et al., 1996	3	Retrospective survey

2.5.6.4. Global distribution of prevalence studies

Many prevalence studies have been carried out globally. Of the total, 35.3% of studies retrieved were conducted in Australia (6 studies), 3 studies in the United States of America (17.7%), 1 study in Canada (5.9%), and 1 study in Brazil (5.9%).

In Europe, 4 studies were conducted as follows. One study was conducted in Denmark (5.9%), 1 study in Finland (5.9%), 1 study in Switzerland (5.9%) and 1 study in Sweden (5.9%). In Africa, there is a lack of studies on sports injuries in general and on prevalence of basketball studies in particular (Louw et al., 2003). Only 1 study done in South Africa is available (5.9%). Table 2.16 summarises the prevalence studies from different countries.

Table 2.16 Global distribution of prevalence studies

Authors/year	No of studies	Research setting	Country
Mark et al., 2000; Larry, 1995; QISU, 2000; Casell, 2003; McKay et al., 2001; Hickey et al., 1997	6	Team, Hospital, Injury surveillance, Hospital,competitions, clinic respectively.	Australia
Louw et al., 2003	1	Schools and clubs	South Africa
Lindqvist et al., 1996	1	Injury surveillance	Sweden
Moreira et al., 2002	1	National team	Brazil
Messina, D.F., 1999; Gomez et al., 1996; Prebble et al., 1999.	3	Schools, schools, hospital respectively.	USA
Kujala et al., 1995	1	Insurance company	Finland
Meeuwisse et al., 2003	1	Teams/clubs	Canada
Yde & Nielsen, 1990	1	Clubs	Denmark
Maffulli et al., 1996	1	Clinic	China
De Loës, 1995	1	Military Insurance	Switzerland

2.5.7. SUMMARY

The literature review highlights that the prevalence of basketball injuries is high worldwide. The use of a variety of data collection methods, data analysis methods and injury definitions limit the comparability and interpretation of published data. There is currently a lack of published studies into basketball in Africa. The next chapter will discuss the methodology used in this study.

CHAPTER THREE

METHODOLOGY

The aim of the study was to investigate the prevalence, mechanisms, and nature and management of basketball-related injuries in Rwanda. This chapter describes the research setting, sample, measurement tools and procedures. A description of study design, pilot study and how data analysis was carried out is given.

3.1. RESEARCH SETTING

The study was conducted in Rwanda. Rwanda is situated in the great lakes region in central Africa and has a surface area of 26,338 sq. km. (UNICEF, 1998). Rwanda is bordered to the north by Uganda, to the east by Tanzania, to the west by the Democratic Republic of Congo and to the south by Burundi (UNICEF, 1998). The study was conducted in twelve first-division basketball clubs/teams in Rwanda.

3.1.1. BASKETBALL STRUCTURE IN RWANDA

In Rwanda, there are two divisions of basketball. The first division is composed of twelve amateur teams (8 male teams and 4 female teams). The second division is comprised of secondary-school teams and recreational-level teams. The recreational level includes provincial and institutional basketball teams.

3.1.2. SUBJECT RECRUITMENT

We conveniently selected three provinces i.e. Kigali City, Butare and Ruhengeri. These teams were selected on the basis that are all in the first division.

In Kigali City, we recruited nine teams, two in Butare, and one in Ruhengeri. Table 3.1 summarizes the distribution of teams by province and district.

Table 3.1 Distribution of teams by province and district

PROVINCE	DISTRICT	TEAMS
KIGALI CITY	Nyarugenge	APR male & female basketball clubs KIGALI CITY male & female basketball clubs.
	Nyamirambo	ESPOIR basketball club
	Kacyiru	AGF basketball club
	Kicukiro	KICUKIRO basketball club KIE male & female basketball clubs
BUTARE	Municipality of Butare	UNR male & female basketball clubs
RUHENGERI	Mutobo	ISAE BUSOGO basketball club.

3.2. STUDY DESIGN

A retrospective survey with a retrospective period of nine months was conducted to capture information on the epidemiology and management of basketball-related injuries in Rwanda.

3.3. SAMPLE DESCRIPTION, SIZE AND RECRUITMENT

3.3.1. SAMPLE DESCRIPTION AND RECRUITMENT

Male and female teams were recruited. Currently there are twelve first-division teams in the Rwandan Federation of Basketball (8 male and 4 female teams); all basketball players from these teams were recruited.

3.3.2. SAMPLE SIZE

Each team had eighteen players on its players' list; thus, the total potential sample was 216 players. All eighteen basketball players per team were included in the study. However, all teams started training late (middle of February 2005 instead of January 2005).

Since the researcher had to return to South Africa in February 2005, the data collection time was insufficient to collect all data. Consequently, 183 basketball players (124 male basketball players and 59 female basketball players) instead of 211 players participated in the survey. The 5 players who participated in the pilot study were excluded from the main survey. Thus, we captured 86.7% of the potential sample.

Inclusion criteria

The inclusion criteria for players in this study were females and males of all ages who played for the season 2004 in first division until the period of data collection and who voluntarily agreed to participate in this study.

Exclusion criteria

The exclusion criteria were basketball players of the second division and all players who did not play for the season 2004.

3.4. RESEARCH PROCEDURE AND INSTRUMENTS

3.4.1. INSTRUMENTS

An adapted, structured, self-administered questionnaire with closed-ended questions was used (**Appendix E**). The questionnaire design was adapted from the validated questionnaire used in a study on knee injury patterns among young basketball players in Cape Town (Louw et al., 2003).

The entire questionnaire used in the Louw et al. study was used except the question regarding injury severity, since it did not conform to the specific objectives of this study. The researcher also added a question on use of physiotherapy services and reasons of use of physiotherapy services by basketball players. Exposure data was not collected, since this was a retrospective survey and recall bias will compromise the reliability of exposure data.

The reliability of exposure data will thus be questionable. The questionnaire was adapted to collect data retrospectively over a period of 9 months from Rwandan basketball players and to provide detailed information regarding prevalence, mechanisms, nature and management of basketball-related injuries.

The questionnaire comprised three sections:

Section A: Demographic characteristics included age, gender, team name, playing position, date and questionnaire number as well as the injury characteristics like occurrence of injury, period of occurrence, frequency of injury for the complete season and body parts and structures which were more affected.

Section B of the questionnaire was based on the two last injuries sustained by a player during the 2004 season (first and second injury). In the first three questions, players were requested to report on types of injury sustained. The players were given arrangements of different possible types of injury from which they had to choose one or more types and place a tick. For question 4, the players were requested to report on the mechanisms of the first injury. The players were given a range of possible mechanisms found in literature from which they had to choose one or more mechanisms and place a tick. For question 5, the players were requested to report on the nature of the injury by placing a tick in the relevant place, where a range of natures of injury was given.

In questions 6 to 8, the players were requested to report whether they received any treatment and were given a *yes* or *no* category response. If they answered *yes*, they had to specify a type of treatment received. A range of possible types of treatment was given, and they had to choose one or more responses by placing a tick.

For the second injury, the questions were the same eight questions as those for the first injury (types of injury sustained, mechanisms of injury and types of treatment received).

Section C of the questionnaire was composed of two questions (1 and 2) to assess the use of physiotherapy services by basketball players and possible reasons for using services. The first question was given five category responses: *Always, very often, often, sometimes and never.*

For the second question, players were given possible reasons for not using physiotherapy services and had to choose one or more responses by placing a tick. The questionnaires were distributed to the basketball players after training by the researcher or the researcher's assistants and were collected immediately to increase the response rate.

3.4.2. TRANSLATION OF THE INSTRUMENTS

Participants were allowed to complete the questionnaire in English, French or Kinyarwanda. The original questionnaire was in English (**Appendix E**) and professional translators translated the questionnaire from English to French (**Appendix F**) and from English to the local Kinyarwanda language (**Appendix G**) to maintain the precise content of the questionnaire. In order to maintain validity, French and Kinyarwanda questionnaires were translated back into English.

3.4.3. VALIDITY OF THE INSTRUMENTS

Validity means the ability to produce accurate results and to measure what is supposed to be measured (Sarantakos, 1998).

The questionnaire was adapted from a previously validated questionnaire (Louw et al., 2003). The re-translation was done to maintain the validity of the instrument.

3.4.4. PROCEDURE

3.4.4.1. Training assistants

Two final-year physiotherapy students at Kigali Health Institute (K.H.I) were trained during two days as research assistants to this study. The purpose of that training was to ensure that they understood the aim of the study and received the instructions regarding administration of the questionnaire.

3.4.4.2. Data collection

Data collection was performed by the researcher and two assistants. An explanation of the study was given to basketball players before the questionnaire was administered. The data was collected within the period of two weeks, from 15th February to 4th March, 2005. The completion took about 10-20 minutes. The questionnaire was administered before or after the training sessions. The questionnaire was self-administered at that particular time and was collected immediately to increase the response rate.

3.5. PILOT STUDY

The questionnaire used in this study was pre-tested during the pilot study to determine the clarity of the questions. The questionnaire was pre-tested for a period of three days on five basketball players who were excluded from the main study. No changes were done following the responses given by the players. The time taken to complete this questionnaire was about 10-20 minutes.

Reliability testing

Reliability refers to the ability of an instrument to produce consistent results (Sarantakos, 1998). To test reliability of the instrument, the test-retest method was used. Two repeated measures were conducted. A group of five conveniently selected basketball players of the first division and findings were compared to determine reliability. The interval between the first test and the retest was one week. The comparison was based on repeated measurements using the same questionnaire. There was 100% agreement between the first and second test responses.

3.6. DATA ANALYSIS.

The responses to the questionnaire were entered into Microsoft Excel and then analyzed descriptively using the Statistical Package for Social Science (SPSS). Descriptive statistics were used. Percentages, means, mode and standard deviations were calculated to describe the data set. SPSS-PC was used to accommodate the multiple responses provided by basketball players. The results were displayed by using tables, histograms, pie charts and graphs.

3.7. ETHICAL CONSIDERATIONS

Permission was obtained from the Committee of Higher Degrees at UWC. Permission to carry out the study was requested from the Minister of Youth, Culture and Sports in Rwanda (**Appendix A**) and from the President of the Rwandan Basketball Federation (**Appendix C**). Informed consent from the Minister of Youth, Culture and Sports (**Appendix B**) and from the president of the Rwandan Basketball Federation (**Appendix D**) was obtained. The aims and importance of the study were explained to players before the collection of data. It was explained that the study was voluntary and participants were ensured that all the information given would be confidential.

