An injury profile of high school soccer players on a synthetic surface at a private school in the eThekwini municipality

By

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I, Asthiq Timul, hereby declare that the contents of this dissertation are entirely my own in both conception and execution, unless acknowledged otherwise by a form of reference (including citations of published and unpublished sources).

18 July 2023

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PhD Anatomy

DEDICATION

I am incredibly grateful for the support and guidance I have received from my family, friends, and colleagues throughout this journey. Without their help, I would not have achieved the success that I have today with my dissertation. My parents, brother, girlfriend, and grandparents are truly a source of strength in my life and words can never really express how thankful I am for all they do for me. You have helped make this dissertation possible by giving me love, care and understanding so, to you, thank you!

If you don't give up … you will never fail.

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ABSTRACT

Background

In South Africa, sport is a compulsory activity in the majority of schools and most of the population that play soccer at schools are amateur players. Many schools in Durban have astroturf courts on which the scholars play soccer. Astroturf is a synthetic surface that has gained much popularity due to it being cost effective and easy to maintain. Despite the benefits associated with playing on astroturf, one of the concerns is increased risk if injury to the players. Over the last decade, soccer injuries have become commonplace amongst scholars, with the most affected age group being between 13–15 years of age. The aim of this study is to determine the injury profile of amateur scholar soccer players playing on a synthetic surface at a private school in the eThekwini municipality.

Methodology

The research study is a quantitative study with a descriptive design. An organised, quantitative questionnaire was handed out to 108 registered learners at Al-Falaah College. The responses of the questionnaire were used to establish the demographic and injury profile of the soccer players in this study.

Results

A 100% response rate was recorded. The majority (*n*=24; 22.2%) of the learners were in the 14 year age group of Indian (*n*=98; 90.7%) ethnicity. The most common site of injury was recorded as the knee joint (*n*=54; 50%), followed by the ankle joint (*n*=36; 33.3%), wrist (*n*=29; 26.9%) and foot (*n*=28; 25.9%). The most common mechanism of injury reportedly occurred during tackling (*n*=61; 56.5%) and the least number of injuries were reported as occurring during heading (*n*=4; 3.7%). Most of the participants were found to be using incorrect footwear when playing on a synthetic surface, such as, studded boots (*n*=63; 58.3%) and sneakers (*n*=39; 36.1%).

Conclusion

The majority (79.6%) of the injuries reported were characterised as mild to moderate. The lower extremity was the most frequently injured, specifically the knee and ankle joint. Ligament and muscular injuries were the most common injury affecting the lower extremity. Younger individuals are more likely to face injury when playing soccer on a synthetic surface.

Keywords: Soccer injuries, synthetic surface, injury profile

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GLOSSARY OF TERMS

Surface friction – The amount of friction between two objects (Marques *et al.,* 2019).

Muscle strain – Also known as a pulled muscle, this may be due to repetitive micro trauma. A muscle strain occurs when the muscle is stretched beyond its capabilities (Nolle *et al.,* 2022).

Chronic Instability – Chronic instability is defined as a feeling as if your joint is going to give way after repetitive injury to the respective joint (Hertel and Corbett, 2019).

Sprain – Ligaments attach to bony structures. When the ligament is stretched beyond its capabilities, it is regarded as a sprain (Archary, 2008).

Injury – A soccer injury is physical damage to an individual that may result in the individual being unable to continue or participate in the near future (Diemer *et al.,* 2021).

Plantarflexion – Plantarflexion is a movement where the individual's toes are flexed away from their body, e.g., standing on the tips of your toes (Stafilidis and Kopper-Zisser, 2021).

Dorsiflexion – Dorsiflexion is a movement where the individual's toes are extended towards their body (Ugbolue *et al.,* 2021).

Inversion sprain – Inversion sprains are described as the inward twisting of your ankle joint, which may lead to injury of the anterior talofibular ligament (Mok *et al.,* 2021).

Intrinsic factors – Intrinsic factors are regarded as internal factors. These are factors that are without external influence such as age, gender, height, and weight (Archary, 2008).

Extrinsic factors – Extrinsic factors are regarded as external influences during a game of soccer such as player position, choice of footwear and protective equipment (Archary, 2008).

Concussion – Trauma to the head that may or may not result in unconsciousness as well as partial cognitive impairments (Mooney *et al.,* 2020).

Hypertrophic cardiomyopathy – A cardiac condition where the muscles of the heart are thickened, this results in the heart having to work harder (Drezner *et al.,* 2021).

Aerobic exercise – Activities or exercise that is designed to increase the heart rate, for oxygen to be transported to the muscles at a faster rate (Šarabon *et al.,* 2020).

Dynamic stretching – Dynamic stretching occurs when muscles are stretched during active movement to prepare the muscles for activity (Kyranoudis *et al.,* 2018).

Static stretching – Static stretching is when the muscle is stretched to its end range of motion and held in that position to increase the range of motion within the muscle (Palucci *et al.,* 2021).

CHAPTER 1

1.1 INTRODUCTION

Soccer, with an estimate of 40 million amateur players worldwide, is the most popular team sport played by men, women, and children with various skill levels (Noroozi *et al.,* 2015:4). In addition, soccer is one of the fastest growing sports worldwide, since anyone can play soccer, with no limitations in terms of height and weight (Owoeye *et al.,* 2020:1).

In South Africa, sport is a compulsory activity in many schools and most of the population that play soccer at schools are amateur soccer players. Many schools in Durban have astroturf courts on which the scholars play soccer. Astroturf is a synthetic surface that has gained much popularity due to it being cost effective and easy to maintain (Sentsomedi and Puckree, 2016:298).

Scholars are more susceptible to injury as opposed to adults as musculoskeletal injuries in scholars affect their growth cartilage. During periods of rapid growth limitations in terms of flexibility may make tendons and muscles prone to injury (Milewski and Chambers, 2017:1561). In an immature musculoskeletal system, the open epiphyseal growth plates and remaining growth require significant consideration before deciding whether surgical intervention should be advised (Moksnes and Grindem, 2016:730-736). This translates into a remarkable implication on scholars and their families, including health and financial burdens as well as socioeconomic and healthcare systems.

Medical professionals, including chiropractors, may have a limited knowledge of the types of injury patterns that may be seen in scholars. A study by Archery (2008:16) on adult amateur indoor and outdoor soccer players in the Durban area showed a decrease of the incidence of soccer injuries by preventative interventions. Archary (2008) further concluded that by understanding the mechanisms of injury and the most common areas injured, relevant treatment and preventative programmes can be adopted. Research documenting the injury patterns in scholars is limited and has to date, not been documented in South Africa. Therefore, this study will document the injury patterns and mechanisms of injury in school-going soccer players. In so doing,

it will hope to assist the medical profession to create possible treatment strategies to reduce the rate of injury seen in scholars.

1.2 AIM OF THE STUDY

The aim of this study is to determine the injury profile of amateur scholar soccer players playing on a synthetic surface at a private school in the eThekwini municipality.

1.2.1 Objective One

To establish a demographic profile of the male scholars who play soccer on a synthetic surface in a private school in the eThekwini municipality.

1.2.2 Objective Two

To establish if there are any associations between an injury profile and demographic profile of male scholars who play soccer on a synthetic surface in a private school in the eThekwini municipality.

1.2.3 Objective Three

To establish if there is an association between an injury profile and the use of protective equipment of male scholars who play soccer on a synthetic surface in a private school in the eThekwini municipality.

1.3 RATIONALE FOR THE STUDY AND RESEARCH QUESTIONS

During the last decade, there has been a significant increase in the number of people playing soccer on synthetic surfaces. While the nature of the synthetic surface has changed from a short-pile carpet laid over a thin pad, to longer “grass-like” properties that are embedded with granules of small pieces of rubber or crushed sand, it remains unresolved as to whether or not the third generation of synthetic surface alters the risk of injury (Williams *et al.,* 2013:2). This study will assist medical professionals in understanding the injury profiles and mechanisms of injury related to soccer playing scholars and in so doing, decreasing the risk of injuries and re-injuries.

1.4 ASSUMPTIONS AND LIMITATIONS

It was assumed that all the participants were able to understand and respond in English. All participants were required to report truthfully.

1.5 CONCLUSION AND OUTLINE OF CHAPTERS

This chapter (Chapter one) provided the background to the study and the outlined aims and objectives. Chapter two consists of the literature review and chapter three provides a detailed outline of this study's research methodology. Chapter four presents the results obtained from the study and chapter five will discuss the results of the study relevant to the literature. The conclusion contains recommendations for future studies.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Originally known as Ts'uh Ku'h or cuju, soccer originated in the city of Zibo in ancient China during the 2nd and 3rd centuries BC (Liu *et al.,* 2018:605). In 1904, the Federation of the International Football Association (FIFA) originated, with Uruguay hosting the inaugural soccer world cup tournament in 1930, which is currently played around the world after every four years (Sarmento *et al.,* 2014:183). With approximately 200 000 professional and 240 million amateur players, soccer is regarded as the most popular sport in the world (Jung, 2020:929). Soccer is played in every nation (Sarmento *et al.,* 2014: 183). Soccer has risen in popularity over the years since anybody can play soccer (Stølen *et al.,* 2012:501). Soccer is played by men, women, children and adults of various backgrounds and levels of skill (*et al.,*507). With this rise in popularity, soccer has expanded to be played on a synthetic surface.

2.2 Evolution of synthetic grass

Synthetic grass may be regarded as one of the most remarkable innovations throughout the evolution of soccer (Rämme, 2015: 2). One of the most popular types of synthetic surfaces is astroturf, which was introduced into sport in 1965 when stadium owners understood the difficulty of growing natural grass indoor (Attenborough *et al.,* 2014:1546). Astroturf, which was being viewed as the solution to this problem, was originally developed as a short-pile carpet that was laid over hard concrete (Rössler *et al.,* 2016:310). The first generation (original), astroturf consisted of a dense carpet over a tar-like surface. However, an increase in the rates of skin abrasion resulted from this hard surface, which also displayed poor shock absorption and high surface friction (Jones *et al.,* 2020:4). The design of astroturf was subsequently improved, with the second generation of astroturf seeing the replacement of the tar-like surface by stone and earth, and the introduction of polyethylene grass fibers to ensure that the fibers were twice as long and softer (Jones *et al.,* 2020:4).

During the late 90s, the third generation of astroturf was developed which was designed with the aspiration of replicating natural grass by further increasing the length and density of the polyethylene fibers, as well as the addition of rubber and sand

particles, thus reinvigorating the dirt between the blades of natural grass (Jones *et al.,* 2020:4). Over the years there has been a drastic increase in the number of soccer fields with astroturf (Sousa *et al.,* 2013:146).

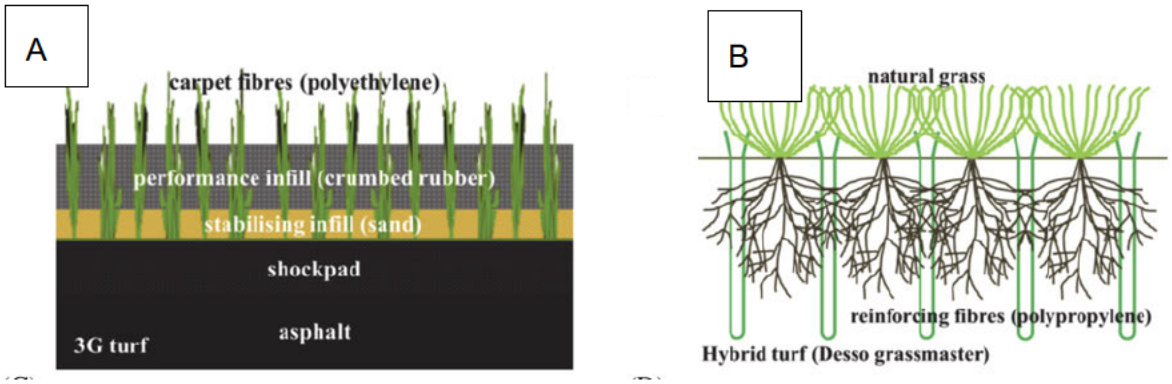


Figure 2.1: Composition of (A) Synthetic grass vs (B) Natural grass (Adapted from Forrester and Fleming, 2019:2)

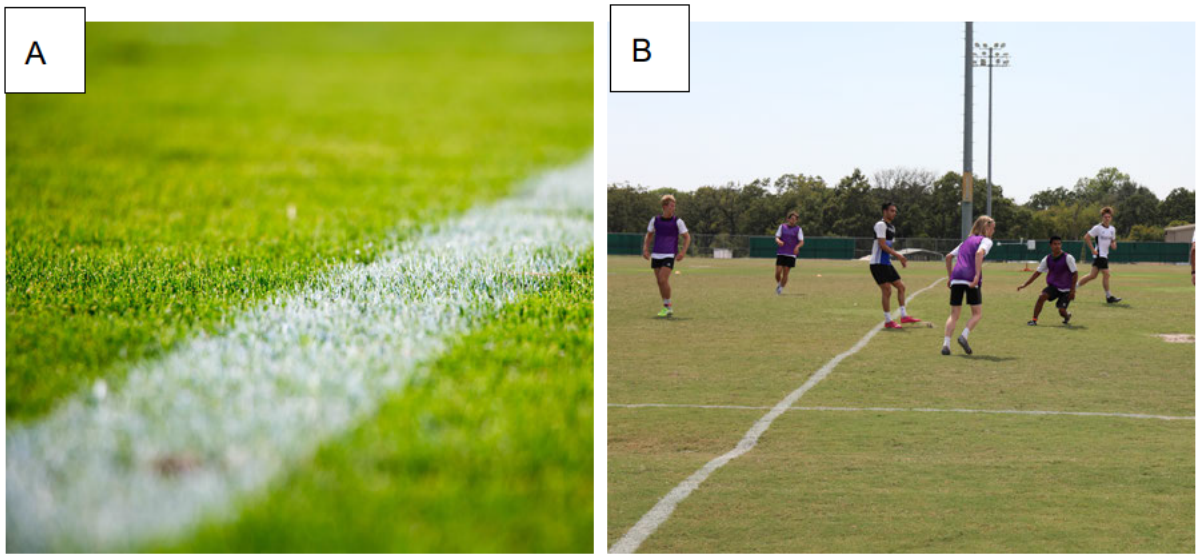


Figure 2.2: Playing surface of (A) Astroturf vs (B) Natural grass (Source: Danielski, 2021:1; Siddiqui et al., 2022:26)

It has been reported that playing soccer on astroturf significantly improves the players' level of skill and fitness as astroturf offers players the luxury of training throughout the year, while maintaining a uniform quality of playing surface (Rämme, 2015:2).

The introduction of astroturf into soccer has resulted in a significant transition of the different facets of the game. For example, the generally flat surface has been linked to an increase in game speed, which in turn results in the players having to improve their mental acumen (ability to take in and process information) during the game

(Rämme, 2015:3). With an increase in the speed of the game, the technical players are afforded more space and time on the ball, but the passing needs to be more accurate and aimed at their teammates' feet rather than in front of them (Rämme, 2015:4).

The introduction of astroturf has also resulted in the evolution of defense tactics: a) enforcing a tight line of defense thus limiting the distance between the defense and midfield in order to prevent the opposing team from playing passes through that area of the field (Rämme, 2015:13), and b) fewer slide tackles noticed. This results in technical players having the license to express themselves as defenders to take a more sedate approach by covering the space as opposed to attempting to gain possession of the ball (Rämme, 2015: 13).

2.3 Synthetic grass vs natural grass

According to Sousa *et al.,* (2013:148), FIFA favours the use of astroturf over natural grass on soccer fields arguing that through its use, soccer will be able to be played all year round irrespective of seasonal changes. Another advantage of astroturf is the reduction in the cost of maintenance of the pitch, which will result in finances being freed for the development of other facets of a stadium. Despite these benefits, soccer players perceive that a higher physical effort is required whilst playing on astroturf as opposed to natural grass, and a higher difficulty in ball control is required as opposed to natural grass (Nedelec *et al.,* 2014:1517). While these may be viewed as stumbling blocks to the use of astroturf in soccer, perhaps the most concerning aspect of the use of astroturf is the player perception of an increased risk of injury when playing on it as opposed to natural grass (Balazs *et al.,* 2015:1799).

2.4 Site of injury

Soccer is an intricate sport which is often associated with high risk of injury (Sinovas *et al.,* 2020: 459). Soccer players that play on astroturf are reported to have a predominance of injury to the lower extremity, with the knee and ankle joint being the most frequent site of injury (Teahan *et al.,* 2021:3). However, a reduced risk of muscle strain has been reported during play on astroturf as opposed to natural grass (Silvers-Granelli *et al.,* 2015:2628). According to a study by Yurgil *et al.* (2021:191), there is an increase in frictional force on astroturf, which in turn increases the risk of injury to the soccer player.

The change in shoe-surface interface on astroturf has been reported to produce a greater risk of significant injury to the anterior cruciate ligament (Balazs *et al.,* 2015:1798). This increase in the frictional force between the astroturf and the shoe-surface interface, together with the rise in force necessary to release from the astroturf, may lead to contact and non-contact injuries, particularly to the anterior cruciate ligament (Balazs *et al.,* 2015:1798). Injury to the anterior cruciate ligament generally leads to the soccer player being forced away from the game for a year with the possibility of never returning to their previous level of ability prior to injury (Ardern *et al.,* 2012:43).

