

**PREVALENCE AND RISK FACTORS OF KNEE INJURIES  
AMONG UNIVERSITY OF BENIN ATHLETES**

**BY**

**ISAH ETSENOSHIOLUAME JASMINE**

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# **CERTIFICATION**

This dissertation by Jasmine Etsenoshioluame Isah is accepted in its presented form as satisfying the dissertation requirement of the degree of Bachelor of Physiotherapy of the School of Basic Medical Sciences, College of Medical Sciences of the University of Benin.

**MR EGUAGIE OKHUAHESUYI**

.....

**SUPERVISOR**

.....

**SIGNATURE AND DATE**

**EXTERNAL EXAMINER**

.....

**SIGNATURE AND DATE**

**APPROVED**

.....

**DR. (MRS.) C .O. OBASEKI**

**HEAD**

**DEPARTMENT OF PHYSIOTHERAPY**

**COLLEGE OF MEDICAL SCIENCES**

**UNIVERSITY OF BENIN, BENIN CITY**

## **DEDICATION**

This work is dedicated to God the Heavenly Father, whose goodness, mercy, favour, divine guidance and strength have guided me throughout this period of work and this journey.

Without him, this achievement would not have been possible. To my wonderful parents, Mr. J.O. Isah and Mrs. E.H. Isah as well as my lovely siblings, for the constant support, encouragement, love and prayers and financial help in my academic journey.

# ABSTRACT

## **Background:**

Knee injuries are among the most prevalent musculoskeletal problems affecting student-athletes, often resulting in pain, impaired performance, and limited participation. Despite the growing engagement of university students in organized sports, limited research has addressed the prevalence and contributing factors of knee injuries within Nigerian university settings.

## **Aim:**

This study aimed to determine the prevalence, types, risk factors, and socio-demographic correlates of knee-related injuries among student-athletes at the University of Benin.

## **Methods:**

A descriptive cross-sectional research design was employed. A total of 207 student-athletes from various faculties of the University of Benin participated in the study. Data were collected using a structured, self-administered questionnaire assessing socio-demographic characteristics, types of knee injuries, associated risk factors, and management strategies. Descriptive statistics summarized the data, while inferential analysis using Chi-square tests assessed associations between variables at a 0.05 significance level.

## **Results:**

Findings revealed a high prevalence of knee injuries, with 185 respondents (89.4%) reporting a history of knee injury. The most common types were fractures (45.4%), ligament tears (24.9%), and meniscus injuries (15.7%). Injuries were mostly sports-related (29.7%) or caused by sudden movement (25.9%), and the left knee was the most frequently affected (36.8%). More than half of the injured athletes (51.9%) sought treatment—mainly through medication and physiotherapy—while 39.5% reported persistent pain during activity.

Statistical analysis showed no significant relationship between intrinsic risk factors (flexibility, previous lower limb injury, and muscle imbalance) or extrinsic risk factors (training intensity, surface type, warm-up routine, and use of protective gear) and knee injury occurrence ( $p > 0.05$ ). However, sport type was significantly associated with knee injury prevalence ( $\chi^2 = 17.12, p = 0.029$ ), with football and volleyball athletes being more affected. Age, gender, body mass index (BMI), and level of study were not significantly related to knee injury prevalence.

### **Conclusion:**

Knee injuries are highly prevalent among student-athletes at the University of Benin, primarily associated with the type of sport rather than intrinsic, extrinsic, or demographic variables. There is a critical need for improved injury prevention programs, enhanced warm-up and training protocols, better facility maintenance, and accessible physiotherapy services to reduce the burden and recurrence of knee injuries in university sports settings.

### **Keywords:**

Knee injury, student-athletes, prevalence, risk factors, sport type, University of Benin, Nigeria.

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# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of study

Sports participation among adolescents is widely acknowledged for its physiological, psychological, and social benefits. These include enhanced physical health, improved self-esteem, positive social interaction, and reduced risk of depression. Nonetheless, the physical demands associated with sport inevitably expose athletes to injuries, particularly in structured, high-performance environments (Kemler et al., 2022). As modern sports continue to evolve in competitiveness and organization, there has been a parallel increase in the application of scientific training methods aimed at optimizing physical, psychological, and cognitive capacities. However, these intensified training regimens have been linked to heightened physical and mental stress, thereby increasing the risk of sports-related injuries (Nusia et al., 2023).

