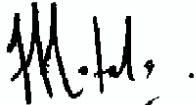


**THE PREVALENCE AND RISK FACTORS OF INJURIES IN
AMATEUR OUTDOOR AND INDOOR VOLLEYBALL
PLAYERS IN A KWAZULU-NATAL NORTH COAST
REGION.**

**By
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A dissertation submitted to the faculty of health in partial compliance with the requirements for the Masters Degree in Technology: Chiropractic, at the Durban University of Technology.

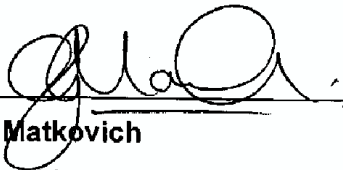


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17 NOV 2009

Date

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Date

DEDICATION

TO THE ALMIGHTY GOD FOR GIVING ME THE STRENGTH AND ABILITY TO ACCOMPLISH WHAT I HAVE ACHIEVED AND TO MY FAMILY AND FRIENDS FOR THEIR UNDIVIDED SUPPORT, UNDERSTANDING, MOTIVATION AND UNCONDITIONAL LOVE.

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The Focus Group and Pilot Study Participants- For their participation in this study.

THANK - YOU

DEFINITIONS

Professional volleyball player: Players that receive an income and play at a competitive level.

Amateur volleyball player: Players that play either socially or at League level and do not receive an income from playing.

Volleyball: It is defined as a team sport in which two teams of six active players, separated by a high net, each try to score points against one another by grounding the ball on the opposing team's court under organized rules. The ball is usually played with two hands or arms and a team can contact the ball no more than three times before it crosses over the net (Souza, 2000).

KwaZulu-Natal North Coast region: This area includes all the towns situated between and including Zinkwazi and Umdloti.

Acute: If the pain was of an immediate or sudden onset.

Chronic: If the pain lasted more than three months duration.

ABSTRACT

Objectives: To determine the prevalence and risk factors of amateur outdoor and indoor volleyball players in a KwaZulu-Natal North Coast region.

Methods: The location of the study was the KwaZulu-Natal North Coast region, which includes two of its districts, viz, Tongaat (Indoor) and Kwa Dukuza (Outdoor). A total of 115 out of a possible 160 volleyball players participated in this study which comprised of 68 outdoor and 47 indoor players. The answering of the questionnaires was done on separate days for both the districts. On the allocated days, they were given a letter of information (Appendix B) to read and the questionnaires (Appendix C) to answer. Participation in the study was voluntary and consent was given by filling in the questionnaire. The researcher was present on this day to supervise and to collect the completed questionnaires immediately after the session was completed.

Results: Out of a total of 115 participants, 79 (68.7%) of the participants sustained an injury due to volleyball. According to results found in this study, the knee, ankle and shoulder were the most frequently injured sites. 79 Participants reported to have sustained an injury, 67 participants reported to have a present injury and 60 participants reported a worst injury. The knee was found to be the most injured site in both the outdoor and indoor participants, followed by the ankle. The results in this study show that the use of protective gear can help minimise injury rates.

Conclusion: The prevalence and risk factors of amateur outdoor and indoor volleyball players in a KwaZulu-Natal North Coast region has been discussed in this study. With regards of number of injuries, the results have shown that there is no significant difference between outdoor and indoor volleyball players. In terms of the site of injuries, the lower limb was affected the most in comparison to the rest of the body. Results in this study have shown that outdoor players sustained more knee injuries whilst indoor players showed a high number of ankle injuries.

Key Terms: volleyball, volleyball injuries, injury prevalence, risk factors

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CHAPTER ONE

1.0 INTRODUCTION TO THE STUDY

This chapter deals with an explanation of the rationale behind this study, and includes the aims, objectives, background, hypotheses and limitations of the study.

1.1. INTRODUCTION

1.1.1. DEFINITION

Volleyball can be defined as a team sport that can be played, either indoor or outdoor with each team comprising of six players. Each team is separated by a high net and can use their hands, arms, or (rarely) other parts of their bodies to hit the ball back and forth over the net. The aim is to score points by grounding the volleyball on the opponent's court under organized rules (Elliott, 1992).

1.1.2. BACKGROUND OF THE SPORT

Indoor and outdoor volleyball is becoming one of the fastest growing sports (Souza, 2000). According to Erin (2001), over the past thirty years, volleyball has developed from a recreational activity into a highly competitive and skilled sport. Erin (2001), also states that it is enjoyed by millions of people around the world, making it the second most popular participatory sport worldwide, that can involve both genders of all ages.

Since volleyball is defined as a fast paced, high impact sport, injuries can and do occur (Souza, 2000). Studies conducted overseas (Bahr, 1997; Cassell, 2001; Erin, 2001; Hewett, 1999 and Powell, 1995) concluded that there is high injury prevalence with regards to risk factors. Majority of volleyball injuries are overuse related and occur over a period of time. Volleyball players are at risk of injury due to several factors such as lack of proper technique, high impact of the nature of the sport, overuse, overstress, sudden changes in direction of movement, and

the impact of different terrains (playing surfaces) (Aagard, 1997). This study investigates these factors by comparing amateur volleyball injury prevalence to risk factors to different indoor and outdoor terrains and how they may contribute to injuries in the volleyball player.

1.1.3. AIM OF THE STUDY

The aim of the study is to investigate and compare the prevalence and risk factors of injuries in amateur indoor and outdoor volleyball players in a KwaZulu-Natal North Coast region, South Africa.

For the purpose of this study, the following information was gathered in terms of:

- demographics of volleyball players in a KwaZulu-Natal North Coast region.
- the participant's volleyball history.
- the presence of any past or current injuries and
- if current, the factors contributing to these injuries were investigated.

This information mentioned above was gathered with the aim of helping to identify any problems that may exist, quantifying the extent of these problems and identifying to some extent the potential risk factors. It is hoped that this would be beneficial to volleyball players in the KwaZulu-Natal North Coast region.

The reason for this study being conducted in this region is because a very dedicated volleyball sect who plays the sport on a regular basis. The researcher is also familiar with this area and is aware of this volleyball league and injuries that impact on the game. The location of the study is the KwaZulu-Natal North Coast region, which includes two of its districts, viz, Tongaat and Kwa Dukuza (formerly known as Stanger).

There is a need to help these players improve the level of their game and in turn reach greater heights. The participants of the study reside in these districts and will include both males and females. All the participants are amateur volleyball players and are above the age of 18.

The study was conducted on the Kwa Dukuza outdoor league and the Tongaat indoor league because Kwa Dukuza only has an outdoor league and Tongaat only an indoor league. The volleyball season runs from October to February for the summer league and April to August for the winter league.

1.2 OBJECTIVES

1.2.1. The first objective is to determine a demographic profile of amateur outdoor and indoor volleyball players in a KwaZulu-Natal North Coast region.

1.2.2. The second objective is to determine the prevalence of injuries in amateur outdoor and indoor volleyball players in a KwaZulu-Natal North Coast region. This will be achieved by means of data collection and documentation specific to:

- Patient demographics including age, gender, ethnicity, height, weight, district and team they represent.
- Volleyball history including years of experience playing volleyball, number of training sessions per week, number of training hours per week, number of hours of court training per week and number of hours of gym training per week.
- Factors directly related to injuries:
 - Location of previous, current and worst injuries
 - Length of time for which, previous, current and worst injuries were present
 - Effect of previous injuries on volleyball training or competition

- Length of time for which volleyball was prevented as a result of these injuries
- Mechanism of previous, current or worst injuries
- Severity of current or worst injuries
- Treatment received for previous, current or worst injuries

1.2.3. The third objective is to determine the knowledge of amateur outdoor and indoor volleyball players in a KwaZulu-Natal North Coast region with regard to the use of health care providers for illness and injury.

1.2.4. The fourth objective is to determine the risk factors for current injuries in amateur outdoor and indoor volleyball players in a KwaZulu-Natal North Coast region.

1.2.5. The fifth objective is to compare the prevalence and risk factors for injury between amateur outdoor and indoor volleyball players in a KwaZulu-Natal North Coast region.

1.3. RATIONALE BEHIND THIS STUDY

Volleyball is a popular sport, both globally and in South Africa (Souza, 2000). According to studies conducted in Australia and New-Zealand, volleyball has a high incidence of injuries due to numerous risk factors associated with the sport such as different terrains, footwear chosen by the players and improper techniques (Aagard, 1997). However, these studies and their results cannot be assumed as being the same for volleyball players in South Africa. This research topic will help determine the status quo for volleyball players and their injury prevalence and risk factors within the South African North Coast area. Most of the players who are affiliated to these leagues come from underprivileged backgrounds and therefore require sponsorships which include finances, protective gear and kits. Their infrastructures are not of high standards,

yet these districts end up producing athletes of high caliber that have managed to go from amateur league level progressing to the international circuit.

According to (Bahr, 1997; Cassell, 2001; Erin, 2001; Hewett, 1999 and Powell, 1995) the studies conducted overseas show increased injury rate. If the same is true for South Africa, then health care professionals need to be more aware of the risk factors associated with the sport in order to give the best advice and conduct the appropriate management of the players.

Due to the player's dedication to the sport in this region, this was a good area to choose, for research to help improve the player's game and assist them to give off their best to help further themselves improve volleyball for their personal success and also for the future of the sport.

1.4 HYPOTHESES (BASED ON THE OBJECTIVES)

1.4.1. The first hypothesis is that the demographic profile of amateur volleyball players in a KwaZulu-Natal North Coast region in South Africa is not similar to international literature profiling volleyball players.

1.4.2. The second hypothesis is that the mapped prevalence for volleyball injuries in South Africa is different from that of other countries due to its unique circumstances of volleyball being produced in South Africa.

1.4.3. The third hypothesis is the knowledge of amateur outdoor and indoor volleyball players in a KwaZulu-Natal North Coast region will not be congruent with the knowledge of volleyball players internationally.

1.4.4. The fourth hypothesis is thought that the risk factors associated with volleyball injuries in South Africa will differ significantly from the risk

factors found in other studies, because of the difference in standard of volleyball produced in these countries.

1.4.5. The fifth hypothesis is thought that the prevalence and risk factors of injury between amateur outdoor and indoor volleyball players in this study will not be similar to those studies conducted overseas.

1.5 LIMITATIONS OF THE STUDY

A study such as this assumes that the respondent's answers to the questions are truthful. It is also assumed that the respondents, under the supervision of the researcher, fully understand the questionnaire and the information that is required from them.

1.6. CONCLUSION

In this chapter an introduction to volleyball and the background of the sport and area of the study were provided. In Chapter Two (Literature Review), a definition of volleyball is provided, as well as explanations of the different types of injuries that prevail amongst volleyball players and the various types of risk factors. Relevant information and results from related studies will be discussed with reference to volleyball injuries and related risk factors. In Chapter Three, the materials and methods used in this study are explained, including the process of statistical analysis. Chapter Four deals with the results obtained from this study. Chapter Five provides a discussion of each result and how it compares with the results of other studies. In Chapter Six, conclusions are drawn from this study and recommendations are provided for future studies.

CHAPTER TWO

LITERATURE REVIEW

2.0 A REVIEW OF THE RELATED CHAPTER

This chapter provides a brief definition and basic introduction to volleyball, and the nature of the injuries that are sustained in the sport, the mechanisms that cause the injuries, risk factors that are related to the sport, relevant information and results of related studies on volleyball injuries, and finally the prevalence and risk factors of indoor and outdoor volleyball injuries. The reason for the study being conducted in South Africa is also included.

2.1 INTRODUCTION TO THE SPORT OF VOLLEYBALL

Volleyball can be defined as an Olympic team sport that is played between two teams with six players each and they are separated by a high net and use their hands, arms or other parts of their bodies to a less significant degree to hit the ball over the net. Each team is allowed a maximum of three hits to get the ball over the net to the opposing team. A point is scored if the ball is grounded on the opponent's court, if the opposing team commits a fault or if they fail to return the ball properly (Volleyball World Wide, 2007).

Volleyball originated in Massachusetts, USA, in 1895. The sport developed over six decades and was first introduced at the Olympic Games in Tokyo in 1964 (Volleyball World Wide, 2007). Since the sport originated, volleyball has developed from a recreational activity into a highly competitive and skilled sport (Cassell, 2001). According to Souza (2000), it is estimated that eighty million people in approximately 180 countries play volleyball making it the second most participatory sport in the world. The sport is played by both genders, people of all ages and can also be played both indoors and outdoors (Cassell, 2001).

2.2. PREVALENCE OF INJURIES IN VOLLEYBALL

Profiling of a sport or activity in terms of demands on the athlete is an important component of a profiling system. For effective prevention, it is important to understand the functional anatomy and pathophysiology of injuries of different tissues (International Federation of Sports Medicine, 1989). For injury prevention, it is also necessary to understand the importance of excessive overload and how these loads are distributed, sports injury mechanism and biomechanical response of body tissues to impact or overuse (International Federation of Sports Medicine, 1989). If the etiological factors are well understood, it is possible to prevent similar injuries occurring or recurring. Sports injuries are caused by intrinsic (pertaining to the athlete) or extrinsic causes (pertaining to the rules of the game, environmental conditions, playing surfaces and coaching techniques), either alone or in combination (Kibbler and Chandler, 1993).

Just as certain injuries can be associated with a particular sport, profiles of athletes are also sports specific. Observing and examining sport specific athletic profiles and correlating these profiles with risk factors and injuries, and by determining the modifiability of these risk factors, a decrease in injury risk may be possible (Armstrong, 1990). Due to the high impact and nature of volleyball as a sport, injuries can and do occur (Blain, 2005).

Studies that have been previously conducted overseas regarding profiling of volleyball injuries included Monash University in Australia which researched the Injury Rates and Severity Amongst Volleyball Participants and concluded that shoulder and knee injuries were very common (Cassell, 2001). This same study also compared outdoor and indoor volleyball injuries and the overall result of the general injury rate for indoor was 4.2 per 1000 hours and 4.9 per 100 hours for outdoor. This study showed that outdoor volleyball has a higher injury rate than indoor volleyball.

Cassell (2001) also highlighted that in outdoor volleyball, there were more shoulder injuries due to the players having to adjust more often with regards to the varying weather conditions such as wind and rain, resulting in abnormal and unusual shoulder movements. There was also a high incidence of injuries occurring due to blocking and attacking at the net. The most common types of injuries that were found in this study were strains and sprains followed by fractures and dislocations and overuse injuries (Cassell, 2001).

A review of the literature from around the world regarding the injury prevalence and risk factors of volleyball players has shown that there is a common injury pattern in America (Powell, 1995), Australia (Cassell, 2001), Norway (Bahr and Bahr, 1997), Ohio (Hewett, 1999) and Scotland (Watkins, 1992).

The common injuries that were identified in the research that were compiled overseas concluded that injuries to the ankle, back, finger, knee, shoulder, toe, thumb and wrist were present (International Journal of Sports Medicine, 1997).