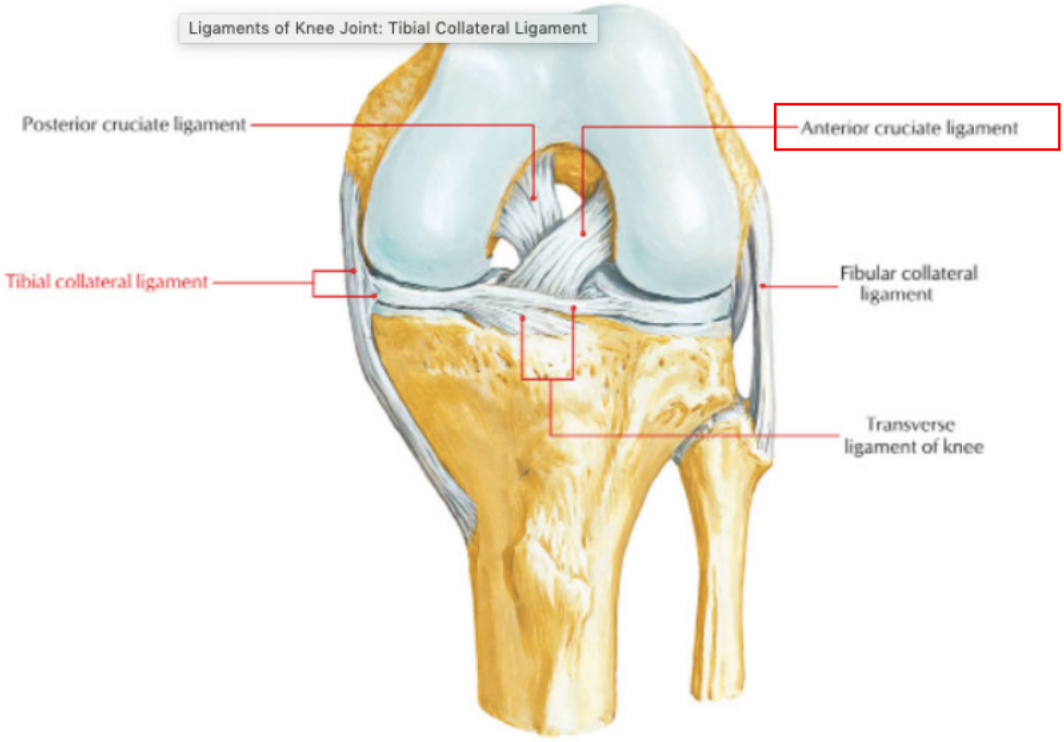


Figure 2.3: Ligaments of the knee joint, with the presence of the anterior cruciate ligament in the knee joint (Adapted from Kang et al., 2019:512)

The knee joint reflects extreme vulnerability in soccer players as the knee is involved in 22% of astroturf-related injuries to the lower extremity (Freiberg *et al.,* 2021:49). The most common injuries to the knee joint involve the ligamentous structures (especially the anterior cruciate ligament) and the menisci. The ligamentous injuries to the knee are severe due to the substantial risk of re-injury and the threat of chronic instability (Freiberg *et al.,* 2021: 49).

Injury to the ligamentous structures within the knee joint is due to either contact (72%) or non-contact (28%) mechanism of injury (Dragoo *et al.,* 2012:3). Contact injuries are

observed when there is a tackle to the knee joint, while weight bearing has a higher probability of causing damage to the menisci than the ligamentous structures (Freiberg *et al.,* 2021:49). Non-contact injuries of the anterior cruciate ligament occur when the game requires a sudden stop or change in direction with the player's knee in full extension (Lucarno *et al.,* 2021:1795).

In contrast, ankle injuries have a higher likeliness of occurring due to direct trauma (Menard *et al.,* 2021: 684). The force of direction on the ankle joint is significantly more likely to be from the medial or lateral direction; this is the reason why ankle sprains are common in soccer (Menard *et al.,* 2021: 685). There are 3 major ligaments that make up the lateral ligament complex of the ankle joint: the anterior talofibular ligament, the calcaneofibular ligament and the posterior talofibular ligament. When the foot is in the neutral position, the anterior talofibular ligament runs parallel to the axis of the foot, but during plantar flexion, the ligament runs parallel to the axis of the leg hence functioning as a collateral ligament (Jung, 2020: 2213). Most ankle sprains occur when the foot is in plantar flexion therefore the anterior talofibular ligament is the most frequently injured in an inversion sprain (Jung, 2020: 2213). Compared to the general population, soccer players are more predisposed to developing osteoarthritis of the ankle joint (Ménard *et al*., 2021: 684).

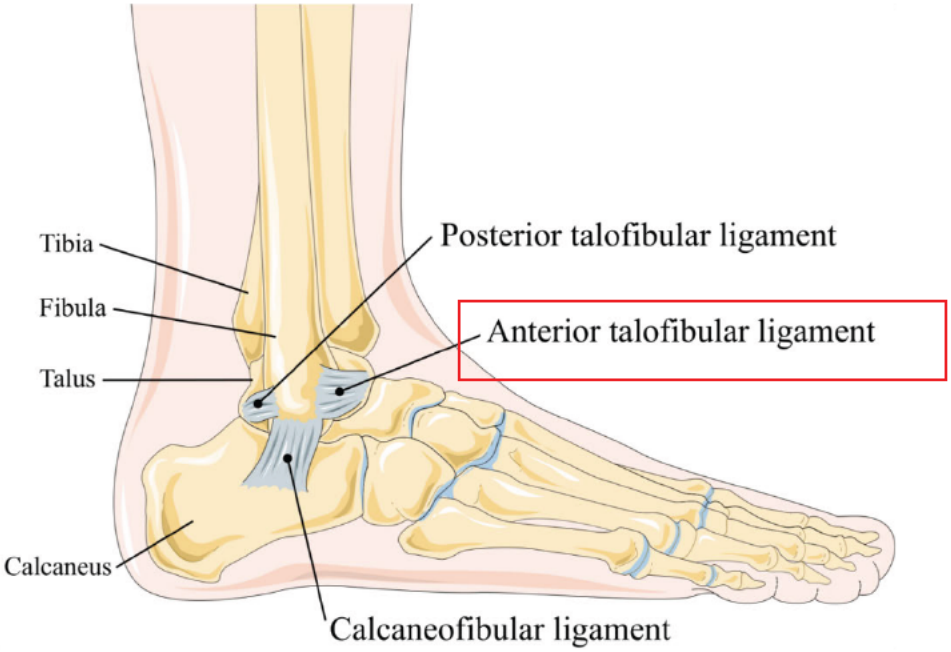


Figure 2.4: Ligaments of the ankle joint, with the presence of the anterior talofibular ligament (Adapted from D'Hooghe et al., 2020:283)

It is well documented that the knee and ankle joint are common sites of injury in soccer players (van Yperen *et al.,* 2018:1129). Knee and ankle injuries make up between 60%-90% of injuries (Faude *et al.,* 2013:829).

Direct contact between two players' heads when trying to retrieve the ball in the air has been reported as one of the most serious injuries in soccer (Hubertus *et al.,* 2019:426). With heading being a common sport-specific manoeuvre in soccer, this may potentially result in a concussion (Hubertus *et al.,* 2019:427). According to Durand *et al.* (2018:553), soccer injuries among players 7–17 years of age presenting with a concussion incidence has increased nearly 1600% between the years 1990 and 2004. High school soccer players (12-17years) are more probable to suffer a concussion whereas primary school soccer players (7-11years) are more probable to suffer a fracture. The most common site of fracture observed in young soccer players was a stress fracture of the tibia which hinders the growth stage of a young soccer player (Koivisto *et al.,* 2022:826).

Figure 2.5: Mechanism of head injury in soccer due to direct contact (Adapted from Tanner, 2015:1)

2.5 Injury rate of adolescents vs adults

Over the last decade, soccer injuries have become common amongst scholars, with the most affected age group being between 13–15 years of age (Lee *et al.,* 2020a:3). Thus, it has become apparent that scholars are more susceptible to injury as opposed to adults, with musculoskeletal injuries in scholars reportedly affecting their growth

cartilage (Hall *et al.,* 2020:58). Male adolescents between the ages of 12 through to 16 years of age increase 12cm (on average) in height per year (Bult *et al.,* 2018:1). An immature musculoskeletal system may be vulnerable during this growth spurt due to a possible decrease in bone density (Bult *et al.,* 2018:1). Periods of rapid growth result in limitations in terms of flexibility, hence leading to tendons and muscles prone to injury (Milewski and Chambers, 2017:1561-1562). Individuals with an immature musculoskeletal system need different considerations as opposed to individuals with a mature musculoskeletal system, as there is a higher chance of a fracture (Zaki *et al.,* 2020:6). In an immature musculoskeletal system, the open epiphyseal growth plates and remaining growth require significant consideration before deciding whether surgical intervention should be advised (Moksnes and Grindem, 2016:730-736).

2.6 Mechanism of injury

Tackling or being tackled is the most common mechanism of injury in soccer (Archary, 2008:5). Tackling is generally seen when the player defending is attempting to gain possession of the ball. Defenders will often do all that they can to prevent the attacker from scoring a goal, resulting in more frequent injury to midfielder and attackers (Balazs *et al.,* 2015:4).

The primary mechanism of injury in soccer is non-body contact injuries (54%) (Archary, 2008:72). Running, shooting, turning and jumping caused 39% of all injuries, which are classified as non-body contact injury (Lucarno *et al.,* 2021:1795). There are many risk factors (intrinsic and extrinsic) associated with non-contact injuries. Intrinsic risk factors include proprioception, muscular strength, ligamentous properties, and biomechanics. Whereas the extrinsic factors include factors such as the type of playing surface, the type of shoe used, the type of protective gear used, warm up routines, player position and the environmental conditions (Williams *et al.,* 2013:1). The identification and modification of the risk factors plays an integral role in reducing the likeliness of injury or re-injury (Watson *et al.,* 2019:6).

2.7 Injury prevention

Injury prevention is divided into two respective groups; primary prevention and secondary prevention. Primary prevention is focused on the prevention of an injury before it could happen, whereas secondary prevention is focused on reducing the effects of the current injury or re-injury (Watson *et al.,* 2019: 7).

While there are various contributing factors that leaves a soccer player prone to injury or re-injury on astroturf, the use of incorrect footwear has been identified as a major factor (Watson *et al.,* 2019:5). Gamonales *et al.* (2021:1) stated that majority of the equipment that caused injuries was attributed to soccer boots.

A key factor in injury prevention on astroturf is the footwear used. According to O'Kane *et al.* (2016:5), with regard to choice of footwear, the soccer player needs to ensure that the soccer boot is the correct size for the individual, the laces are adequately fastened, and most importantly, that the soccer boot is in harmony with the surface of play. The use of incorrect footwear on astroturf will result in soccer players not having adequate frictional force, which may lead to slipping (Dragoo *et al.,* 2012:2). On the contrary, if a player has too much frictional force on astroturf, it may result in an increase in torque when twisting, turning and coming to sudden stops, which may lead to injury (Dragoo *et al.,* 2012:2).

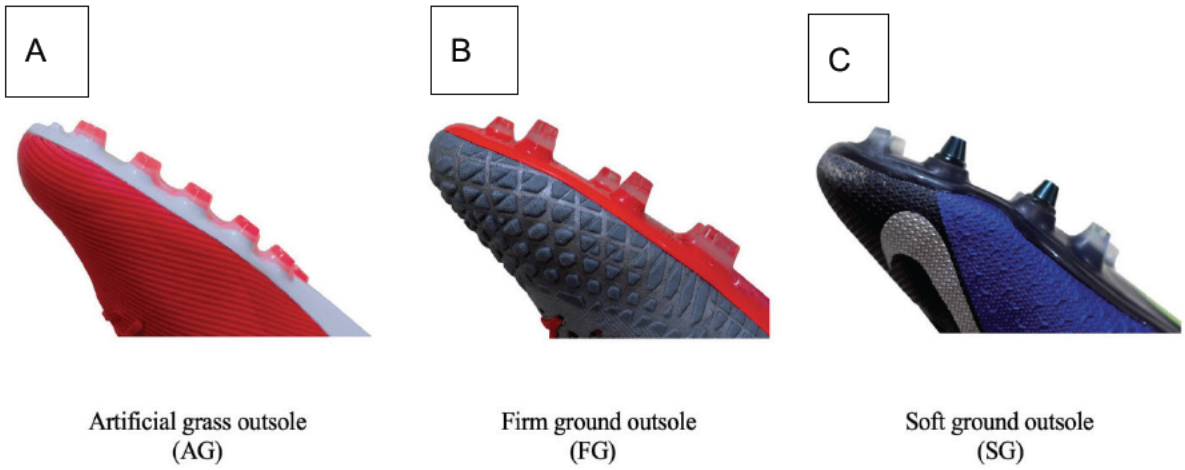


Figure 2.6: (A) Soccer boot used for synthetic grass (B) and (C) Soccer boot used for natural grass. Note the difference in stud shape and size in the different boots (Adapted from Thomson et al. 2022:6)

The modern design of a soccer boot incorporates an under-surface consisting of blades or studs. Firm-ground boots consisting of blades or studs are recommended for synthetic surface use (Frias and Fong, 2021:381). Soft-ground versions are recommended for natural grass use as they are equipped with longer metal studded and bladed under surface which allows penetration of the surface with ease, hence increasing surface traction (381).

There is a greater rotational torque between the surface of the shoe and the synthetic surface compared to natural grass. There is also a notable change in the foot loading

patterns during cutting manoeuvres on a synthetic surface compared to natural grass (Williams *et al.,* 2013:2). Soccer players are reliant on footwear to ensure optimal performance. The soccer boot aids the player in providing grip to the playing surface, protects the foot, and supplements ball control (Frias and Fong, 2021:381). Cutting manoeuvres are frequently involved in soccer. This movement is key in allowing a quick change of direction due to a sudden forceful twisting of the lower limb while the foot is planted on the surface and the knee flexed. This allows the player to evade a tackle and to obtain an advantageous position (381).

The preparticipation evaluation (PPE) is a pivotal tool in primary prevention. The preparticipation evaluation is completed before the athlete gets onto the soccer field. The preparticipation evaluation will be useful in detecting any medical conditions that may be life threatening or that may predispose the athlete to injury (Andujo *et al.,* 2020:58). In soccer players, identifying their previous musculoskeletal injuries will play a vital role in determining the necessary rehabilitation protocol (Watson *et al.,* 2019:6).

The equipment in soccer consists of the soccer ball, soccer boots, soccer kit as well as protection guards (shin, ankle, and knee). Protective equipment is designed to shield different body parts against injury with no restriction of any sports activity (Owoeye *et al.,* 2020:4). There are several protective equipments available to prevent this, such as, knee guards and strappings in order to reduce the rate of injury or re-injury.

The preventative programme must include an adequate warm up routine, regular cool down, strapping of the ankles and knees or any joint in the body with a pre-existing injury, rehabilitation and the promotion of fair play (Vasileiadis, 2020:110). Vasileiadis (2020:111) reported that almost all soccer players warmed-up for matches and training. The warm-up routine included aerobic activity, dynamic stretching, and soccer-specific skills, while the cool-down routine included aerobic activity, dynamic and static stretching. The purpose of an adequate warm-up routine is to ensure that the athlete's body is in the best physical condition leading up to the game, as well as to reduce the chance of possible injury during the game (Gaetano and Gaetano, 2017:83). Warming-up for training was shorter than for matches and mostly included aerobic activity, static stretching, exercise and cooling down (Cezarino *et al.,* 2020:300). Neuromuscular warm-up programmes significantly reduced the rate of

ACL (anterior cruciate ligament) injury in young soccer players (De Sire *et al.,* 2021:4957).

Coppalle *et al.* (2019:409) reported that pre-season training was responsible for an overall higher number of injuries as compared with in-season and post-season training injury rates across all sports. The use of a combination of balance and control exercises, eccentric hamstring, plyometrics and strength exercises have been found to be useful in limiting of all lower limb injuries. Armstrong (2019:12) reported that playing soccer when not fully fit exposes players to a high risk of re-injury. Fatigued sport players have decreased skill performances, which can lead to injury (Sorkkila *et al.*, 2020:130). Accordingly, promoting and encouraging proper warm-up exercises, strengthening, endurance and stretches prior to matches or training sessions is necessary. Soccer players have a higher likelihood of injury during a match than whilst warming up (Cezarino *et al.*, 2020:299).

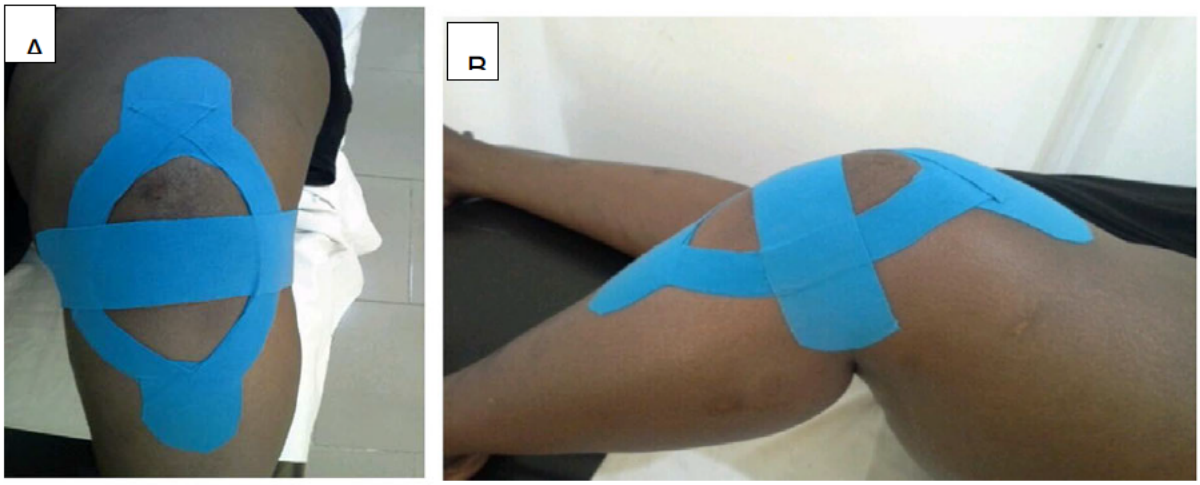


Figure 2.7: (A) Anterior view of knee strapping (B) Lateral view of knee strapping (Adapted from Danazumi et al. 2021:4)

The correct rehabilitation following injury needs to be implemented and followed diligently to lessen financial implications as soccer injuries on a synthetic surface has resulted in 349 patients missing a total of 6137 days away from work (Archary, 2008:6). Approximately two-thirds of injuries are mild, 20% moderate and 14% severe. The ankle and knee joints, together with the muscles of the thigh and hip are the predominant areas of injury in soccer. After an injury the RICE (rest, ice, compression, and elevation) principle needs to be implemented, followed by a period of immobilisation and protection (Jung, 2020:2212).