Among the most common and debilitating of these injuries are those affecting the knee joint. Knee injuries involve damage to one or more structures within the joint, including ligaments, tendons, cartilage, muscles, or bones, resulting from either acute trauma or chronic overuse (Rauch, 2022). The knee joint is a complex weight-bearing structure that supports mobility and load transmission during virtually all functional and athletic movements. Due to the high mechanical demands placed on the knee, particularly in high-impact and repetitive-motion sports, it is especially vulnerable to injury (Webster et al., 2023). Common types of knee injuries include ligament tears, meniscal injuries, sprains, fractures, and dislocations. Chia et al. (2022) identified several contributing factors such as age, gender, type of sport, body mass index (BMI), flexibility, and muscular imbalances—especially disparities in the hamstring-to-quadriceps strength ratio.

According to the World Health Organization (2022), a risk factor is any attribute, characteristic, or exposure that increases the likelihood of developing a disease or injury. These factors are categorized as either modifiable (subject to intervention) or non-modifiable. The etiology of knee injuries is multifactorial, often resulting from the interaction of intrinsic

(personal and biomechanical) and extrinsic (environmental or training-related) variables. Eustaquio et al. (2021) emphasized the need for epidemiological studies to unravel these complex interactions and facilitate the implementation of targeted injury prevention protocols within athletic populations

Intrinsic factors contributing to knee injuries include poor neuromuscular control, strength imbalances (e.g., between the hamstrings and quadriceps), and psychological components such as fear of re-injury. Extrinsic factors comprise training load, fatigue, inadequate recovery periods, surface type, and history of previous injuries. Acute knee injuries are typically defined as those diagnosed within 30 to 42 days of symptom onset (Almaawi et al., 2020). These injuries may also present in chronic forms, where repetitive micro trauma leads to long-term degenerative changes.

Globally, knee injuries constitute a major public health concern in sports, with university athletes facing a particularly high risk due to increased training intensity, competitive stress, and transition from high school to higher-level competition. Lebrun et al. reported that approximately 23 million adolescents in Africa suffer from sports injuries annually. Prieto-González et al. (2021) observed injury incidence rates of 7.21 per 1,000 hours in soccer and 4.31 in basketball, with knee injuries accounting for 19.32% of all reported injuries. In a Nigerian study by Bashir et al. (2020), knee injuries were found to be the most prevalent type among amateur athletes, comprising 28.3% of all reported cases. Within this study, football players had the highest injury incidence (19.5%), followed by track and field athletes (11.3%) and basketball players (10.1%).

Knee injuries are not restricted to professional athletes; they also occur frequently among individuals engaged in vigorous physical activity (Atik & Kaya, 2022). University athletes are particularly susceptible due to inadequate recovery, suboptimal facilities, limited access to sports medicine specialists, and a lack of structured injury prevention programs. In the Nigerian context, these systemic challenges further exacerbate the risk and severity of sports injuries. The University of Benin, like many Nigerian institutions, fields athletes in football, basketball, athletics, and volleyball—all of which impose considerable stress on the knees.

The consequences of knee injuries extend beyond temporary discomfort. Even when treated appropriately, such injuries can result in chronic pain, long-term mobility limitations, accelerated joint degeneration, and psychological distress such as anxiety and depression.

Compensatory movement patterns developed to avoid pain may lead to further injuries or postural imbalances.

Despite the significant burden of knee injuries among athletes, there is a dearth of localized data regarding their prevalence and associated risk factors in the Nigerian university context. At the University of Benin, the lack of context-specific epidemiological data hinders the development of evidence-based preventive and rehabilitative strategies. As Cronström et al. (2021) noted, understanding the risk profile of knee injuries is not only essential for improving athletic performance and recovery but also a matter of public health. Consequently, this study aims to explore the prevalence of knee injuries among student-athletes at the University of Benin and identify the major intrinsic and extrinsic risk factors responsible for these injuries.