2.3. VOLLEYBALL ACTIONS

According to Souza (2000), there are certain specific actions in volleyball that can cause injury to a player.

The following are examples of volleyball actions:

DIGGING: This action is performed by hitting the ball with the medial aspects of the forearms (Souza, 2000).

SETTING: The main goal of setting is to put the ball in the air in such a way that it can be driven by an attack into the opponents court (Souza, 2000).

SPIKING: At the moment of contact, the hitters arm is fully extended above his or her head and slightly forward, making the highest possible contact while maintaining the ability to deliver a powerful hit (Souza, 2000).

BLOCKING: Actions that are taken by players standing at the net to stop or alter the opponents attack (Souza, 2000).

SERVING: A player stands behind the line that marks the court and serves the ball in an attempt to drive it into the opponents court (Souza, 2000).

There was a correlation between the injury pattern and the specific volleyball actions of the volleyball players (Souza, 2000). Certain volleyball actions caused injuries to specific areas of the body (Souza, 2000). Souza (2000) explained that injuries commonly seen in volleyball players were highest due to the blocking action resulting in injuries to the fingers and ankles. Spiking leads to injury of the shoulder, knee and ankle (Erin, 2001). Serving and setting accounted for a smaller number of injuries and resulted in injuries to the wrist and fingers. Jumping resulted in overuse injury to the knee, resulting in “Jumpers Knee” also known as Patella Tendonitis (Souza, 2000).

The injury patterns were not significantly different in outdoor and indoor volleyball. In outdoor volleyball, most injuries occurred in court defense and spiking, whilst indoor volleyball led to injuries during blocking and spiking (Bhairo, Nihstn and Van Daken, 1997).

2.4. COMMON SITES OF INJURY/IES

According to studies conducted overseas, the common areas of injury in volleyball are the ankle, back, finger, knee, shoulder, toe, thumb, and wrist.

ANKLE:

The most common type of ankle injury is a sprain¹ (Souza, 2000). Basically, a sprain is stretching and tearing of a ligament/s. The most common damage in an ankle sprain is to the talo-fibula ligament or the calcaneo-fibula ligament. In addition, tendons and muscles can also be damaged known as strains² (Souza, 2000).

According to Cassell in an Australian study, the rate of ankle injuries reached up to 61% (Cassell, 2001). In another study conducted in America, there was a 65.7% rate of ankle injuries. In the same study, it was found that 35.6% of the ankle injuries were sustained by the female volleyball players (Powell, 1995).

In a similar study conducted in Norway, the rate of ankle injuries was 54% of which 79% were recurrences of injuries and most of these injuries occurred at the net when landing after blocking or attacking (Bahr and Bahr, 1997). In another study that was done in Denmark, research showed that 31% of the players sustained ankle injuries (Solgaard, 1995). According to another study that was done in Denmark, it was found that the rate of ankle injuries was higher in indoor volleyball due to blocking and spiking actions (Aagaard, 1997). According to Watkins (1992), there was a high incidence of ankle injuries with 55% of the players having them in Scotland.

SPRAIN¹: INJURY CAUSED MAINLY TO LIGAMENTS BY BEING STRETCHED OR TEARING (CLUETT, 2008).

STRAIN²: INJURY CAUSED DUE TO MUSCLES OR TENDONS BEING STRETCHED BEYOND CAPACITY OR LEADING TO TEARS (CLUETT, 2008).

BACK:

The common condition involving the back is caused by hyper-extending the back on spiking or serving. The back is also placed under a huge amount of strain during movements such as jumping, bending and twisting whilst playing volleyball (Souza, 2000). In a study conducted in Australia, back injuries ranged between 9 and 18% of the overall injury rate in the volleyball players (Cassell, 2001). In another study conducted in Norway, back injuries contributed 11% of the total injury rates (Bahr and Bahr, 1997).

FINGER:

Fingers are a common area to be injured as the hands are mainly used to make contact with the ball in volleyball. A common injury is a sprain. This occurs when the finger is bent in a way that causes damage to the ligaments (Cluett, 2008). Studies conducted in Australia on volleyball injuries concluded that finger injuries were between 8 and 45% (Cassell, 2001).

According to another study that was done in America, injuries to the hands and fingers constituted 15.8% (Powell, 1995). In a Norwegian study, finger injuries accounted for 7% of the total number of injuries (Bahr and Bahr, 1996). In a study that was compiled in Scotland, finger and hand injuries were caused by contact with the ball during blocking and contributed to 22% of the total injury rate (Watkins, 1992).

According to a study that was done in Denmark, there was a high incidence of finger injuries due to the high frequency of blocking and spiking. There was a higher incidence in indoor volleyball over outdoor volleyball (Solgaard, 1995).

KNEE:

A common condition involving the knee is known as Patella Tendonitis. This condition is very common to volleyball players and has been given a specific term known as “Jumpers Knee” (Souza, 2000). The patella tendon connects the patella to the tibia and when large amounts of stresses are placed on the tibia, like jumping, a partial strain of the tendon can occur. This can lead to inflammation of the tissue due to overuse from repetitive jumping and landing (Souza, 2000).

According to Cassell (2001), the injury rate involving the knee was 59% and the most common cause of these injuries in this study was overuse injuries due to repetitive strain. A study conducted in Norway found that knee injuries comprised of 8% of the total number of injuries (Bahr and Bahr, 1997). Hewett (1999) found that there was a higher prevalence of knee injuries in women than men due to the anterior cruciate ligament commonly being weaker in females than in males. Scottish studies in male volleyball players suggested that there was a fairly high incidence of knee injuries (Watkins, 1992).

SHOULDER:

The common injury of the shoulder in volleyball is known as “Spikers Shoulder”. This occurs when the rotator cuff muscles of the shoulder are placed under a great deal of strain, especially during the movement of spiking, when the players use a lot of overhead actions (Souza, 2000).

According to Cassell (2001), shoulder injuries contributed to 24% of the total number of injuries. In this same study, the prevalence of shoulder injuries was higher in outdoor volleyball as compared to indoor volleyball players due to the varying weather conditions resulting in unusual shoulder movements. In a study that was conducted in Norway, it was found that shoulder injuries contributed to 8% of the total injury rate (Bahr and Bahr, 1996).

TOE:

There is a common condition specific to volleyball players known as “Sand Toe”. This term is used to describe the player’s foot being forced into plantar flexion when the player’s toes are caught in the sand. The injury is most likely a capsular sprain (Souza, 2000).

THUMB:

The common injury to the thumb is a thumb sprain. This occurs when the thumb is bent out of its normal range of movement and the ligaments of the thumb are damaged (Quinn, 2007).

WRIST:

Injuries such as lunate dislocation of the wrist can occur from diving for the ball or setting. Sprains occur when the player attempts to block a spiked ball. Continued hyperextension and radial deviation of the wrist during setting can also lead to overuse injuries such as wrist tendonitis (Quinn, 2007).

Research conducted overseas has shown the presence of injuries commonly occur at the following areas (listed from most common to least common): ankle, knee, fingers, shoulder, back, wrist, thumb and toe (Souza, 2000). Literature found regarding injury prevalence in volleyball players that was compiled overseas found that the most frequent injuries were acute injuries located in the ankle and finger, and overuse chronic injuries in the knee and shoulder (International Journal of Sports Medicine, 1997).

2.5. THE PREVALENCE OF RISK FACTORS IN VOLLEYBALL

Volleyball is a fast paced sport and injuries can and do occur whilst playing the game (Armstrong, 1990). The identification of injuries and their risk factors are required in order to develop risk controls within the context of sports injury prevention (Briner and Benjamin, 1990). Players are at risk of injury and there is

a need to investigate ways of reducing their risk by profiling player's injuries (Briner and Benjamin, 1990).

The occurrence of injuries in sports and the negligence of injured players are key factors in the early exit of talented players from competitive sport in developing countries (Arnason *et al.*, 2005). Risk factors that can affect the biomechanics, functional anatomy and pathophysiology of injuries can be classified as either intrinsic (pertaining to the athlete) or extrinsic (pertaining to the rules of the game, environmental conditions and playing surfaces and coaching techniques) (American Orthopedic Sports Society for Sports Medicine, 2004).

In order for effective prevention, it is important to understand the functional anatomy and pathophysiology of injuries of different tissues (International Federation of Sports Medicine, 1989). Injuries can be prevented by understanding the importance of excessive overload and how these loads are distributed, sports injury mechanism and biomechanical response of body tissues due to impact or overuse (International Federation of Sports Medicine, 1989). If the etiological factors are well understood, it is possible to prevent similar injuries occurring or recurring.

2.6. RISK FACTORS

2.6.1. INCORRECT COACHING METHODS

Volleyball coaching can be divided into match coaching and developmental coaching. The main objective of match coaching is to win a match by providing a strategy for the team. Developmental coaching emphasizes player development by reinforcing the basic skills during exercise known as "Drills" (Welcome to AVCA, 2008).

"Drills" promote repetition and refinement of specific volleyball movements. The coach constructs the "Drills" and their purpose is to stimulate match situations by increasing speed of movements, timing, good communication and team-work

(Welcome to AVCA, 2008). According to this study, coaches should use varying coaching routines and concentrate on developing the player's skills (Welcome to AVCA, 2008). Therefore it may be found that incorrect coaching can be detrimental to the individual volleyball player and it is recommended that individuals who want to coach the sport must undergo a specialised coaching programme that is specific to volleyball.

2.6.2. INADEQUATE FITNESS LEVELS

Research has found that conditioning and specific exercise programmes are recommended and specific training in skills and techniques are required for the players. The rationale behind these, are due to the fact that volleyball is a high impact sport and requires a variety of physical attributes such as endurance, speed, power, flexibility, strength and balance (Cassell, 2001). In order for participants to cope with the demands of the game and reduce the risk of injury, participants need to train and prepare to meet a minimum set of physiological, physical and psychological requirements. It is essential for volleyball players to train for general fitness so that they can perform to their maximum ability and reduce their risk of injury (Cassell, 2001).

The players are also advised to undergo a skills and training programme accompanied by a fitness test at the beginning of the volleyball season (Cassell, 2001). Players should always warm up, stretch and cool down before and after every training session and competitive game because it has been found that cold muscles and low fitness levels may contribute to high injury rates (Cassell, 2001).

2.6.3. DRESS CODE, INJURY COUNTERMEASURES AND PROTECTIVE GEAR

Blain (2005) stated that appropriate dress code and use of protective gear are important in injury prevention, and he also mentioned that the use of defensive

pants and lightweight footwear are also advised. Defensive pants provide protection to the players from floor burns and bruises by being padded from the hip to the knee. Lightweight footwear should be worn to prevent ankle sprains or injuries from occurring. According to Blain (2005), lightweight shoes provide adequate ankle and arch support and offer good shock absorption. Special specifically designed volleyball shoes for men and women are used and allow for better grip on the volleyball court and therefore preventing ankle sprains and dangerous falls.

Blain (2005) advised that players should strap or brace the affected areas correctly during training and match days to help prevent previous injuries from reoccurring and to help reduce injury rates. Volleyball pads are used to protect the player from injury during purposeful dives and accidental falls. The protective gear is considered to be a vital part of volleyball safety as they protect the body parts that are exposed to and are at risk of being injured. The use of appropriate dress code and protective gear is therefore important and helps reduce the injury rate of the players (Blain, 2005).

2.6.4. PLAYING SURFACES

According to Olympic Volleyball guidelines, the playing surface of a volleyball court must be flat, horizontal and uniform (American Academy of Orthopedic Surgeons, 2007). There are a variety of playing surfaces used in volleyball. The sport can be played on hardwood, grass, sand or asphalt surfaces. Good playing surfaces are a major contributory factor to the rate of injuries in volleyball players (American Academy of Orthopedic Surgeons, 2007).

Grass surfaces can be slippery when wet and thus resulting in falls and leading to increased number of injuries. Volleyball played on sand can result in players sustaining sand burns. Wood and asphalt surfaces result in a higher number of injuries due to the nature of these surfaces as compared to grass and sand.

Therefore, the surface where volleyball is played on can be a major contributory factor to injury rate (American Academy of Orthopedic Surgeons, 2007).

2.6.5. ENVIRONMENTAL HAZARDS AND WEATHER CONDITIONS

The court should have 23 feet of overhead clearance and free from any obstructions for the safety of the volleyball players (English Volleyball Association, 2002). If the net is supported by wires, they should be covered with a soft material to help prevent injuries from occurring American Academy of Orthopedic Surgeons, 2007).

Prior to commencing a game, the court should be cleared of any objects on the court that could pose a danger to the players (American Academy of Orthopedic Surgeons, 2007). Extreme weather conditions affect the level of play in outdoor volleyball. The players have to adapt to the change of weather conditions which could result in unusual body movements and volleyball actions which may lead to injuries (Cassell, 2001).

2.6.6. FIRST AID

The presence of First Aid at the court side is important for the treatment of minor injuries such as facial cuts, bruises, minor tendonitis, sprains and strains during the acute phase. First aid is needed for possible emergency situations which have to be handled appropriately and quickly in cases of concussions, dislocations, contusions, severe sprains or fractures. It is for this reason that medical personnel need to be within close proximity of the playing courts (American Academy of Orthopedic Surgeons, 2007).

Addressing acute injuries at the time of injury or whilst still in the acute phase, will decrease the chances of developing long term chronic conditions. This is the

main reason why there should be medical personnel involved with volleyball teams during training days and competitive matches.

2.7. RISK FACTORS THAT ARE UNIQUE TO SOUTH AFRICA

The international risk factors for volleyball injuries that have been discussed previously such as incorrect coaching methods, inadequate fitness levels, dress code, injury countermeasures and protective gear, playing surfaces, environmental hazards and weather conditions and first aid also do apply to the South African context.

There are however, certain risk factors which are specific to South Africa, namely, South Africa's political history, lack of finance and poor socioeconomic factors however, given that the previous studies regarding injury prevalence and risk factors stem from studies conducted overseas, this information cannot always be applied to the South African context due to the above named unique factors faced in South Africa.

2.7.1. SOUTH AFRICA'S POLITICAL HISTORY

According to Volleyball S.A. (2004), the previous government's policy of dividing sport along racial lines could have adversely impacted on how volleyball was administered which resulted in the existence of separate bodies, each of which laid claims to being the most legitimate in respect of organizing, administering and developing the game. The previously formed bodies amalgamated and formed a unitary, non-racial body that is now known as Volleyball S.A. South Africa's past isolation from sport during the apartheid era might have halted the development of volleyball in this country and therefore may not be at the same level as elsewhere in the world (Volleyball S.A.).

2.7.2. LACK OF FINANCE AND POOR SOCIOECONOMIC FACTORS

South Africa is considered to be a third world country and there is not adequate funding for sports in this country. Therefore volleyball facilities and infrastructures are limited and not of first world standards (Volleyball S.A., 2004). There are development programmes which are being introduced nationally, to try and improve the standard of the sport in South Africa to match that of international standards (Department of Sport and Recreation, 2009).