The data were collected for only those who were ready to voluntarily participate in the study and whose consent was obtained. Withdrawal at any stage of the study was ensured. The results will be made available to the Rwandan Ministry of Youth, Sports and Culture, the Rwandan Federation of Basketball, clubs, coaches and players.

CHAPTER FOUR

RESULTS

4.1. INTRODUCTION

In this chapter the results of the study are presented. The socio-demographic characteristics of basketball players are presented under various headings. Prevalence, mechanisms, nature of basketball injuries, body parts and structures injured and types of treatment and physiotherapy access by basketball players are graphically presented.

4.2. SOCIO-DEMOGRAPHIC CHARACTERISTICS OF BASKETBALL PLAYERS.

4.2.1 SAMPLE RESPONSE

Total of 211 questionnaires provided to basketball players, 183 basketball players responded to the survey, resulting in a response of 86.7%. Response among the females was 81.9% (n= 59) and 86.1% (n= 124) among male basketball players.

4.2.2 BIO-DEMOGRAPHIC DATA

The basketball players were aged between 18 and 34 years old (mean=21.99; SD= 2.716 years). Table 4.1 shows that most of basketball players were between 18 and 22 years old. Of 183 respondents in this study, 124 (67.8%) were male and 59 (32.2%) were female basketball players (Figure 4.1).

Distribution of basketball players regarding their gender

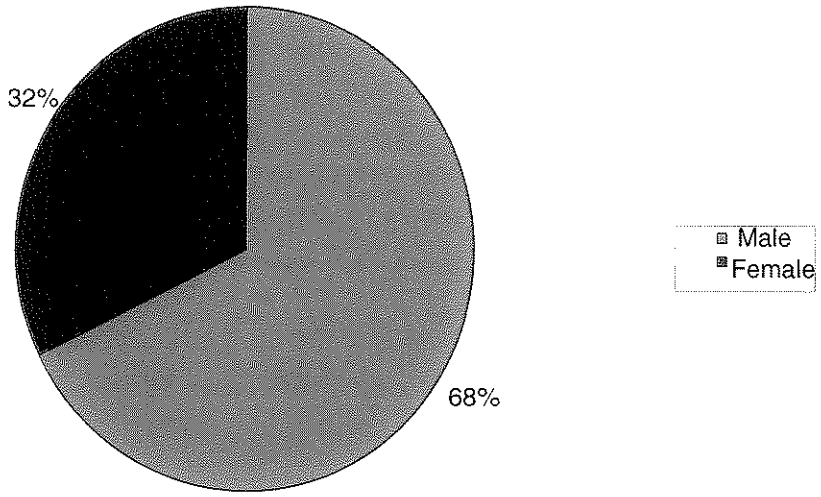

Figure 4.1 Distribution of basketball players regarding their gender.

Table 4.1:Distribution of basketball players regarding their age.

Variables	Characteristics	Frequency	Percentage
Age	18-22	117	63.9%
	23-28	61	33.4%
	29-35	5	2.5%

4.3. PREVALENCE AND PERIOD OF INJURY OCCURRENCE

All basketball players (n=183) sustained at least one or more injury. A total of 651 injuries occurred during training and competition, resulting in injury rate of 3.6 injuries per player per season.

The injuries occurred during training were 501 (77%) and 150 (23%) injuries occurred during competition. Most of basketball injuries in the present study occurred during training compared with competition sessions.

4.4. BODY PARTS INJURED

The study shows that the lower extremities are more often injured compared with the upper extremities. The most affected part was the ankle (79.2%, n=145). Basketball players who sustained ankle injury once was 63.4% (n=116), twice (8.2%, n=15), three times (6.0%, n=11), four times (1.1%, n=2) and five times (0.5%, n=1).

Finger injuries were second most common (57.3%, n=105), followed by knee injuries (51.9%, n=95). Other body parts such as eyes, elbow, forearm, leg, Achilles tendon and foot were less affected. Figure 4.2 shows the summary of body parts which are most affected in this study.

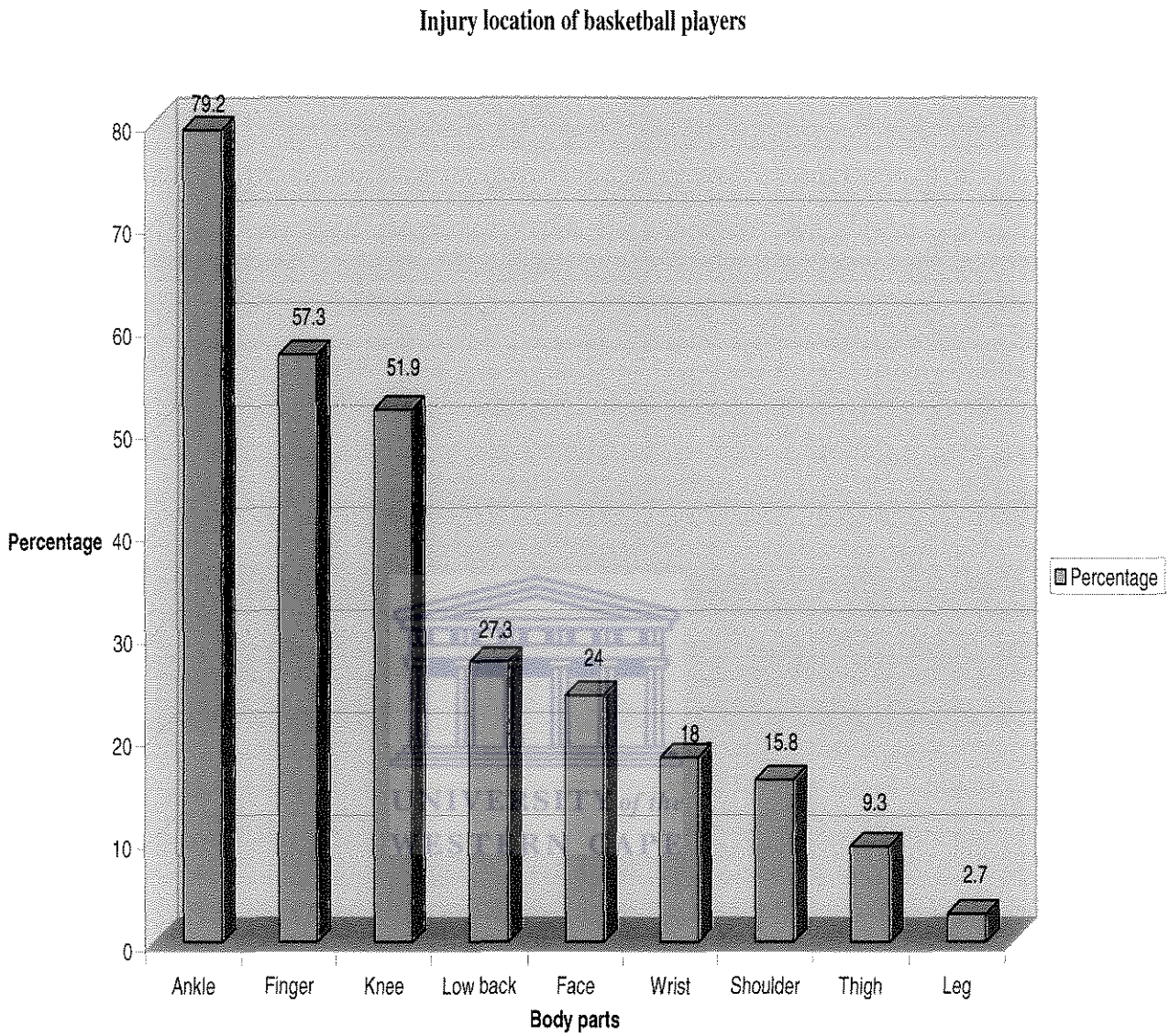

Figure 4.2: Percentage of injury location of basketball players.

4.5. MECHANISMS OF BASKETBALL RELATED INJURIES.

4.5.1. FIRST INJURY MECHANISMS

The 183 players could nominate more than one mechanism, thus the total number of mechanisms nominated was 352.

Of 352 mechanisms, the most reported mechanisms of basketball related injuries during training and competitions were defensive rebounding (18.2%, n=64) and landing badly from a jump (16.8%, n=59).

Contact with another player (15.9%, n= 56), bumped into someone (13.9%, n=49), catching a ball accounted for 9.7% (n=34) of the first injury mechanisms. Turn and twist, fell, feel pain when playing basketball and tripped were also reported.

4.5.2. SECOND INJURY MECHANISMS

The total number of mechanisms reported for injuries was 291.The most reported mechanisms of basketball injuries were landing badly from a jump (26.1%, n=76), defensive rebounding (18.9%, n=55). Turn and twist (12%, n=35), bumped into someone (9.3%, n=27), contact with another player (8.9%, n=26) were also reported in high percentage. Tripped, catching the ball, feel pain when playing basketball, fell, and lateral pivot were also reported. The most reported injury mechanisms for both second and first injury were landing badly from a jump and defensive rebounding. Table 4.2 shows mechanisms of injury for the first and second injury.

Table 4.2: Mechanisms of injury regarding first and second injury (n=183 basketball players).

Mechanisms	First injury	Second injury	Average
Defensive rebounding	18.2%	18.9%	18.5%
Landing badly	16.8%	26.1%	21.5%
Contact	15.9%	8.9%	12.4%
Bumped into someone	13.9%	9.3%	11.6%
Catching the ball	9.7%	5.8%	7.8%
Turn & twist	7.4%	12%	9.7%
Fell	7.4%	3.1%	5.3%
Pain when playing	6.8%	5.2%	6%
Tripped	3.9%	7.9%	5.9%
Lateral pivot	-	2.8%	-

4.6. SYMPTOMS RELATED TO BASKETBALL INJURIES

4.6.1. FIRST INJURY

For the first injury, the 183 players could nominate more than one symptom, thus the total number of symptoms nominated was 325. Of 325 symptoms, the most reported symptoms were swelling (40.6%, n=132) and severe pain (40.3%, n=131). The other symptoms were bleeding (5.8%, n=19), aching (9.9%, n=32), stiffness (2.5%, n=8), and giving away (0.9%, n=3).

4.6.2. SECOND INJURY

For the second injury, the 183 players also could nominate more than one symptom, thus the total number of symptoms nominated was 297. Of 297 symptoms, the most reported symptoms were swelling (45.8%, n=136) and severe pain (42.1%, n=125). The other symptoms were aching (6.7%, n=20), stiffness (2.4%, n=7), bruise (1.7%, n= 5) and giving away (1.3%, n=4). Swelling and severe pain were the most reported symptoms in the first and second injury. Table 4.3 shows the reported symptoms of basketball related injuries.