## **1.2 Statement of problem**

Knee injuries are among the most frequent and functionally limiting musculoskeletal injuries in sports, accounting for up to 40% of all sport-related injuries (Webster et al., 2023). These injuries range from acute traumatic damage, such as ligamentous tears, to chronic overuse conditions, often leading to persistent pain, instability, or early degenerative changes such as osteoarthritis (Almaawi et al., 2020; Rauch, 2022). While sports participation promotes numerous health benefits—improving physical fitness, mental health, and social development—it also increases the risk of injury, particularly in high-impact, repetitive motion sports like football, basketball, and track events (Kemler et al., 2022; Kolodziej et al., 2022).

University athletes represent a uniquely vulnerable population due to their exposure to increased training volumes, competitive pressures, and often insufficient recovery time (Atik & Kaya, 2022). In the Nigerian context, additional challenges such as inadequate sports medicine infrastructure, limited access to rehabilitation professionals, and poorly maintained training environments further exacerbate the risk and severity of knee injuries (Bashir et al., 2020). According to Prieto-González et al. (2021), knee injuries accounted for 19.32% of all injuries among athletes, with soccer and basketball demonstrating particularly high incidence rates. Similarly, Bashir et al. (2020) reported knee injuries as the most prevalent injury type (28.3%) among amateur athletes in northern Nigeria, with football players experiencing the highest incidence (19.5%).

Knee injuries are multifactorial in origin, arising from the interplay of intrinsic factors such as muscle imbalance, poor neuromuscular control, and prior injury history, and extrinsic factors such as training intensity, playing surfaces, equipment quality, and fatigue (Chia et al., 2022; WHO, 2022). Without a context-specific understanding of these factors, athletes remain at heightened risk of avoidable injuries, prolonged recovery, and long-term physical and psychological consequences, including depression, anxiety, and career-limiting performance deficits (Cronström et al., 2021; Nusia et al., 2023).

Despite the frequency and consequences of knee injuries, to the best of the researcher's knowledge, there remains a critical lack of localized epidemiological data on their prevalence and associated risk factors within Nigerian south-south university settings, particularly at the University of Benin. This gap in knowledge limits the capacity of university health systems to develop targeted prevention strategies, design evidence-based rehabilitation protocols, and improve athlete outcomes.

Therefore, this study seeks to investigate the prevalence of knee injuries among University of Benin athletes and identify the primary intrinsic and extrinsic risk factors contributing to their occurrence. Addressing this research gap is critical for informing injury prevention programs, optimizing rehabilitation protocols, and safeguarding the long-term health and performance of university-level athletes in Nigeria.

### **1.3 Research Questions**

The study, therefore, aimed to answer the following questions;

- i. What is the prevalence of knee-related injuries among student-athletes at the University of Benin?
- ii. What intrinsic (personal/biological) risk factors are associated with knee injuries in this population?
- iii. What extrinsic (environmental/training-related) risk factors contribute to the occurrence of knee injuries among University of Benin athletes?
- iv. Is there a significant relationship between the type of sport and the prevalence of knee-related injuries among student-athletes?
- v. What is the relationship between selected socio-demographic variables (e.g., age, gender, BMI, level of study) and the prevalence of knee-related injuries among University of Benin athletes?

## **1.4 Aim of the study**

This study investigated the prevalence, risk factors, and socio-demographic correlates of knee-related injuries among student-athletes at the University of Benin.

## **1.5 Specific objectives**

The specific objectives of this study were;

- i. To determine the prevalence of knee-related injuries among student-athletes at the University of Benin.
- ii. To identify intrinsic (personal/biological) risk factors associated with knee-related injuries in this population.
- iii. To examine extrinsic (environmental and training-related) factors contributing to knee-related injuries among student-athletes.
- iv. To assess the relationship between type of sport and the prevalence of knee-related injuries.
- v. To evaluate the association between selected socio-demographic variables (e.g., age, gender, BMI, and level of study) and the prevalence of knee-related injuries among University of Benin athletes.

## **1.6 Hypothesis**

### **1.6.1 Main hypothesis**

There will be no significant association between selected risk factors (intrinsic, extrinsic, and socio-demographic variables) and the prevalence of knee-related injuries among student-athletes at the University of Benin.