The risk factors and injury rates regarding volleyball players are influenced by the poor socioeconomic status of South Africa because players cannot afford appropriate protective gear. A lack of funding can also impact on the standard of coaching available to players (Volleyball S.A., 2004).

2.7.3. POOR COACHING, LIMITED VOLLEYBALL KNOWLEDGE AND INADEQUATE FITNESS LEVELS BY SOUTH AFRICAN COACHES

According to the Department of Sport and Recreation (2009), the standards of coaching in South Africa are inferior to their international counterparts because coaching workshops are not as easily accessible in South Africa as they are overseas. This they advise may contribute to the low standards of volleyball coaching in South Africa as the coaches' lack of knowledge in volleyball which may lead to increased risk of injuries (Department of Sport and Recreation, 2009).

Furthermore, Volleyball S.A. (2004), advise that incorrect training methods, poor training facilities and poor fitness levels can lead to high risk of injuries.

2.7.4. DRESS CODE, INJURY COUNTERMEASURES AND PROTECTIVE GEAR AVAILABLE TO SOUTH AFRICAN PLAYERS

According to Blain (2005), appropriate dress code and use of protective gear are important in injury prevention. Volleyball players in South Africa are at increased

risk of injuries due to them not being able to afford the appropriate dress code and protective gear that is required.

2.7.5. SOUTH AFRICAN PLAYING SURFACES AND INFRASTRUCTURE

The playing surfaces can be a major contributory factor to the amount of injuries sustained by volleyball players in South Africa. This can be also attributed to South Africa having poor sporting infrastructures (Department of Sport and Recreation, 2009). The issues regarding Infrastructure development are in the process of being addressed by the South African government. Whilst some Provincial Sports Federations are well established with multi-million rand facilities, a number of the smaller codes of sport such as volleyball lag far behind in having the proper administrative infrastructure to provide an effective service to their constituency (Rajbansi, 2008).

The Department of Sport and Recreation project aims at the first step to attempt and develop the smaller sporting codes such as volleyball, swimming and athletics towards improving their efficiency. This programme entails the establishment of a sports centre to accommodate various codes of sport and to provide administrative support to federations (Rajbansi, 2008).

2.7.6. SOUTH AFRICAN ENVIRONMENTAL HAZARDS AND WEATHER CONDITIONS

Many factors (fitness levels, correct volleyball gear and correct coaching methods) need to be combined to produce peak performances from participants. Some factors can be controlled whilst others are beyond human control. Weather is one of those factors that cannot be controlled. Outdoor volleyball can be subjected to extremes of weather conditions. There can be periods of high temperature where humidity can result in dehydration and heat illness (Reeser,

2003). The weather conditions in South Africa are generally unpredictable and may contribute to the rate of injuries.

2.8. CONCLUSION

The demographical and geographical context of this empirical investigation stems justifiably from the need to effect a betterment plan for volleyball players in South Africa and internationally. Whilst it is common knowledge that volleyball is a popular sport in South Africa, the findings of this research leads to scientifically based solutions on the alleviation and treatment of common sports injuries caused mainly through negligence and poor management within the domain of volleyball.

Based on these international findings regarding poor terrain, protective gear, coaching and finances, this research aims to address areas lacking within the South African volleyball arena so risk factors for injuries can be reduced.

CHAPTER THREE

3.0 MATERIALS AND METHODS

This chapter deals with the collection of data and the research methodology used in this study. The process of statistical analysis is also discussed.

3.1. STUDY DESIGN

This study was a descriptive, quantitative, population based questionnaire study, investigating the injury prevalence and risk factors of amateur indoor and outdoor volleyball players in a KwaZulu-Natal North Coast region in South Africa.

The data was collected by means of a self administered questionnaire (Appendix C), which was completed by the subjects, under the supervision of the researcher. In general, questionnaires are a good source of information, provided that the questionnaire has been determined valid and reliable (Mouton, 1996).

3.2. DEVELOPMENT OF THE QUESTIONNAIRE

This questionnaire was developed by reading through previous sports injury questionnaires by Twizere (2004), Adamson (2006), and Archary (2008). These questionnaires were adapted to the context of this Research. A Pre Focus Group Questionnaire (Appendix H) was initially developed. In the focus group there were many inconsistencies and ambiguity that was found and therefore changes had to be made. A Post Focus Group Questionnaire was developed for the Pilot Study in which no changes were made so the Post Focus Group Questionnaire (Appendix C) was the finalized questionnaire and was handed out to the subjects of this study.

Due to the purposes of this study, this questionnaire was adapted to be more suitable to volleyball and the players. The Volleyball Injury Questionnaire was then validated. Validity refers to establishing the accuracy and trustworthiness of an instrument, data and findings in research, ensuring that future research using that particular tool is accurate (Bernard, 2000).

A Focus Group was required to help develop the Volleyball Questionnaire. The participants of this Focus Group were enlisted via word of mouth by the researcher. The group consisted of seven participants being present, which included four health care professionals who are experienced in treating sports injuries, including a physiotherapist and three chiropractors, one chiropractic student, one volleyball player and the researcher.

Before commencing the Focus Group, each participant was required to read an Information Letter (Appendix D), and sign an Informed Consent Form (Appendix G) as well as a Confidentiality Statement (Appendix E) and a Code of Conduct Form (Appendix F). In the Focus Group, each participant was given a copy of the Volleyball Questionnaire (Appendix H). Comments were requested from the participants on how the questionnaire could be modified in order for it to be used to assess volleyball injuries accurately.

The questions were discussed in sequential order. If inconsistencies were found, or changes proposed, a unanimous decision was made to institute change. A video of the proceedings was made and is available as evidence of the individuals involved and the content of the discussion (Appendix J). The Questionnaire that was used in this Focus Group to adapt it to volleyball was developed by Adamson (2006) for gymnastic injuries and Archary (2008) for soccer injuries.

The Questionnaire that was discussed in this Focus Group to help determine that it accurately identified concepts relating to the injury prevalence. The suggested changes (Appendix I) were analyzed and these were made to the questionnaire, resulting in the corrected version being used in this study. The content of the discussions from the Focus Group will be kept confidential.

The documents and video proceedings (Appendix J) will be kept in a secure area and will be destroyed after five years for confidentiality reasons. The refined questionnaire from the Focus Group was then reviewed in a departmental meeting and a Pilot Study thereafter. The Pilot Study was conducted to clear out any problems regarding ambiguity or redundancy of questions in the questionnaire. The questionnaire (Appendix C), following the changes made by the Focus Group, was sent to respondents, who met the inclusion / exclusion criteria of this study. Those who participated in the Focus Group and the Pilot Study were excluded from the study.

The respondents chosen were a representative of the study group to be researched. They were required to answer the questionnaire, and to determine if the questionnaire was easy to complete. It was judged in terms of its readability, simplicity and whether the instructions to the questionnaire were easy to understand. The final questionnaire was produced and handed out to be completed by the indoor and outdoor amateur volleyball participants.

3.3. ALLOCATION OF PARTICIPANTS

3.3.1. METHOD AND SAMPLING PROCEDURE

Permission was requested regarding the answering of the questionnaires from the Heads of the outdoor and indoor leagues (Appendix A). Once written permission was granted, a suitable date was established for all the participants to be present. The answering of the questionnaires was done on separate days for both the districts. On the allocated days, they were given a Letter of Information

(Appendix B) to read and the Questionnaire (Appendix C) to answer.

Participation in the study was voluntary and consent was given by filling in the questionnaire. The researcher was present on this day to supervise and to collect the completed questionnaires immediately after the session was completed.

Once the questionnaire was completed, they were collected immediately by the researcher. Only the researcher and the supervisor have access to the questionnaires as they are kept in a safe place for confidentiality reasons.

There were a total number of 160 participants from both the Tongaat and Kwa Dukuza leagues. For this study to be considered valid and for statistical analysis, a response rate of 70% or more ($n=112$ or greater) was required (Esterhuizen, 2008). If the 70% response rate had not been met on that day, another day would have been arranged for the remaining volleyball players to complete their questionnaires. Each player's information was kept strictly anonymous and participants were asked to keep their information confidential until this study was completed.

3.3.2. POPULATION SIZE

The population area is a North Coast region, including the two districts, viz, Kwa-Dukuza and Tongaat. Both districts have a combined total of 160 players (80 players from each district) made up of 10 teams consisting of 8 players.

$[(10 \times 8 = 80) \times 2 = 160]$. Therefore, the total population size used for this study was 160 subjects. The total sample population ($n = 160$) was invited to participate in this study. Participation was voluntary and those who choose not to participate were not coerced into participating. A response rate of over 70 % was achieved and 115 questionnaires were completed.

3.4. CRITERIA FOR PARTICIPATING IN THE STUDY

3.4.1. INCLUSION CRITERIA

- All participants must be registered with either the Kwa-Dukuza district volleyball association or the Tongaat volleyball association.
- All participants must be 18 years or older.
- All participants must be amateur volleyball players.

3.4.2. EXCLUSION CRITERIA

The exclusion criteria for the participants were as follows:

- All participants who have participated for only one season.
- All participants who are professional volleyball players.
- All players who participated in the Focus Group and Pilot Study of this research.

3.5. DATA COLLECTION AND ANALYSIS

The subjects who met the requirements of the study received assistance in filling in the questionnaire from the researcher if it was required.

Participants filled out the questionnaire with respect to:

- Patient demographics including age, gender, ethnicity, height, weight, which district they represent and the name of their team.
- Information on the participant's volleyball history, including years of playing volleyball, the number of training sessions per week, the number of training

hours per week, the number of court training per week and the number of gym training per week.

Factors directly related to injuries:

- Location of previous, current and worst injuries.
- Type of previous, current and worst injuries.
- Length of time for which previous, current and worst injuries were present.
- Effect of previous, current and worst injuries on volleyball.
- Length of time for which volleyball playing was prevented as a result of these injuries.
- Mechanism of previous, current and worst injuries and whether the injuries occurred during training session or a competitive match.
- The severity of the injuries.
- Whether the patient received treatment for these injuries.
- If the player or participant sustained an injury/ies, they were asked to rank them with regards to the corresponding volleyball action.

Participant's general knowledge regarding which health care professional is associated with certain health conditions.

Management and resources:

- Facilities used for training.
- Whether they have a designated coach, with experience and qualifications in the volleyball field.
- Whether there is first aid and a medical team present at the matches.

Protective gear:

- The use of knee, ankle, wrist and elbow guards when they played volleyball.

- Use of appropriate footwear.
- Strapping of fingers when playing volleyball.

Once the data was collected from each questionnaire, it was used for data capturing purposes, and analysis was performed in order to determine the injury prevalence and risk factors of the amateur indoor and outdoor volleyball players in a KwaZulu-Natal North Coast region in South Africa. This study also tried to determine any potential risk factors as identified in previous studies and if so, whether there were any significant relationships existed between these risk factors and the volleyball injuries sustained in this study. These results were then compared to the studies that were conducted internationally.

3.6. STATISTICAL ANALYSIS

SPSS version 15.0 (SPSS Inc, Chicago, Illinois, USA) was used to analyse the data. A two-tailed p value <0.05 was considered as statistically significant.

Descriptive analyses were presented as summary statistics such as mean and standard deviation for quantitative variables, while frequency counts and percentages were used to describe categorical variables. 95% confidence intervals were calculated around prevalence estimates using EpiCalc2000 (version 1.02, Joe Gillman and Mark Myatt, 1998, Brixton Books).

Risk factors for injuries were assessed on the bivariate level using Pearson's chi square tests and independent t-tests. Multivariable binary logistic regression analysis was used to assess the independent effects of the risk factors for predicting the risk of current injury. A backwards stepwise method of model selection was used with entry and removal probabilities set at 0.1 and 0.05 respectively. Odds ratios and 95% confidence intervals were reported.

CHAPTER FOUR

RESULTS

4.1 INTRODUCTION

Results of the statistical analysis of the data are presented in this section. A descriptive analysis is presented first followed by analytical analysis which reports on proportions and means.

4.2. DATA

4.2.1. PRIMARY DATA:

The data collected from the questionnaire/participant responses and the data obtained once the statistical analysis was complete.

4.2.2. SECONDARY DATA:

The data in the literature, books, internet and journals, with which to compare the outcome of results in the research study.

4.3. KEY FOR ABBREVIATIONS:

P value: is the probability of your results being due to chance or random error and if it is a very small value, one can conclude that the results are significant (Hicks, 2004)

CI: Confidence Interval (Esterhuizen, 2009)

N: Total number of scores (Hicks, 2004)

n: Sample size (Hicks, 2004)

SD: Standard Deviation (Esterhuizen, 2009)

OR: Odds Ratio (Esterhuizen, 2009)

Mean: The average of n numbers computed by adding some function of the numbers and dividing by some function of n (Esterhuizen, 2009).

4.4. RESPONSE RATES:

A total 115 volleyball players out of a possible 160 volleyball players participated in the study with 16 players falling into the exclusion criteria because they were younger than 18 years and therefore could not participate. The remaining 29 volleyball players chose not to participate in this study due to personal reasons. The remaining participants were divided into two sub-groups which constituted 67 outdoor volleyball players and 48 indoor volleyball players.

The minimum response rate that was required was 70% of the total sample. The response rate of the participants however was greater than 70%, which met the minimum sample response rate as discussed in Chapter three. A possible reason for the high response rate is that the volleyball players were given a dedicated time at the volleyball courts during a training session to complete the questionnaires as the questionnaires were not allowed to be taken home. The researcher was present to supervise the answering of the questionnaires and collected them immediately after they were completed by the volleyball players.

4.5. RESULTS

4.5.1 Objective One: To determine the demographic profile of amateur indoor and outdoor volleyball players in a KwaZulu-Natal North Coast region.

Table 1 shows the demographic profile of the 115 study participants. They were mainly male (68%) and Indian (81%). There were 59% outdoor players and 41% indoor players. Their mean age, weight and heights are also shown.

TABLE 1: DEMOGRAPHICS OF THE SAMPLE (N=115)

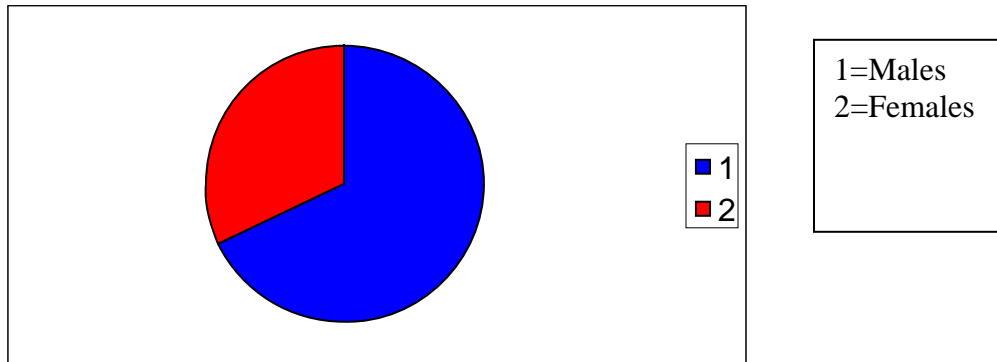
		Count	%
Gender	Male	78	67.8%
	Female	37/115	32.2%
ethnic group	Black	17	14.8%
	White	2	1.7%
	Coloured	2	1.7%
	Asian	1	.9%
	Indian	93	80.9%
district	Outdoor	68/115	59.1%
	Indoor	47/115	40.9%
age (mean, SD) (yrs)		26	9
height (mean, SD) (cm)		170	15
weight (mean, SD) (kg)		68	16

SAMPLE SIZE:

The sample consisted of 115 volleyball players residing in the Kwa-Dukuza and Tongaat districts. There were 68 players from Kwa-Dukuza (outdoor) and 47 players from Tongaat (indoor).