Table 4.3: Symptoms of basketball related injuries (n=183 basketball players).

Symptoms	First injury	Second injury
Swelling	40.6%	45.8%
Severe pain	40.3%	42.1%
Aching	9.9%	6.7%
Stiffness	2.5%	2.4%
Bruise	-	1.7%
Bleeding	5.8%	-
Giving away	0.9%	1.3%

4.7. GENDER DIFFERENCES IN BASKETBALL INJURIES

The present study showed that there was no difference in injuries according to gender except in knee and ankle injuries.

4.7.1 KNEE INJURIES

Table 4.4, shows that the female basketball players sustained more knee injuries in this study than male basketball players. Out of 59 female basketball players, 44 (74.6%) players sustained knee injuries and out of 124 male basketball players, 51 (41.1%) players sustained knee injuries.

Table 4.4 Gender versus knee injuries cross-tabulation.

GENDER	KNEE INJURIES				TOTAL	
	UNINJURED	%	INJURED	%	No of players	%
Female	15	25.4	44	74.6	59	100
Male	73	58.9	51	41.1	124	100

Chi-square tests (= 17.916) showed that there is a difference in knee injuries among females and males basketball players. However, there was a higher significance (p=0.000) that females basketball players sustained more knee injuries than male basketball players.

4.7.2 ANKLE INJURIES

Table 4.5 shows that the male basketball players sustained more ankle injuries in this study than female basketball players. Out of 124 male basketball players, 111 (89.5%) players sustained ankle injuries and out of 59 female basketball players, 34 (57.6%) players sustained ankle injuries.

Table 4.5 Gender versus ankle injuries cross-tabulation

GENDER	ANKLE INJURIES				TOTAL	
	Uninjured	%	Injured	%	No of players	%
Male	13	10.5	111	89.5	124	100
Female	25	42.4	34	57.6	59	100

Chi-square tests (=29.345) showed that there is a difference in ankle injuries among female and male basketball players. There was a higher significance (p =0.000) that male basketball players sustained more ankle injuries than female basketball players.

4.8. INJURY MANAGEMENT

4.8.1. FIRST INJURY

For the first injury, 97.8% (n=179) of basketball players reported that they received treatment. The options regarding types of treatment were medical, physiotherapy, traditional, self-treatment and none. The percentages were calculated on the basis of number of basketball players who sustained at least one injury. One or more treatment could be reported. The most type of treatment reported was self-treatment (67.8%, n=124), followed by medical (31.7%, n=58), physiotherapy (9.8%, n=18) and traditional treatment (5.5%, n=10). Self-treatment was defined as any use of anti-inflammatory drugs, strapping or ice by the player himself.

4.8.2. SECOND INJURY

For the second injury, 92.3% (n=169) of basketball reported that they received treatment. The most type of treatment reported is self-treatment (81.4%, n=149), followed by medical treatment (12.0%, n=22), physiotherapy (9.8%, n=18) and traditional treatment (9.8%, n=18). Other basketball players reported that they did not receive any type of treatment (1.6%, n=3). Table 4.6 shows the types of treatment received by basketball players.

Table 4.6: Types of treatment received by basketball players (n= 183 basketball players).

Types of treatment	First injury	Second injury
Self-treatment	67.8%	81.4%
Medical	31.7%	12.0%
Physiotherapy	9.8%	9.8%
Traditional	5.5%	9.8%
None	0.5%	1.1%

4.9. BASKETBALL PLAYERS' USE OF PHYSIOTHERAPY SERVICES

To measure the use of physiotherapy services, five variables were given: Always, very often, often, sometimes and never. 71.0% (n=130) of Rwandan basketball players reported that they have never used the physiotherapy services, 14.8% (n=27) have often visited physiotherapy services, 6.0% (n=11) sometimes visited physiotherapy services, 5.5% (n=10) visited physiotherapy services very often and 2.7 % (n=5) visited always physiotherapy services. Figure 4.3 shows the use of physiotherapy services by Rwandan basketball players.

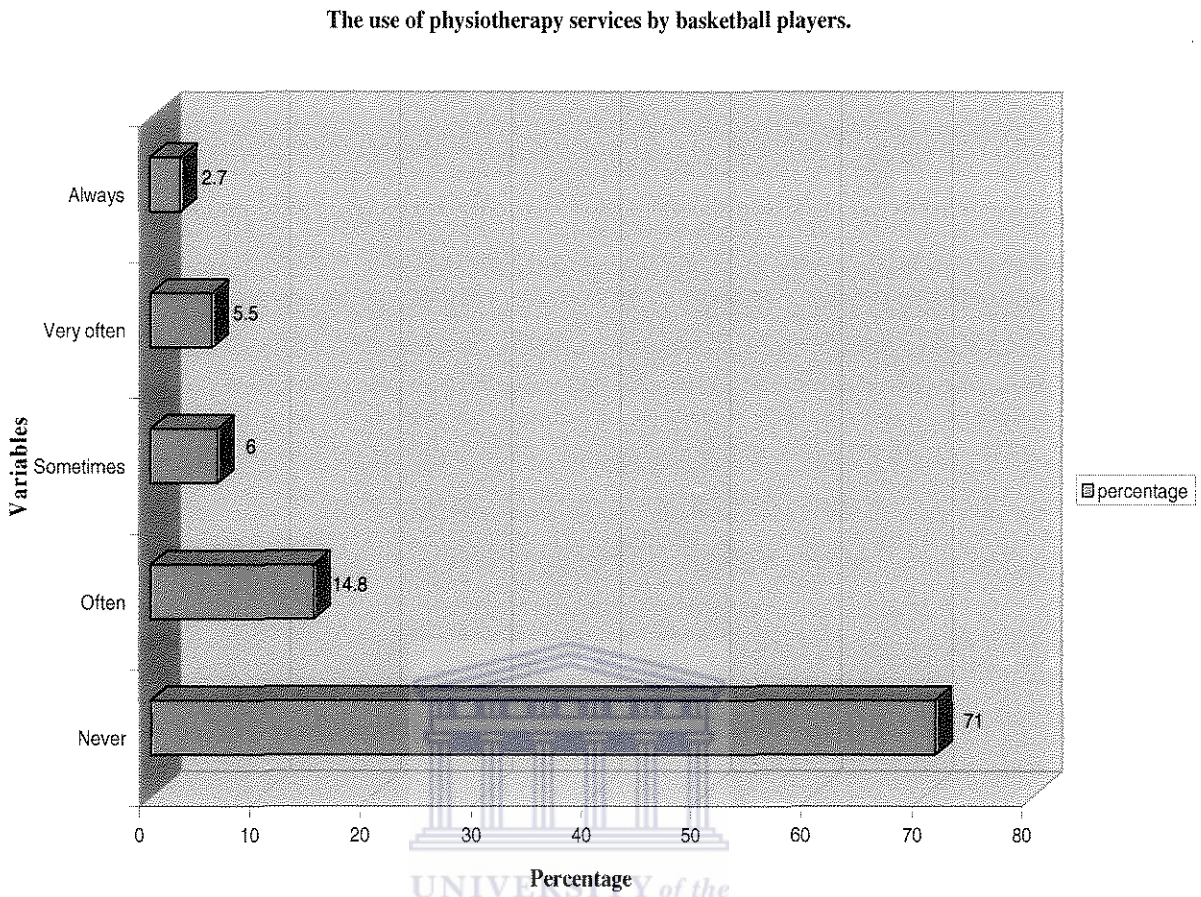

Figure 4.3: The use of physiotherapy services by basketball players.

4.10. REASONS LEADING TO DO NOT USE PHYSIOTHERAPY SERVICES

The reasons of no use of physiotherapy services in this study were: Financial problem, not informed, absence of services and ignorance. The 183 basketball players could nominate more than one reason, thus the total number of reasons was 340. Of 340 reasons, 148 (43.5%) were the absence of services led to no use of physiotherapy services, 146 (42.9%) were the financial problem led them to do not use physiotherapy services, 38 (11.2%) were ignorance of physiotherapy services and finally, 8 (2.4%) were not informed about physiotherapy services. Figure 4.4 shows the reasons leading to no use of physiotherapy services.