### **1.6.2 Sub hypothesis**

- i. There will be no significant prevalence of knee-related injuries among student-athletes at the University of Benin.
- ii. Intrinsic factors such as age, gender, BMI, previous injury history, and flexibility will not significantly associated with the occurrence of knee-related injuries.

- iii. Extrinsic factors such as type of playing surface, training intensity, use of protective equipment, and coaching supervision will not significantly associated with the occurrence of knee-related injuries.
- iv. There will be no significant relationship between the type of sport engaged in and the prevalence of knee-related injuries among student-athletes.
- v. Selected socio-demographic variables (age, gender, BMI, and level of study) will not significantly associated with the prevalence of knee-related injuries among student-athletes at the University of Benin.

## **1.7 Significance/Justification of study**

This study holds considerable significance for multiple stakeholders within the university athletic and health management systems. Firstly, by identifying the prevalence and risk factors of knee-related injuries among student-athletes at the University of Benin, the study provides essential epidemiological data that is currently lacking in the Nigerian South-South region. This evidence can be used by sports physicians, physiotherapists, coaches, and athletic trainers to develop targeted injury prevention strategies, tailor rehabilitation protocols, and enhance return-to-play guidelines.

Furthermore, university administrators and policy makers can utilize the findings to improve sports infrastructure, implement safer training environments, and allocate resources more efficiently to injury prevention programs. The study also contributes to the academic body of knowledge on sports injury epidemiology in developing countries, helping to close the global research gap between high-income and low- to middle-income settings.

Ultimately, the study supports the long-term health, psychological well-being, and athletic performance of university athletes, reducing the risk of chronic disability, mental health challenges, and premature withdrawal from sport.

## **1.8 Scope and delimitations**

This study focused on knee-related injuries among student-athletes enrolled at the University of Benin. It specifically investigates:

- i. The **prevalence** of knee injuries within this population;

- ii. **Intrinsic (personal/biological)** risk factors such as age, gender, BMI, flexibility, and history of prior injury;
- iii. **Extrinsic (environmental/training-related)** risk factors such as training intensity, playing surfaces, use of protective gear, and coaching practices;
- iv. The relationship between the **type of sport** (e.g., football, basketball, athletics) and injury prevalence;
- v. The influence of **socio-demographic variables** (age, gender, level of study, BMI) on knee injury occurrence.

The study involved only student-athletes actively participating in organized university sports during the current academic session.

## 1.9 Limitations of the study

- i. The study was delimited to **athletes currently enrolled** at the University of Benin and did not reflect the injury patterns of non-student or professional athletes.
- ii. Only **knee-related injuries** were considered; injuries to other body parts were excluded.
- iii. Data relied on **self-reported injury history**, which were slightly subjected to recall bias or incomplete documentation.
- iv. The study focused on a **cross-sectional** design and did not include longitudinal follow-up to assess long-term outcomes of injuries.
- v. Extrinsic factors considered were limited to those measurable within the university context (e.g., surface type, equipment use) and did not capture all environmental contributors to injury.

## 1.10 Operational definitions

- i. **Knee Injury:**

Any physical damage affecting the knee joint, including the ligaments (e.g., ACL, MCL), menisci, tendons, bones, or surrounding soft tissue, sustained during sports participation. It includes both acute injuries (e.g., sprains, dislocations) and chronic or overuse conditions (e.g., patellofemoral pain

syndrome, tendinopathy) that result in pain, swelling, instability, or functional limitation.

ii. **Student-Athletes:**

Students currently enrolled at the University of Benin who actively participate in organized sporting activities, either through school teams, departmental competitions, or university leagues.

iii. **Prevalence of Knee Injuries**

The proportion of student-athletes who have sustained one or more knee-related injuries during a defined period (e.g., current academic session or previous 12 months), as reported via survey or documented in medical/sports records.

iv. **Intrinsic Risk Factors**

Personal or biological characteristics of the athlete that may predispose them to knee injuries. These include **age, gender, body mass index (BMI), muscle imbalance, flexibility, neuromuscular control, prior injury history**, and anatomical alignment.