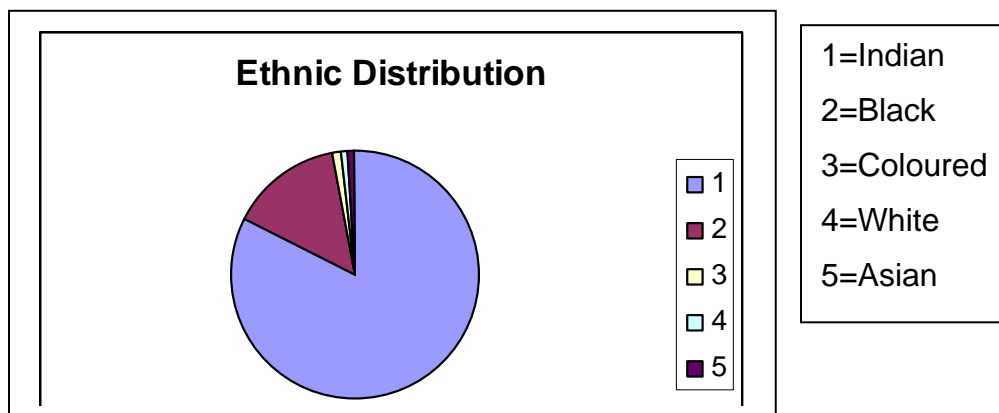
GENDER DISTRIBUTION:

Of the 115 participants in this study, 78 (67.8%) were males and 37 (32.2%) were females.



ETHNIC DISTRIBUTION:

The majority of the volleyball players in this study were Indian (80.9%, n=93), followed by Black (14.8%, n=17), Coloured (1.7%, n=2), White (1.7%, n=2) and lastly Asian (0.9%, n=1).



AGE DISTRIBUTION:

The inclusion criterion for this study, in terms of age, was for the volleyball players to be 18 years and older. The youngest participants were 18 years and the eldest participant was 50 years. The mean age of the participants in this study was 26 years.

4.5.2 Objective two: To determine the prevalence of injuries in amateur outdoor and indoor volleyball players in a KwaZulu-Natal North Coast region.

PAST INJURIES

TABLE 2: PREVALENCE OF HISTORY OF AN INJURY SUSTAINED DUE TO VOLLEYBALL

Have you ever sustained an injury due to volleyball?	Frequency	Percent
yes	79	68.7
no	36	31.3
Total	115	100.0

The injury rates regarding the participants injury history were 79 (68.7%) volleyball players did sustain an injury and 36 (31.3%) not sustaining an injury.

CURRENT INJURIES

TABLE 3: PREVALENCE OF HAVING A CURRENT INJURY DUE TO VOLLEYBALL

Do you have a current injury due to volleyball?	Frequency	Percent
yes	67	58.3
no	48	41.7
Total	115	100.0

The prevalence of current volleyball injuries was 58.3%.

CHARACTERISTICS OF CURRENT INJURIES:

The knee was the most frequently injured site (43.3% of current injuries). This was followed by the shoulder (16.7%) and ankle (10.4%). The sites of current injury are shown in Table 4.

TABLE 4: SITE OF CURRENT INJURY

	Frequency	Percent
Knee	29	43.3
Shoulder	11	16.4
Ankle	7	10.4
Wrist	4	6.0
Ankle	3	4.5
Back	2	3.0
Forearm	2	3.0
Lower back	2	3.0
Elbow	1	1.5
Finger	1	1.5
Finger	1	1.5
Hand	1	1.5
Heel	1	1.5
knee/arm	1	1.5
Neck	1	1.5
Total	67	100.0

CHARACTERISTICS OF CURRENT INJURY

The type of injuries sustained by the participants was Acute 23 (34.3%), Chronic 24 (35.8%), Traumatic 9 (13.4%) and Repetitive strain 11 (16.4%). According to the results obtained, chronic injuries were ranked the highest.

Landing, 11 (26.2%) resulted in the highest rate of injuries sustained by the participants during training whilst flicking, 1 (2.4%) resulted in the least number of injuries. In competitive matches, blocking, 12 (33.3%) resulted in the highest number of injuries and digging, 1 (2.8%) resulted in the least.

The injuries were rated according to severity by the participants and 23 (34.3%) sustained mild injuries, 31 (46.3%) sustained moderate injuries and 13 (19.4%) sustained severe injuries. Therefore moderate injuries were ranked the highest. According to the results in this study, 40 (59.7%) of the participants stopped training due their present injury whilst 27 (40.3%) participants continued training.

In addition to the above results, 21 (32.3%) of the volleyball players were prevented from playing volleyball for less than two weeks, 18 (27.7%) between two weeks and a month and 26 (40%) were prevented from playing for more than a month. This shows that volleyball contributes to long term chronic injuries. The number of participants that received treatment for their injuries was 47 (70.1%) whilst 20 (29.9%) did not receive treatment.

TABLE 5: CHARACTERISTICS OF CURRENT INJURY

		Count	%	
Type	Acute	23	34.3%	
	Chronic	24	35.8%	
	Traumatic	9	13.4%	
	Repetitive strain	11/67	16.4%	
How did the injury occur in training	Blocking	10	23.8%	
	Collision	5	11.9%	
	Digging	4	9.5%	
	Flicking	1	2.4%	
	Jumping	8	19.0%	
	Landing	11	26.2%	
	Spiking	3	7.1%	
	Other	0/42	.0%	
	How did the injury occur in matches	Blocking	12	33.3%
		Collision	5	13.9%
Digging		1	2.8%	
Flicking		0	.0%	
Jumping		5	13.9%	
Landing		8	22.2%	
Spiking		5	13.9%	
Other		0/36	.0%	
Severity	Mild	23	34.3%	
	Moderate	31	46.3%	
	Severe	13/67	19.4%	
Stop training	yes	40	59.7%	
	no	27/67	40.3%	
Prevent playing	<2 weeks	21	32.3%	
	2 weeks - 1 month	18	27.7%	
	> 1 month	26/65	40.0%	
Treatment	yes	47	70.1%	
	no	20/67	29.9%	

TYPE OF TREATMENT RECEIVED FOR CURRENT INJURY

70% had received treatment for their current injury. The most common treatment was bracing/strapping (41.5%); followed by medication (29.2%), home remedies (27.7%), massage (24.6%), ultrasound (15.4%), dry needling (13.8%), rehabilitation (12.3%), other (10.8%), interferential current therapy (6.2%) and lastly manipulation (4.6%). Most of those who received treatment used more than one type of treatment, thus the percentages total more than 100%.

Figure 1 shows the percentages of use of each type of treatment in those who received treatment.

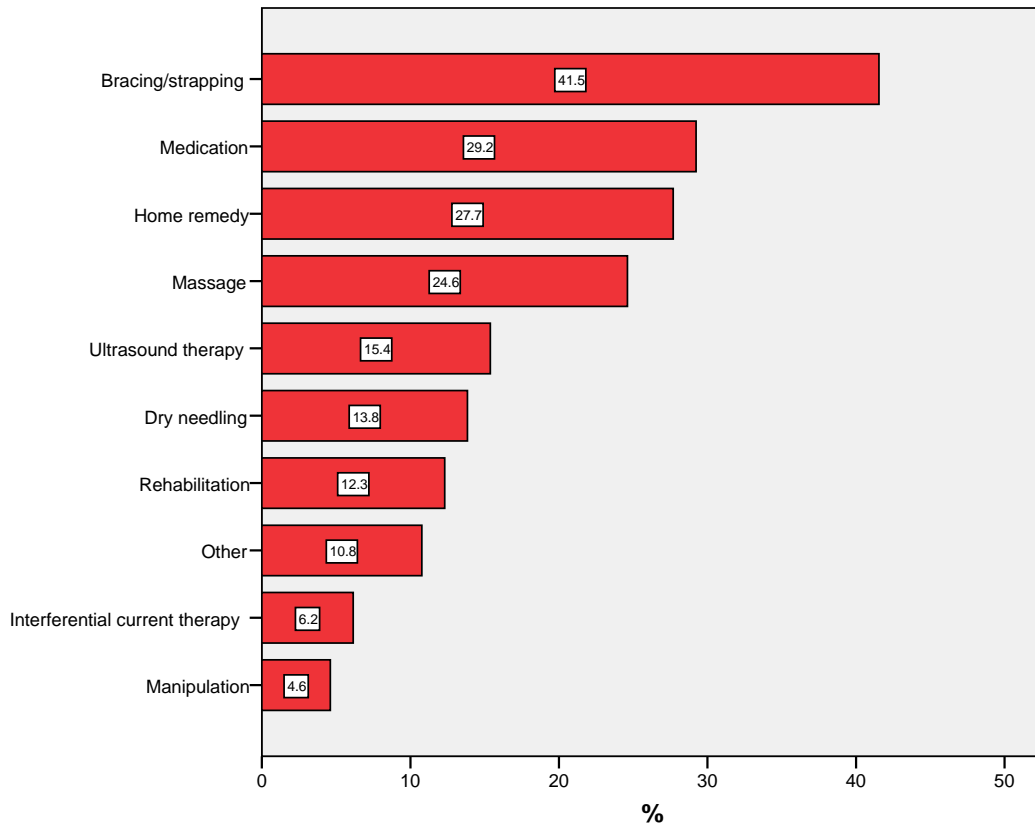


FIGURE 1: TYPE OF TREATMENT RECEIVED FOR CURRENT INJURY

CHARACTERISTICS OF WORST INJURY

TABLE 6: CAN YOU IDENTIFY YOUR WORST INJURY?

		Frequency	Percent
Valid	yes	60	75.9
	No	19	24.1
	Total	79	100.0

Of the 79 players who ever sustained an injury, 60 (76%) could identify their worst injury (Table 6).

SITE OF WORST INJURY

The most common site of worst injury was the knee (42%) followed by the ankle (28.3%). The areas such as the arms, back, neck and nose 1 (1.7%) were injured the least.

TABLE 7: SITE OF WORST INJURY

	Frequency	Percent
knee	25	41.7
ankle	17	28.3
Shoulder	5	8.3
shoulder	4	6.7
finger	3	5.0
wrist	2	3.3
arms	1	1.7
back	1	1.7
neck	1	1.7
nose	1	1.7
Total	60	100.0

CHARACTERISTICS OF WORST INJURY:

According to Table 8, it was found that majority of the participants worst injuries were chronic 25 (41.7%) in nature. The majority of the injuries caused during training were mainly due to blocking and jumping 10 (28.6%) whilst flicking

caused the least 1 (2.9%). Blocking 10 (27.8%) also recorded the highest number of injuries that were sustained during competitive matches. Only 60 participants out of 115 reported they had sustained their worst injury and 28 (46.7%) of the 60 described their worst injury as severe. Due to the number of severe cases, 40 (66.7%) halted training and 31 (53.4%) of the participants were prevented from playing volleyball for more than a month. The majority number of the participants did however receive treatment for their worst injury 47 (81%).

As compared to characteristics of current injuries that were found in these volleyball players, chronic injuries ranked the highest. With regards to the injury mechanisms, landing ranked the highest in the current injury whilst jumping and blocking were the highest in the worst injury category and flicking was ranked the least in both current and worst injury categories.

TABLE 8: CHARACTERISTICS OF WORST INJURY

		Count	%	
Type	Acute	17	28.3%	
	Chronic	25	41.7%	
	Traumatic	9	15.0%	
	Repetitive strain	9/60	15.0%	
How did the worst injury occur in training	Blocking	10	28.6%	
	Collision	2	5.7%	
	Digging	4	11.4%	
	Flicking	1	2.9%	
	Jumping	10	28.6%	
	Landing	6	17.1%	
	Spiking	2	5.7%	
	Other	0/35	.0%	
	How did the worst injury Occur in matches	Blocking	10	27.8%
		Collision	4	11.1%
Digging		4	11.1%	
Flicking		2	5.6%	
Jumping		6	16.7%	
Landing		5	13.9%	
Spiking		5	13.9%	
Other		0/36	.0%	
Severity	Mild	8	13.3%	
	Moderate	24	40.0%	
	Severe	28/60	46.7%	
Stop training	yes	40	66.7%	
	no	20/60	33.3%	
Prevent playing	<2 weeks	11	19.0%	
	2 weeks - 1 month	15	25.9%	
	> 1 month	31	53.4%	
	31	1/58	1.7%	
Treatment	yes	47	81.0%	
	no	11/58	19.0%	

Type of treatment received for worst injury

Figure 2 shows the treatment received for the worst injury. Again the most common treatment was bracing/strapping (41.7%), followed by medication (35%), home remedies (30%), rehabilitation (28.3%), massage (23.3%), ultrasound (18.3%), dry needling and manipulation (8.3%), other (6.7%) and lastly interferential current (5%). With regards to treatment received for current and worst injury, bracing and strapping ranked the highest, followed by medication and home remedy. Manipulation and interferential current therapy were ranked the least.