2.8 Conclusion

Watson *et al.* (2019:6) had highlighted that the identification and modification of the risk factors played an integral role in reducing the likeliness of injury or re-injury. This study therefore aimed at understanding the injury profile and mechanism of injury of amateur scholar soccer players that played on a synthetic surface.

CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

This chapter aims to describe the research methodology data collection and data analysis employed in this study.

3.2 RESEARCH DESIGN

The research study was a quantitative study with a descriptive design used to assess the injury profile of soccer players on a synthetic surface at a private school in the eThekwini municipality. Gatekeeper permission was obtained to gather data at Al-Falaah College (Appendix A). Ethical approval for this study (286/21) was obtained from the DUT Institutional Research Ethics Committee (IREC), and is included as Appendix G.

3.3 STUDY SETTING, TARGET POPULATION AND SAMPLING

This research study was conducted at Al-Falaah College, a private school that is situated in the district. The study setting was chosen based on the presence of an astroturf court at the school, which was frequently used by the learners. Since the college had learners from Grade R to Grade 12, the learners also met the age requirement of the study.

There were approximately 1000 learners registered at Al-Falaah College from grades R-12 at the time of the study. Of this total number of registered learners, 150 were between the ages of 12–17 years and played soccer on a synthetic surface. This study employed a convenience type of non-probability sampling. The sample size of this study, as determined by Dr Gill Hendry, the statistician, was 108 male learners. Hence, the study was opened to male learners between the ages of 13–18 years.

3.4 INCLUSION CRITERIA

The research participants for this study had to:

- Be registered learners at Al-Falaah College.
- Be between the ages of 13 and 18 years.
- Play soccer on a synthetic surface.

3.5 EXCLUSION CRITERIA

Participants would be excluded from the study if they:

- Were not registered learners at Al-Falaah College.
- Were younger than 13 years of age or older than 18 years of age.
- Did not play soccer on a synthetic surface.
- Did not receive parental or guardian permission to participate in the study.
- Did not sign the letter of informed consent.
- Were involved in the pilot study.

3.6 RESEARCH TOOL

An organised, quantitative questionnaire was used to establish the demographic and injury profile of high school soccer players. A well organised questionnaire is beneficial in terms of keeping misinterpretation of the questionnaire to a minimum (Naidoo, 2018:44). The questionnaire used in this study was created and used in the study by Archary (2008) to determine a profile of soccer injuries in selected league amateur indoor and outdoor soccer players in the greater Durban area. The questionnaire (Appendix D) was adapted with permission (Appendix E) from the original author (Archary, 2008:6) to obtain all the relevant data from the participants.

The questionnaire contained the following sections:

Section A — Demographics

The demographic section of the questionnaire consists of 8 questions that elicit responses with respect to the participants' age, ethnicity, height, and weight. Included in this section is the history of play on synthetic surface and whether the learner plays any other sport besides soccer. Figure 3.1 shows a sample of the questions in the demographic section.

Appendix D

Questionnaire

Part A: Identification

This questionnaire is being conducted to determine an injury profile of high school soccer players on a synthetic surface at a private school in the eThekwini municipality.

Your participation is voluntary, therefore you may withdraw your participation from this study at any point during the process without any consequence. All of the data that is conducted will be confidential. All of the data collected will be used for only for the purpose of this study and reporting thereof.

By participating in this questionnaire, I confirm that I have read and understood the letter of information and informed consent.

1. What is your current age (In years)? *
   - ☐ 13
   - ☐ 14
   - ☐ 15
   - ☐ 16
   - ☐ 17
   - ☐ 18
2. What is your ethnicity? *
   - ☐ Black
   - ☐ White
   - ☐ Indian
   - ☐ Coloured
   - ☐ Other:
3. What is your height in meters? *
   - ☐ < 1.5
   - ☐ 1.5m - 1.6
   - ☐ 1.6m - 1.7
   - ☐ 1.7m - 1.8
   - ☐ > 1.8
4. What is your weight in kilograms? *
   - ☐ < 50
   - ☐ 50kg - 59
   - ☐ 60kg -69
   - ☐ 70kg - 79
   - ☐ 80kg- 89
   - ☐ 90kg - 100
   - ☐ > 100
5. Number of years as a player on synthetic surface? *
   - ☐ < 1
   - ☐ 1 - 2
   - ☐ 3 - 5
   - ☐ > 5
6. How many games per week do you participate on a synthetic surface? *
   - ☐ 1
   - ☐ 2
   - ☐ 3
   - ☐ 4
   - ☐ 5 or more
7. What is your playing position? *
   - ☐ Goal keeper
   - ☐ Defender
   - ☐ Midfielder
   - ☐ Striker
8. Do you participate in any other sports? *
   - ☐ Yes
   - ☐ No

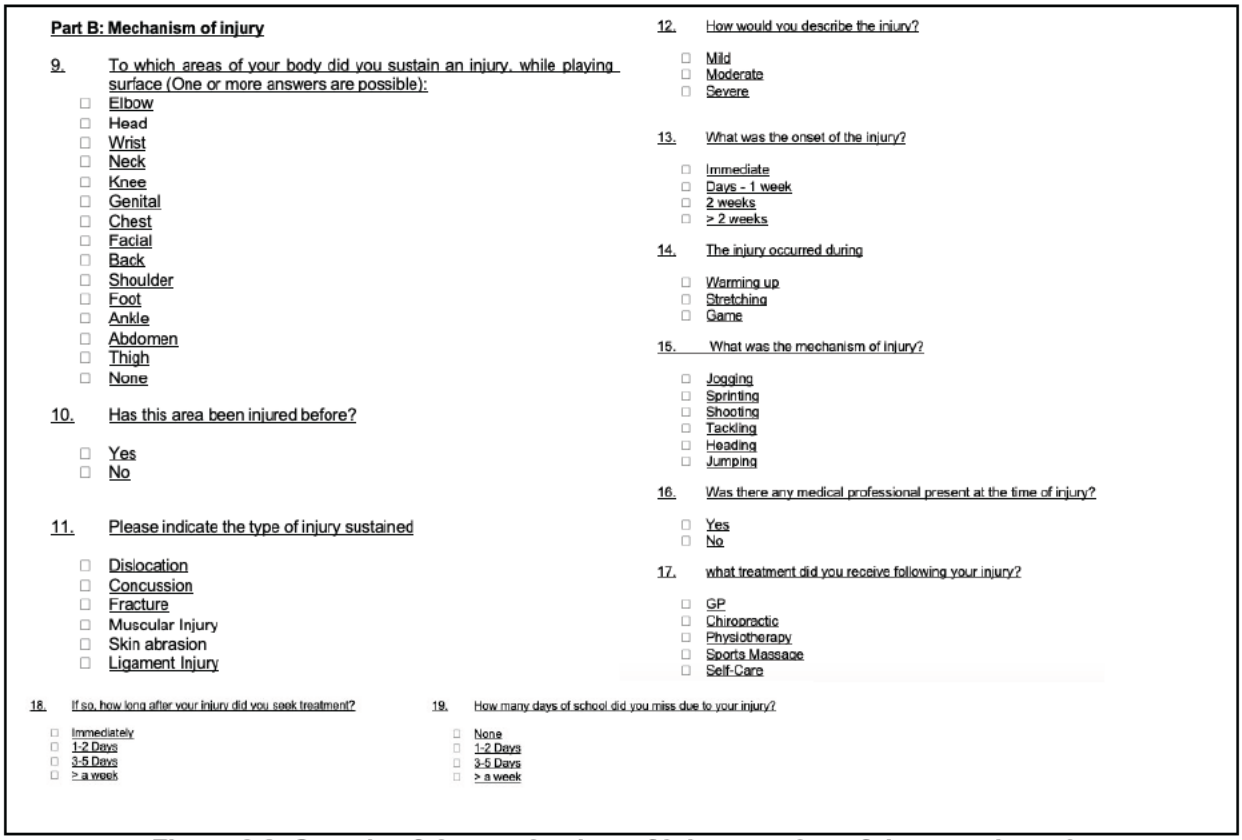
If yes, please specify. *

- ☐ Cricket
- ☐ Rugby
- ☐ Volleyball
- ☐ Athletics
- ☐ Hockey
- ☐ Other:

Figure 3.1: Sample of the identification (demographic) section of the questionnaire

Section B — Mechanism of injury

This section of the questionnaire comprises 11 questions in total which aim to elicit responses from the learners with respect to their injury sustained while playing soccer on a synthetic surface. It focuses on the area, type and severity of the injury sustained, the activity of the learner during which the injury occurred, and the treatment regimen followed. Figure 3.2 is a sample of the questions in the mechanism of injury section of the questionnaire.



Part B: Mechanism of injury

9. To which areas of your body did you sustain an injury, while playing surface (One or more answers are possible):
   - ☐ Elbow
   - ☐ Head
   - ☐ Wrist
   - ☐ Neck
   - ☐ Knee
   - ☐ Genital
   - ☐ Chest
   - ☐ Facial
   - ☐ Back
   - ☐ Shoulder
   - ☐ Foot
   - ☐ Ankle
   - ☐ Abdomen
   - ☐ Thigh
   - ☐ None

10. Has this area been injured before?
   - ☐ Yes
   - ☐ No

11. Please indicate the type of injury sustained
   - ☐ Dislocation
   - ☐ Concussion
   - ☐ Fracture
   - ☐ Muscular Injury
   - ☐ Skin abrasion
   - ☐ Ligament Injury

12. How would you describe the injury?
   - ☐ Mild
   - ☐ Moderate
   - ☐ Severe

13. What was the onset of the injury?
   - ☐ Immediate
   - ☐ Days - 1 week
   - ☐ 2 weeks
   - ☐ > 2 weeks

14. The injury occurred during
   - ☐ Warming up
   - ☐ Stretching
   - ☐ Game

15. What was the mechanism of injury?
   - ☐ Jogging
   - ☐ Sprinting
   - ☐ Shooting
   - ☐ Tackling
   - ☐ Heading
   - ☐ Jumping

16. Was there any medical professional present at the time of injury?
   - ☐ Yes
   - ☐ No

17. what treatment did you receive following your injury?
   - ☐ GP
   - ☐ Chiropractic
   - ☐ Physiotherapy
   - ☐ Sports Massage
   - ☐ Self-Care

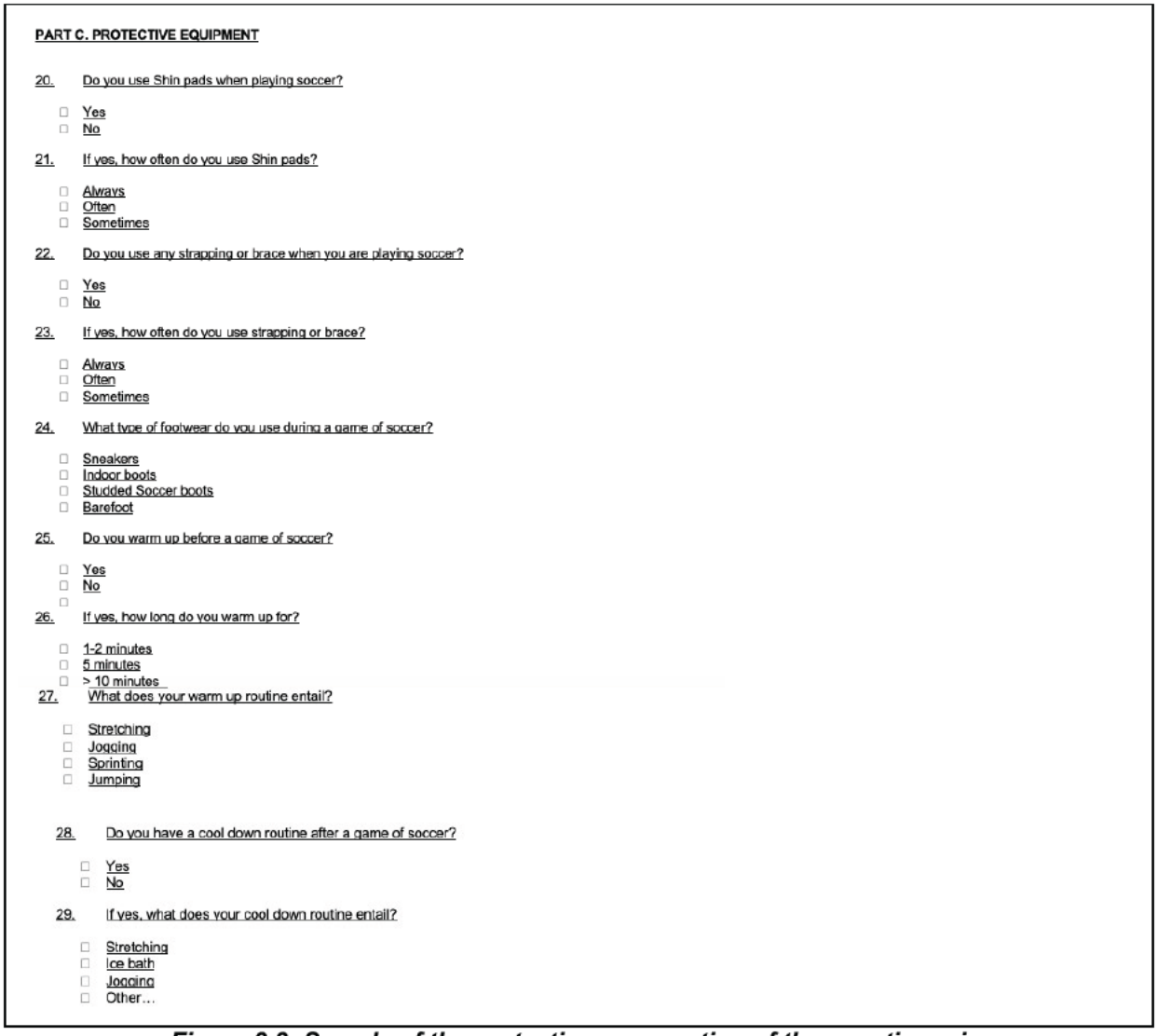
18. If so, how long after your injury did you seek treatment?
   - ☐ Immediately
   - ☐ 1-2 Days
   - ☐ 3-5 Days
   - ☐ > a week

19. How many days of school did you miss due to your injury?
   - ☐ None
   - ☐ 1-2 Days
   - ☐ 3-5 Days
   - ☐ > a week

Figure 3.2: Sample of the mechanism of injury section of the questionnaire

Section C- Protective gear

This section of the questionnaire comprises 10 questions, that elicits learners' responses with regard to the type of protective gear, as well as warm-up and cool-down routines employed by them when playing soccer on a synthetic surface. Figure 3.3 is a sample of the questions in the protective gear section.



PART C. PROTECTIVE EQUIPMENT

20. Do you use Shin pads when playing soccer?

- ☐ Yes
- ☐ No

21. If yes, how often do you use Shin pads?

- ☐ Always
- ☐ Often
- ☐ Sometimes

22. Do you use any strapping or brace when you are playing soccer?

- ☐ Yes
- ☐ No

23. If yes, how often do you use strapping or brace?

- ☐ Always
- ☐ Often
- ☐ Sometimes

24. What type of footwear do you use during a game of soccer?

- ☐ Sneakers
- ☐ Indoor boots
- ☐ Studded Soccer boots
- ☐ Barefoot

25. Do you warm up before a game of soccer?

- ☐ Yes
- ☐ No
- ☐

26. If yes, how long do you warm up for?

- ☐ 1-2 minutes
- ☐ 5 minutes
- ☐ > 10 minutes

27. What does your warm up routine entail?

- ☐ Stretching
- ☐ Jogging
- ☐ Sprinting
- ☐ Jumping

28. Do you have a cool down routine after a game of soccer?

- ☐ Yes
- ☐ No

29. If yes, what does your cool down routine entail?

- ☐ Stretching
- ☐ Ice bath
- ☐ Jogging
- ☐ Other…

Figure 3.3: Sample of the protective gear section of the questionnaire

The questionnaire was initially going to be completed online, due to the restrictions imposed during the Covid 19 pandemic. However, at the time of data collection, the restrictions had been eased and hence the school management requested that the questionnaires be completed in person rather than online. Therefore, an amendment was made to the ethics application and once approval was received (Appendix G), the researcher went to the research site to explain the study, and distribute the information letter, consent form and study questionnaire to the target population.

3.7 DATA ANALYSIS

Descriptive statistics, in the form of tables and graphs, will be used to describe the data graphically. To test for significant trends in the data, inferential statistics will be applied. These will likely include Pearson's correlation, t-tests, ANOVA, and chi-square tests. Where the conditions are not met for the application of these tests, non-

parametric equivalent tests, or exact tests, where applicable, will be used. Throughout, a p-value of 0.05 will be used to indicate significance. The analysis will be carried out using SPSS (Statistical Package for Social Sciences) (Hendry 2020).

3.8 Ethical Considerations

Ethical approval (IREC 286/21) and consent was obtained from the institutional research and ethics committee (IREC) at the Durban University of Technology. Once the research study was completed all of the informed consent forms and questionnaires was safely stored in a secure cabinet at the Durban University of Technology: Department of Chiropractic. After a period of 5 years from completion of this research study, the data will be shredded.

Confidentiality- The participants of the study were not required to provide their name, this was to ensure their anonymity and confidentiality.

Autonomy- There was no participant that was coerced into partaking in this study. Participation in this study was completed without the presence of the researcher, to ensure autonomy to the participant. All participants were treated with equal respect. Participants were required to obtain informed consent and reserved the right to withdraw from the research process at any point without any consequence (De Jong, J. 2016,1-12).

Non-maleficence- Participation in the study was voluntary and the participants were able to withdraw from the study at any point during the research process without any fear of consequence, this was to ensure non-maleficence. The avoidance of harm in order to reach a benefit, harm should not be disproportionate to the benefits (Sundean et al 2013, 1-5).