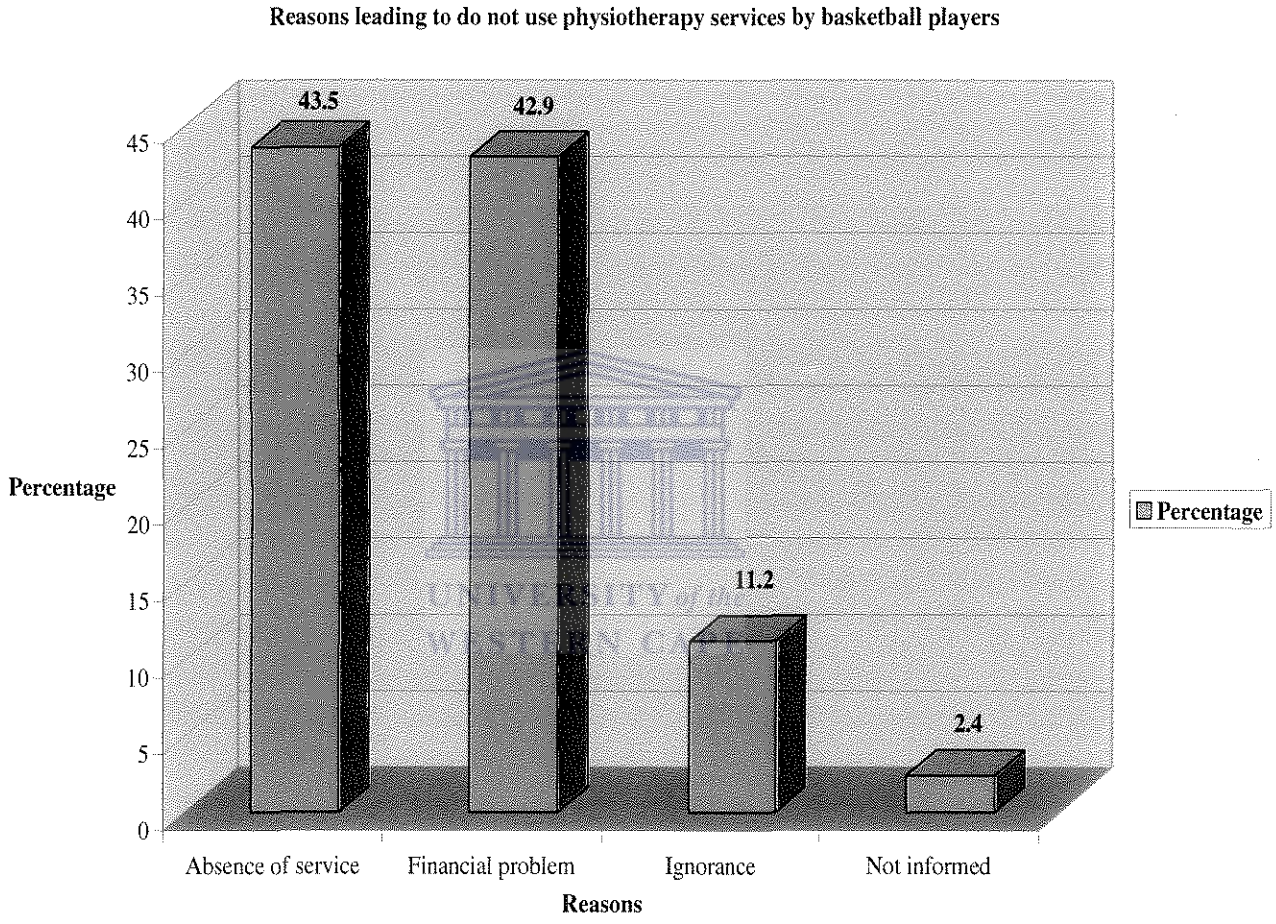

Figure 4.4: Reasons leading to do not use physiotherapy services to basketball players (n=340 reasons).

CHAPTER FIVE

DISCUSSION

5.1 INTRODUCTION

The aim of this study was to investigate the prevalence, mechanisms, nature and management of basketball-related injuries in Rwanda. This chapter discusses all these epidemiological aspects of the Rwandan basketball injuries and compares findings of similar published studies. The findings are the results of the information collected from Rwandan basketball players.

5.2 LEVEL OF PARTICIPATON IN THE STUDY

In this study, the response was 86.7% in a sample of 183 basketball players. This is a high response compared to similar studies (Messina, 1999; Louw et al., 2003; Gomez et al., 1996; McKay et al., 2001). The male basketball players showed a higher response (86.1%) compared with the female basketball players (81.9%). This difference can be explained by the fact that male basketball teams were preparing for friendly games in the following week of data collection, and consequently, more male players were in training and available to present data than were female basketball teams. The high response in this study may indicate the support offered by the players and coaches for this project.

5.3 GENERAL FINDINGS RELATED TO DEMOGRAPHIC FACTORS.

The mean age of the basketball players was 21.9 years, with a standard deviation of 2.7 years.

This small standard deviation showed that the majority of basketball players were aged between 18 and 22 years old. The findings of this study revealed that the modal age was 22 years old. Therefore, the age range, mean age and small standard deviation are indicators that the majority of Rwandan basketball players are young.

More male basketball players (67.8%) compared with female basketball players (32.2%) participated in this study. This is because there are more male teams (8 teams) than female teams (4 teams) in the Rwandan first division. Rwandan females are not keen to participate in sports. This could be attributed to cultural issues (barriers/taboos for women to perform some activities and shyness of Rwandan women) that limit Rwandan females from participating in certain vigorous activities (Oxfam, 2005; Women and armed conflict, 1999). Vigorous activities may be defined as all activities which demand a lot of force and which may change the normal morphology of Rwandan woman. The Rwandan society considers those vigorous activities to be appropriate for men, but not females. This reduced level of physical activity among Rwandan females place them at risk of developing chronic diseases of lifestyle such as hypertension and diabetes. Education regarding the health-related benefits of physical activity/sports is of paramount importance in Rwanda. The Rwandan women activists should lobby against cultural barriers that limit females from participating in sports.

5.4 DESCRIPTION OF INJURY PREVALENCE

All basketball players who participated in this study reported at least one or more basketball injury. The injury rate was 3.6 injuries per player per season. The result of prevalence in this study was higher than, and differs from, other similar studies (Louw et

al., 2003; Moreira et al., 2002; Meeuwisse et al., 2003; Kujala et al., 1995). In this study, injury was defined as an action in which the player received bodily harm necessitating stoppage of play or substitution, or display of an obvious disability, sustained during training or matches and causing a player to miss at least one training session or match (McKay et al., 2001). The definition of injury used in this study was different from those used in other similar studies.

The definition by other researches also included the requirement of medical consultation or reporting at the insurance company (Mark et al., 2000; Messina, 1999; Kujala et al., 1995; Meeuwisse et al., 2003; Gomez et al., 1996; Hickey et al., 1997; De Loës, 1995). According to Finch (1997), the differences in injury definition between studies limited the comparability of injury prevalence.

The results of this study revealed a high prevalence of injury during training sessions (77%) compared with competitions (23%). These results concur with the study by Meeuwisse et al. (2003). However, most of the studies reviewed indicated that basketball injuries were more prevalent during competition than during training sessions (Messina, 1999; Finch et al., 1999; Kujala et al., 1995). The difference of these findings on training and competition injury prevalence to similar studies in the literature could be explained by some environmental risk factors such as inappropriate training playing surface, inexperienced coaching and inappropriate shoes. The researcher observed that most training surfaces were inappropriate as it differs from the recommended surfaces for basketball. Inadequately trained coaches is another shortcoming as senior players who had no coaching training are often expected to lead the training sessions.

Financial problems urge many basketball players to wear ordinary shoes (Low-top) during training. Basketball boots are worn more often during competitions in attempt to reduce wear of their expensive boots. This observation is confirmed by the report of the Rwandan Basketball Federation (2003), which stated that basketball teams had inexperienced coaches, inappropriate playgrounds and financial problems that led to insufficient equipment such as protective equipment and appropriate basketball shoes. These extrinsic risk factors could explain the reason for the high prevalence of injuries during training compared to that of competitions, considering that most competition playgrounds meet the standard requirements for basketball.

5.5 MECHANISMS AND NATURE OF BASKETBALL INJURIES

The results of this study revealed that the lower extremities were more affected than the upper extremities. The study findings also showed that ankle injuries (79.2%) were the most common injury. Ankle joint is more prone to injuries due to the anatomy (more ligaments), biomechanics of this joint and the mechanisms of the game itself (jumping, landing) reported in the literature. These findings agreed with similar studies (NCAA, 2000-2001; Larry, 1995; Zvijac &Thompson, 1996; Prebble et al., 1999; McKay et al., 2001; Yde et al., 1990). In this study, the second most prevalent injury was to fingers (57.3%); the findings of this study agreed with similar studies (McKay et al., 2001; Yde et al., 1990). This result disagreed with other similar studies that found knee injuries to be the second most prevalent (NCAA, 2000-2001; Larry, 1995; Zvijac & Thompson, 1996; Prebble et al., 1999). This difference could be explained by the fact that the Rwandan basketball players may have a lack of proper technique for catching the ball due to inexperienced coaching in most basketball teams (FERWABA Report, 2003).

It is hypothesized that a lack of playing experience in basketball, or other sports involving catching a ball with the hands, is a risk factor for finger injuries (Larry, 1995). The results of this study further revealed that the third most common body part to be involved in injury was the knee (51.9%), followed by the lower-back (27.3%), face (24%), wrist (18%), shoulder (15.8%) and thigh (9.3%). The results of this study concur with similar studies in the literature (Murphy et al., 2003; Hewett, 2000; Hickey et al., 1997; Messina, 1999; The American Academy of Orthopaedic Surgeons' Report, 2002). The high rates of Rwandan basketball injuries could be due to the absence of prevention strategies, such as adequately trained coaches, good technique, protective equipment and appropriate playing surface, implemented in Rwandan basketball.

The results of this study revealed that female basketball players sustained more knee injuries (74.6%) compared with male (41.1%) basketball players. This concurs with other studies in the literature (Murphy et al., 2003; Hewett, 2000; Hickey et al., 1997; Messina, 1999; The American Academy of Orthopaedic Surgeons' Report, 2002).

Factors that could predispose players to knee injuries include anatomical differences in ligament size and structure, lower limb biomechanical differences and hormonal factors (Powell, J.W. & Barber-Foss, K.D., 2000; Hewett, 2000; Messina, 1999; The American Academy of Orthopaedic Surgeons' Report, 2002). In addition to these risk factors, the Rwandan female basketball players may have a poor pre-season screening programme and insufficient strength, flexibility and neuromuscular training (The American Academy of Orthopaedic Surgeons' Report, 2002). The lack of preventive intervention may cause premature osteoarthritis of the knee joint for female athletes following the repetitive injuries of that joint.

Since the injuries were self-reported, diagnoses were not recorded and, therefore, the information on ACL or other types of knee injuries can not be given in this study.

The results of this study revealed that male basketball players (89.5%) sustained more ankle injuries than female basketball players (57.6%). This finding was not noted in literature reviewed (Messina, 1999; Powell & Barber-Foss, 2000). This may also be due to poor physical conditioning programmes, lack of protective equipment and poor landing technique. However, these factors apply to males and females Rwandan basketball players. The level of competition may be significantly different between male and female basketball teams. Due to the high prevalence of ankle sprains in Rwandan basketball players, prevention is important. Prevention strategies include prophylactic taping, peroneal muscle strengthening, teaching players to land properly, the use of ankle stabilizers and the use of appropriate basketball shoes, all of which should be implemented in Rwanda (Louw et al., 2003; Thacker et al., 1999; Verhagen et al., 2000; Osborne & Rizzo, 2003).

The results of this study revealed that the most common symptoms were swelling (40.6%, 45.8%), severe pain (40.3%, 42.1%) and aching (9.9%, 6.7%) for the first and second injuries respectively. These symptoms may indicate the normal process of inflammation after injury. Bleeding (5.8%), stiffness (2.5%, 2.4%), bruising (1.7%) and giving away (0.9%, 1.3%) were also reported for first and second injuries respectively. Bleeding indicates that there is an open wound due to abrasion or cuts of the skin. Giving away of a joint indicates that there is a partial or complete tear of joint components (ligaments) necessitating a surgical intervention and hospitalization. In general, swelling,

severe pain and aching were the most reported symptoms in the first and second injury. The results of this study agreed with the results found by Jones et al. (2000) and Louw et al. (2003).