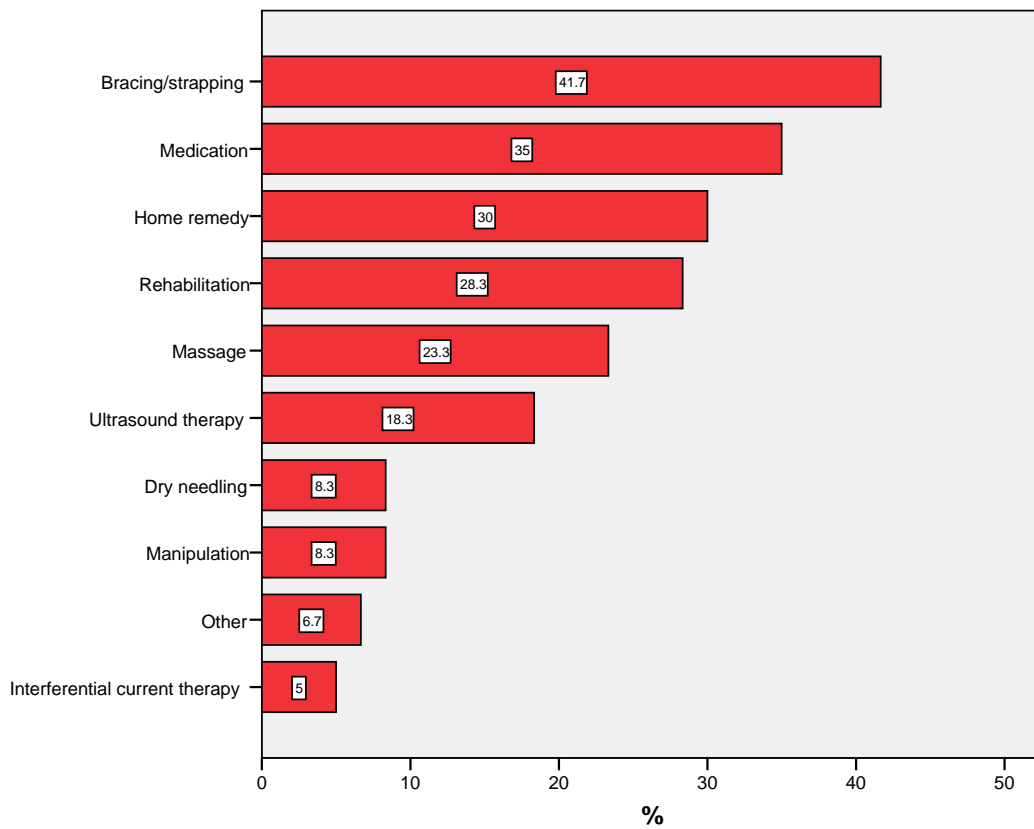


FIGURE 2: TREATMENT RECEIVED FOR WORST INJURY

CHARACTERISTICS OF OTHER INJURIES

Have you sustained any other injuries due to volleyball?

20 (26%) of the participants from a total of 115, stated that they had sustained other injuries due to volleyball apart from their past injury and worst injury.

		Frequency	Percent
Valid	Yes	20	26.0
	No	57	74.0
	Total	77	100.0

TABLE 9: HAVE YOU SUSTAINED ANY OTHER INJURIES DUE TO VOLLEYBALL?

SITE OF OTHER INJURY

In this category of injuries, the shoulder 5 (25%) was the common site of injury, followed by the knee 4 (20%), ankle and back 2 (10%).

	Frequency	Valid Percent
Ankle	2	10.0
back	2	10.0
finer	1	5.0
knee	4	20.0
lower back	2	10.0
Scapula	1	5.0
shoulder	5	25.0
thigh	1	5.0
thumb	1	5.0
wrist	1	5.0
Total	20	100.0

TABLE 10: SITE OF OTHER INJURY

FREQUENCY OF INJURY OF EACH SITE

Table 11 shows that the knee was very often injured, the ankle was found to be the part that was injured often and areas such as the forearm and elbow were injured very seldom according to the results of this study. The reason for the knee being the part being injured very often can be associated with the injury mechanisms such as jumping and landing. There could be a correlation between the type of injury mechanism and the site of the injury.

	Very often		Often		Seldom	
	Count	%	Count	%	Count	%
Foot/toes	0	.0%	5	19.2%	21	80.8%
Ankle	7	15.9%	16	36.4%	21	47.7%
Achilles tendon	1	4.3%	4	17.4%	18	78.3%
Leg	2	9.5%	3	14.3%	16	76.2%
Knee	15	35.7%	14	33.3%	13	31.0%
Hamstring	0	.0%	4	17.4%	19	82.6%
Quadriceps	0	.0%	2	10.0%	18	90.0%
Hip	0	.0%	4	23.5%	13	76.5%
Lower back	3	11.1%	9	33.3%	15	55.6%
Upper back	0	.0%	4	23.5%	13	76.5%
Neck	0	.0%	2	11.1%	16	88.9%
Head	0	.0%	3	17.6%	14	82.4%
Shoulder	8	26.7%	8	26.7%	14	46.7%
Biceps	1	5.9%	2	11.8%	14	82.4%
Triceps	0	.0%	2	11.1%	16	88.9%
Elbow	1	4.8%	6	28.6%	14	66.7%
Forearm	1	5.6%	1	5.6%	16	88.9%
Wrist	3	15.0%	5	25.0%	12	60.0%
Fingers	4	15.4%	7	26.9%	15	57.7%
Other	0	.0%	0	.0%	1	100.0%

TABLE 11: FREQUENCY OF INJURY OF EACH SITE

4.5.3. Objective 3: To determine the knowledge of amateur outdoor and indoor volleyball players in a KwaZulu-Natal North Coast region with regard to the use of health care providers for illness and injury.

Table 12 shows that General Practitioner was the practitioner of choice for arthritis, asthma, fractures, high blood pressure, osteoarthritis, pins and needles, and posture problems. Chiropractors were the predominant choice for neck pain, low back pain and slipped disc.

	Biokineticist		Chiropractor		Physiotherapist		GP		Pharmacist		Homeopath		Other	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%		
arthritis	2	3.2%	1	1.6%	5	7.9%	53	84.1%	0	.0%	1	1.6%	1	1.6%
asthma	0	.0%	0	.0%	2	2.9%	65	92.9%	3	4.3%	0	.0%	0	.0%
fractures	1	1.5%	5	7.6%	18	27.3%	35	53.0%	0	.0%	1	1.5%	6	9.1%
high blood pressure	0	.0%	0	.0%	1	1.6%	61	95.3%	2	3.1%	0	.0%	0	.0%
muscle spasm	3	4.8%	10	15.9%	32	50.8%	18	28.6%	0	.0%	0	.0%	0	.0%
neck pain	3	4.7%	23	35.9%	21	32.8%	15	23.4%	1	1.6%	1	1.6%	0	.0%
osteoporosis	4	6.5%	12	19.4%	15	24.2%	26	41.9%	0	.0%	1	1.6%	4	6.3%
joint pain	4	6.1%	14	21.2%	25	37.9%	19	28.8%	2	3.0%	1	1.5%	1	1.5%
pins and needles	3	4.8%	14	22.6%	18	29.0%	21	33.9%	1	1.6%	2	3.2%	3	4.7%
posture	8	13.1%	18	29.5%	10	16.4%	21	34.4%	0	.0%	0	.0%	4	6.3%
low back pain	6	9.5%	36	57.1%	9	14.3%	11	17.5%	0	.0%	0	.0%	1	1.5%
shoulder pain	7	10.6%	20	30.3%	25	37.9%	14	21.2%	0	.0%	0	.0%	0	.0%
slipped disc	4	6.3%	26	41.3%	14	22.2%	16	25.4%	0	.0%	0	.0%	3	4.7%
sprains	13	19.7%	19	28.8%	20	30.3%	13	19.7%	1	1.5%	0	.0%	0	.0%

TABLE 12: CHOICE OF HEALTH CARE PROVIDER FOR TREATMENT OF THE LISTED CONDITIONS

4.5.4. Objective 4: To determine the risk factors for current injuries in amateur outdoor and indoor volleyball players in a KwaZulu-Natal North Coast region

DEMOGRAPHICS:

Comparison of demographic variables between injured and non injured groups

Table 13 shows that the only significant demographic variable associated with current injury was weight ($p=0.003$) with the injured players being heavier than the non injured players. This study also found that there were more injuries in outdoor volleyball players as compared to indoor volleyball players. Table 13 also shows that both, the male and female players are injured more than non-injured.

		Current injury				P value
		yes		no		
		Count	%	count	%	
Age (mean, SD)		27.3	8.5	25.1	8.4	0.161
Gender	Male	45	57.7%	33	42.3%	0.858
	Female	22	59.5%	15	40.5%	
Ethnic Group	Black	14	82.4%	3	17.6%	0.089
	White	1	50.0%	1	50.0%	
	Coloured	0	.0%	2	100.0%	
	Asian	1	100.0%	0	.0%	
	Indian	51	54.8%	42	45.2%	
	Other	0	.0%	0	.0%	
	Height (mean, SD) cm		171.9	14.2	167.7	
Weight (mean, SD) kg		71.5	16.4	62.6	14.7	0.003
district	Outdoor	43	63.2%	25	36.8%	0.193
	Indoor	24	51.1%	23	48.9%	

Table 13: Comparison of demographic variables between injured and non injured groups

VOLLEYBALL HISTORY

Comparison of volleyball history variables between injured and non injured groups

The number of years playing volleyball differed significantly between those with and without injuries ($p=0.047$). Those with a current injury had been playing for longer. This is shown in Table 14. A large number of the injured participants 49 (62.8%) stated that they do not train in the gym and this can be attributed to their fitness levels and in turn reflect on the total number of injuries sustained. As mentioned in Chapter Two, fitness of an athlete is important to help minimize and prevent injuries from occurring.

	Current injury				P value
	Yes		no		
	Mean	Standard Deviation	Mean	Standard Deviation	
Age started	13.8	4.6	14.2	5.2	0.691
Years	13.1	7.7	10.3	6.6	0.047
Sessions	2.4	1.6	2.2	1.0	0.483
Hours	4.9	2.5	4.6	3.0	0.566
Court hours	3.8	2.6	3.3	2.5	0.262
Gym Yes (n, %)	18	48.6%	19	51.4%	0.150
No (n, %)	49	62.8%	29	37.2%	
Hours gym	4.5	1.7	5.1	2.5	0.417

TABLE 14: COMPARISON OF VOLLEYBALL HISTORY VARIABLES BETWEEN INJURED AND NON INJURED GROUPS

MANAGEMENT AND RESOURCES

Comparison of management and resources between injured and non injured groups

Table 15 shows that having a medical team had a significant impact on the reduction of injury ($p=0.010$). In Chapter Two, risk factors such as court facilities, incorrect coaching methods and first aid were discussed in terms of the South African context and can therefore be applied to this study. The results found in Table 15 showed that the availability of first aid and a qualified coach with experience did not influence the injury rates specifically.

TABLE 15: COMPARISON OF MANAGEMENT AND RESOURCES BETWEEN INJURED AND NON INJURED GROUPS

		Current injury				P value
		Yes		no		
		Count	%	Count	%	
Courts	no	0	.0%	1	100.0%	0.235
	yes	67	58.8%	47	41.2%	
Gym facilities	no	56	56.6%	43	43.4%	0.359
	yes	11	68.8%	5	31.3%	
Pool	no	66	58.4%	47	41.6%	0.811
	yes	1	50.0%	1	50.0%	
Other facilities	no	64	58.2%	46	41.8%	0.936
	yes	3	60.0%	2	40.0%	
Coach	yes	59	59.6%	40	40.4%	0.470
	no	8	50.0%	8	50.0%	
Qualified	yes	46	59.0%	32	41.0%	0.760
	no	19	55.9%	15	44.1%	
Experienced	yes	57	62.6%	34	37.4%	0.151
	no	8	44.4%	10	55.6%	
First aid	yes	33	55.0%	27	45.0%	0.459
	no	34	61.8%	21	38.2%	
Medical team	yes	5	29.4%	12	70.6%	0.010
	no	61	62.9%	36	37.1%	

Comparison of protective wear use between injured and non injured groups

In Chapter Two, the importance of protective gear was discussed. It was stated that protective gear is considered to be a vital part in safety of volleyball players as they are used to protect the body parts that are exposed or previously injured. The use of protective gear is advised as they help in reducing and preventing injuries. Wearing ankle guards was associated with having an injury ($p=0.012$), and never wearing the correct footwear was related to having an injury ($p=0.014$).

TABLE 16: COMPARISON OF PROTECTIVE WEAR USE BETWEEN INJURED AND NON INJURED GROUPS

		Current injury				P value
		yes		no		
		Count	%	Count	%	
Knee guards	Always	22	71.0%	9	29.0%	0.467
	Very often	4	57.1%	3	42.9%	
	Often	4	66.7%	2	33.3%	
	Sometimes	7	58.3%	5	41.7%	
	Never	30	50.8%	29	49.2%	
Ankle guards	Always	15	78.9%	4	21.1%	0.012
	Very often	0	.0%	6	100.0%	
	Often	5	71.4%	2	28.6%	
	Sometimes	8	66.7%	4	33.3%	
	Never	39	54.9%	32	45.1%	
Wrist guards	Always	3	42.9%	4	57.1%	0.618
	Very often	0	.0%	1	100.0%	
	Often	3	75.0%	1	25.0%	
	Sometimes	2	66.7%	1	33.3%	
	Never	59	59.0%	41	41.0%	
Elbow guards	Always	4	80.0%	1	20.0%	0.869
	Very often	1	50.0%	1	50.0%	
	Often	2	50.0%	2	50.0%	
	Sometimes	2	50.0%	2	50.0%	
	Never	58	58.0%	42	42.0%	
footwear	Always	56	54.9%	46	45.1%	0.014
	Very often	11	84.6%	2	15.4%	
Strap fingers	Always	15	65.2%	8	34.8%	0.449
	Very often	52	56.5%	40	43.5%	
	Often	0	.0%	0	.0%	
	Sometimes	0	.0%	0	.0%	
	Never	0	.0%	0	.0%	

Logistic regression analysis of risk factors for current injury

Logistic regression analysis showed that after controlling for the other significant factors for injury, wearing ankle guards and years of playing were no longer significantly associated with injury. The factors that remained in the model were weight (risk of injury increased by 1.03 times with every 1 kg increase in weight), not having a medical team (3.7 times the risk of having a medical team) and never wearing the correct footwear (4.1 times the risk of always wearing the correct footwear).

TABLE 17: LOGISTIC REGRESSION ANALYSIS OF RISK FACTORS FOR CURRENT INJURY

	P value	OR	95.0% C.I. for OR	
			Lower	Upper
Step 3(a) weight	.010	1.035	1.008	1.063
Medical team (no vs. yes)	.028	3.697	1.148	11.904
Foot wear (very often vs. always)	.092	4.078	.795	20.917
Constant	.001	.010		

A Variable(s) entered on step 1: weight, years, medical team, ankle guards, and footwear.

4.5.5 Objective 5: To compare the prevalence and risk factors for injury between amateur indoor and outdoor volleyball players in a KwaZulu-Natal North Coast region.

Comparison of prevalence of history of injury by district

There was no difference between the prevalence of ever sustaining an injury or present injury between outdoor and indoor players. 48 (70.6%) of the outdoor players sustained an injury whilst 31 (66%) of the indoor players sustained an injury. The results in this study showed that majority of the participants in both the outdoor and indoor leagues did sustain an injury due to volleyball.

TABLE 18: COMAPRISON OF PREVALENCE OF HISTORY OF INJURY BY DISTRICT

district			Players ever sustained an injury		Total
			yes	no	
Outdoor	Count		48	20	68
	% within district		70.6%	29.4%	100.0%
Indoor	Count		31	16	47
	% within district		66.0%	34.0%	100.0%
Total	Count		79	36	115
	% within district		68.7%	31.3%	100.0%

Pearson's chi square= 0.277, p=0.599

Comparison of prevalence of present injury by district

There was no significant difference that was noted regarding the prevalence of participants from having a present injury due to volleyball between both the districts. In this study, 43 (63.2%) of the outdoor participants had a present injury whilst 24 (51.1%) of the indoor participants had a present injury. A total number of 67 (58.3%) out of 115 participants reported a present injury.