v. **Extrinsic Risk Factors**

Environmental and external conditions that may contribute to the risk of sustaining a knee injury. These include **type of sport, training intensity, training surface, use or non-use of protective equipment, coaching supervision**, and **warm-up/cool-down practices**.

vi. **Type of Sport**

The specific athletic discipline or sport in which the athlete is engaged, such as **football, basketball, track and field, volleyball**, etc. These sports differ in movement demands and injury risks.

vii. **Socio-Demographic Variables**

Selected background characteristics of the athletes, including **age, sex, BMI,** and **level of study**, which may influence injury patterns or vulnerability.

viii. **Significant Association**

A statistically meaningful relationship (typically at  $p < 0.05$  level) identified between variables, such as between risk factors and the occurrence of knee injuries, as determined through appropriate statistical analyses.

ix. **Risk Factor**

Any attribute, characteristic, or exposure that increases the likelihood of a knee injury occurring in a student-athlete.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Knee Injuries**

Knee injuries are among the most prevalent musculoskeletal disorders, particularly in active populations such as athletes, older adults, and individuals engaged in physically demanding occupations. The knee joint's complex structure comprising bones (femur, tibia, and patella), ligaments, tendons, menisci, and cartilage, makes it highly susceptible to a range of injuries, including ligament tears, meniscal tears, dislocations, and fractures. Anterior cruciate ligament (ACL) injuries are among the most studied knee injuries, particularly in sports medicine. According to Griffin et al. (2006), ACL tears often occur due to sudden stops, pivoting, or landing awkwardly from a jump, and are more common in female athletes due to anatomical and hormonal factors. Meniscal injuries, which frequently accompany ACL injuries, can result from twisting motions and contribute to long-term joint degeneration if untreated (Logerstedt et al., 2010).

#### **2.2 Relevant anatomy of the knee**

##### **2.2.1 The Knee Joint**

According to Moore *et al.* (2013), the knee joint is the biggest synovial joint in the body and functions as a hinge joint. This joint is created by the articulation of the femur, tibia, and patella. The patella protects the knee joint by absorbing the quadriceps muscle's force and serving as a fulcrum (Majewski & Susanne, 2005). The two main components of the joint are the patellofemoral joint, which joins the patella to the femur, and the tibiofemoral joint, which joins the tibia to the femur. The knee joint has a number of ligaments, including the patellar ligament, medial and lateral collateral ligaments, anterior and posterior cruciate ligaments, and others (Moore *et al.*, 2013). Osteoarthritis, ligament and patellar instability are just a few of the disorders and injuries that the complex architecture of the knee joint leaves it vulnerable to (Majewski & Susanne, 2005). The femoral condyles and tibial plateaus articulate to produce the tibiofemoral joint, the biggest joint in the knee, which is cushioned by articular cartilage. The intercondylar fossa divides the medial and lateral condyles, the two bony prominences at the distal end of the femur (Moore *et al.*, 2013). On the other hand, the patellofemoral joint, which is situated between the patellar surface of the distal femur and the

posterior surface of the patella, is made up of the articulating surfaces of the patella and femur (Moore *et al.*, 2013).

### **2.2.2 The Joint Capsule**

The fibrous knee joint capsule surrounds the knee joint and aids in giving the joint stability and support. It is made up of two layers that are continuous with one another: an exterior layer and an interior layer. The inner layer is thinner and more fragile than the outer layer, which is thick and dense (Moore *et al.*, 2013).

Synovial fluid, which lubricates the knee joint and lessens friction between the bones and soft tissues, is also present in the knee joint capsule. According to Moore *et al.* (2013), the synovial membrane borders on the interior of the capsule and creates synovial fluid. Additional stability to the knee joints comes from the ligaments surrounding the joints such as anterior and the posterior cruciate ligaments together with support from the medial and lateral collateral ligaments that reinforce the knee joint capsule (Moore *et al.*, 2013).