The study revealed that the most common mechanisms reported by Rwandan basketball players were landing badly from a jump, defensive rebounding, bumping into someone, contact with another player, and catching the ball -- for both first and second injury. The results of this study agreed with the results of studies by McKay et al. (2001) and Meeuwisse et al. (2003). The high rates of landing and defensive rebounding as injury mechanisms in Rwandan basketball players could be attributed to the lack of preventive strategy implementation such as protective equipment, proper technique of landing and the dynamic nature (biomechanics and activities performed when playing basketball) of the game (Thacker et al., 1999; Verhagen et al., 2000; Osborne & Rizzo, 2003; Hergenroeder, 1998).

In Rwanda, young players are not trained by an experienced coach. Most young people start playing basketball in secondary school, and there is a lack of a well-structured programme that teaches good landing techniques to young players (9-21 years). It has been showed that special landing training provided during training sessions improves landing technique to make it biomechanically safer and reduced knee injury rate (Louw et al., 2004). Consequently, injuries may negatively affect Rwandan basketball players' performance and injuries prevent them from reaching the professional level of play. Turn-and-twist, falling, pain when playing basketball and tripping were also reported as mechanisms of basketball injuries.

Programme to teach players correct landing techniques and body movement patterns should be introduced, and then a preventive intervention study will be needed. Such a programme was developed by Louw et al. (2004) and shows promising results in improving technique and decreasing injuries.

5.6 TREATMENT RECEIVED AND USE OF PHYSIOTHERAPY SERVICES BY BASKETBALL PLAYERS.

The results of this study revealed that the most reported type of treatment was self-treatment (67.8% and 81.4% for the first and second injury respectively). Self-treatment was defined as any use of unprescribed anti-inflammatory drugs, strapping, or application of ice. Normally, the self-treatment should be classified as no treatment since the player did not consult a professional practitioner. The self-treatment must be discouraged and an awareness campaign on appropriate injury management is needed especially for players in Rwanda. The results of this study agreed with the results found by McKay et al. (2001). The second treatment reported was medical treatment (31.7% and 12%), followed by physiotherapy treatment (9.8% and 9.8% for first and second injury respectively). The high percentages of self-treatment used by Rwandan basketball players could be attributed to the high cost of medical and physiotherapy treatments compared to the low economic status of Rwandan basketball players and basketball teams. In addition, there is no medical assistance plan for Rwandan basketball players at team level or at federation level because of the budget constraints. The medical plan may help basketball players to be treated at low cost and to receive the appropriate treatment.

Another type of treatment reported by basketball players was traditional treatment (5.5% and 9.8% for the first and second injury respectively); traditional treatment includes the use of herbal medicine, cut of skin, etc. by traditional healers. However, there is no scientific evidence of effectiveness of traditional treatment, although Rwandan basketball players continue to use it as a mode of treatment as it is most affordable. The use and misuse of traditional therapies may cause infectious and fatal side effects on players' lives (WHO, 2002). In these cases, basketball players are not aware of the effectiveness of other modes of treatment (medical and physiotherapeutic). The study revealed that only 1.6% of basketball players did not receive any type of treatment. The inappropriate management of basketball injuries may be the reason for the recurrence of injuries reported by basketball players. This has an impact on team and specifically players' performances (Finch et al., 1999).

The results of this study revealed that most of the basketball players have never used physiotherapy services (71.0%). However, 6.0% of basketball players received physiotherapy services sometimes, 14.8% have often visited physiotherapy services, 5.5% have visited physiotherapy services very often and 2.7% always visit physiotherapy services. The results of this study agreed with the results found by Louw et al. (2003). The high percentage of basketball players who have never used physiotherapy services (71.0%) could be due to financial problems, basketball players being unaware of physiotherapy services or of the effectiveness of physiotherapy services, or physiotherapy services not being available in some areas of Rwanda. In opposition to traditional and self-treatments, education of all concerned parties such as coaches, players, managers and policy makers is needed to educate and inform them the importance of physiotherapy in

the management of injuries. The high percentage of players who have never consulted physiotherapists could reflect the absence of physiotherapy promotion programmes. The emphasis on primary prevention and the implementation of preventive measures and strategies are needed in Rwanda.

The results of this study revealed that the most common reason for not seeking physiotherapy was the absence of services (43.5%). This could be supported by the fact that there is not physiotherapist or other medical practitioner who was allocated to any of the basketball teams. In Kigali city there are only four referral hospitals that have physiotherapy services and five physiotherapy private clinics, for 600,000 people. In Butare and Ruhengeri, there is only one physiotherapy service by a provincial hospital for each province, for 700,000 and 900,000 people respectively (National Census Services, 2002).

There is no physiotherapy private clinic available in those two provinces. Physiotherapy services available in hospitals or private clinics are very expensive; consequently, basketball players can not afford those services. The financial limitations (42.9%) were the second reason that led them to not use physiotherapy services. Ignorance (11.2%) and not being informed (2.4%) about physiotherapy services was the second category of reasons that led basketball players to not use physiotherapy services. Only 4.4% of basketball players reported that they were not informed about physiotherapy, but the majority of basketball players were not informed about physiotherapy because they presumed physiotherapy to be massage therapy only. A campaign promoting physiotherapy services among sports people is thus greatly needed in Rwanda.

5.7 LIMITATIONS OF THE STUDY

- Injuries were self-reported and therefore the accurate information is not possible (lack of diagnosis).

- Recall over nine months may lead to reliability compromise.

- Delayed commencement of the training, which affected the researcher's expected sample size (183 players instead of 211 players). It was very difficult to find all players at the training playground, and the researcher's time was very limited.

- The basketball players' questionnaire did not assess the playing hours and exposure times; hence, this limited the present study when calculating prevalence and incidence, as these factors are calculated in other studies. It also affected the way in which injuries are defined and expressed in the study.

CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 INTRODUCTION

In this final chapter, a concise summary of the study is provided. Details of the major issues in the study are given in the conclusion, and thereafter some recommendations are proposed at the end of this chapter.

6.2 SUMMARY

The aim of this study was to investigate the prevalence, mechanisms, nature and management of basketball-related injuries in Rwanda. The study specifically identified prevalence of musculoskeletal-related injuries, the mechanisms and nature of those injuries and types of treatment administered to basketball players.

In general, the findings of this study revealed that injury prevalence and injury rate were high (3.6 injuries per player per season) compared to similar studies, and the most affected body parts were the ankles, fingers and knees. More injuries were sustained during training rather than during competition.

This study revealed that the most reported mechanisms were landing badly, defensive rebounding and contact with another player. The most reported symptoms, which characterized the nature of basketball injuries, were swelling, severe pain and aching.

This study revealed that the type of treatment mostly used by basketball players was self-treatment, followed by medical treatment.

Finally, this study revealed that a great number of basketball players had never visited physiotherapy services, and the common reasons were absence of services and financial problems.

6.3 CONCLUSIONS

The injury prevalence among Rwandan basketball players is high. Treatment and rehabilitation after injury of basketball players was found to be very poor.

Education to raise coaches', players' and managers' awareness of epidemiology and adequate management is needed in order to prevent basketball injuries and to promote players' faster recovery and hence maintain players' performance. Well-planned strategies to prevent common basketball injuries are also urgently required. Lack of preventive strategies will affect the performance and health of basketball players in general by recurrence of injury. Consequently, the level of competition of basketball in Rwanda will also be affected.

Despite the financial problems faced by the Rwandan Basketball Federation, and basketball players in particular, physiotherapists need to organize an adequate promotional programme to raise awareness and encourage the use of physiotherapy services by all concerned parties.

However, this study is the first to investigate the epidemiology and management of basketball-related injuries in Rwanda.

Finally, considering the sample characteristics and sample size of this study, the results of this study can be generalized.

6.4 RECOMMENDATIONS

Based on the findings of this study, the following recommendations are suggested:

1. Further research into risk factors is required before any preventive strategy can be implemented.

2. Future prospective studies that address possible recall bias and consider exposure time are required.

3. The findings of this study on common injuries in basketball, mechanisms, body parts involved and types of treatment used by basketball players need to be made available to coaches, managers and players in the form of seminars or workshops.

4. Promotional education on primary prevention among Rwandan basketball players is required and must include information on protective equipment, hydration, warm-up, stretching, and strengthening and flexibility exercises.

5. Physiotherapists must be volunteers for promoting and demonstrating the role of physiotherapy in management of sports injuries by joining different sporting teams.
6. The Rwandan governing bodies of sports in general (MIJESPOC), the National Olympic Committee and the Rwandan Basketball Federation must encourage the training of qualified coaches and facilitate the implementation of injury prevention strategies to minimize the epidemiology of basketball injuries, as revealed by this study.

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APPENDICES

APPENDIX A

UNIVERSITY *of the* WESTERN CAPE

Private Bag X17 **Bellville 7535** South Africa
Telephone: (021) 959-2542/6 Fax: (021) 959-1217 e-Mail: mmarais@uwc.ac.za

Pour réception le 09-12-04
Philbert

DEPARTMENT OF PHYSIOTHERAPY

The Minister of youth, sports and culture,
Republic of Rwanda.

Date: 25/11/04

Sir,

Subject: Request to conduct a research study in Rwanda

I am a postgraduate Rwandan student pursuing a Master's Degree programme in physiotherapy at the University of the Western Cape in South Africa. I am conducting a research project as part of the requirements for a master's Degree in physiotherapy. The title of my research is "EPIDEMIOLOGY AND MANAGEMENT OF BASKETBALL RELATED INJURIES IN RWANDA". The research aims to investigate common basketball injuries. This information could assist in planning prevention programmes.

I hereby kindly request your permission to conduct this study in all 1st Division male and female basketball teams.

It is hoped that the results of this study could help in increasing awareness among basketball players, coaches and managers about adequate management of common injuries and could also promote it. It could serve as database to Ministry of youth, sports and culture, Rwandan Federation of Basketball and National Olympic Committee.
I would be very grateful if you could allow me to conduct the study between December 2004 and January 2005.
Ethical approval was obtained from UWC. Participation in this study will be anonymous and voluntary and the information gathered will be confidential.
I am looking forward to your co-operation. Thanking you in anticipation.

Sincerely,

Moussa Hakizimana

Dr Quinette Louw
Supervisor.