TABLE 19: COMPARISON OF PREVALENCE OF PRESENT INJURY BY DISTRICT

district			Current injury		Total
			yes	no	
Outdoor	Count		43	25	68
	% within district		63.2%	36.8%	100.0%
Indoor	Count		24	23	47
	% within district		51.1%	48.9%	100.0%
Total	Count		67	48	115
	% within district		58.3%	41.7%	100.0%

Pearson's chi square= 1.693, p=0.193

ASSESSMENT OF RISK FACTORS IN OUTDOOR PLAYERS

Logistic regression analysis of risk factors for current injury in outdoor players

Table 20 shows that weight was a significant risk factor in outdoor players (p=0.049) as well as not having a medical team (p=0.024).

TABLE 20: LOGISTIC REGRESSION ANALYSIS OF RISK FACTORS FOR

CURRENT INJURY IN OUTDOOR PLAYERS

		P value	OR	95.0% C.I. for OR	
				Lower	Upper
Step 4(a)	Weight	.049	1.034	1.000	1.069
	Medical team (no vs. yes)	.024	5.490	1.248	24.146
	Constant	.017	.042		

A Variable(s) entered on step 1: weight, years, medical team, ankle guards, and footwear.

ASSESSMENT OF RISK FACTORS IN INDOOR PLAYERS

Table 21: Logistic regression analysis of risk factors for present injury in indoor players

Table 21 showed there were no factors which were significantly associated with injury in indoor players.

		P value	OR	95.0% C.I. for OR	
				Lower	Upper
Step 6(a)	Constant	.884	1.043		

A Variable(s) entered on step 1: weight, years, medical team, ankle guards, and footwear.

CHAPTER FIVE

DISCUSSION OF RESULTS

5.1 INTRODUCTION

In this chapter, the results of this study will be discussed in the context of the literature available to date and the outcomes and objectives of this research will also be discussed.

5.2 DISCUSSION OF RESULTS

5.2.1 Response rate

The minimum response rate that was required was 70% of the total sample. The response rate of the participants however was >70%, which met the minimum sample response rate as discussed in Chapter three. A possible reason for the high response rate is that the volleyball players were given a dedicated time at the volleyball courts during a training session to complete the questionnaires as the questionnaires were not allowed to be taken home. The researcher was present to supervise the answering of the questionnaires and collected them immediately after they were completed by the volleyball players.

5.2.2 The first objective

The initial objective was to determine the demographic profile of amateur indoor and outdoor volleyball players in a KwaZulu-Natal North Coast region.

5.2.2.1 The demographic profile

A total of 67 outdoor players and 48 indoor players participated in this study (n=115). In terms of ethnicity, majority of both the outdoor (59.1%) and indoor (40.9%) participants were Indian. The possible reason for the vast majority of this study being Indian is due to the location of this study. The Tongaat and Kwa-Dukuza areas are predominantly Indian populated. The ages of the groups varied from 18 years to 50 years.

According to gender, there were more males 78 (67.8%) than females 37 (32.2%) overall. This may be attributed to the gender type that the sport attracts. Volleyball started off as a predominantly male dominated sport in these areas and slowly over the years grew to incorporate females which in turn, led to a female league being formed. The female league is not as well established as the male league, accounting for the higher number of male participants.

The demographic profile found in the participants of this study was not similar to international literature regarding profiling of volleyball injuries. Studies that were conducted overseas differed in terms of the age groups, the ethnicity of the participants and the gender of the participants. More specifically, certain studies were conducted only on one gender type whilst in this study we included both male and female. Other studies were conducted on participants below the age of 16 whilst in this study we included participants that were 18 years and older.

Therefore, because of the difference in demographics of this study's sample to other studies, the results from other studies cannot be assumed to be true for this study, in particular demographics.

5.2.3 The second objective

The second objective was to determine the prevalence of injuries in amateur outdoor and indoor volleyball players in a KwaZulu-Natal North Coast region.

5.2.3.1 The site and number of injuries

Results in this study showed that the majority of the participants 67 (58.3%) had sustained injuries due to volleyball. According to results found in this study, the knee, ankle and shoulder were the most frequently injured sites. These results that were found in this study reflected the outcomes of some of the studies conducted overseas. Cassell (2001) found similar results in Australian volleyball players in which the shoulder and the knee were the most commonly injured areas and Watkins (1992), highlighted that 55% of Scottish volleyball players sustained ankle injuries.

5.2.3.2 Mechanisms of injuries

In this study, blocking and landing caused the most number of injuries. Similar results were found in studies that were carried out internationally. According to Souza (2000), blocking resulted in a high number of injuries in volleyball players in America. According to Bahr and Bahr (1997), spiking and blocking were considered to be high risk actions as these skills demanded repeated jumping at the net.

Majority of the type of injuries that were found in this study were chronic in nature. The possible reason can be due to the lack of immediate treatment and therefore the development of chronic conditions and injuries. Another reason for chronic type of injuries could be due to repetitive overuse injuries and inadequate rest between games and training sessions.

The results in this study found that the majority number of the participants that sustained an injury were prevented from playing volleyball for over a month. The injuries were categorized as severe because the volleyball players had to halt their training for this period. Mechanism type and severity of injury for this study were found to be in keeping with international literature.

5.2.3.3 Type of treatment received

70% had received treatment for their current injury and 81% of the participants received treatment for their worst injury. The most common choices of treatment were bracing/strapping; followed by medication, home remedies and rehabilitation. Chiropractic manipulation was ranked in the lower order of choice with the possible reason being the lack of chiropractic knowledge amongst the volleyball players in the selected leagues.

5.2.4 The third objective

The third objective was to determine the knowledge of amateur outdoor and indoor volleyball players in a KwaZulu-Natal North Coast region with regard to the use of health care providers for illness and injury.

According to Table 12 (Chapter Four), participants are aware of what Chiropractic treatment entails, however in Figures 1 and 2 in Chapter four, majority of the volleyball players did not receive chiropractic manipulation. A possible reason for this is due to the rates being unaffordable or just too expensive for the players.

The reason for the lack of chiropractic manipulation for their injuries possibly stem from the area where this study was conducted. South Africa is known to be a developing country and is still categorized as a third world country and therefore has a low socioeconomic status (Volleyball S.A., 2004). The districts

where this study was conducted are not affluent communities. Resulting in most of the volleyball players in the selected districts not being able to afford the rates of a Chiropractor and opt out for cheaper and more affordable options like home remedies, self medication and strapping.

Further reasoning is the unavailability of chiropractors in Kwa-Dukuza and Tongaat. It has been found that Chiropractors have only recently started practicing in these two districts. The unavailability of Chiropractors could have guided the participants to choose Physiotherapists and General Practitioners instead.

5.2.5 The fourth objective

The fourth objective was to determine the risk factors for current injuries in amateur outdoor and indoor volleyball players in a KwaZulu-Natal North Coast region.

The risk factors determined in this study were found to contribute to the injuries sustained by the participants were the volleyball player's weight, the absence of a medical team and the use of incorrect footwear.

The weight of the participants had been noted to cause injuries mainly due to jumping and landing. This was found mainly to have affected the outdoor participants because of the nature of the playing surfaces. This was found to cause strain on the knee joint and thus increasing the number of the injuries in overweight outdoor participants. The possible reason for the use of incorrect footwear could have been due to the participants not been able to afford the appropriate footwear. The absence of medical personnel at training and competitive match days may also have been due to lack of funds by the selected leagues.

Other factors that also contributed to the above mentioned objective regarding risk factors included inadequate use of protective gear, incorrect coaching methods and poor fitness levels. These factors have been discussed in Chapter Two.

According to Blain (2005), he found that the use of protective gear such as strapping and guards (ankle, elbow, knee and wrist guards) played a role in reducing injury rates. Blain (2005) also stated that lightweight shoes provided adequate ankle and arch support and offer good shock absorption and help prevent injuries from occurring. In Table 16, it was found that 56 (54.9%) of the participants who sustained an injury wore appropriate footwear.

Results in this study showed that majority of the participants did not train more than four to six hours per week. This could be the reason for the participant's poor fitness levels which in turn contributed to the injury rate. Coaches play a major part in the level of fitness and skills of the volleyball players. Players need to be trained specifically for the sport of volleyball and in order for that to be achieved; the coaches in the respected districts should be adequately qualified in their fields.

A large number of the injured participants 49 (62.8%) stated that they do not train in the gym and this could be attributed to their fitness levels and in turn reflect on the total number of injuries sustained. As mentioned in Chapter Two, fitness of an athlete is important to help minimize and prevent injuries from occurring. Therefore it is important for volleyball players, coaches and team trainers to understand the basics of injuries and preventative measures regarding injuries.

Results from this study with regards to risk factors (weight, medical team, incorrect footwear) and associated factors (fitness levels, inadequate coaching) are not in keeping with international literature.

5.2.6 The fifth objective

The fifth objective was to compare the prevalence and risk factors for injury between amateur indoor and outdoor volleyball players in a KwaZulu-Natal North Coast region.

This study showed that there were more injuries sustained by the outdoor players as compared to the indoor players but were not statistically significantly in Table 18. In studies conducted overseas, Bahr and Bahr (1997) found that the injury patterns found between outdoor and indoor volleyball differ slightly due to the different competitive environments and level of tactics of the two disciplines. The main risk factors that were found in the outdoor district in this study were the participant's weight, absence of a medical team and injuries due to the use of incorrect footwear. There were no significant risk factors that were found to affect the indoor participants.

5.3 Objectives and the related hypothesis:

5.3.1 The first objective

The first objective was to establish a demographic profile of amateur outdoor and indoor volleyball players in a KwaZulu-Natal North Coast region.

Null hypothesis one:

The demographic profile of amateur outdoor and indoor volleyball players in a KwaZulu-Natal North Coast region is not similar to international literature profiling volleyball injuries.

This is not rejected, due to the findings with respect to local demographic groups that participated in this research study.

5.3.2 The second objective

The second objective was to determine the prevalence of injuries in amateur outdoor and indoor volleyball players in a KwaZulu-Natal North Coast region.

Null hypothesis two:

The injury profile of amateur outdoor and indoor volleyball players in a KwaZulu-Natal North Coast region was similar to the literature with respect to site, number and mechanism of injury.

This hypothesis is not rejected, based on the presence of significant findings which is congruent with the literature.

5.3.3 The third objective

The third objective was to determine the knowledge of amateur outdoor and indoor volleyball players in a KwaZulu-Natal North Coast region with regard to the use of health care providers for illness and injury.

Null hypothesis three:

The knowledge regarding the use of health care providers for illnesses and injuries by the volleyball players in this study was of an acceptable standard to confirm their appropriate choices of suitable health care professionals to the literature.

This hypothesis is not rejected based on significant findings.

5.3.4 The fourth objective

The fourth objective was to determine the risk factors for current injuries in amateur outdoor and indoor volleyball players in a KwaZulu-Natal North Coast region.

Null hypothesis four:

It was found that protective gear does not play a significant role in decreasing the number and severity of injuries in amateur outdoor and indoor volleyball players.

This hypothesis is not rejected based on significant findings.

5.3.5 The fifth objective

The fifth objective was to compare the prevalence and risk factors for injury between amateur outdoor and indoor volleyball players in a KwaZulu-Natal North Coast region.

Null hypothesis five:

Amateur outdoor and indoor volleyball players do not show the same site and severity of injuries and the use of protective gear does not play a role in decreasing the number and severity of injuries in amateur outdoor and indoor volleyball players.

This hypothesis is not rejected based on significant findings.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 CONCLUSION

The prevalence and risk factors of injuries in amateur outdoor and indoor volleyball players in a KwaZulu-Natal North Coast region has been described in this study.

The majority of the participants in this study were male (67.8%), whilst only 32.2% were female. The sample population age ranged from 18 years to 50 years, with a mean age of 26 years. In terms of ethnicity, there majority were Indian participants (80.9%). The mean age of commencing volleyball in this study was 13.8 years. The mean years of volleyball experience was 13.1 years. The majority of the participants in this study trained between four and six hours per week. 39 participants in this study participated in other forms of recreational exercise besides volleyball.

In terms of injury prevalence, 79 (68.7%) out of 115 participants were reported to have sustained an injury in this study. The percentage of present injuries was 58.3%. With the site of injuries and the nature of the sport, the ankle, knee and shoulder were found to be the most commonly injured areas. The outdoor (Kwa-Dukuza) (46) players showed more injuries than the indoor (Tongaat) (33) players however, the difference was not significant in terms of number of injuries sustained.

In terms of the severity of the injuries, outdoor volleyball players sustained more severe injuries as compared to the indoor volleyball players. This was shown by a large number of outdoor players having missed training sessions and competitive matches for a period greater than a month.

There was no statistical significance with regards to the injuries sustained by males (57.7%) and females (59.5%).

Out of 67 participants who reported present injuries in this study, 47 (70.1%) had received treatment for their injuries, with the most common forms of treatment being bracing or strapping (41.5%), medication (29.2%) and home remedies (27.7%). Out of 60 participants who stated that they could identify their worst injury, 47 (81%) had received treatment. Bracing or strapping (41.7%), medication (35%), home remedies (30%) and rehabilitation (28.3%) ranked the highest in terms of treatment protocols.

Chiropractic manipulation was ranked in the lower order options. A possible reason could be a lack of Chiropractic knowledge by the volleyball players and participants not being able to afford the rates of a Chiropractor due to the poor socioeconomic status of the volleyball players in both the Kwa-Dukuza and Tongaat districts.

This study also found certain trends with regards to the injury rates and risk factors involved. Risk factors affected the outdoor volleyball players more than the indoor volleyball players as there were no significant risk factors for indoor volleyball. The outdoor risk factors that were statistically significant were the participant's weight, incorrect footwear used and not having a medical team present at training and competitive match days.

6.2 RECOMMENDATIONS

6.2.1 Recommendations with respect to the study

- A large sample population is required for studies to be conducted in the future in order to accurately assess the risk factors for injury without having the possibility of incurring type two errors in statistical analysis.
- A clear definition of the word injury needs to be used instead of allowing the volleyball players to use their own subjective definition.

6.2.2 Recommendations for further studies

- It is suggested that a quantitative study be carried out to help determine the use and effectiveness of protective gear affecting injury rates.
- It is suggested that further research be conducted regarding preventative measures such as supplementation, warming up and cooling down regimes and how they affected injury rates.

6.3 IMPLEMENTATIONS OF THIS STUDY

- It is suggested that post this research, relevant coaching and management workshops for the various clubs and volleyball associations within South Africa should be conducted to benefit from the findings of this research. The articulation of the betterment plan will be at the point of praxis for both the medical fraternity (Practitioner) and the end user (Patient).

- One of the aims of this study was to help increase public awareness of chiropractors and volleyball injuries and to help develop an association between both these fraternities. This study will help enlighten chiropractors on the common volleyball injuries sustained and therefore make it easier for the chiropractor or any health professional who deals with sports injuries to understand the injuries and treat them. If the etiological factors are well understood, it is possible to prevent similar injuries from occurring or recurring.