### **2.2.3 Ligaments**

Two menisci and many ligaments support the knee joint. The transverse, arcuate popliteal, oblique popliteal, anterior cruciate ligament (ACL), lateral collateral ligament (LCL), posterior cruciate ligament (PCL), medial collateral ligament (MCL), and popliteo-fibular ligament are just a few of the ligaments that help to stabilize the knee joint (Moore *et al.*, 2013). Through cutaneous receptors, each of these ligaments contributes to joint proprioception and provides stability in a particular orientation. For instance, the PCL inhibits posterior displacement whereas the ACL largely opposes anterior and rotational motion of the tibia in relation to the femur. The MCL prevents excessive valgus load during external rotation of the knee by stabilizing the medial portion of the joint. When in flexion and internal rotation, this ligament is flexible; when in extension and external rotation, it is tight. In contrast, the LCL connects the femur to the fibula and stabilizes the lateral portion of the knee while preventing excessive varus stress and external rotation in all knee flexion postures. Last but not least, the popliteo-fibular ligament serves as a static constraint to the posterior tibial translation and external rotation of the tibia on the femur (LaPrade & Wentorf, 2002; Moore *et al.*, 2013).

### **2.2.4 The Meniscus**

The C-shaped fibrocartilage menisci are situated between the femur and tibia. They enhance bone congruency and serve to cushion the joint. The inner section of the menisci has radially structured collagen bundles, whereas the outer portion contains bigger circumferentially oriented bundles. The menisci are made up of an outer vascularized third and an interior three quarters that are thinner and avascular. The intercondylar region of the tibia is where the medial and lateral menisci are connected at both ends (Platzer, 2004). According to Moore *et al.* (2013), the lateral meniscus is placed on the outside of the knee, whereas the medial meniscus is on the inside of the knee. Its posterior horn is linked to the posterior intercondylar area of the tibia, between the attachment points of the lateral meniscus and the posterior collateral ligament (PCL), while its anterior horn is attached to the anterior intercondylar area of the tibia and blends with the anterior cruciate ligament (Moore *et al.*, 2013). Overlying the lateral tibia surface is the lateral meniscus, a nearly spherical fibrocartilaginous plate. Its anterior horn partly combines with the ACL and is attached to the anterior intercondylar region of the tibia. Similar to the medial meniscus, its posterior horn joins to the posterior intercondylar regions just in front of it (Moore *et al.*, 2013).

### **2.2.5 Bursae of the knee joint**

Prepatellar, infrapatellar, anserine, and semimembranosus bursae are only a few of the bursae connected to the knee joint (Moore *et al.*, 2013). Between the skin and the patella anteriorly is where you'll find the prepatellar bursa. Between the patellar ligament and the tibial tuberosity, the infrapatellar bursa connects to the knee joint. The pesanserinus tendons enter the proximal tibia medially, where the anserine bursa is situated. According to Moore *et al.* (2013), the semimembranosus bursa is situated posteromedially between the semimembranosus tendon and the medial head of the gastrocnemius muscle. These bursae assist to lessen friction and facilitate mobility by acting as cushions between soft tissue and bones or tendons. These bursae can become inflamed, resulting in discomfort, edema, and restricted motion.

### **2.2.6 Muscles acting on the knee joint**

The muscles around the knee joint are just as important for supporting the joint as the ligaments are. These muscles not only provide mobility for the knee's six degrees of freedom, but they also work with the neuromuscular system to regulate knee motion and provide proprioception in the knee. Near the knee, the majority of the muscles work initially to move

the joint and afterwards to stabilize it. Some of these muscles, referred to as biarticular muscles, however, function in two different ways at the knee and hip joints. In addition to helping the hip joint move, they principally work to move the knee joint. The knee joint may move in a variety of directions, including extension, flexion, and rotation. These muscles are located in the anterior, posterior, medial, and lateral compartments of the thigh and leg. Here are the details of some of the major muscles that act on the knee joint:

- i. **Quadriceps femoris:** In the front compartment of the thigh, there are four muscles collectively known as the quadriceps femoris. The rectus femoris, vastuslateralis, vastusintermedius, and vastusmedialis are some of these muscles. They come from the ilium and femur and pass through the patellar ligament to enter the patella and tibial tuberosity. According to Moore *et al.* (2013), the quadriceps femoris is the primary extensor of the knee joint.
- ii. **Hamstrings:** The hamstrings are a trio of muscles that are situated at the back of the thigh. The biceps femoris, semitendinosus, and semimembranosus are some of these muscles. They emerge from the femur and ischial tuberosity, inserting into the tibia and fibula. The primary flexors of the knee joint, the hamstrings are also involved in playing a role in rotation (Moore *et al.*, 2013).
- iii. **Gastrocnemius:** The two-headed gastrocnemius muscle is situated at the back of the thigh. Together with the soleus, it creates the Achilles tendon when it passes the knee joint. The gastrocnemius controls knee flexion as well as plantar flexion of the ankle joint (Kapandji, 2008).
- iv. **Popliteus:** Deep to the gastrocnemius muscle in the posterior part of the leg is the popliteus muscle. It releases the joint between the knees from full extension and rotates the tibia medially to enable flexion (Moore *et al.*, 2013).
- v. **Sartorius:** The anterior thigh compartment contains the sartorius muscle. It flexes the knee joint in addition to flexing, abducting, and laterally rotating the hip joint (Moore *et al.*, 2013).
- vi. **Gracilis:** The gracilis muscle is located in the medial compartment of the thigh. It adducts the hip joint and also flexes and medially rotates the knee joint (Moore *et al.*, 2013)