A Place of Quality, A Place to Grow

REPUBLIC OF RWANDA

APPENDIX

Kigali, 28/12/04

N° 1778/22.40

MINISTRY OF YOUTH,
CULTURE AND SPORTS
B.P. 1044 - KIGALI

Tél : 58 3525, 58 3531
Fax : (250) 58 3518
E-mail : : minicult@rwanda1.com

Mr Moussa HAKIZIMANA
UNIVERSITY of the WESTERN CAPE
Private Bag X17 Belleville 7535 South Africa
Telephone (021) 959-1217 e-Mail: mmarais@uwc.ac.za.
DEPARTMENT OF PHYSIOTHERAPY

Re: Allowing to conduct research study in Rwanda

Sir,

This is to inform you that we received your letter of 25th November 2004 and wish to encourage dealing with the chosen title of your research.
So, we hereby make you know that your are allowed to conduct the research between December 2004 and January 2005.

For more information according to your program, please contact the Rwandan Basketball Federation.

**The Minister of Youth,
Culture and Sports
Joseph HABINEZA**

C.c to :
Mr. President of the Rwandan
Basketball Federation
KIGALI

KARABARANGA Jean Pierre
Secrétaire Général
MIJESPOC

APPENDIX C

University of the Western Cape

Private Bag X17 Bellville 7535 South Africa
Telephone: (021) 959 2542 Fax: (021) 959 1217

DEPARTMENT OF PHYSIOTHERAPY

President of Rwandan Federation of Basketball.
Kigali-Rwanda.
Dated 25/11/2004

Sir,
I am a postgraduate Rwandan student pursuing a Master's Degree programme in physiotherapy at the University of the Western Cape in South Africa. I am expected to conduct a research project relevant to my area of study as part of the requirement for a master's Degree in physiotherapy.

I wish to carry out a study in all basketball teams, male and female. The title of my research thesis is "EPIDEMIOLOGY AND MANAGEMENT OF BASKETBALL RELATED INJURIES IN RWANDA".

I hereby kindly request your permission to conduct this study in basketball teams. All ethical issues will be addressed to the letter including, voluntary participation, confidentiality and anonymity as the information will be collected in form of questionnaire.

The results of this study will serve as database to Rwandan federation of basketball and will increase the awareness of basketball players, coaches and managers about adequate management of common injuries.

Moussa Hakizimana.

APPENDIX D

FEDERATION RWANDAISE DE BASKET BALL
(FERWABA)
Affiliée à la FIBA, FIBA-AFRIQUE et à l'ECSBC

A QUI DE DROIT

A tous les Clubs de Basket ball, prière faciliter Mr MOUSSA HAKIZIMANà faire ses recherches pour ses travaux de fin de ses études.

Merci.

Fait à Kigali le 25 Janvier 2005.

SG FERWABA

MUGABO Jean Lucien

FERWABA . B.P.6726 Kigali. Tél / Fax: (250)576752, 512256, ou 08513006
E-mail : ferwaba@yahoo.fr Cpte: BCDI No 101-1109701

APPENDIX E

QUESTIONNAIRE FOR BASKETBALL PLAYERS

Dear player,

Good day, my name is MOUSSA HAKIZIMANA, I am a Rwandan postgraduate student enrolled in Physiotherapy (Masters programme) at the University of the Western Cape – South Africa. I am conducting a research survey as part of requirements for a Masters Degree in Physiotherapy. The title of my study is" **Epidemiology and management of basketball related injuries in Rwanda".** The aim of the study is to investigate on prevalence, types, mechanisms, nature and types of treatment used by Rwandan basketball players.

I kindly request for your participation in this study by completing the questionnaire form with your views according to the statements given in the questionnaire.

The participation is voluntary and the information given will be confidential. You are free to withdraw from the study at any time.

Thank you.

Researcher signature: Date:

Player's signature:

QUESTIONNAIRE FOR BASKETBALL PLAYERS

INSTRUCTION:

- All questions are strictly confidential
- Please be as truthful as possible
- Please select one or more responses by using a tick (√).

Questionnaire number: ---------- **Date:** ----------

Team name: ----------

Age (yrs): ----------

Gender: Male ☐ **Female**☐ **Playing position:** ----------

SECTION A

1. Did you sustain any injury while playing basketball last season?

Yes ☐ No ☐

2. When did you injure yourself during basketball? (One or more answers are possible)

Training ☐ Competition ☐

3. How many injuries have you sustained over the last season (9 months back)?

Training Competitive matches

PLEASE ANSWER THE FOLLOWING QUESTIONS REGARDING THE INJURIES YOU SUSTAINED THIS SEASON (Due which you missed training or competition).

4. On which of the following body parts and structures did you sustain injury? (One or more answers are possible). State number of times for the complete season.

	Muscle	Ligament	Tendon	Capsule	Bone	Skin	Other
HEAD:							
Skull:	☐	☐	☐	☐	☐	☐	☐
Face:	☐	☐	☐	☐	☐	☐	☐
Eyes	☐	☐	☐	☐	☐	☐	☐

Other (specify) ----------

	Muscle	Ligament	Tendon	Capsule	Meniscus	Bone	Skin	Other
SPINE/TRUNK:								
Neck:	☐	☐	☐	☐	☐	☐	☐	☐
Upper back:	☐	☐	☐	☐	☐	☐	☐	☐
Lower back:	☐	☐	☐	☐	☐	☐	☐	☐
Ribs/chest:	☐	☐	☐	☐	☐	☐	☐	☐

	Muscle	Ligament	Tendon	Capsule	Bone	Skin	Other
UPPER EXTREMITY							
Shoulder	☐	☐	☐	☐	☐	☐	☐
Arm	☐	☐	☐	☐	☐	☐	☐
Elbow	☐	☐	☐	☐	☐	☐	☐
Forearm	☐	☐	☐	☐	☐	☐	☐
Wrist	☐	☐	☐	☐	☐	☐	☐
Hand	☐	☐	☐	☐	☐	☐	☐
Finger	☐	☐	☐	☐	☐	☐	☐

	Muscle	Ligament	Tendon	Capsule	Meniscus	Bone	Skin	Other
LOWER EXTREMITY								
Pelvis	☐	☐	☐	☐	☐	☐	☐	☐
Hip	☐	☐	☐	☐	☐	☐	☐	☐
Thigh	☐	☐	☐	☐	☐	☐	☐	☐
Knee	☐	☐	☐	☐	☐	☐	☐	☐
Leg	☐	☐	☐	☐	☐	☐	☐	☐
Ankle	☐	☐	☐	☐	☐	☐	☐	☐
Achilles	☐	☐	☐	☐	☐	☐	☐	☐
Foot	☐	☐	☐	☐	☐	☐	☐	☐

SECTION B

FOR THE FIRST INJURY:

1. What type of injury have you sustained? (One or more answers are possible)

Strain ☐	Sprain ☐	Contusion ☐
Rupture ☐	Haematoma ☐	Effusion ☐
Abrasion ☐	Laceration ☐	Subluxation ☐
Dislocation ☐	Fracture ☐	Other (specify).....

2. Did you suffer any overuse injury?

Yes ☐ No ☐

3. If Yes, which one(s) of the following?

Tendinosis ☐	Tendinitis ☐	Paratenonitis ☐	Bursitis ☐
Apophysitis ☐	Stress fracture ☐	compartment syndrome ☐	

Other (Specify) .....

4. How did your first injury of this season occur? (One or more answers are possible)

Landing badly from a jump ☐	Lateral pivot ☐	Catching the ball ☐
Bumped into someone ☐	Turning & twist ☐	Defensive rebounding ☐
Fell ☐	Contact ☐	Tripped ☐

No injury, just feel/felt pain while playing basketball ☐

Other (Please specify) .....

5. Did you experience any of the following symptoms when get first injury? (One or more answers are possible)

Bleeding ☐	Swelling ☐	Bruising ☐
Aching ☐	Locking ☐	Stiffness ☐
Severe Pain ☐	Giving away ☐	

6. Did you receive any treatment for your injury?

Yes ☐ No ☐

7. If Yes. what type of treatment did you receive following first injury? (One or more answers are possible)

Medical ☐	Traditional ☐	Physiotherapy ☐
Self treatment ☐	None ☐	

8. If physiotherapy, what kind of treatment did you receive following first injury? (One or more answers are possible).

Ice/cold ☐	Compression ☐	Elevation ☐
Soft tissue stretch ☐	Heat ☐	Massage ☐
Acupuncture ☐	Deep frictions ☐	Strapping ☐
Ultrasound ☐	Splinting ☐	TENS ☐
Interferential ☐	Muscle stimulation ☐	Exercise therapy ☐
Rehabilitation ☐	Joint mobilization ☐	Other (specify).....

FOR THE SECOND INJURY:

1. What type of injury have you sustained? (One or more answers are possible)

Strain ☐	Sprain ☐	Contusion ☐
Rupture ☐	Haematoma ☐	Effusion ☐
Abrasion ☐	Laceration ☐	Subluxation ☐
Dislocation ☐	Fracture ☐	Other (specify).....

2. Did you suffer any overuse injury?

Yes ☐ No ☐

3. If Yes, which one(s) of the following?

Tendinosis☐ Tendinitis☐ Paratenonitis☐ Bursitis☐

Apophysitis☐ Stress fracture☐ compartment syndrome☐

Other (Specify) ……

4. How did your second injury of this season occur? (One or more answers are possible)

Landing badly from a jump☐ Lateral pivot ☐ Catching the ball ☐

Bumped into someone ☐ Turning & twist☐ Defensive rebounding☐

Fell ☐ Contact ☐ Tripped ☐

No injury, just feel/felt pain while playing basketball☐

Other (Please specify) ……..

5. Did you experience any of the following symptoms when get injury? (One or more answers are possible)

Bleeding ☐ Swelling ☐ Bruising☐

Aching ☐ Locking ☐ Stiffness☐

Severe Pain☐ Giving away☐

6. Did you receive any treatment for your injury?

Yes☐ No☐

7.If Yes, what type of treatment did you receive following second injury? (One or more answers are possible)

Medical ☐ Traditional☐ Physiotherapy☐

Self treatment☐ None ☐

8. If physiotherapy, what kind of treatment did you receive following second injury? (One or more answers are possible).

Ice/cold ☐	Compression ☐	Elevation ☐
Soft tissue stretch ☐	Heat ☐	Massage ☐
Acupuncture ☐	Deep frictions ☐	Strapping ☐
Ultrasound ☐	Splinting ☐	TENS ☐
Interferential ☐	Muscle stimulation ☐	Exercise therapy ☐
Rehabilitation ☐	Joint mobilization ☐	Other (specify).....