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Appendix- A

Letter of Permission

Dear Head of Tongaat and Kwa-Dukuza Volleyball leagues.

I am a sixth year chiropractic student at Durban University of Technology. I am currently studying towards my Masters Degree and I am undertaking a research project and humbly request your assistance and permission.

Title of Research: The prevalence and risk factors of injuries in amateur outdoor and indoor volleyball players in a KwaZulu-Natal North Coast region.

Aim/Purpose of the study:

- The demographic profile of players will be established.
- To establish a profile of volleyball injuries over a set period of time.
- To establish the differences and severity between outdoor and indoor volleyball players.
- To determine the risk factors found in outdoor and indoor volleyball players.

This research will be done by means of a pre-validated questionnaire that will be administered to the volleyball players. I need authorisation to administer the questionnaires to the respective leagues.

I will briefly discuss the research and thereafter questionnaires will be handed out along with a letter of information. The questionnaire will take approximately 15 minutes to complete and will be collected immediately after completion by the researcher. The entire process should take approximately 30 minutes. Your assistance would be highly appreciated and vital to this research.

Thanking you sincerely

Farzana Motala – (031 373 2512)

Dr Grant Matkovich – (031 201 8204)

Appendix B
LETTER OF INFORMATION – RESEARCH PARTICIPANT

Dear Participant

The title of my research project is:

The prevalence and risk factors of injuries in amateur outdoor and indoor volleyball players in a KwaZulu-Natal North Coast region.

Background to the study:

Chiropractic is a health profession specializing in the diagnosis, treatment and prevention of mechanical disorders of the musculoskeletal system and the affects of these disorders on the function of the nervous system and general health. Chiropractic practitioners essentially rely upon non-invasive treatment methods and will refer patients to various other medical practitioners should medication or surgery be indicated.

Chiropractors are primary contact health physicians who are able to diagnose and treat patients for a range of conditions. The purpose of my study is to determine the prevalence of certain injuries present in both, outdoor and indoor volleyball players. My research also aims to provide valuable statistics to medical fraternity in order to prevent and treat these injuries in volleyball.

Objective of the study:

The data obtained by means of this questionnaire will allow for the establishment of an injury profile of volleyball players and provide valuable information to assist healthcare professionals regarding treatment protocols.

Your participation in this study is much appreciated and you are assured your comments and contributions to the discussion will be kept confidential throughout. The results of the discussion will only be used for research purposes.

Remuneration:

Participation in this study is voluntary and there will be no remuneration. However, volleyball players will benefit from this research study regarding injury prevention in the future.

Procedure:

Each member will then receive a copy of the questionnaire, please read and answer each question. Please do not make any marks on the questionnaire that may enable me to identify you. This questionnaire is confidential and anonymous.

If you have any further questions please feel free to contact either my supervisor or myself.

Supervisor: Dr. Grant Matkovitch : 031 201 0341

Researcher: Farzana Motala : 031-373 2205

Your time, opinion and assistance with this project are invaluable and greatly appreciated.

Farzana Motala

Appendix- C
Post pilot study and focus group

QUESTIONNAIRE FOR VOLLEYBALL PLAYERS

All questions are strictly confidential. Please be as truthful as possible and tick one box per question unless otherwise indicated.

Section 1: Patient Information

1. Age in years? Years

2. Gender

Male	Female
<input type="checkbox"/>	<input type="checkbox"/>

3. Which ethnic group do you belong to? (For statistical purposes only)

Black	White	Coloured	Asian	Indian	Other
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. What is your height in cm? cm

5. What is your weight in kg? Kg

6. Which district do you play for?

KWA-DUKUZA	TONGAAT
<input type="checkbox"/>	<input type="checkbox"/>

7. Which team do you play for?
.....

Section 2: Volleyball History

8. At what age did you start playing volleyball?

..... Years

9. How many years have you been playing volleyball?

..... Years

10. How many sessions per week do you train for volleyball?

11. At present how many hours per week do you train for volleyball?
 Hours

12. Of this, how many hours per week is court training?
 Hours

13. Do you also train in the gym?

Yes	No

14. If yes, on average how many hours of gym work do you do per week?
 Hours

15. Do you do other exercise and training? If "Yes", please specify:

Section 3: Previous Volleyball Injuries

16. Have you **ever** sustained an injury/ies due to volleyball?

Yes	No

17. Do you have an injury at present, due to volleyball?

Yes	No

17.1 If 'yes', was it:

	YES	NO
ACUTE(Immediate or sudden onset)		
CHRONIC (More than three months)		
TRAUMATIC		
REPETITIVE STRAIN		

17.2. How did the injury occur? (Cross/Mark one block)

		TRAINING SESSION	COMPETITIVE MATCHES
PRESENT INJURY	BLOCKING COLLISION		
	DIGGING		
	FLICKING		
	JUMPING		
	LANDING		
	SPIKING		
	OTHER		

17.3 Which part of your body is injured at present?

.....

17.4 How would you describe your present injury?

Mild	Moderate	Severe

17.5 Has this injury caused you to stop training?

Yes	No

17.6 How long did this present injury prevent you from playing?

Less than two weeks	Two weeks-one month	Greater than one month

17.7. Have you **ever** received treatment for your present volleyball injury?

Yes	No

17.8. If yes, what type of treatment did you receive? (You may tick more than one option)

Bracing / strapping		Medication/ injections	
Dry Needling		Home remedy, eg. Ice/Heat	
Manipulation		Interferential current therapy	
Massage		Ultrasound therapy	
Rehabilitation		Other	

If "Other", please specify:

.....

.....

18. Can you identify your worst injury due to volleyball?

Yes	No

18.1 If yes, was it:

	YES	NO
ACUTE(Immediate or sudden onset)		
CHRONIC (More than 3months)		
TRAUMATIC		
REPETITIVE STRAIN		

18.2 How did the worst injury occur? (Cross/Mark one block)

		TRAINING SESSION	COMPETITIVE MATCHES
WORST INJURY	BLOCKING		
	COLLISION		
	DIGGING		
	FLICKING		
	JUMPING		
	LANDING		
	SPIKING		
	OTHER		

18.3 Which part of your body was injured?

.....

18.4 How would you describe the worst injury?

Mild	Moderate	Severe

18.5 Has this injury caused you to stop training?

Yes	No

18.6 How long did it prevent you from playing?

Less than two weeks	Two weeks-one month	Greater than one month

18.7 Did you receive treatment for your worst injury?

Yes	No

18.8 If yes, what type of treatment did you receive? (You may tick more than one Option)

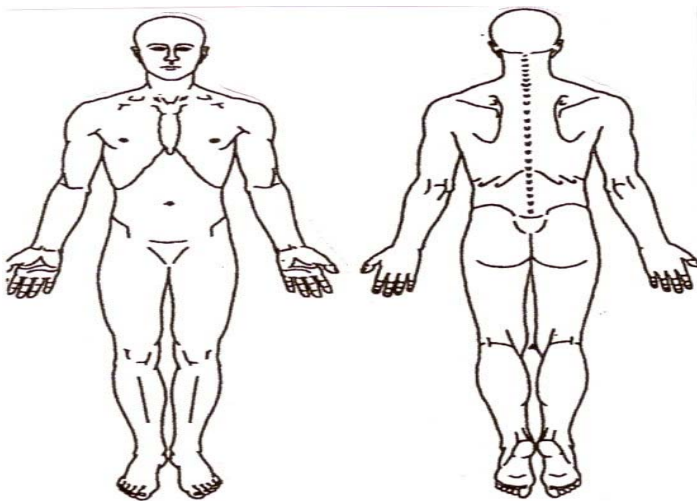
Bracing / strapping		Medication/ injections	
Dry Needling		Home remedy, eg. Ice/Heat	
Manipulation		Interferential current therapy	
Massage		Ultrasound therapy	
Rehabilitation		Other	

If "Other", please specify:

19. Have you sustained any other injury/ies due to volleyball?

Yes	No

19.1 If yes, which part/s of your body was injured? Mark the specified area with a cross



19.2 .How often have the following areas of your body been injured while playing volleyball?

(This includes any injuries from volleyball sustained at any time during your volleyball career.)- MARK ANSWER WITH AN X

Seldom- once or twice

Often- 3-5 times

Very Often- more than 5 times

A. Foot/ toes	Very often	Often	Seldom
B. Ankle	Very often	Often	Seldom
C. Achilles tendon	Very often	Often	Seldom
D. Leg (calf/ Shin)	Very often	Often	Seldom
E. Knee	Very often	Often	Seldom
F. Hamstring (front of leg)	Very often	Often	Seldom
G. Quadriceps (back of leg)	Very often	Often	Seldom
H. Hip / Groin	Very often	Often	Seldom
I. Lower Back	Very often	Often	Seldom
J. Upper Back	Very often	Often	Seldom
K. Neck	Very often	Often	Seldom
L. head	Very often	Often	Seldom
M. Shoulder	Very often	Often	Seldom
N. Biceps (front of upper arm)	Very often	Often	Seldom
O. Triceps (back of upper arm)	Very often	Often	Seldom
P. Elbow	Very often	Often	Seldom
Q. Forearm	Very often	Often	Seldom
R. Wrist	Very often	Often	Seldom
S. Fingers	Very often	Often	Seldom
T. Other	Very often	Often	Seldom

If "Other", please specify:

.....

19.3 If you sustained more than one injury, please identify.

ACUTE(IMMEDIATE OR SUDDEN ONSET)	CHRONIC(MORE THAN THREE MNTHS)	TRAUMATIC	REPETITIVE STRAIN

19.4 How did the injury/ies occur? (Rank in order of most problematic to least)
(Eg. 1-Flicking)

BLOCKING	
COLLISION	
DIGGING	
FLICKING	
JUMPING	
LANDING	
SPIKING	
OTHER (Please Specify)	

19.5. How have the injuries listed below affected your volleyball?

A. Foot/ toes	Prevented volleyball	Limited volleyball	No effect
B. Ankle	Prevented volleyball	Limited volleyball	No effect
C. Achilles tendon	Prevented volleyball	Limited volleyball	No effect
D. Leg (calf/ Shin)	Prevented volleyball	Limited volleyball	No effect
E. Knee	Prevented volleyball	Limited volleyball	No effect
F. Hamstring (front of leg)	Prevented volleyball	Limited volleyball	No effect
G. Quadriceps (back of leg)	Prevented volleyball	Limited volleyball	No effect
H. Hip / Groin	Prevented volleyball	Limited volleyball	No effect
I. Lower Back	Prevented volleyball	Limited volleyball	No effect
J. Upper Back	Prevented volleyball	Limited volleyball	No effect
K. Neck	Prevented volleyball	Limited volleyball	No effect
L. head	Prevented volleyball	Limited volleyball	No effect
M. Shoulder	Prevented volleyball	Limited volleyball	No effect
N. Biceps (front of upper arm)	Prevented volleyball	Limited volleyball	No effect
O. Triceps (back of upper arm)	Prevented volleyball	Limited volleyball	No effect
P. Elbow	Prevented volleyball	Limited volleyball	No effect
Q. Forearm	Prevented	Limited volleyball	No effect

	volleyball		
R. Wrist	Prevented volleyball	Limited volleyball	No effect
S. Fingers	Prevented volleyball	Limited volleyball	No effect
T. Other	Prevented volleyball	Limited volleyball	No effect

If "Other", please specify:

.....

20. Please indicate which health care provider YOU would choose FIRST FOR TREATMENT if you had each of the following conditions. (Please tick one box per condition only):

	Bio-kineticist	Chiro-practor	Physio-therapist	GP	Phar-macist	Homeo-path	Othe
Arthritis							
Asthma							
Fractures							
High Blood Pressure							
Muscle spasm							
Neck pain							
Osteoporosis							
Pain in your joints							
Pins and Needles/ Numbness in your arms or legs	*	*	*	*	*	*	
Postural Abnormalities (e.g. Scoliosis or Hyperlordosis)	*	*	*	*	*	*	
Low back pain							
Shoulder pain							
Slipped disc							
Sprains e.g: ankle sprain							

Section 4: Management and Resources

21. What facilities were used for training?

<input type="checkbox"/>	Volleyball Courts
<input type="checkbox"/>	Gym
<input type="checkbox"/>	Pool
<input type="checkbox"/>	Other

If "other", please specify:

.....

22. Is there a designated coach for your team?

Yes	No

23. Is your coach a qualified volleyball coach?

Yes	No

24. Is he/she experienced working in the volleyball field?

Yes	No

25. Is there first aid at all games that are played?

Yes	No

26. Is there a medical team involved with the team?

Yes	No

SECTION 5: PROTECTIVE GEAR

27. Do you wear any of the following protective equipment?

(More than one answer is possible)

PLEASE ANSWER YES OR NO WITH REGARDS TO THE FFG.

	KNEE GUARDS	ANKLE GUARDS	WRIST GUARDS	ELBOW GUARDS
ALWAYS (100%)				
VERY OFTEN (75%)				
OFTEN (50%)				
SOMETIMES (25%)				
NEVER (0%)				

28. Do you wear appropriate volleyball recommended footwear when playing?

Yes	No

29. Do you strap your fingers when playing volleyball?

Yes	No

THANK YOU

Appendix- D
Letter of information-focus group

TITLE OF RESEARCH PROJECT:

The prevalence and risk factors of injuries in amateur outdoor and indoor volleyball players in a KwaZulu-Natal North Coast region.

NAME OF SUPERVISOR: Dr. G. Matkovich: 031- 2018204

NAME OF RESEARCHER: Farzana Motala: 031-3732512

Please circle the appropriate answer:

- | | | | |
|----|--|-----|----|
| 1. | Have you read the research information sheet? | Yes | No |
| 2. | Have you had an opportunity to ask questions regarding this study? | Yes | No |
| 3. | Have you received satisfactory answers to your questions? | Yes | No |
| 4. | Have you had an opportunity to discuss this study? | Yes | No |
| 5. | Have you received enough information about this study? | Yes | No |
| 6. | Do you understand the implications of your involvement in this study? | Yes | No |
| 7. | Do you understand that you are free to | | |
| | a) withdraw from this study at any time? | Yes | No |
| | b) withdraw from this study at any time, without reasons given? | Yes | No |
| | c) withdraw from this study at any time without affecting your future health care or relationship with the Chiropractic day clinic at the Durban University of Technology? | Yes | No |
| 8. | Do you agree to voluntarily participate in this study? | Yes | No |
| 9. | Who have you spoken to regarding this study? | | |

If you have answered NO to any of the above, please obtain the necessary information from the researcher and/or supervisor before signing. Thank you.

Please print in block letters:

Focus Group Member: _____ Signature: _____

Witness Name: _____ Signature: _____

Researcher's Name: _____ Signature: _____

Supervisor's Name: _____ Signature: _____

Appendix-E
CONFIDENTIALITY STATEMENT – FOCUS GROUP

IMPORTANT NOTICE:

THIS FORM IS TO BE READ AND FILLED IN BY EVERY MEMBER PARTICIPATING IN THE FOCUS GROUP, BEFORE THE FOCUS GROUP MEETING CONVENES.