Justice- All of the participants were treated with respect in order to ensure justice. This was in respect to the participants “Right for fair treatment to individuals who volunteer to partake in the study and those who decline participation, and the participants” right to their privacy (Barrow, 2020.1-5).

Benevolence- Possible benevolence of the study included presenting the results of this study at the Durban University of Technology library, “The participants right to freedom from anything that puts them in harm or discomfort and protection from exploitation” (Barrow, 2020.1-10).

3.9 PROCEDURE

Following the approval from the Durban University of Technology (DUT) Institutional Research Ethics Committee (286/21) (IREC), the head of sport at Al-Falaah College was contacted regarding permission to conduct a research study. The permission letter is included as Appendix A.

- On receipt of provisional ethics from IREC (286/21), a pilot study was conducted prior to the collection of data.
- This was to ensure that the questionnaire was free of any interpretation issues.
- Participants that were used in the pilot study were not used in the main study.
- Following the completion of the pilot study and the receipt of full ethical approval (286/21), the head of sport at Al-Falaah College was contacted once again to arrange for the data collection stage.
- The researcher sent out Appendix B (letter of parental/guardian permission), Appendix C (letter of information and consent), Appendix D (questionnaire) and Appendix F (child assent form) to the Head of Sport, which was handed out and completed by the participants that met the inclusion and exclusion criteria during a physical education lecture.
- The data was collected via the questionnaires (Appendix D).

Information regarding the voluntary nature of participation and the use of data were included on the first page of the questionnaire. This was done to provide the potential participant with an option of whether they wished to participate or not.

- The relevant completed documentation was then collected from the Head of Sport by the researcher.
- The information from the questionnaire was coded by the researcher and sent to the statistician for statistical analysis.

3.9 MEASUREMENT TOOL

3.9.1 Pilot Study

- The pilot study involved two participants that met the inclusion and exclusion criteria of the study. During the pilot study all relevant documentation pertaining to the study was handed out to the participants in the same manner as it would be done in the main group data collection. The pilot study was completed for

the following reasons: To ensure that the questions were appropriate and easily understandable.

- To determine the approximate time required to complete the questionnaire and,
- to possibly identify any problematic areas in the questionnaire.

3.9.2 Inclusion Criteria

- Learners who are registered at Al-Falaah College and play soccer on a synthetic surface.
- Learners between the ages of 13–18years.

3.9.3 Exclusion Criteria

- Learner who are not registered at Al-Falaah College.
- Learners who are younger than 13 years of age or older than 18 years of age.
- Learners who did not provide a signed letter of informed consent.

3.10 Conclusion

Chapter 3 outlined the research methodology of this study. The research design, research tool and statistical techniques used to analyse the data are described in this chapter. This chapter also described the development of the questionnaire, procedure and ethical considerations. The following chapter will provide the results of this study.

CHAPTER 4 RESULTS

4.1 INTRODUCTION

Chapter 4 is a presentation of the analytical and descriptive analysis of the data collected in this study. These analyses will begin with the demographic characteristics, followed by the mechanisms of injury and risk factors of the participants in this study.

4.2 RESPONSE RATE

A total of 108 questionnaires were handed out to male participants between the ages of 13 and 18 years from Al-Falaah College, a private school situated in the eThekwini municipality. The total number of 108 questionnaires were returned in this study, which equates to a 100% response rate.

4.3 OBJECTIVES

4.3.1 Demographic Profile

Objective one:

To establish a demographic profile of the male scholars who play soccer at the school.

The age and ethnicity of the respondents are illustrated in Figure 4.1. With respect to age, of the 108 respondents, the majority (*n*=24, 22.2%) was in the 14yr age group, followed by the 13 and 15 year age groups respectively (*n*=22; 20.4%). The overwhelming majority of the respondents were of Indian ethnicity (*n*=98; 90.7%), followed by Coloureds (*n*=5; 4.6%) and Black and White ethnicity (*n*=2; 1.9%).

Analysis from Kruskal Wallis test revealed that age significantly affected the type of injury sustained by the respondents, x^2 (5 = 16.550, *p*=.005). Post-hoc Mann-Whitney tests using a Bonferroni-adjusted alpha level of .003 (0.05/15) were used to compare all pairs of injuries. Those who sustained fractures or skin abrasions were significantly younger than those who sustained ligament injuries, *p*=.003 and .002, respectively.

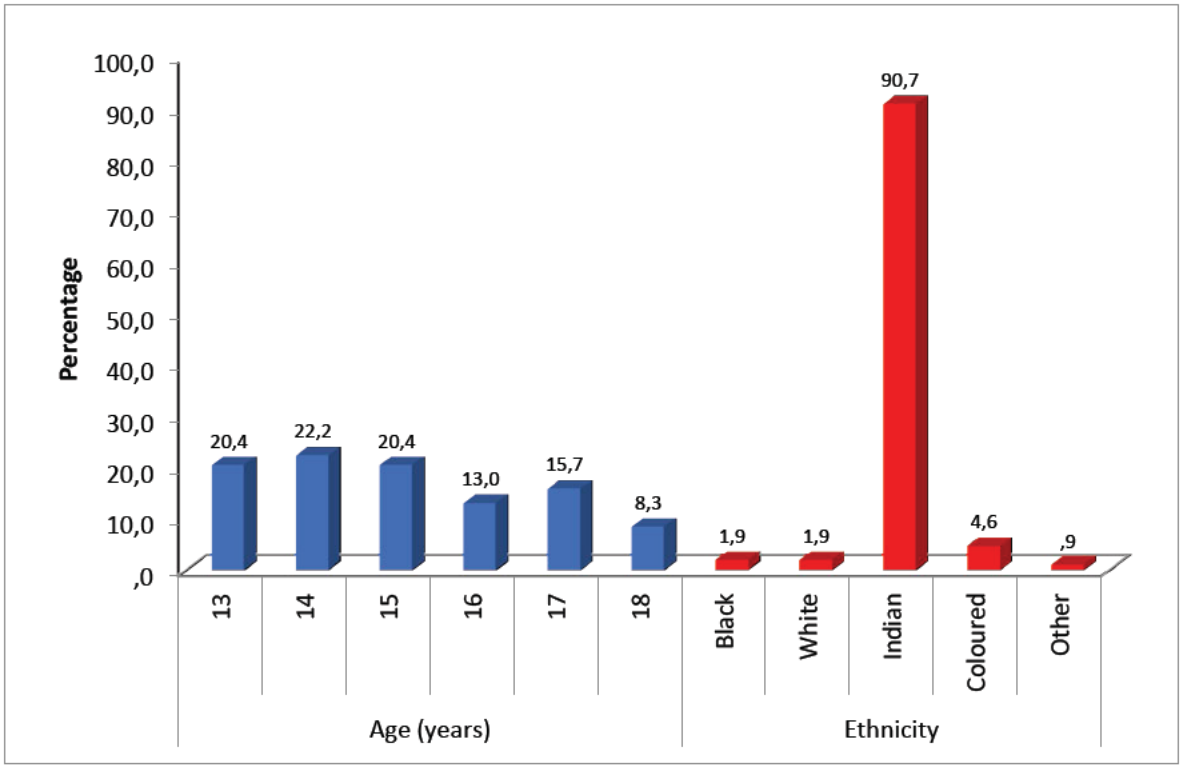


Figure 4.1: Percentage of respondents by age and ethnicity

With respect to height and weight of the respondents (as shown in Figure 4.2), most participants were between 1.7–1.8 meters tall (*n*=39; 36.1%) and between 50-59 kilograms (*n*=40; 37%). There was a significant difference in height for those who did and did not have a head injury, x^2 (1) = 4.507, *p*=.034. The mean rank height was 29.42 for those with a head injury and 55.98 for those without a head injury. Analysis from Kruskal Wallis revealed that the respondents' weight significantly affected the type of injury they sustained, x^2 (5=12.211, p<.001. Post-hoc Mann-Whitney tests using a Bonferroni-adjusted alpha level of .003 (0.05/15) were used to compare all pairs of injuries. These tests revealed that those who sustained muscular injuries or skin abrasions were significantly lighter in weight than those who sustained ligament injuries, p<.001 in both cases.

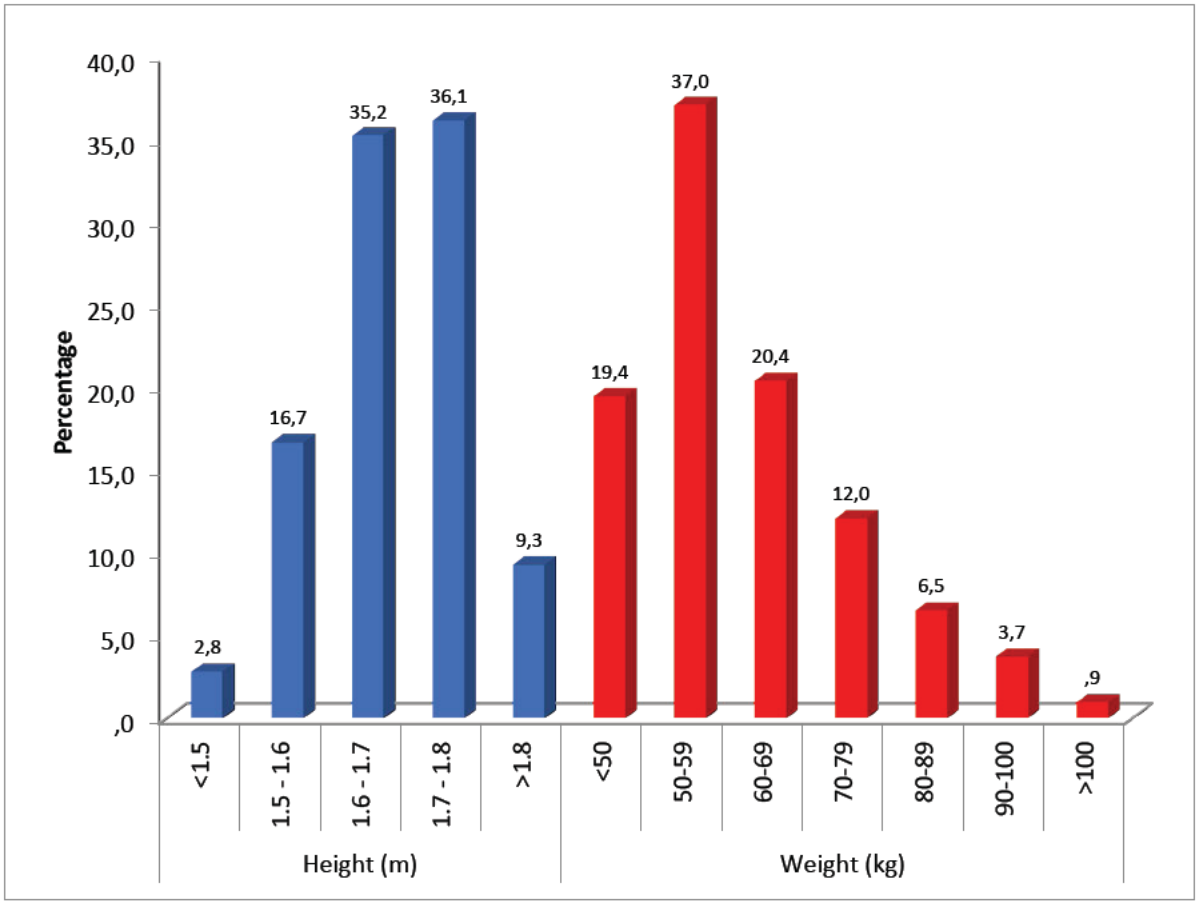


Figure 4.2: Percentage of respondents by height and weight

Figure 4.3 indicates the timeframe and position of the respondents with regard to the use of the synthetic surface. Most of the respondents reported having played soccer on a synthetic surface for more than 5 years (*n*=37; 34.3%) with a minimum of 1 game per week (*n*=49; 45.4%). In terms of field positions during the soccer matches, more respondents identified as defenders and midfielders than any other position (*n*=36; 33.3%). Analysis from Kruskal Wallis revealed that the number of games played by the respondents per week significantly affected the type of injury they sustained, χ^2 (5 = 11.099, *p*=.049. Post-hoc Mann-Whitney tests using a Bonferroni-adjusted alpha level of .003 (0.05/15) were used to compare all pairs of injuries. However, none of the comparisons were significant after the Bonferroni adjustment.

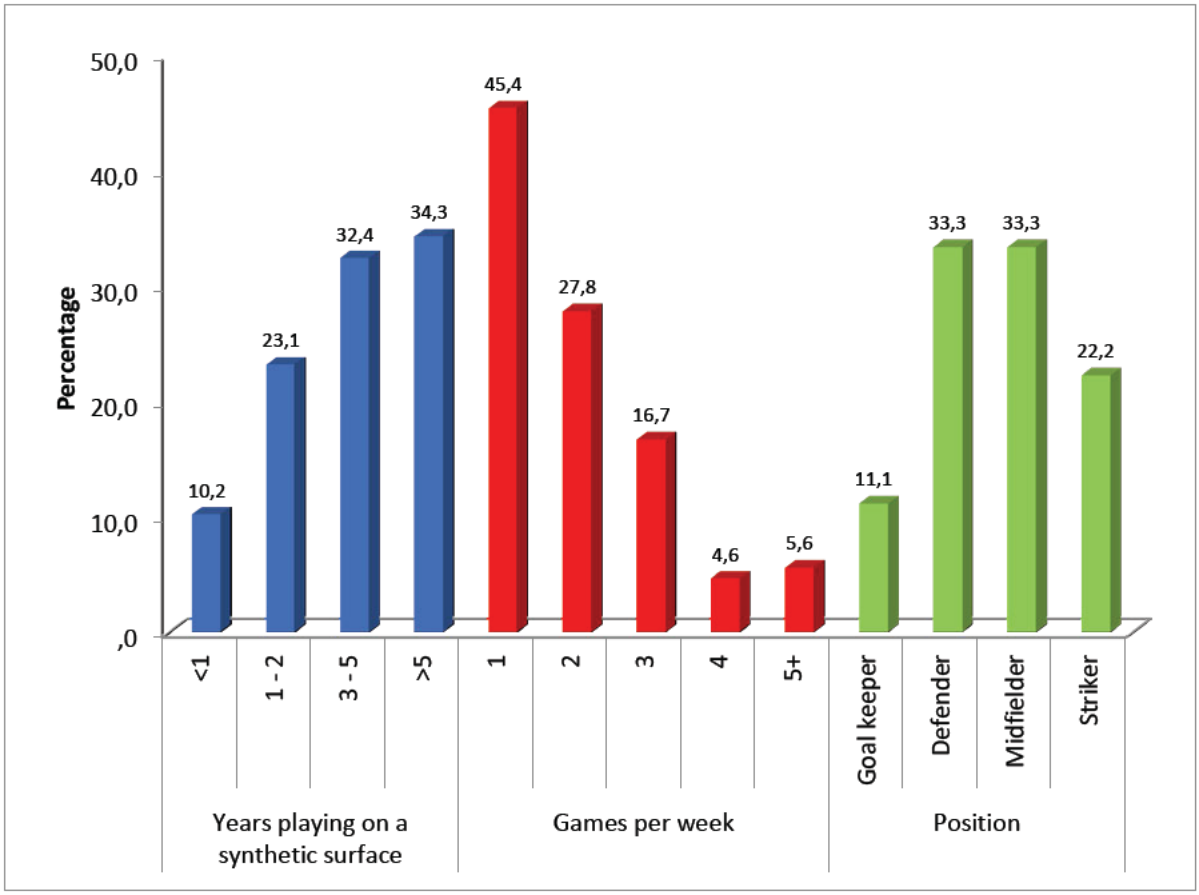


Figure 4.3: Percentage of years, games and position played by respondents on a synthetic surface

Table 4.1: Player position in relation to injury

Position	Responses as Frequency (%)			Fisher's exact	p-value
	warming up	stretching	game		
Goalkeeper	0 (0)	**1 (9.1)**	10 (90.9)	12.511	<.010*
Defender	**5 (15.2)**	0 (0)	28 (84.8)		
Midfielder	0 (0)	0 (0)	33 (100)		
Striker	**4 (18.2)**	0 (0)	18 (81.8)		

*indicates significance at 95%

Table 4.1 illustrates the use of a Fishers exact test to determine the relationship between respondent position and when the injury occurred. The test revealed that a

significant number of injuries occurred for goal keepers during the pre-game stretching, and for defenders and strikers during the pre-game warm-up sessions.

4.3.2 Mechanisms of Injury

Objective Two:

To establish if there are any associations between the injury profile and the demographic profile of male scholars who play soccer on a synthetic surface in a private school in the eThekwini municipality.

Figure 4.4 highlights the sites of respondents' injuries incurred during playing soccer on the synthetic surface. While there were no statistical significance differences noted with regard to the sites of injury, four predominant sites of injury were revealed in the study group. The most common site of injury was the knee joint (*n*=54; 50%), followed by the ankle joint (*n*=36; 33.3%), wrist (*n*=29; 26.9%) and foot (*n*=28; 25.9%). A significant number of respondents (*n*=77; 71%) indicated that the area currently injured had been injured before, p<.001.