SECTION C

1. Did you get facilities to access physiotherapy services when required?

Always (100%) ☐	Very often (75%)☐	Often (50%)☐
Sometimes (25%)☐	Never (0%) ☐	

2. If no access to Physiotherapy services, what can be the reason?

Financial problem☐	Not informed☐	Absence of services☐
Ignorance ☐		

APPENDIX F

QUESTIONNAIRE POUR LES BASKETEURS

Cher basketeur,

Bonjour, je répond au nom de HAKIZIMANA Moussa, étudiant Rwandais inscrit au programme de maîtrise en physiothérapie à l'université de Western Cape en Afrique du Sud. Je fait cette recherche comme l'une des conditions d'obtenir un Diplôme de maîtrise en Physiothérapie. Le titre de ma recherche est" EPIDEMIOLOGIE ET TRAITEMENT DE TRAUMATISMES SPORTIFS RELATIVE AU BASKETBALL AU RWANDA". L'objectif de cette recherche est d'examiner la prevalence, les mechanismes, la nature de ces traumatisms et comment ces traumatisms sont traités au Rwanda.

Cependant, je vous prie de participer dans cette recherche en répondant aux questions, selon les ascertations données dans le questionnaire. Votre participation est volontaire et les informations fournies seront traitées confidentiellement. Vous êtés libre de vous retirer n'importe quand au cours de la recherche.

Merci.

Signature du chercheur: Date:…./…../……

Signature du basketeur:

APPENDIX F

QUESTIONNAIRE POUR LES BASKETEURS

Cher basketeur,

Bonjour, je répond au nom de HAKIZIMANA Moussa, étudiant Rwandais inscrit au programme de maîtrise en physiothérapie à l'université de Western Cape en Afrique du Sud. Je fait cette recherche comme l'une des conditions d'obtenir un Diplôme de maîtrise en Physiothérapie. Le titre de ma recherche est" EPIDEMIOLOGIE ET TRAITEMENT DE TRAUMATISMES SPORTIFS RELATIVE AU BASKETBALL AU RWANDA". L'objectif de cette recherche est d'examiner la prevalence, les mechanismes, la nature de ces traumatisms et comment ces traumatisms sont traités au Rwanda.

Cependant, je vous prie de participer dans cette recherche en répondant aux questions, selon les ascertations données dans le questionnaire. Votre participation est volontaire et les informations fournies seront traitées confidentiellement. Vous êtés libre de vous retirer n'importe quand au cours de la recherche.

Merci.

Signature du chercheur: Date:…./…../……

Signature du basketeur:

QUESTIONNAIRE POUR LES BASKETEURS.

INSTRUCTIONS :

- Toutes les questions sont strictement confidentielles.
- S'il vous plaît, soyez aussi sincère que possible.
- S'il vous plait, choisissez une ou plusieurs réponses en marquant un « V ».

Numéro du questionnaire : ---------- Date : ----------

Nom de l'équipe : ----------

Age (années) : ----------

Gender : Male ☐ Femelle ☐

Position dans l'équipe : ----------

SECTION A

1. Avez-vous eu un traumatisme en jouant au basketball la saison dernière ?

Oui ☐ Non☐

2. Quand avez-vous eu ce traumatisme ?(Une ou plusieurs réponses sont possibles).

Entraînement ☐ compétition/match ☐

3. De combien de traumatismes avez-vous souffert pendant la saison passée (9 mois passé).

Entraînement ☐ Compétition/match ☐

Répondez aux questions suivantes concernant les traumatismes dont vous avez souffert au cours de la saison dernière. Selon lesquels vous étiez absent pendant les Entraînement ou compétition.

4. Sur quelles structures et parties du corps suivantes avez-vous souffert de traumatisme (Une ou plusieurs réponses sont possibles).
Mentionnez le nombre de traumatismes pour la saison complète.

	Muscle	Tendon	Capsule	Os	Peau	Autres
Tête :						
Crâne	☐	☐	☐	☐	☐	☐
Face	☐	☐	☐	☐	☐	☐
Yeux	☐	☐	☐	☐	☐	☐

Autres ----------

Colonne/Tronc :	Muscle	Tendon	Capsule	Os	Peau	Autres
Cou	☐	☐	☐	☐	☐	☐
Tronc sup.	☐	☐	☐	☐	☐	☐
Tronc inf.	☐	☐	☐	☐	☐	☐
Côtes/poitrine	☐	☐	☐	☐	☐	☐

Membre sup. :	Muscle	Tendon	Capsule	Os	Peau	Autres
Epaule	☐	☐	☐	☐	☐	☐
Bras	☐	☐	☐	☐	☐	☐
Coude	☐	☐	☐	☐	☐	☐
Avant-bras	☐	☐	☐	☐	☐	☐
Poignet	☐	☐	☐	☐	☐	☐
Main	☐	☐	☐	☐	☐	☐
Doigts	☐	☐	☐	☐	☐	☐

	Muscle	Tendon	Meniscus	Capsule	Os	Peau
Membre inf.:						
Bassin	☐	☐	☐	☐	☐	☐
Hanche	☐	☐	☐	☐	☐	☐
Cuisse	☐	☐	☐	☐	☐	☐
Genou	☐	☐	☐	☐	☐	☐
Jambe	☐	☐	☐	☐	☐	☐
Cheville	☐	☐	☐	☐	☐	☐
T. d'Achille	☐	☐	☐	☐	☐	☐
Pied	☐	☐	☐	☐	☐	☐

SECTION B.

POUR LE PREMIER TRAUMATISME

1. De quel type de traumatisme avez-vous souffert ? (Une ou plusieurs réponses sont possibles).

Elongation☐ Contusion☐ Haematome☐Déchirure partielle☐ Déchirure totale☐

Epanchement☐ Abrasion☐ Lacération☐ Entorse☐ Luxation☐

Fracture☐ Autres (spécifier) ----------

2. Avez-vous souffert de traumatisme résultant d'une hypersollicitation?

Oui☐ Non☐

3. Si oui, lequel(s) des traumatismes suivants ?

Tendinosis☐ tendinite☐ paratenonite☐ Bursite☐

Apophysite☐ Fracture de trace☐ syndrome de compartement☐

Autres (spécifier) ----------

4. Comment votre premier traumatisme de la saison est-il survenu ? (Une ou plusieurs réponses sont possibles).

Mauvais atterrissage après un saut ☐ pivot latéral ☐ Rebond défensif ☐

Saisie de la balle☐ Chute☐ Se cogner contre quelqu'un☐

Contact☐ Tourner et twister ☐ Trébucher ☐

Pas de traumatisme, mais sensation de douleur en jouant le basketball ☐
Autre (spécifier) ----------

5. Avez-vous présenté l'un des symptômes suivants quand le 1er traumatisme est survenu ? (Une ou plusieurs réponses sont possibles).

Saignement☐ Gonflement☐ Ecchymose ☐ Douleur☐

Locking/blockage☐ Raideur☐ Douleur severe☐ Relâchement☐

6. Avez-vous reçu un traitement pour votre traumatisme?

Oui☐ Non☐

7. Si oui, quel type de traitement avez-vous reçu pour ce 1er traumatisme ?
(Une ou plusieurs réponses sont possibles).

Médical☐ Traditionnel☐ Physiothérapie☐

Auto-traitement☐ Aucun☐

8. Si physiothérapie, quel type de traitement avez-vous reçu pour le 1er traumatisme ?
(Une ou plusieurs réponses sont possibles).

Froid/glaçon☐ Compression☐ Elevation☐ Chaleur☐

Massage☐ Acupuncture☐ Frictions profondes☐ Straping☐

Ultrasons☐ Attelle☐ TENS☐ Stimulation musculaire☐

Exercices☐ Réhabilitation ☐ Mobilisation☐ Courant interférentiel☐

Autre (spécifier) ----------

POUR LE SECOND TRAUMATISME

1. De quel type de traumatisme avez-vous souffert ? (Une ou plusieurs réponses sont possibles).

Elongation☐ Contusion☐ Haematome☐Déchirure partielle☐ Déchirure totale☐

Epanchement☐ Abrasion☐ Lacération☐ Entorse☐ Luxation☐

Fracture☐ Autres (spécifier) ----------

2. Avez-vous souffert de traumatisme résultant d'une hypersollicitation?

Oui☐ Non☐

3. Si oui, lequel(s) de traumatismes suivants ?

Tendinosis☐ tendinite☐ paratenonite ☐ Bursite☐

Apophysite☐ Fracture de trace ☐ syndrome de compartement☐

Autres (spécifier) ----------

4. Comment votre second traumatisme de la saison est-il survenu ?(Une ou plusieurs réponses sont possibles).

Mauvais atterrissage après un saut☐ pivot latéral ☐ Rebond défensif☐

Saisie de la balle☐ Chute☐ Se cogner contre quelqu'un☐

Contact☐ Tourner et twister ☐ Trébucher ??? ☐

Pas de traumatisme, mais sensation de douleur en jouant le basketball☐

Autres (spécifier) ----------

5. Avez-vous présenté l'un des symptômes suivants quand le second traumatisme est survenu ? (Une ou plusieurs réponses sont possibles).

Saignement☐ Gonflement☐ Ecchymose ☐ Douleur☐

Locking/blockage☐ Raideur☐ Douleur severe☐ Relâchement☐

6. Avez-vous reçu un traitement pour votre second traumatisme?

Oui☐ Non☐

7. Si oui, quel type de traitement avez-vous reçu pour ce second traumatisme ?
(Une ou plusieurs réponses sont possibles).

Médical☐ Traditionnel☐ Physiothérapie☐

Auto-traitement☐ Aucun☐

8. Si physiothérapie, quel type de traitement avez-vous reçu pour le second traumatisme ?
(Une ou plusieurs réponses sont possibles).

Froid/glaçon☐ Compression☐ Elévation☐ Chaleur☐

Massage☐ Acupuncture☐ Frictions profondes☐ Straping☐ Ultrasons☐

Attelle☐ TENS ☐ Stimulation musculaire☐ Exercices☐

Réhabilitation ☐ Mobilisation☐ Courant interférentiel ☐

Autre (spécifier) ----------

SECTION C :

1. Avez-vous des facilités/moyens d'accéder aux services de physiothérapie quand c'est nécessaire ?

Toujours☐ plus souvent ☐ Souvent☐ Quelque fois ☐

Jamais☐

2. Si vous n'avez pas la possibilité d'accéder aux services de physiothérapie, quelle en est la raison ?

Problème financier☐ Manque d'information☐ Absence de services☐

Ignorance☐

APPENDIX G

URUTONDE RW' IBIBAZO BIGENEWE ABAKINNYI BA BASKETI

Mukinnyi,

Mugire umunsi mwiza.