DECLARATION

1. All information contained in the research documents and any information discussed during the focus group meeting will be kept private and confidential. This is especially binding to any information that may identify any of the participants in the research process.
2. The returned questionnaires will be coded and kept anonymous in the research process.
3. None of the information shall be communicated to any other individual or organization outside of this specific focus group as to the decisions of this focus group.
4. The information from this focus group will be made public in terms of a journal publication, which will in no way identify any participants of this research.

Once this form has been read and agreed to, please fill in the appropriate information below and sign to acknowledge agreement.

Please print in block letters:

Focus Group Member: _____ Signature: _____

Witness Name: _____ Signature: _____

Researcher's Name: _____ Signature: _____

Supervisor's Name: _____ Signature: _____

Appendix-F
CODE OF CONDUCT – FOCUS GROUP

IMPORTANT NOTICE:

THIS FORM IS TO BE READ AND FILLED IN BY EVERY MEMBER PARTICIPATING IN THE FOCUS GROUP, BEFORE THE FOCUS GROUP MEETING CONVENES.

As a member of this committee, I agree to abide by the following conditions:

1. All information contained in the research documents and any information discussed during the focus group meeting will be kept private and confidential. This is especially binding to any information that may identify any of the participants in the research process.
2. None of the information shall be communicated to any other individual or organization outside of this specific focus group as to the decisions of this focus group.
3. The information from this focus group will be made public in terms of a journal publication, which will in no way identify any participants of this research.

No.	Member represents	Member's Name	Signature	Contact details
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

Appendix-G
INFORMED CONSENT FORM

(TO BE COMPLETED BY THE PARTICIPANTS OF THE FOCUS GROUP)

TITLE OF RESEARCH PROJECT:

The prevalence and risk factors of injuries in amateur outdoor and indoor volleyball players in a KwaZulu-Natal North Coast region.

NAME OF SUPERVISOR: Dr Grant Matkovich (031 201 8204)

NAME OF RESEARCH STUDENT: Farzana Motala (031 373 2512)

Please circle the appropriate answer

YES /NO

- | | | |
|---|-----|----|
| 1. Have you read the research information sheet? | Yes | No |
| 2. Have you had an opportunity to ask questions regarding this study? | Yes | No |
| 3. Have you received satisfactory answers to your questions? | Yes | No |
| 4. Have you had an opportunity to discuss this study? | Yes | No |
| 5. Have you received enough information about this study? | Yes | No |
| 6. Do you understand the implications of your involvement in this study? | Yes | No |
| 7. Do you understand that you are free to? | | |
| a) Withdraw from this study at any time? | Yes | No |
| b) Withdraw from the study at any time, without reasons given | Yes | No |
| c) Withdraw from the study at any time without affecting your future health care or relationship with any of the stakeholders in this study | Yes | No |
| 8. Do you agree to voluntary participate in the study? | Yes | No |
| 9. Who have you spoken to regarding this study? | | |

If you have answered NO to any of the above, please obtain the necessary information from the researcher and / or supervisor before signing. Thank You.

Please print in block letters:

Research Participant: _____ Signature: _____

Witness Name: _____ Signature: _____

Researcher's Name: _____ Signature: _____

Supervisor's Name: _____ Signature: _____

Appendix-H

Pre focus group questionnaire

All questions are strictly confidential. Please be as truthful as possible and tick one box per question unless otherwise indicated.

IF YOU HAVE PLAYED PROFESSIONAL VOLLEYBALL IN THE PAST SEASON THEN DON'T CONTINUE

PART A. IDENTIFICATION

1. Age (years): _____
2. Ethnicity: Black White Coloured Indian Other _____
3. Division: Outdoor(Kwa-Dukuza) Indoor(Tongaat)

IF YOU ARE A PLAYER IN OUTDOOR AND INDOOR LEAGUES AT THE SAME TIME THEN DON'T CONTINUE

4. Team: _____
5. Number of years as a player in outdoor or indoor volleyball: _____
6. Number of years as a player in this current league as described in question 3. _____
7. How many games/training sessions per week have you participated in the past season:
0-2 2-4 If greater than 4, please specify how many: _____
8. Playing position: _____
9. Do you participate in any other sports? Yes No
10. If Yes, please specify: _____

PART B. HISTORY OF INJURY

In the answers you give below, consider only the information over the last season.

1. **Do you have any pre-existing medical condition? (Anemia's, Diabetes, Osteoporosis, hypertension etc.)**

2. **Which of the following injuries did you sustain(One or more answers are possible):**
 Wrist Elbow Shoulder Head/Neck/Facial Knee/ Thigh
 Chest Abdomen Genital Foot/Ankle Back

3. Based on question two, which body parts sustained injury? (Indicate on the illustration)

4. How many injuries have you received/sustained during training or competitive session(s)?

Last season
Training sessions: _____
Competitive matches: _____

Season before last
Training sessions: _____
Competitive matches: _____

5. Has the injury resulted in you missing the following sessions? (More than one answer is possible)

Training sessions: Competitive matches:

In the questions below, please base your answers on the three most severe injuries if the answer to the above question is greater than one.

6. Which were the injury mechanisms in the following periods?

Injury One:

Training Session

Spiking: Burns (Grass/Carpet): Running: Digging:
Jumping: Landing: Blocking: Turning: Collision:
Overuse: Other: _____

Competitive matches

Spiking: Burns (Grass/Carpet): Running: Digging:
Jumping: Landing: Blocking: Turning: Collision:
Overuse: Other: _____

Injury Two:

Training Session

Spiking: Burns (Grass/Carpet): Running: Digging:
Jumping: Landing: Blocking: Turning: Collision:
Overuse: Other: _____

Competitive matches

Spiking: Burns (Grass/Carpet): Running: Digging:
Jumping: Landing: Blocking: Turning: Collision:
Overuse: Other: _____

Injury Three:

Training Session

Spiking: Burns (Grass/Carpet): Running: Digging:
Jumping: Landing: Blocking: Turning: Collision:
Overuse: Other: _____

Competitive matches

Spiking: Burns (Grass/Carpet): Running: Digging:
Jumping: Landing: Blocking: Turning: Collision:
Overuse: Other: _____

7. How many training sessions and competitive matches did you miss last season as a result of the injury?

Injury One:

Training sessions:

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

Competitive matches:

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

Injury Two:

Training sessions:

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

Competitive matches:

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

Injury Three:

Training sessions:

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

Competitive matches:

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

8. What kind of treatment did you receive following injuries? (One or more answers are possible).

Injury One:

GP: Physiotherapy: Self treatment: Chiropractic:
None: Sports massage: Biokineticist: Courtside:
Other: _____

Injury Two:

GP: Physiotherapy: Self treatment: Chiropractic:
None: Sports massage: Biokineticist: Courtside:
Other: _____

Injury Three:

GP: Physiotherapy: Self treatment: Chiropractic:
None: Sports massage: Biokineticist: Courtsideside:
Orthopedic surgeons: Other: _____

9. How long since the injury have you gone for treatment?

Injury One:

1-3 days 4-7 days Greater than 7 days

Injury Two:

1-3 days 4-7 days Greater than 7 days

Injury Three:

1-3 days 4-7 days Greater than 7 days

**10. What kind of treatment or advice did you receive following injury?
(One or more answers are possible).**

Injury One:

Ice/cold: Compression: Elevation: Heat:
Electro-modalities: Muscle stimulation: Surgery: Injectibles:
Joint mobilization: Massage: Deep frictions: Stretching:
Exercise therapy: Strapping: Splinting:
Dry Needling: Injectibles: Oral medication (Anti-inflammatory/NSAIDS):

Injury Two:

Ice/cold: Compression: Elevation: Heat:
Electro-modalities: Muscle stimulation: Surgery: Injectibles:
Joint mobilization: Massage: Deep frictions: Stretching:
Exercise therapy: Strapping: Splinting:
Dry Needling: Injectibles: Oral medication (Anti-inflammatory/NSAIDS):

Injury Three:

Ice/cold: Compression: Elevation: Heat:
Electro-modalities: Muscle stimulation: Surgery: Injectibles:
Joint mobilization: Massage: Deep frictions: Stretching:
Exercise therapy: Strapping: Splinting:
Dry Needling: Injectibles: Oral medication (Anti-inflammatory/NSAIDS):

11. What advice did you receive?

Injury One:

Rest/No sport activity: Limited sport activity: Full sport activity:

Injury Two:

Rest/No sport activity: Limited sport activity: Full sport activity:

Injury Three:

Rest/No sport activity: Limited sport activity: Full sport activity:

12. How long have you been unavailable for training or competitive matches because of injury?

Training sessions

1-3 days 4-7 days Greater than 7 days

First injury:
Second injury:
Third injury:

Competitive matches

1-3 days 4-7 days Greater than 7 days

First injury:
Second injury:
Third injury:

13. Did you get facilities to access health care services on site?

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

14. Which health care services can you access after the game?

GP: Physiotherapy: Self treatment: Chiropractic:
None: Sports massage: Biokineticist: Fieldside:
Other: _____

PART C. PROTECTIVE EQUIPMENT

Training session

1. Do you wear knee guards?

Always (100%): Very often (75%): Often (50%): Sometimes (25%):

Never (0%):

2. a) Do you wear ankle protection? (Braces, Strapping, etc.)

Always (100%): Very often (75%): Often (50%): Sometimes (25%):

Never (0%):

b) If yes, specify the reason:

3. a) What footwear do you wear when playing? _____

b) Do you think it is appropriate? _____

Competitive matches

1. Do you wear knee guards?

Always (100%): Very often (75%): Often (50%): Sometimes (25%):

Never (0%):

2. a) Do you wear ankle protection? (Braces, Strapping etc.)

Always (100%): Very often (75%): Often (50%): Sometimes (25%):

Never (0%):

b) If yes, specify the reason: _____

3. a) What footwear do you wear when playing? _____

b) Do you think it is appropriate? _____

Appendix I

Focus Group Questionnaire Corrections

The following changes were made to Appendix H and formed Appendix C:

Section 1: Patient Information

The option of gender was added.

The statement, 'If you are a player in outdoor and indoor leagues at the same time then don't continue' was removed.

The question, 'What is your height?' was added.

The question, 'What is your weight?' was added.

The question, 'Which district do you play for?' was added.

The question, 'Which team do you play for?' was added.

Section 2: Volleyball History

The question, 'At what age did you start playing volleyball?' was added.

The question, 'Do you have any pre-existing medical condition?' was removed.

The question, 'How many sessions per week do you train for volleyball?' was added.

The question, 'At present, how many hours per week do you train for volleyball?' was added.

The question, 'Of this, how many hours per week is court training?' was added.

The question, 'Do you also train in the gym?' was added.

The question, 'If yes, on average how many hours of gym work do you do per week?' was added.

The question, 'Do you do other exercise and training? If "Yes", please specify' was added.

Section 3: Previous Volleyball Injuries

The question, 'Have you ever sustained an injury/ies due to volleyball was added?'

The question, 'Do you have an injury at present, due to volleyball?' was added.

The question, 'If yes, was it Acute, Chronic, Traumatic or Repetitive Sprain' was added.

The question, 'How did the injury occur?' was converted into a table.

The question, 'Which part of your body is injured at present?' was added.

The question, 'How would you describe your present injury? and options of mild, moderate or severe were added.

The question, 'Has this injury caused you to stop training?' was added.

The question, 'How long did this previous injury prevent you from playing? and options of 'Less than two weeks', 'Two weeks-one month' and 'Greater than one month' were added.

The question, 'What type of treatment did you receive?' was converted into table form.

The question, 'Can you identify your worst injury?' was added.

The question, 'Have you sustained any other injury/ies due to volleyball?' was added.

The question, 'If yes, which part/s of your body was injured? Mark the specified area with a cross' was added.

A picture of the human body was added to identify the specific injured sites.

The question, 'How often have the following areas of your body been injured while playing volleyball?' was added.

The question, 'How have the injuries listed below affected your volleyball?' was added. The options, 'Prevented volleyball', 'Limited volleyball' and 'No effect' were added.

Section 4: Management and Resources

The question, 'What facilities were used for training?' was added.

The options of 'Volleyball courts', 'Gym', 'Pool' and 'Other' were added.

The statement, 'If "Other", please specify' was added.

The question, 'Is there a designated coach for your team?' was added.

The question, 'Is your coach a qualified volleyball coach?' was added.

The question, 'Is he/she experienced working in the volleyball field?' was added.

The question, 'Is there first aid at all games that are played?' was added.

The question, 'Is there a medical team involved with the team?' was added.

Section 5: Protective Gear

The question, 'Do you wear any of the following protective equipment?' was added and was converted into table form.

The question, 'Do you strap your fingers when playing volleyball?' was added.

Appendix-J

Focus group DVD

Appendix-K

Ethics clearance certificate

ETHICS CLEARANCE CERTIFICATE			
Student Name	FARZANA MOTALA	Student No	20200735
Ethics Reference Number	FHSEC 016/09	Date of FRC Approval	02/06/09
Research Title:	THE PREVALENCE AND RISK FACTORS OF INJURIES IN AMATEUR OUTDOOR AND INDOOR VOLLEYBALL PLAYERS IN A KWAZULU-NATAL NORTH COAST REGION.		

In terms of the ethical considerations for the conduct of research in the Faculty of Health Sciences, Durban University of Technology, this proposal meets with Institutional requirements and confirms the following ethical obligations:

1. The researcher has read and understood the research ethics policy and procedures as endorsed by the Durban University of Technology, has sufficiently answered all questions pertaining to ethics in the DUT 186 and agrees to comply with them.
2. The researcher will report any serious adverse events pertaining to the research to the Faculty of Health Sciences Research Ethics Committee.
3. The researcher will submit any major additions or changes to the research proposal after approval has been granted to the Faculty of Health Sciences Research Committee for consideration.
4. The researcher, with the supervisor and co-researchers will take full responsibility in ensuring that the protocol is adhered to.
5. **The following section must be completed if the research involves human participants:**

	YES	NO	N/A
❖ Provision has been made to obtain informed consent of the participants	✓		
❖ Potential psychological and physical risks have been considered and minimised	✓		
❖ Provision has been made to avoid undue intrusion with regard to participants and community	✓		
❖ Rights of participants will be safe-guarded in relation to:			
- Measures for the protection of anonymity and the maintenance of Confidentiality.	✓		
- Access to research information and findings.	✓		
- Termination of involvement without compromise	✓		
- Misleading promises regarding benefits of the research	✓		

Motala
SIGNATURE OF STUDENT/RESEARCHER

18-05-09
DATE

[Signature]
SIGNATURE OF SUPERVISOR/S

18-05-09
DATE

[Signature]
SIGNATURE OF HEAD OF DEPARTMENT

11/06/09
DATE

[Signature]
SIGNATURE: CHAIRPERSON OF RESEARCH ETHICS COMMITTEE

2/06/09
DATE