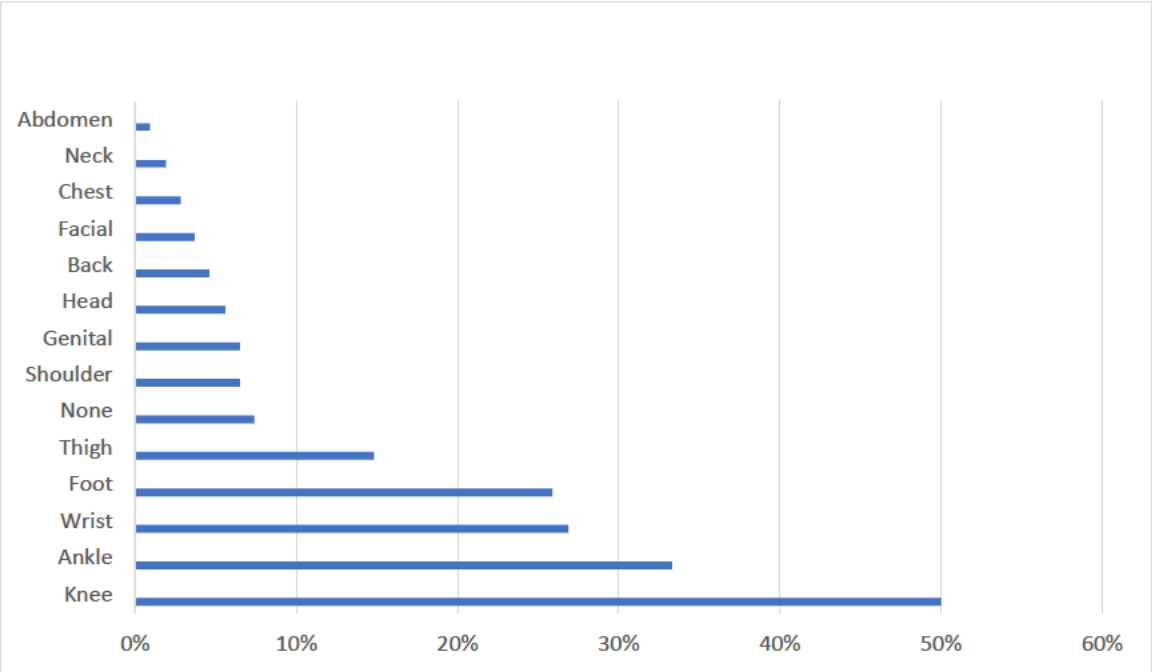


Figure 4.4: Site of injury of respondents playing soccer on a synthetic surface – in order of increasing prevalence

Figure 4.5 highlights that most of the injuries (56.5%) reported by the respondents occurred during tackling manoeuvres during the actual game time. The injuries were mainly characterised as being mild (42.6%) to moderate (37.0%) in severity with an

immediate onset (38.9%) or onset within the 1st week (37.0%) following injury. The mild to moderate injuries reported were mainly of the ligament (26.9%), muscular (24.1%) and skin abrasion (21.3%) types of injury.

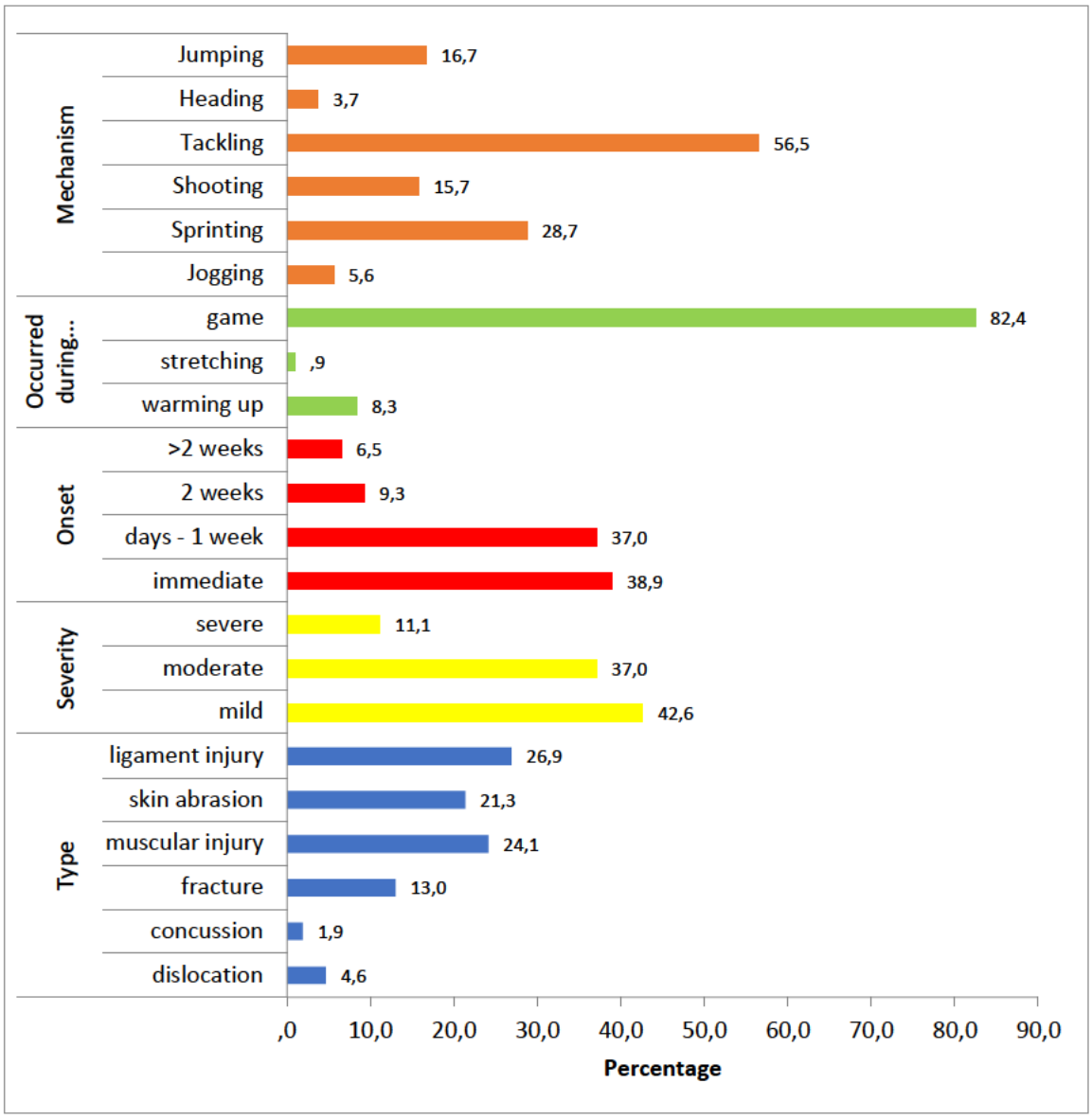


Figure 4.5: Percentage of mechanism, time, onset, severity, and type of injury

Table 4.2 indicates the type of injury incurred by the respondents, the time of onset, severity of the injury and the phase of the game in which the injury occurred. The chi-square goodness-of-fit test was used to determine if any response option was selected significantly more than others. A significant proportion of the injuries were noted to be a muscular injury, a ligament injury or skin abrasion; to be described as mild or moderate; have an immediate onset or within the first week; and have happened during the game. The severity of the injury was significantly and positively correlated

with age (rho=.312, *p*=.002), height (rho=.292, *p*=.003), weight (rho=.28, *p*=.004) and the number of games played per week on a synthetic surface (rho =.325, *p*=.001). The speed of onset of the injury was significantly correlated with the number of years that the respondent was playing on a synthetic surface (rho =.209, *p*=.038); with a quicker onset being associated with less experience on the synthetic surface.

No statistical significance was noted between the type of injury incurred and the mechanism or activity; with most injuries reported as occurring during tackling (*n*=61; 56.5%), and the least injuries reported as occurring during heading (*n*=4; 3.7%).

Table 4.2: Types of injury in relation to severity

Injury	Category	Frequency (%)	X^2	df	p-value
Type	dislocation	5 (4.6)	38.636	5	<.001*
	concussion	2 (1.9)			
	fracture	14 (13.0)			
	muscular injury	26 (24.1)			
	skin abrasion	23 (21.3)			
	ligament injury	29 (26.9)			
Severity	mild	46 (42.6)	20.163	2	<.001*
	moderate	40 (37.0)			
	severe	12 (11.1)			
Onset	immediate	42 (38.9)	42.939	3	<.001*
	days – 1 week	40 (37.0)			
	2 weeks	10 (9.3)			
	>2 weeks	7 (6.5)			
Occurred during...	warming up	9 (8.3)	143.515	2	<.001*
	stretching	1 (.9)			
	game	89 (82.4)			

* Indicates significance at 95%

4.3.3 Protective Gear

Objective three:

To establish if there is an association between the injury profile and the use of protective equipment of male scholars who play soccer on a synthetic surface in a private school in the eThekwini municipality.

Table 4.3: The type of footwear worn by respondents when playing soccer on a synthetic surface

	Category	Frequency (%)	X^2	df	*p*-value
Type of footwear	Sneakers	39 (36.1)	96.296	3	<.001*
	Indoor boots	5 (4.6)			
	Studded soccer boots	63 (58.3)			
	Barefoot	1 (.9)			

* Indicates significance at 95%

Table 4.3 indicates the results of the chi-square goodness-of-fit test which determined if any response option is selected significantly more than others with regard to the types of footwear used by respondents while playing on the synthetic surface. No statistical significant difference was noted in the various types of footwear reportedly used by the respondents. It was noted that many respondents were using the incorrect footwear, such as studded soccer boots (*n*=63; 58.3%) and sneakers (*n*=39; 36.1%), when playing on a synthetic surface.

Table 4.4: The presence of medical professionals at time of injury

	Frequency (%)		n	*p*-value
	Yes	No		
Was there any medical professional present at the time of injury?	26 (24.1)	72 (66.7)	98	<.001*

* Indicates significance at 95%

As shown in Table 4.4, a binomial test was used to determine if a significant proportion of participants answered yes or no. The presence of a medical professional at the time of injury was not noted to be statistically significant. Participants (*n*=26; 24.1%) indicated that there was a medical professional present at the time of injury.

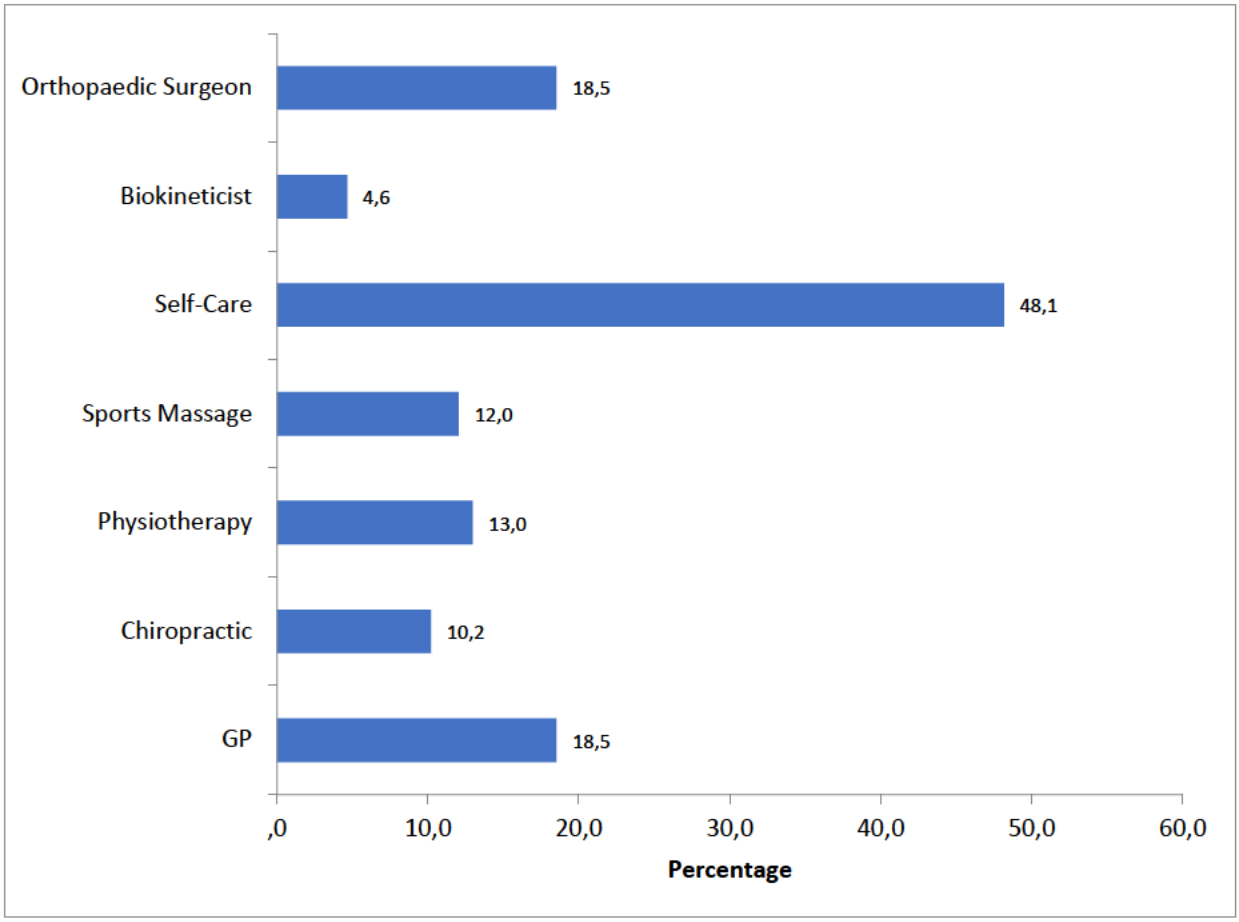


Figure 4.6: Percentage of treatment protocol used by respondents

Figure 4.6 illustrates the type of treatment protocols used by the respondents following an injury. While there were no significant statistical differences between the respective treatment protocols utilised, the most common treatment protocol selected was self-care (*n*=52; 48.1%), followed by a general practitioner (*n*=20; 18.5%) and Orthopaedic surgeon (*n*=20; 18.5%) respectively.

Table 4.5: The onset of respondent treatment in relation to school absenteeism

	Category	**Frequency** (%)	**X^2**	**df**	***p*-value**
Onset of treatment	Immediately	34 (31.5)	29.969	3	<.001*
	1-2 days	41 (38)			
	3-5 days	11 (10.2)			
	> 1 week	11 (10.2)			
Absent from school	None	57 (52.8)	58.293	3	<.001*
	1-2 days	20 (18.5)			
	3-5 days	10 (9.3)			
	> 1 week	12 (11.1)			

* indicates significance at 95%

Chi-square goodness-of-fit tests revealed no statistical significant difference between the onset of treatment of the injury sustained during the game and absenteeism from school (see Table 4.5). Most of the respondents got medical assistance within 1–2 days (*n*=41; 38%), followed by those who received medical assistance immediately (*n*=34; 31.5%). With regard to the injury affecting the school attendance, it was noted that most of the respondents were not absent from school due to injury (*n*=57; 52.8%), followed by (*n*=20; 18.5%) absent for 1-2 days, (*n*=10; 9.3%) absent for 3-5 days and (*n*=12; 11.1%) absent for more than a week due to injury.

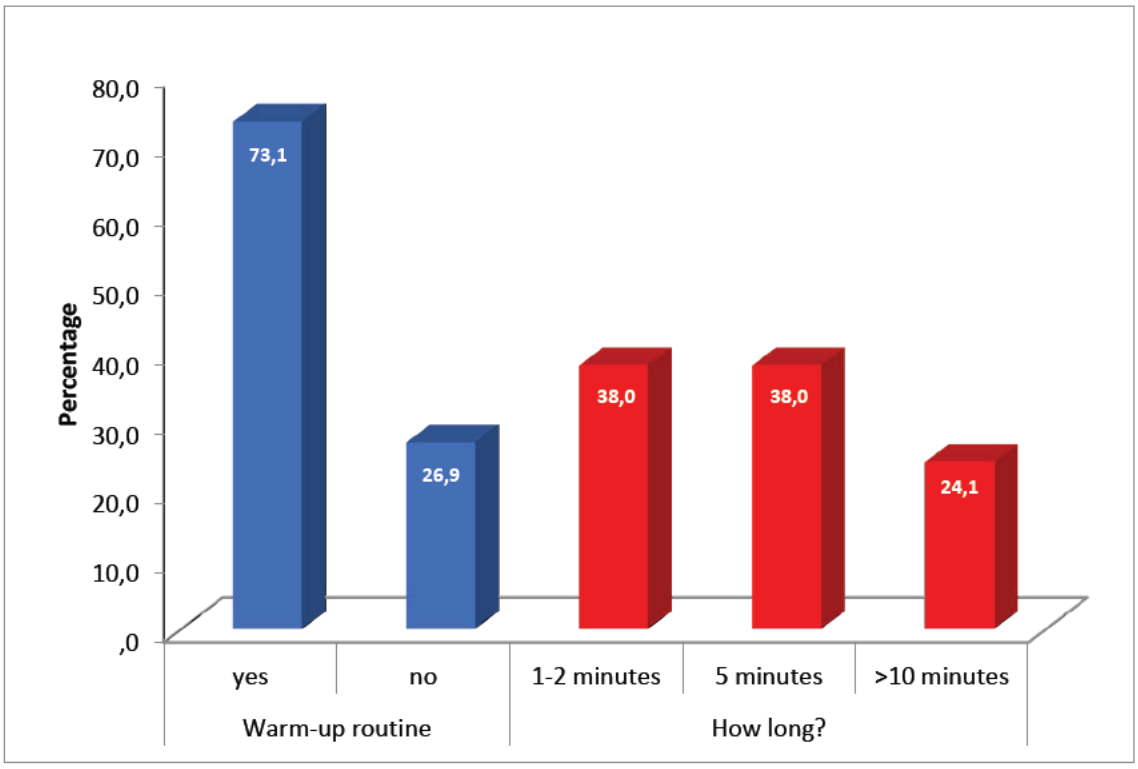


Figure 4.7: Percentage of respondents' warm-up routine in relation to time

As shown in Figure 4.7, most of the respondents (*n*=79; 73.1%) warmed up prior to a game for a period of 1–2 minutes (*n*=30; 38%) and 5 minutes (*n*=30; 38%).

Figure 4.8 indicates the type of activities performed during warm-up sessions and the percentage of time spent by the respondents on each activity. It was noted that a significant proportion of respondents selected stretching as their warm-up routine (*n*=62; 78.5%).