Nitwa Hakizimana Moussa, nkaba ndi umunyeshuri w'umunyarwanda mu cyiciro cya gatatu muri Kaminuza ya Western Cape mu gihugu cy' Afrika y'Epfo mu ishami rya Physiotherapy. Nkaba ndi gukora ubushakashatsi ku byerekeye "Epidemiyologi n' ubuvuzi bw'ibikomere biterwa no gukina basketi mu Rwanda. Ubu bushakashatsi bugamije kwerekana umubare w'abakinnyi bakomereka, igitera uko gukomereka, uburyo bakomerekamo n' ukuntu ibyo bikomere bivurwa mu Rwanda.

Nkaba nabasabaga kwitabira ubu bushakashatsi musubiza uru rutonde rw'ibibazo bikurikira. Kugira uruhare muri ubu bushakashatsi ni ubushake bwanyu si itegeko kandi nkaba nabizeza ko ibisubizo muzatanga bizafatwa nk'ibanga. Mushobora kudakomeza kugira uruhare muri ubu bushakashatsi igihe cyose mubishakiye.

Murakoze.

Umukono w'umushakashatsi …….. Italiki…../…/…..

Umukono w'umukinnyi ……

URUTONDE RW'IBIBAZO BIGENEWE ABAKINNYI BA BASKETI

AMABWIRIZA:

- Ibibazo byose ni ibanga.
- Musabwe gukoresha ukuri bishoboka.
- Musabwe guhitamo igisubizo kimwe cyangwa byinshi mukoresheje akamenyetso"V".

Nimero y' urutonde rw'ibibazo: .....

Izina ry'ikipe: .....

Imyaka y'umukinnyi: .....

Igitsina: Gabo ☐ Gore ☐

Umwanya akinaho (mu ikipe): .....

IGICE CYA MBERE (A)

1. Wigeze ugira igikomere urimo ukina basketi mu irushanwa rishize?

   Yego ☐ Oya ☐

2. Icyo gikomere wakigize ryari? (Igisubizo kimwe cyangwa byinshi birashoboka)

   Mu myitozo ☐ Mu mikino ☐

3. Wagize ibikomere bingahe mu irushanwa rishize (amezi icyenda ashize)?

   Mumyitozo : ☐ Mu mikino : ☐

SUBIZA IBIBAZO BIKURIKIRA BIJYANYE N'IBIKOMERE WAGIZE MURI SHAMPIYONA ISHIZE, BYATUMYE USIBA MU MYITOZO CYANGWA UBURA MU MIKINO.

4. Ni ku bihe bice by'umubiri bikurikira wagizeho ibikomere? (Igisubizo kimwe cyangwa byinshi birashoboka). Tanga umubare w'ibikomere wagize mu irushanwa ryose.

UMUTWE:

	Imikaya	tendon	capsule	igufa	uruhu	ibindi
Igihanga	☐	☐	☐	☐	☐	☐
Mu buranga	☐	☐	☐	☐	☐	☐
Amaso	☐	☐	☐	☐	☐	☐

Ibindi (Sobanura) .....

UMUGONGO/IGIHIMBA:

	Imikaya	tendon	capsule	igufa	uruhu	ibindi
Ijosi	☐	☐	☐	☐	☐	☐
Igihimba cyo hejuru	☐	☐	☐	☐	☐	☐
Igihimba cyo hepfo	☐	☐	☐	☐	☐	☐
Imbavu/igituza	☐	☐	☐	☐	☐	☐

AMABOKO:

	Imikaya	tendon	capsule	igufa	uruhu	ibindi
Urutugu	☐	☐	☐	☐	☐	☐
Bras	☐	☐	☐	☐	☐	☐
Inkokora	☐	☐	☐	☐	☐	☐
Avant-bras	☐	☐	☐	☐	☐	☐
Ubujana	☐	☐	☐	☐	☐	☐
Ikigaza	☐	☐	☐	☐	☐	☐
intoki	☐	☐	☐	☐	☐	☐

AMAGURU:

	Imikaya	tendon	capsule	meniscus	igufa	uruhu	ibindi
Bassin	☐	☐	☐	☐	☐	☐	☐
Amayunguyungu	☐	☐	☐	☐	☐	☐	☐
Ikibero	☐	☐	☐	☐	☐	☐	☐
Umurundi+Imbwana	☐	☐	☐	☐	☐	☐	☐
Akabumbankore	☐	☐	☐	☐	☐	☐	☐
Tendon d' Achille	☐	☐	☐	☐	☐	☐	☐
Ikirenge	☐	☐	☐	☐	☐	☐	☐

IGICE CYA KABIRI (B)
IGIKOMERE CYA MBERE

1. Ni ibuhe bwoko bw'igikomere wagize? (Igisubizo kimwe cyangwa byinshi birashoboka)

Elongation ☐ contusion☐ Haematome☐ dechirure partielle☐

Dechirure totale☐ Amazi mu ngingo☐ Abrasion☐ laceration☐

Mpfunira☐ Luxation☐ Imvune☐
Ibindi (Sobanura) .....

2. Wigeze ugira igikomere gitewe n'imyitozo myinshi?

Yego☐ Oya☐

3. Niba ari yego, ni ikihe muri ibi bikurikira?

Tendinosis☐ Tendinite☐ Paratenonite☐ Bursite☐

Apophysite☐ Fracture de trace☐ Syndrome de compartement☐
Ibindi (Sobanura).....

4. Ni gute igikomere cya mbere cyabayeho? (Igisubizo kimwe cyangwa byinshi birashoboka)

Kumanuka nabi wasimbutse☐ pivot lateral☐ Rebond defensive☐

gukacira umupira☐ Kugwa☐ Guhutazwa n'undi mukinnyi☐

kugongana☐ guhindukira☐ Gutsikira☐

Nta gikomere, ariko kumva ububabare urimo ukina basketi☐
Ibindi (Sobanura) ……..

5. Wigeze ugira kimwe mu bimenyetso bikurikira igihe wakomerekaga bwa mbere? (Igisubizo kimwe cyangwa byinshi birashoboka)

Kuva amaraso☐ Kubyimbirwa☐ bruising☐ Ububabare☐

Locking/blockage☐ Raideur☐ Ububabare bukabije☐

Kurekura kw'urugingo☐

6. Haba hari ubuvuzi mwahawe kubera icyo gikomere cya mbere?

Yego☐ Oya☐

7. Niba ari yego, ni ubuhe bwoko bw'ubuvuzi mwabonye kuri icyo gikomere cya mbere? (Igisubizo kimwe cyangwa byinshi birashoboka)

Bwa Kiganga☐ Bwa Gihanga☐ Ubugororangingo☐

Kwivura☐ Ntabwo☐

8. Niba ari ubugororangingo, ni ubuhe bwoko bw'ubugororangingo mwahawe ku gikomere cya mbere? (Igisubizo kimwe cyangwa byinshi birashoboka)

Ubukonje☐ Gukanda☐ Elevation☐ Ubushyuhe☐ Massage☐

Acupuncture☐ Frictions profondes☐ Straping☐ Ultrasons☐

Attelle☐ TENS☐ Stimulation musculaire☐ Imyitozo☐

Rehabilitation☐ Mobolization☐ Courant interferentielle☐
Ibindi (Sobanura) ……

IGIKOMERE CYA KABIRI

1. Ni ibuhe bwoko bw'igikomere wagize? (Igisubizo kimwe cyangwa byinshi birashoboka)

Elongation☐ contusion☐ Haematome☐ dechirure partielle☐ Dechirure totale☐

Amazi mu ngingo☐ Abrasion☐ laceration☐ Mpfunira☐ Luxation☐

Imvune☐ Ibindi (Sobanura) ……..

2. Wigeze ugira igikomere gitewe n'imyitozo myinshi?

Yego☐ Oya☐

3. Niba ari yego, ni ikihe muri ibi bikurikira?

Tendinosis☐ Tendinite☐ Paratenonite☐ Bursite☐ Apophysite☐

Fracture de trace☐ Syndrome de compartement☐
Ibindi (Sobanura)…….

4. Ni gute igikomere cya kabiri cyabayeho? (Igisubizo kimwe cyangwa byinshi birashoboka)

Kumanuka nabi wasimbutse☐ pivot lateral☐ Rebond defensive☐

gukacira umupira☐ Kugwa☐ Guhutazwa n'undi mukinnyi☐ kugongana☐

guhindukira☐ Gutsikira☐

Nta gikomere, ariko kumva ububabare urimo ukina basketi☐
Ibindi (Sobanura) ……..

5. Wigeze ugira kimwe mu bimenyetso bikurikira igihe wakomerekaga bwa kabiri? (Igisubizo kimwe cyangwa byinshi birashoboka)

Kuva amaraso ☐ Kubyimbirwa ☐ bruising☐ Ububabare☐

Locking/blockage☐ Raideur☐ Ububabare bukabije☐

Kurekura kw'urugingo☐

6. Haba hari ubuvuzi mwahawe kubera icyo gikomere cya kabiri?

Yego☐ Oya☐

7. Niba ari yego, ni ubuhe bwoko bw'ubuvuzi mwabonye kuri icyo gikomere cya kabiri? (Igisubizo kimwe cyangwa byinshi birashoboka)

Bwa muganga ☐ Bwa Gihanga ☐ Ubugororangingo☐

Kwivura☐ Ntabwo☐

8. Niba ari ubugororangingo, ni ubuhe bwoko bw'ubugororangingo mwahawe ku gikomere cya kabiri? (Igisubizo kimwe cyangwa byinshi birashoboka)

Ubukonje☐ Gukanda☐ Elevation☐ Ubushyuhe☐ Massage☐

Acupuncture ☐ Frictions profondes☐ Straping☐ Ultrasons☐

Attelle ☐ TENS ☐ Stimulation musculaire☐ Imyitozo☐

Rehabilitation ☐ Mobolization ☐ Courant interferentielle☐
Ibindi (Sobanura) .....

IGICE CYA GATATU (C)

1. Mwaba mubona uburyo mwivuriza mu bugororangingo iyo byabaye ngombwa?

Buri gihe☐ Inshuro nyinshi ☐ Mu rugero☐ Rimwe na rimwe☐

Nta na rimwe☐

2. Niba se ubwo buryo bwo kwivuriza mu bugororangingo mutabubona byaba biterwa ni iki? (Igisubizo kimwe cyangwa byinshi birashoboka)

Ikibazo cy'amikoro☐ Kutabibwirwa☐

Nta servisi ihari☐ Kutabimenya☐