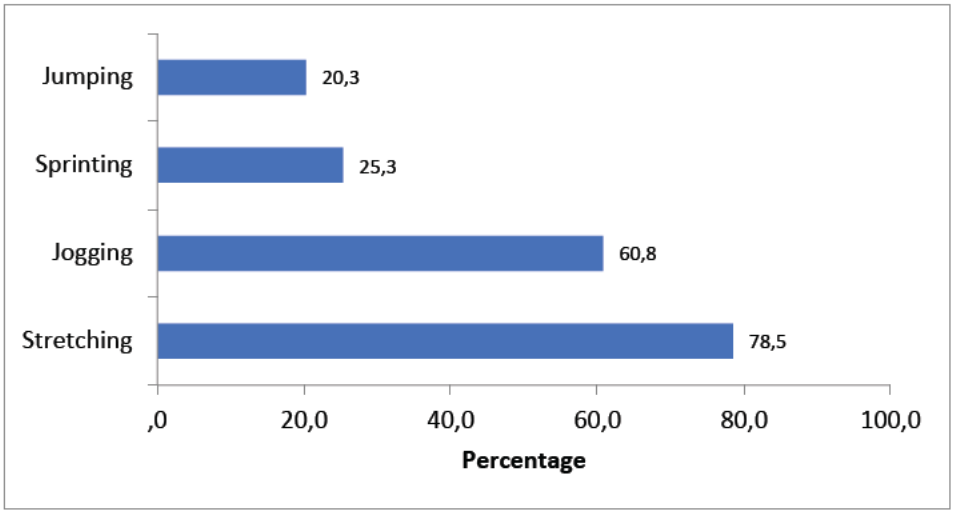


Figure 4.8: Percentage of respondent activities during warm-up routine

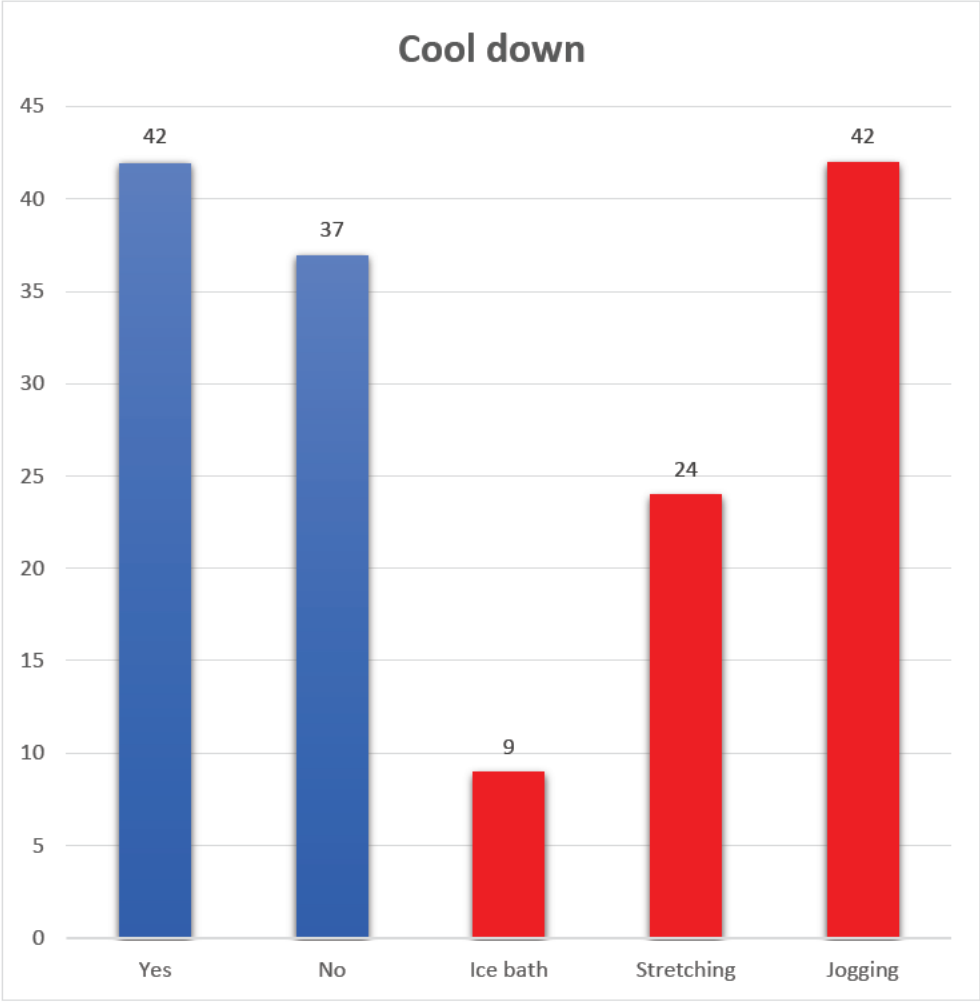


Figure 4.9: Cool down routine of respondents – participation and types of cool down activities

As shown in Figure 4.9 above, 42 out of 79 respondents indicated that they would cool down after a game. Of the 79 respondents that indicated that they would cool down

after the game, the majority (*n*=23; 42%) sited jogging as part of their cool down routine, *p*=.007.

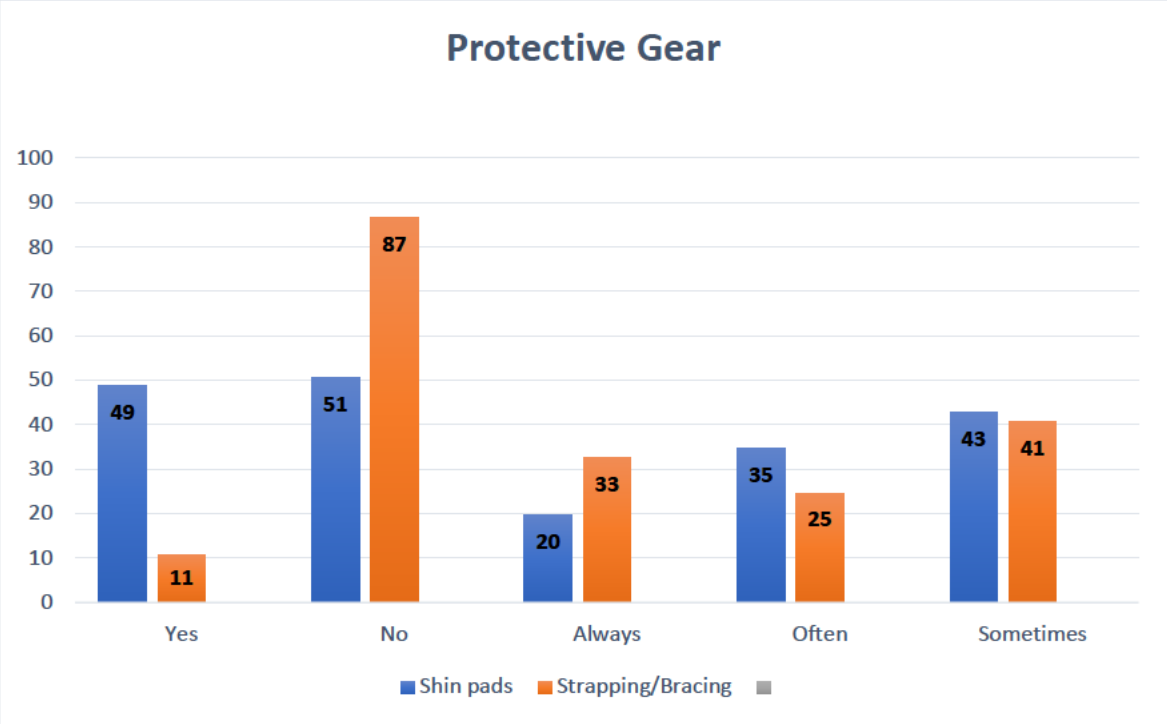


Figure 4.10: Percentage of protective gear worn by respondents in relation to the frequency of use

Figure 4.10 above highlights the responses with regard to the use of protective gear. There were significantly few participants that reported using strapping (*n*=12; 11.1%) and or shin pads (*n*=53; 49.1) when playing soccer. It must also be noted that of those respondents who use shin pads and strapping, only 20.8% and 33% respectively, always use protective gear.

4.4 Conclusion

In this chapter, the responses obtained from the questionnaires were presented and analysed using a variety of statistical tests. The next chapter will discuss these results and their implications.

CHAPTER 5 DISCUSSION

5.1 INTRODUCTION

Chapter 5 will discuss the results and the objectives of this research study.

5.2 DISCUSSION OF RESULTS

5.2.1 Response Rate

The 100% response rate recorded in this study was higher than previously reported studies (Archary,2008) and had a similar response rate of 100% to a study done on 14–36-year-old respondents by (Slimani *et al.,* 2018: 294). A possible reason for the high response rate is that the participants were allowed to take the questionnaire home to obtain parental consent and complete at their leisure.

5.2.2 The First Objective

To establish a demographic profile of the male scholars who play soccer on a synthetic surface in a private school in the eThekwini municipality.

5.2.2.1 The Demographic Profile

With regard to the demographic profiling, majority of the participants in this study were Indian (90.7%), followed by Coloured participants (4.6%), Black participants (1.9%) and White participants (1.9%). A study done within a 10km radius by Sewpersad (2020: 41) revealed that 63.2% of the population were Indian, and thus the higher saturation of the Indian population in this area accounts for the majority of respondents being Indian.

In terms of the age, the most frequent age group injured was 14 years of age (22.4%), followed by 13–15 years of age (20.4%) respectively. This finding is similar to the findings of Lee *et al.* (2020b:1) who reported that the majority of the injuries were seen in the participants aged between 13-15 years. This finding also corroborates the findings of Sinovas *et al.* (2020:463) who reported that younger soccer players (14–16years) tend to have a higher injury rate as opposed to older soccer players (16–18 years). Sinovas *et al.* (2020:463) further adds that this pattern of injury by age may be

due to younger soccer players having a lack in technique, muscle strength, endurance, and co-ordination. Furthermore, Milewski and Chambers (2017: 1561-1562) reported that those who sustained fractures or skin abrasions were significantly younger than those who sustained ligament injuries, p=.003 and .002, respectively.

The peak height and weight of the participants in this study was (1.7-1.8m) and (50-59kg) respectively. The mean rank height is 29.42m for those with a head injury and 55.98m for those without a head injury. Those who sustained muscular injuries or skin abrasions were significantly lighter in weight than those who sustained ligament injuries, p<.001 in both cases. These findings are congruent to a study on under 12 to under 19 youth academies of the Dutch Eredivisie done by Bult *et al.* (2018:1).

5.2.2.2 Number of Years Playing on a Synthetic Surface

The participants of this study had sufficient experience playing soccer on a synthetic surface as the results have revealed that most participants have been playing on a synthetic surface for 5 years or longer. This may be due to the global popularity of soccer. Most participants revealed that they play soccer on a synthetic surface at least once a week. This may be due to the participants' weekly physical education lesson, whereas the senior participants may be placing more emphasis on academics.

5.2.2.3 Playing Position

The results of this study revealed that defenders (33.3%) and midfielders (33.3%) are injured more than any other position. This is congruent to the findings in a study done by Balazs *et al.* (2015:4) stating that defenders will be the most injured position as defenders will often do all that it takes to prevent the opposing team from scoring. However, this finding contrasts with a study done by Rämme (2015:13) where it has been shown that with the introduction of astroturf, the speed and tactics of the game have evolved. The defensive line is tighter, which results in a shorter distance between the defensive line and midfield. This is to prevent the opposing team from playing passes through that area of the field.

5.2.2.4 Onset of Injury

The purpose of a warm-up routine is to prepare the body for the best possible condition by mentally preparing, improving physical condition, and reducing the risk of injury (Gaetano and Gaetano, 2017:83). The results in this study revealed that there were a significant number of injuries to defenders and strikers during their warm-up routine.

By warming up before a match the athlete aims to increase the temperature of the muscles. Consequently, if this process is not adequately achieved then the vascularisation effect will not be achieved resulting in the muscle temperature of the athlete remaining the same or lowering, in essence this will leave the athlete in a condition of no “warm-up” and may result in injury during warm-up (85).

5.2.3 The Second Objective

To establish if there are any associations between an injury profile and demographic profile of male scholars who play soccer on a synthetic surface.

5.2.3.1 Site of Injury

In this study, most of the injuries were reported in the lower extremities (knee and ankle joints) as opposed to the upper extremities. This finding agrees with a similar study done by Cezarino *et al.* (2020:300). The results of this study revealed that the knee joint (50%) was the most frequently injured site. This finding is congruent to studies conducted by Silvers-Graneilli *et al.* (2015:2628), who reported a higher risk of injury to the knee joint. This was followed by the ankle joint (33.3%).

The sites injured in this study in descending order were wrist (26.9%), foot (25.9%), thigh (14.8%), shoulder joint (6.5%), genital (6.5%), head (5.6%), back (4.6%), facial (3.7%), chest (2.8%) and abdomen (.9%). These findings are similar to a study done by Archary (2008:71) on indoor and outdoor adult soccer players.

5.2.3.2 Mechanism of Injury

In soccer the most common mechanism of injury is either contact or non-contact related injuries. In a study by Watson *et al.* (2019:2) it was revealed that in youth soccer players, most soccer related injuries were due to player-to-player contact. This finding was also reported by Archary (2008:5), who stated that tackling or being tackled is the most common mechanism of injury in soccer. The results in this study were similar in that it revealed that player-to-player contact (tackling) was the primary mechanism of injury (56.5%).

A recent study by Lucarno *et al.* (2021:1795) on professional female soccer players revealed that running, shooting, and jumping made up 39% of all non-contact injuries. However, the results of this study reported a 61.6% rate of non-contact injuries. This may be explained by the respective difference in the level of skill and gender.

Heading is a common sport specific manoeuvre that is seen in soccer. Direct contact between the players' heads as opposed to the ball is regarded as one of the most sinister injuries in football, as this may potentially result in a concussion (Hubertus *et al.* 2019:427). A study done by Durand *et al.* (2018:553) revealed that the incidence of a head injury in players aged between 7-17 years, has increased by 1600% between 1990 and 2004. In this study heading was not reported as a common mechanism of injury (3.7%).

5.2.3.3 Severity and Onset of Injury

The severity of injury is categorised as mild, moderate, or severe depending on the onset of injury. In this study, minor injuries are related to an onset of two weeks or longer, whereas moderate and severe injuries are related to an immediate to a week onset.

Cristiano *et al.* (2016:333) revealed that of the soccer related injuries incurred during the Brazilian soccer championship in 2016, the majority (71.2%) were characterised as mild to moderate. The findings in this study revealed a similar trend with a 79.6% reporting of soccer related injuries that were characterised as mild to moderate.

In this study 11.1% of soccer players suffered a severe injury with 75.9% noticing the injury immediately or after a few days. Milewski and Chambers (2017:1561-1562) reported that the severity of injury was directly proportional to age, i.e., the younger you are the more susceptible you are to serious injury. Furthermore, Moksnes and Grindem (2016:730-736) indicated that scholars were more prone to injuries than their adult counterparts as injuries affect their growth cartilage. The Hall *et al.* (2020:58) study on the Uruguayan, Spanish and Brazilian academies revealed that the severity of injuries in the under 14 and under 16-year age groups were significantly higher than the under 23-year age group, thus further highlighting the link of severity of injury to a younger age group.

5.2.3.4 Phase of Injury

This study reported a notable difference in the incidence of injury during the phase of play. Most of the participants were reportedly injured during the game (82.4%) as opposed to training (8.3%). This finding was consistent with a study done by Cezarino *et al.* (2020:299) on a Brazilian first division youth soccer team which revealed injury in relation to exposure time. The Cezarino *et al.* (2020:2899) study described that the

injury rates were 8.2 per 1000 match hours and 1.4 per 1000 training hours. This phenomenon may be explained by the rise in intensity and aggressiveness during the game as opposed to training, thus leading to increased injury during game time.

5.2.3.5 Type of Injury

In soccer players the knee joint is extremely vulnerable as it is involved in a significant number of injuries, particularly the anterior cruciate ligament and the menisci. Injury to the ligamentous structures within the knee joint are deemed to be critical as the likelihood of re-injury and chronic instability is alarming (Freiberg, 2021: 49). The menisci of the knee joint are generally injured when there is direct contact to the knee joint, whereas the ligamentous structures of the knee joint is injured when there is non-contact and the game requires a sudden stop or change in direction with the knee joint locked in extension (Lucarno *et al.,* 2021:1795).

In a biomechanical study done by Yurgil *et al.* (2021:191) it was revealed that there was a significant rise in frictional force on astroturf, hence increasing the risk of ligamentous injury within the knee joint. This finding was corroborated by Silvers-Graneilli *et al.* (2015:2628) who investigated the risk of injury on astroturf as opposed to natural grass and revealed that there was a greater risk of injury to the knee joint when playing soccer on astroturf. Silvers-Graneilli *et al.* (2628) also reported a reduced risk of muscular injury on astroturf as opposed to natural grass.

The ankle joint is often injured due to direct trauma from either the lateral or medial aspect, this is when the anterior talofibular ligament or the calcaneal ligament is injured (Jung, 2020:2213).

In scholars the musculoskeletal structures are still developing resulting in limitations, such as the epiphyseal growth plate fractures (Moksnes and Grindem, 2016:732). A study done by Zaki *et al.* (2020:6) on amateur soccer players under the age of 18years between 2000-2015, revealed that the youth had a higher likeliness of fracture to the femur, tibia, and fibula with an increase in incidence from 0.0062% to 0.02% during the 15-year period.

The findings of this study are congruent to the studies above revealing that majority of the participants suffered ligamentous injuries (26.9%) as opposed to muscular injuries (24.1%), skin abrasions (21.3%) and fractures (13%).

5.2.4 The Third Objective

To establish if there is an association between an injury profile and the use of protective equipment of male scholars who play soccer on a synthetic surface.

5.2.4.1 Type of Footwear

The use of incorrect footwear whilst playing soccer on a synthetic surface is regarded as a common risk factor for injury (Dragoo *et al.,* 2012: 2). Use of the incorrect type of footwear may lead to the individual not having adequate frictional force, which may in turn, result in the individual slipping. On the contrary, excess frictional force (due to incorrect footwear) may lead to an increase in torque when the individual changes direction and comes to a sudden stop, which in turn may lead to injury as astroturf does not tear or divot (Frias and Fong, 2021: 381).

The results of this study revealed that only 5% of the participants played soccer on astroturf with the correct footwear. Most of the participants played soccer on astroturf with incorrect footwear, such as sneakers or studded soccer boots (63%). The use of incorrect footwear may be attributed to cost effectiveness as the majority of the participants play soccer on astroturf as well as on natural grass, and may choose the studded boot.

Williams *et al.* (2013:33) conducted a study on recreational athletes that played soccer on artificial turf, with the purpose of discovering the difference in performance in mediolateral and vertical peak ground reaction forces, time to peak ground reaction forces and rate of force developed in a soccer boot, indoor boot, and sneakers. While the findings of the Williams *et al.* (2013:33) study revealed that there were no statistical differences between the variables ($p>0.05$), it was reported that the individuals that used indoor boots were able to produce a greater force in braking and propulsion within the mediolateral and vertical directions. The individuals that used indoor boots were also reportedly able to produce a quicker time to peak ground reaction force in both mediolateral and vertical directions. This was deemed to be because indoor boots have longer mid-forefoot studs and are lighter in weight in relation to soccer boots. A greater shoe-surface interaction is granted when the indoor boot is lighter and has longer mid-forefoot studs, hence obtaining a larger production of force in a shorter period.

5.2.4.2 Health Care

The findings of this study revealed that majority of the participants opted for self-care (48.1%) as their primary health care protocol. This treatment choice may be explained by the fact that majority of the injuries noted in this study were mild to moderate (79.6%). This finding contrasts with the findings of Archary (2008:60) on amateur indoor and outdoor soccer players, that revealed that the primary treatment protocol for injured indoor soccer players were general practitioners. In this study, treatment by a general practitioner (18.5%) was reported as a secondary treatment choice.

5.2.4.3 Treatment of Injuries

The findings in this study revealed that majority (41%) of the scholars chose to seek medical attention within one to two days of incurring the injury, with the majority (52.8%) of the participants revealing that there was no absenteeism from school. This may be explained by the fact that majority of the injuries noted in this study were minor and did not require serious medical intervention.

The findings of this study revealed that the knee and ankle joint were the two most injured areas. Anterior cruciate ligament injuries within the knee joint are extremely common (van Yperen *et al.,* 2018:1129). A twenty-year follow-up study done by van Yperen *et al.* (2018) comparing surgical and non-surgical treatment protocol for rupture of the anterior cruciate ligament in high level athletes, revealed that there was no difference between surgical and non-surgical treatment protocols in regard to the onset of osteoarthritis of the knee joint, functionality and meniscectomies. Similarly, a study done by Grindem *et al.* (2018) looking at individuals that opted for non-surgical intervention two years post anterior cruciate ligament injury, revealed that clinicians should be positive in non-surgical treatment protocols.

A study done by Lavoie-Gagne *et al.* (2022) on elite level European soccer players after a meniscal tear, revealed that of the individuals that underwent knee surgery, 40% of them were likelier to return to playing soccer at an elite level. There was a total of 42% of individuals that underwent knee surgery, post-surgery performances revealed that a defender's level of performance worsened whilst an attacker's level of performance improved This may be due to the positional difference noted between the individuals as defenders tend to pivot, cut and tackle more frequently.

5.2.4.4 Warm-Up Routine

A study done by Kessouri and Dachri (2021) on under 17 Algerian soccer players, revealed that a neuromuscular warm-up (FIFA 11+) would result in an increase in explosive strength and change in direction, hence reducing the rate of injuries. This is particularly crucial for individuals that play soccer on astroturf as the anterior cruciate ligament is a frequent site of injury. This may reduce the rate of anterior cruciate ligament injuries. The FIFA 11+ warm-up was utilised in a study done in Rwanda by (Nuhu *et al.,* 2021) which also revealed that there was a significant decrease in the frequency and severity of injuries.

The findings of this study revealed that the majority (73.1%) of the participants elected to warm-up before playing soccer. This may explain why the majority (46%) of the injuries were reported as mild.

5.2.4.5 Protective Gear

As per the FIFA regulations, shin pads are the only form of protective gear required for professional soccer players (Watson *et al.,* 2019:8). The primary purpose of wearing shin pads when playing soccer, is to protect the individual from abrasions and fractures, as the impact is significantly dissipated along the tibia, thus reducing the likelihood of a fracture (Watson *et al.,* 2019:8). The Sentsomedi and Puckree (2016:64) study on female high school soccer players, also revealed that the use of protective equipment reduced the rate of injury. In this study there was a larger number (51%) of participants that reported not using protective equipment; this may explain why many of the participants in this study experienced knee and ankle injuries.

CHAPTER 6

CONCLUSION AND RECCOMENDATIONS

6.1 CONCLUSION

The findings of this study revealed that the lower limb was the most affected area of the body, with the knee joint and the ankle joint being the most injured sites in scholars that play soccer on a synthetic surface.

Injury to the ligamentous structures were the most common type of injury in scholars with the most popular mechanism of injury being tackling or being tackled.

The findings of this study revealed that the majority of scholars that play soccer on a synthetic surface used the incorrect type of footwear, elected to play without the use of protective equipment and in the result of an injury, opted for selfcare as their primary health care protocol.

6.2 RECOMMENDATIONS

- It is suggested that future studies focus on multiple schools in the eThekwini municipality.
- It is suggested that future studies target schools that are more racially diverse.
- A clear definition of the term synthetic surface needs to be understood to ensure that the term is not opened to interpretation to the participant.
- Scholars within the eThekwini municipality need to be made aware of the benefits of medical intervention when facing injury.

6.3 LIMITATIONS

- The limitation of this study was that the participants involved played other sports on a synthetic surface as well.
- Additionally, during a game of soccer on a synthetic surface there are no traditional positions, resulting in a player having to play in various positions.

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APPENDICES

Appendix A: Gatekeepers permission to conduct research at Al-Falaah College

16th August 2021

Dear Asthiq

Gatekeepers permission is hereby granted for you to conduct your research at Al Falaah college, towards your postgraduate studies, provided ethical clearance has been obtained.

We note that the title of your research project is: An injury profile of high school soccer players on a synthetic surface at a private school in the eThekwini municipality.

Data collection must be treated with due confidentiality and anonymity. Kindly note that Covid-19 protocols need to be adhered to at all times.

We would like to wish you well in your research journey.

Regards

You protect me, I protect you and May ALLAH protect all.

Covid Task Team.

Appendix B: Letter of permission to parent/guardian

Dear: Sir/Madam,

I am currently a registered MTech: Chiropractic student at the Durban University of Technology. One of the requirements for fulfillment of this qualification is to conduct a research study. I would like to therefore request your permission to conduct the following study, entitled: “An injury profile of high school soccer players on a synthetic surface at a private school in the eThekwini municipality.”

The details of my intended study are briefly outlined below:

- The aim of this study is to determine the injury profile of amateur scholar soccer players playing on a synthetic surface at a private school in the eThekwini municipality.
- To establish a demographic profile of the male scholars who play soccer on a synthetic surface in a private school in the eThekwini municipality.
- To establish if there are any associations between an injury profile and demographic profile of male scholars who play soccer on a synthetic surface in a private school in the eThekwini municipality.
- To establish if there is an association between an injury profile and the use of protective equipment of male scholars who play soccer on a synthetic surface in a private school in the eThekwini municipality. This study will be of benefit to medical professionals, including Chiropractors, may have a limited knowledge of the types of injury patterns that may be seen in scholars. Therefore, this research will be beneficial to the medical profession in recognising mechanisms of injury and treatment strategy in order to reduce the rate of injury seen in scholars.

The study will attempt to determine an injury profile of high school soccer players on a synthetic surface at a private school in the eThekwini municipality. Permission is therefore requested, in order to conduct this study among learners at Al-Falaah College. The participation of your minor in this study will be voluntary and participants

will only be required to complete a questionnaire. The information obtained from the questionnaire will remain confidential and all information used in the dissertation will be anonymised. The outcome of the research will be available in the form of a dissertation housed with the Durban University of Technology Library.

Please contact me or my supervisor should you have any queries.

Researcher: Asthiq Timul (082 853 7732) (Timulasthiq@gmail.com)

Supervisor: Dr Fazila Ally (082 703 0006) (fazilaa@dut.ac.za)

Appendix C: Letter of information

LETTER OF INFORMATION

Dear Learner

Welcome to my Research Study

Title of the Research Study: An injury profile of high school soccer players on a synthetic surface at a private school in the eThekwini municipality

Principal Investigator/s/researcher: Asthiq Timul, B:Tech Chiropractic

Co-Investigator/s/supervisor/s: Dr F Ally

Brief Introduction and Purpose of the Study:

Hello, my name is Asthiq Timul. I am a Chiropractic intern at the Durban University of Technology doing research for my Masters degree in Chiropractic. I would like to invite you to participate in my research study.

Over the past few years playing soccer on a synthetic surface has grown in South Africa. There are many learners who enjoy this form of soccer and unfortunately may get injured at a young age when they are first introduced to sport in school. When injuries occur at a young age, it may lead to poor performance in sports and a possibility of carrying the injury throughout life. To date, there is not enough information about

injuries to youth soccer players that play on a synthetic surface. This research study therefore is being carried out to understand the injuries that scholars have due to playing soccer on synthetic surfaces. It is hope that this important information will help the medical professionals to treat and hopefully prevent injuries in the future.

Outline of the Procedures:

- During your physical education lesson the researcher will send out the letter of permission, letter of information and consent for you to read and sign as your agreement to participate in my research study.
- Once the necessary documents are signed, the researcher will then hand out a questionnaire to the participants that meet the inclusion and exclusion criteria.
- Please answer the questionnaire honestly and to the best of your ability.
- All the information gathered will be strictly confidential.
- The entire process of the research during data collection including the evaluation questionnaire assessment should not take more than 30 minutes.

Your help and time with this project are invaluable and greatly appreciated.

Risks or Discomforts to the Participant: There will be no risks or discomfort to you during this research study.

Explain to the participant the reasons he/she may be withdraw from the Study: Should you feel uncomfortable, you are free to withdraw from this research study at any time without consequence.

Benefits: The results from this study will be made available publicly on the Durban University of Technology library. Should you require the results, the researcher may be contacted and the results obtained.

Remuneration: There is no payment associated with this research.

Costs of the Study: Participation in this study is free and requires your time only.

Confidentiality: All of the information provided will remain confidential throughout the study.

Results: Results will be made available on the Durban University of Technology library or by contacting the researcher.

Research-related Injury: There will be no research related injury.

Storage of all electronic and hard copies including tape recordings: The data will be kept for a period of 5 years in a secure cupboard at the Chiropractic department in the Durban University of Technology and the data will thereafter be destroyed.

Persons to contact in the Event of Any Problems or Queries

- Researcher: Asthiq Timul (B.Tech Chiropractic) - 0828537732,
- Supervisor: Dr Fazila Ally (PhD: Anatomy) - 082 703 0006 / fazilaa@dut.ac.za
- Institutional Research Ethics Administrator - 031 373 2375.

Complaints can be reported to the Director: Research and Postgraduate Support Dr L Linganiso on 031 373 2577 or researchdirector@dut.ac.za.

General:

A copy of the information letter should be issued to participants. The information letter and consent form must be translated and provided in the primary spoken language of the research population e.g. isiZulu.

Appendix D: Questionnaire

Part A: Identification

This questionnaire is being conducted to determine an injury profile of high school soccer players on a synthetic surface at a private school in the eThekwini municipality.

Your participation is voluntary, therefore you may withdraw your participation from this study at any point during the process without any consequence. All of the data that is conducted will be confidential. All of the data collected will be used for only for the purpose of this study and reporting thereof.

By participating in this questionnaire, I confirm that I have read and understood the letter of information and informed consent.

1. What is your current age (In years)? *
   - 13
   - 14
   - 15
   - 16
   - 17
   - 18
2. What is your ethnicity? *
   - Black
   - White
   - Indian
   - Coloured
   - Other:
3. What is your height in meters? *
   - < 1.5
   - 1.5m – 1.6
   - 1.6m – 1.7
   - 1.7m – 1.8
   - > 1.8
4. What is your weight in kilograms? *
   - < 50
   - 50kg – 59
   - 60kg -69
   - 70kg – 79
   - 80kg- 89
   - 90kg – 100
   - > 100

5. Number of years as a player on synthetic surface? *

- < 1
- 1 – 2
- 3 – 5
- > 5

6. How many games per week do you participate on a synthetic surface? *

- 1
- 2
- 3
- 4
- 5 or more

7. What is your playing position? *

- Goal keeper
- Defender
- Midfielder
- Striker

8. Do you participate in any other sports? *

- Yes
- No

If yes, please specify. *

- Cricket
- Rugby
- Volleyball
- Athletics
- Hockey
- Other:

Part B: Mechanism of injury

9. To which areas of your body did you sustain an injury, while playing soccer on a synthetic surface (One or more answers are possible):

- Elbow
- Head
- Wrist
- Neck
- Knee
- Genital
- Chest
- Facial
- Back
- Shoulder
- Foot
- Ankle

- Abdomen
- Thigh
- None

10. Has this area been injured before?

- Yes
- No

11. Please indicate the type of injury sustained

- Dislocation
- Concussion
- Fracture
- Muscular Injury
- Skin abrasion
- Ligament Injury
- Skin abrasion

12. How would you describe the injury?

- Mild
- Moderate
- Severe

13. What was the onset of the injury?

- Immediate
- Days – 1 week
- 2 weeks
- > 2 weeks

14. The injury occurred during

- Warming up
- Stretching
- Game

15. What was the mechanism of injury?

- Jogging
- Sprinting
- Shooting
- Tackling
- Heading
- Jumping

16. Was there any medical professional present at the time of injury?

- Yes
- No

17. what treatment did you receive following your injury?

- GP
- Chiropractic
- Physiotherapy

- Sports Massage
- Self-Care
- Biokineticist
- Orthopaedic Surgeon

18. If so, how long after your injury did you seek treatment?

- Immediately
- 1-2 Days
- 3-5 Days
- > a week

19. How many days of school did you miss due to your injury?

- None
- 1-2 Days
- 3-5 Days
- > a week

PART C. PROTECTIVE EQUIPMENT

20. Do you use Shin pads when playing soccer?

- Yes
- No

21. If yes, how often do you use Shin pads?

- Always
- Often
- Sometimes

22. Do you use any strapping or brace when you are playing soccer?

- Yes
- No

23. If yes, how often do you use strapping or brace?

- Always
- Often
- Sometimes

24. What type of footwear do you use during a game of soccer?

- Sneakers
- Indoor boots
- Studded Soccer boots
- Barefoot

25. Do you warm up before a game of soccer?

- Yes
- No

26. If yes, how long do you warm up for?

- 1-2 minutes
- 5 minutes
- > 10 minutes

27. What does your warm up routine entail?

- Stretching
- Jogging
- Sprinting
- Jumping

28. Do you have a cool down routine after a game of soccer?

- Yes
- No

29. If yes, what does your cool down routine entail?

- Stretching
- Ice bath
- Jogging
- Other…

If any of the participants wish to get the results of this research, please bring this to the researcher's attention and it will be made available to you.

Appendix E: Permission to adapt questionnaire

Dear Dr Archary

I am a Masters student at the Durban University of Technology completing a dissertation in Chiropractic. I am writing to request permission to use and adapt the questionnaire carried out in your study on "A profile of soccer injuries in selected league amateur indoor and outdoor soccer players in the greater Durban area".

The provisional title of my dissertation is "An injury profile of soccer players playing on a synthetic surface in scholars in the eThekwini municipality". In my research I plan to determine a injury profile prevalent in scholars that play soccer on a synthetic surface. My objectives are to determine the effectiveness of protective equipment, warm up routines and shoe surface interface affecting injury rates.

I would like to use and adapt your questionnaire under the following conditions:

Ø I will use the questionnaire only for my research study and will not sell or use it for any other purposes.

Ø I will include a statement of attribution and copyright on all copies of the questionnaire. If you have a specific statement of attribution that you would like for me to include, please provide it in your response.

Ø At your request, I will send a copy of my completed research study to you upon completion of the study and/or provide a hyperlink to the final manuscript.

If you do not control the copyright for these materials, I would appreciate any information you can provide concerning the proper person or organization I should contact.

If these are acceptable terms and conditions, please indicate so by replying to me through e-mail at timulasthiq@gmail.com.

Thanks in advance.

Sincerely,

Asthiq Timul

N

Nigel Archary <dr.nigelarchary@gmail.com> Thu, 14 May 2020, 11:09

to me

Yes that's fine, go for it.

Sent from my iPhone

On 14 May 2020, at 09:46, Asthiq Timul <timulasthiq@gmail.com> wrote:

A

Asthiq Timul <timulasthiq@gmail.com> Thu, 14 May 2020, 13:50

to Nigel

Thank you very much.

Appendix F: Assent form for minors

For purposes of this SOP, the following definitions apply:
'Adolescent' means a child between the ages of 12 and 17 years of age.
'Minor' means a person (child) less than 18 years (s17, Children's Act 38 of 2005)
'Assent' means a minor's affirmative agreement to participate in research. Mere failure to object should not be interpreted as assent.

The participation of both minors and adolescents requires:

- Permission in writing from parents or legal guardian for the minor to be approached and invited to participate (in accordance with s 10 of the Children's Act 38 of 2005);
- Assent from the minor in writing (i.e. agreement to participate) if he or she chooses to participate.

Parental permission and minor's decision must be consistent, i.e. if the minor decides not to participate; the parent may not override this decision.

During the assent process:

- The research team explains the trial to the child in language the child can understand, including what it means to take part and what the child can expect.
- The research team may use written forms, videos, graphics, and other visual aids to help explain the trial.
- free of scientific jargon and unexplained acronyms
- The child is encouraged to ask questions.

ASSENT FORM: FOR MINORS

This template to assist you with designing a written informed assent form for minors (persons under the age of 18 years old). **Please write in SIMPLE, NON-TECHNICAL, CHILD-FRIENDLY language**. Note that this assent form template is appropriate for use for child participants aged between 8-13 years old. For adolescents (aged between 14-17

ASSENT FORM FOR MINORS

TITLE OF THE RESEARCH PROJECT: An injury profile of high school soccer players on a synthetic surface at a private school in the eThekwini municipality

RESEARCHERS' NAME(S): Asthiq Timul

RESEARCHERS' CONTACT NUMBER: 082 853 7732

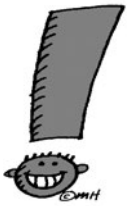
What is a research study?

Research studies help us learn new things. We can test new ideas. First, we ask a question. Then we try to find the answer.

This paper talks about our research and the choice that you have to take part in it. We want you to ask us any questions that you have. You can ask questions any time.

Important things to know…

- You get to decide if you want to take part.
- You can say 'No' or you can say 'Yes'.
- No one will be upset if you say 'No'.
- If you say 'Yes', you can always say 'No' later.
- You can say 'No' at any time.



We would still take good care of you no matter what you decide.

Why are we doing this research?

We are doing this research to find out more about _____

We are doing this research to find out more about how and why learners get injured when they are playing soccer on astroturf.

Why have I been invited to take part in this research project?

You have been invited to take part in this research so that we can help understand the problem and hopefully help to prevent learners that play soccer on astroturf from getting injured in the future.

Who is doing the research?

My name is Asthiq Timul, I am a Chiropractic intern at the Durban University of Technology doing this project for my Masters degree in Chiropractic.

What will happen to me in this study?

If you decide to be in the research, we would ask you to do the following:

- Read and then sign the letter of information and consent.
- You will received an online questionnaire.
- Please read and answer all of the questions honestly.
- Once you are done, you will send the online questionnaire to the head of sport at Al-Falaah College.
- Thank you for your help and time by being a part of this project.

Can anything bad happen to me?

There is nothing bad that can happen to you at any stage in this project.

Can anything good happen to me?

You will be helping by preventing others from getting injured whilst playing soccer on astroturf and the results of this project will be made available to you so that you can find out what you can do to prevent injury.

What else should I know about this research?

If you do not want to be in the study, you do not have to be.

It is also OK to say yes and change your mind later. You can stop at any time. If you want to stop, please tell the researcher.

You can say 'no' to what we ask you to do for the research at any time and we will stop.

Will anyone know I am in the study?

All of your personal information will not be shared with anyone that is not involved in this project**.**

Who can I talk to about the study?

If you have any questions, you can contact:

Researcher- Asthiq Timul (082 853 7732)

Supervisor- Dr Fazila Ally (082 703 0006)

What if I do not want to do this?

If you are feeling uncomfortable answering this online questionnaire, you can stop at any time.

Do you have any other questions?

If you want to be in the research after we talk, please write your name below. We will write our name too. This shows we talked about the research and that you want to take part.

Do you understand this research study and are you willing to take part in it?

YES	NO

Has the researcher answered all your questions?

YES	NO

Do you understand that you can STOP being in the study at any time?

YES	NO

Name of Participant _____

(To be written by child/adolescent)

Printed Name of Researcher

_____

Signature of Researcher _____

_____ _____

Date ***Time***

References:
1. www.sun.ac.za
2. http://fhs.mcmaster.ca/healthresearch/documents/assent.pdf

Appendix G: (IREC approval)

Institutional Research Ethics Committee
Research and Postgraduate Support Directorate
2nd Floor, Berwyn Court
Gate 1, Steve Biko Campus
Durban University of Technology

P O Box 1334, Durban, South Africa, 4001

Tel: 031 373 2375
Email: lavishad@dut.ac.za
http://www.dut.ac.za/research/institutional_research_ethics

www.dut.ac.za

27 July 2022

Mr A Timul
76 Greenwood Close
Parkgate
Verulam

Dear Mr Timul

An injury profile of high school soccer players on a synthetic surface at a private school in the eThekwini municipality
Ethics Clearance Number: IREC 286/21

The Institutional Research Ethics Committee acknowledges receipt of your notification regarding the piloting of your data collection tool.

Kindly ensure that participants used for the pilot study are not part of the main study.

In addition, the IREC acknowledges receipt of your gatekeeper permission letter.

Please note that FULL APPROVAL is granted to your research proposal. You may proceed with data collection.

Any adverse events [serious or minor] which occur in connection with this study and/or which may alter its ethical consideration must be reported to the IREC according to the IREC SOP's.

Please note that any deviations from the approved proposal require the approval of the IREC as outlined in the IREC SOP's.

Yours Sincerely

Professor J K Adam
Chairperson: DUT-IREC

Appendix H: Letter of permission to parent/guardian (pilot study)

Dear: Sir/Madam,

I am currently a registered MTech: Chiropractic student at the Durban University of Technology. One of the requirements for fulfillment of this qualification is to conduct a research study. I would like to therefore request your permission to conduct the following study, entitled: “An injury profile of high school soccer players on a synthetic surface at a private school in the eThekwini municipality.”

The details of my intended study are briefly outlined below:

• The aim of this study is to determine the injury profile of amateur scholar soccer players playing on a synthetic surface at a private school in the eThekwini municipality.

- To establish a demographic profile of the male scholars who play soccer on a synthetic surface in a private school in the eThekwini municipality.
- To establish if there are any associations between an injury profile and demographic profile of male scholars who play soccer on a synthetic surface in a private school in the eThekwini municipality.
- To establish if there is an association between an injury profile and the use of protective equipment of male scholars who play soccer on a synthetic surface in a private school in the eThekwini municipality. This study will be of benefit to medical professionals, including Chiropractors, may have a limited knowledge of the types of injury patterns that may be seen in scholars. Therefore, this research will be beneficial to the medical profession in recognising mechanisms of injury and treatment strategy in order to reduce the rate of injury seen in scholars.

The study will attempt to determine an injury profile of high school soccer players on a synthetic surface at a private school in the eThekwini municipality. Permission is therefore requested, in order to conduct this study among learners at Al-Falaah College. The participation of your minor in this study will be voluntary and participants will only be required to complete a questionnaire. The information obtained from the questionnaire will remain confidential and all information used in the dissertation will be anonymised. The outcome of the research will be available in the form of a dissertation housed with the Durban University of Technology Library.

Please contact me or my supervisor should you have any queries.

Researcher: Asthiq Timul (082 853 7732) (Timulasthiq@gmail.com)

Supervisor: Dr Fazila Ally (082 703 0006) (fazilaa@dut.ac.za)

Appendix I: Letter of information (pilot study)

LETTER OF INFORMATION (Pilot study)

Dear Learner

Welcome to my Research Study

Title of the Research Study: An injury profile of high school soccer players on a synthetic surface at a private school in the eThekwini municipality

Principal Investigator/s/researcher: Asthiq Timul, B:Tech Chiropractic

Co-Investigator/s/supervisor/s: Dr F Ally

Brief Introduction and Purpose of the Study:

Hello, my name is Asthiq Timul. I am a Chiropractic intern at the Durban University of Technology doing research for my Masters degree in Chiropractic. I would like to invite you to participate in my research study.

Over the past few years playing soccer on a synthetic surface has grown in South Africa. There are many learners who enjoy this form of soccer and unfortunately may get injured at a young age when they are first introduced to sport in school. When injuries occur at a young age, it may lead to poor performance in sports and a possibility of carrying the injury throughout life. To date, there is not enough information about injuries to youth soccer players that play on a synthetic surface. This research study therefore is being carried out to understand the injuries that scholars have due to playing soccer on synthetic surfaces. It is hope that this important information will help the medical professionals to treat and hopefully prevent injuries in the future.

Outline of the Procedures:

- During your physical education lesson the researcher will send out the letter of permission, letter of information and consent for you to read and sign as your agreement to participate in my research study.
- Once the necessary documents are signed, the researcher will then hand out a questionnaire to the participants that meet the inclusion and exclusion criteria.
- Please answer the questionnaire honestly and to the best of your ability.
- All the information gathered will be strictly confidential.

- The entire process of the research during data collection including the evaluation questionnaire assessment should not take more than 30 minutes.

Your help and time with this project are invaluable and greatly appreciated.

Risks or Discomforts to the Participant: There will be no risks or discomfort to you during this research study.

Explain to the participant the reasons he/she may be withdraw from the Study: Should you feel uncomfortable, you are free to withdraw from this research study at any time without consequence.

Benefits: The results from this study will be made available publicly on the Durban University of Technology library. Should you require the results, the researcher may be contacted and the results obtained.

Remuneration: There is no payment associated with this research.

Costs of the Study: Participation in this study is free and requires your time only.

Confidentiality: All of the information provided will remain confidential throughout the study.

Results: Results will be made available on the Durban University of Technology library or by contacting the researcher.

Research-related Injury: There will be no research related injury.

Storage of all electronic and hard copies including tape recordings: The data will be kept for a period of 5 years in a secure cupboard at the Chiropractic department in the Durban University of Technology and the data will thereafter be destroyed.

Persons to contact in the Event of Any Problems or Queries

- Researcher: Asthiq Timul (B.Tech Chiropractic) - 0828537732,
- Supervisor: Dr Fazila Ally (PhD: Anatomy) - 082 703 0006 / fazilaa@dut.ac.za
- Institutional Research Ethics Administrator - 031 373 2375.

Complaints can be reported to the Director: Research and Postgraduate Support Dr L Linganiso on 031 373 2577 or researchdirector@dut.ac.za.

General:

A copy of the information letter should be issued to participants. The information letter and consent form must be translated and provided in the primary spoken language of the research population e.g. isiZulu.

Appendix J: Pilot study

Questionnaire

Part A: Identification

This questionnaire is being conducted to determine an injury profile of high school soccer players on a synthetic surface at a private school in the eThekwini municipality.
Your participation is voluntary, therefore you may withdraw your participation from this study at any point during the process without any consequence. All of the data that is conducted will be confidential. All of the data collected will be used for only for the purpose of this study and reporting thereof.
By participating in this questionnaire, I confirm that I have read and understood the letter of information and informed consent.

1. What is your current age (In years)? *
   - 13
   - 14
   - 15
   - 16
   - 17
   - 18
2. What is your ethnicity? *
   - Black
   - White
   - Indian
   - Coloured
   - Other:
3. What is your height in meters? *
   - < 1.5
   - 1.5m – 1.6
   - 1.6m – 1.7
   - 1.7m – 1.8
   - > 1.8
4. What is your weight in kilograms? *
   - < 50
   - 50kg – 59
   - 60kg -69
   - 70kg – 79
   - 80kg- 89
   - 90kg – 100
   - > 100
5. Number of years as a player on synthetic surface? *
   - < 1
   - 1 – 2
   - 3 – 5
   - > 5
6. How many games per week do you participate on a synthetic surface? *
   - 1
   - 2
   - 3
   - 4
   - 5 or more

7. What is your playing position? *
   - Goal keeper
   - Defender
   - Midfielder
   - Striker
8. Do you participate in any other sports? *
   - Yes
   - No

If yes, please specify. *

   - Cricket
   - Rugby
   - Volleyball
   - Athletics
   - Hockey
   - Other:

Part B: Mechanism of Injury

9. To which areas of your body did you sustain an injury, while playing soccer on a synthetic surface (One or more answers are possible):
   - Elbow
   - Head
   - Wrist
   - Neck
   - Knee
   - Genital
   - Chest
   - Facial
   - Back
   - Shoulder
   - Foot
   - Ankle
   - Abdomen
   - Thigh
   - None
10. Has this area been injured before?
   - Yes
   - No
11. Please indicate the type of injury sustained
   - Dislocation
   - Concussion
   - Fracture
   - Muscular Injury
   - Skin abrasion
   - Ligament Injury
   - Skin abrasion
12. How would you describe the injury?
   - Mild
   - Moderate
   - Severe
13. What was the onset of the injury?
   - Immediate
   - Days – 1 week
   - 2 weeks
   - > 2 weeks

14. The injury occurred during
    - Warming up
    - Stretching
    - Game
15. What was the mechanism of injury?
    - Jogging
    - Sprinting
    - Shooting
    - Tackling
    - Heading
    - Jumping
16. Was there any medical professional present at the time of injury?
    - Yes
    - No
17. what treatment did you receive following your injury?
    - GP
    - Chiropractic
    - Physiotherapy
    - Sports Massage
    - Self-Care
    - Biokineticist
    - Orthopaedic Surgeon
18. If so, how long after your injury did you seek treatment?
    - Immediately
    - 1-2 Days
    - 3-5 Days
    - > a week
19. How many days of school did you miss due to your injury?
    - None
    - 1-2 Days
    - 3-5 Days
    - > a week

PART C. PROTECTIVE EQUIPMENT

20. Do you use Shin pads when playing soccer?
    - Yes
    - No
21. If yes, how often do you use Shin pads?
    - Always
    - Often
    - Sometimes
22. Do you use any strapping or brace when you are playing soccer?
    - Yes
    - No
23. If yes, how often do you use strapping or brace?
    - Always
    - Often
    - Sometimes
24. What type of footwear do you use during a game of soccer?
    - Sneakers
    - Indoor boots
    - Studded Soccer boots
    - Barefoot
25. Do you warm up before a game of soccer?
    - Yes
    - No

26. If yes, how long do you warm up for?
    - 1-2 minutes
    - 5 minutes
    - > 10 minutes
27. What does your warm up routine entail?
    - Stretching
    - Jogging
    - Sprinting
    - Jumping
28. Do you have a cool down routine after a game of soccer?
    - Yes
    - No
29. If yes, what does your cool down routine entail?
    - Stretching
    - Ice bath
    - Jogging
    - Other…

If any of the participants wish to get the results of this research, please bring this to the researcher's attention and it will be made available to you.

Appendix K: Pilot study

Assent form for minors

For purposes of this SOP, the following definitions apply:
'Adolescent' means a child between the ages of 12 and 17 years of age.
'Minor' means a person (child) less than 18 years (s17, Children's Act 38 of 2005)
'Assent' means a minor's affirmative agreement to participate in research. Mere failure to object should not be interpreted as assent.

The participation of both minors and adolescents requires:

- Permission in writing from parents or legal guardian for the minor to be approached and invited to participate (in accordance with s 10 of the Children's Act 38 of 2005);
- Assent from the minor in writing (i.e. agreement to participate) if he or she chooses to participate.

Parental permission and minor's decision must be consistent, i.e. if the minor decides not to participate; the parent may not override this decision.

During the assent process:

- The research team explains the trial to the child in language the child can understand, including what it means to take part and what the child can expect.
- The research team may use written forms, videos, graphics, and other visual aids to help explain the trial.
- free of scientific jargon and unexplained acronyms
- The child is encouraged to ask questions.

ASSENT FORM: FOR MINORS

This template to assist you with designing a written informed assent form for minors (persons under the age of 18 years old). **Please write in SIMPLE, NON-TECHNICAL, CHILD-FRIENDLY language**. Note that this assent form template is appropriate for use for child participants aged between 8-13 years old. For adolescents (aged between 14-17

ASSENT FORM FOR MINORS

TITLE OF THE RESEARCH PROJECT: An injury profile of high school soccer players on a synthetic surface at a private school in the eThekwini municipality

RESEARCHERS' NAME(S): Asthiq Timul

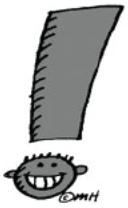
RESEARCHERS' CONTACT NUMBER: 082 853 7732

What is a research study?

Research studies help us learn new things. We can test new ideas. First, we ask a question. Then we try to find the answer.

This paper talks about our research and the choice that you have to take part in it. We want you to ask us any questions that you have. You can ask questions any time.

Important things to know…



- You get to decide if you want to take part.
- You can say 'No' or you can say 'Yes'.
- No one will be upset if you say 'No'.
- If you say 'Yes', you can always say 'No' later.
- You can say 'No' at any time.
- We would still take good care of you no matter what you decide.

Why are we doing this research?

We are doing this research to find out more about _____

We are doing this research to find out more about how and why learners get injured when they are playing soccer on astroturf.

Why have I been invited to take part in this research project?

You have been invited to take part in this research so that we can help understand the problem and hopefully help to prevent learners that play soccer on astroturf from getting injured in the future.

Who is doing the research?

My name is Asthiq Timul, I am a Chiropractic intern at the Durban University of Technology doing this project for my Masters degree in Chiropractic.

What will happen to me in this study?

If you decide to be in the research, we would ask you to do the following:

- Read and then sign the letter of information and consent.
- You will received an online questionnaire.
- Please read and answer all of the questions honestly.
- Once you are done, you will send the online questionnaire to the head of sport at Al-Falaah College.
- Thank you for your help and time by being a part of this project.

Can anything bad happen to me?

There is nothing bad that can happen to you at any stage in this project.

Can anything good happen to me?

You will be helping by preventing others from getting injured whilst playing soccer on astroturf and the results of this project will be made available to you so that you can find out what you can do to prevent injury.

What else should I know about this research?

If you do not want to be in the study, you do not have to be.

It is also OK to say yes and change your mind later. You can stop at any time. If you want to stop, please tell the researcher.

You can say ‘no’ to what we ask you to do for the research at any time and we will stop.

Will anyone know I am in the study?

All of your personal information will not be shared with anyone that is not involved in this project**.**

Who can I talk to about the study?

If you have any questions, you can contact:

Researcher- Asthiq Timul (082 853 7732)

Supervisor- Dr Fazila Ally (082 703 0006)

What if I do not want to do this?

If you are feeling uncomfortable answering this online questionnaire, you can stop at any time.

Do you have any other questions?

If you want to be in the research after we talk, please write your name below. We will write our name too. This shows we talked about the research and that you want to take part.

Do you understand this research study and are you willing to take part in it?

YES	NO

Has the researcher answered all your questions?

YES	NO

Do you understand that you can STOP being in the study at any time?

YES	NO

Name of Participant _____

(To be written by child/adolescent)

Printed Name of Researcher

_____

Signature of Researcher _____

_____ _____

Date ***Time***

References:

1. www.sun.ac.za
2. http://fhs.mcmaster.ca/healthresearch/documents/assent.pdf