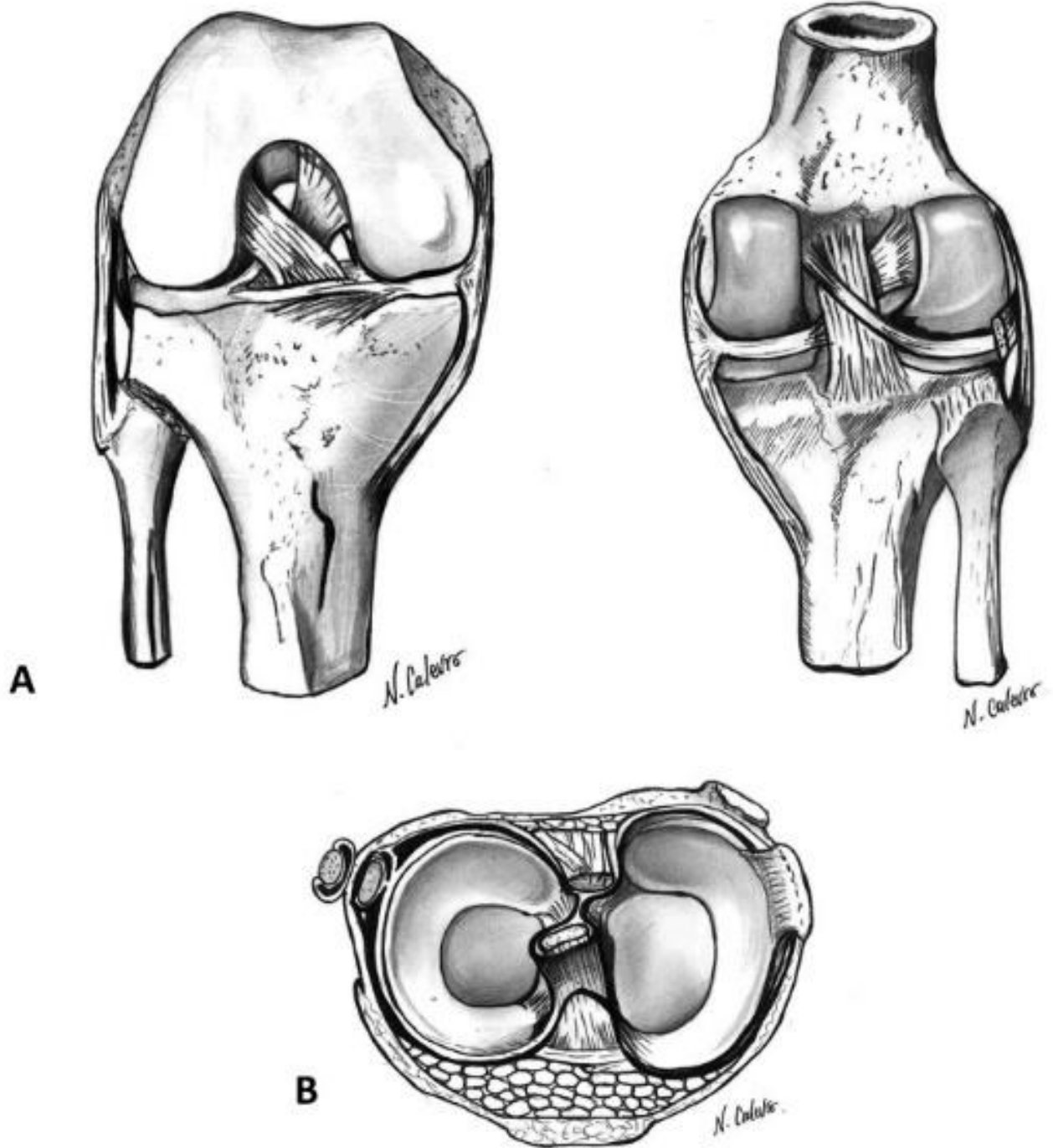


Figure 1: Anatomy of the knee. A; ligaments between femur and tibia. B; menisci (superior view) adapted from “Understanding the human knee and its relationship to total knee replacement” (Vaientiet al. 2017).

### 2.2.6 Innervations of the knee joint

The knee joint receives its innervations from various nerves, including the femoral, tibial, common fibular, saphenous, and obturator nerves. The anterior aspect of the knee joint is supplied by the articular branches of the femoral nerve, while the posterior and lateral aspects are supplied by the articular branches of the tibia and common fibular nerves, respectively. The saphenous nerve, which is primarily a cutaneous nerve, also contributes to the innervations of the knee joint, particularly the medial aspect. Additionally, the posterior division of the obturator nerve provides some innervations to the knee joint.

### 2.2.7 Blood supply to the knee joint

In terms of blood supply, the knee joint is highly vascularized. The periarticular genicular anastomoses, formed by ten vessels, supply the knee joint with blood. These include the genicular branches of the femoral, popliteal, and anterior and posterior recurrent branches of the anterior tibia recurrent and circumflex fibular arteries. The middle genicular branches of the popliteal artery penetrate the fibrous layer of the joint capsule to supply the cruciate ligaments, synovial membrane, and peripheral margins of the menisci. Adequate blood supply to the knee joint is crucial for maintaining joint health and promoting tissue healing in case of injury or damage.

## 2.3 Common knee related injuries

- i. **Anterior Cruciate Ligament (ACL) Tear:** An ACL tear is a common knee injury, especially among athletes participating in sports requiring sudden stops, jumps, or changes in direction, such as soccer or basketball (Dulay et al., 2015). The ACL provides critical stability to the knee joint by preventing anterior translation of the tibia relative to the femur. Injury often results from a non-contact twisting motion or a sudden deceleration (Swenson et al., 2013). According to Nicolini et al. (2014), the most common injuries among athletes especially in contact sports is ACL injuries and symptoms include a popping sound at the time of injury, pain, rapid swelling, and knee instability. Diagnosis is typically confirmed through clinical tests (e.g., Lachman test) and imaging (MRI). Treatment may involve physical therapy or surgical reconstruction, especially in young, active individuals.
- ii. **Meniscal Tear:** The meniscus is a C-shaped cartilage in the knee that acts as a shock absorber and stabilizer (Kezunović, 2013). Tears can occur due to trauma, especially during activities involving twisting motions, or as a result of degenerative changes in

older adults. Common symptoms include joint line pain, swelling, locking, and a sensation of the knee giving way. MRI is the gold standard for diagnosis. Treatment depends on the severity and location of the tear and may involve conservative management (rest, NSAIDs, physical therapy) or arthroscopic surgery for repair or meniscectomy.

- iii. **Medial Collateral Ligament (MCL) Injury:** MCL injuries commonly result from a direct blow to the lateral aspect of the knee, causing the ligament on the inner side of the knee to stretch or tear. It is a frequent injury in contact sports like football and hockey (Nicolini et al., 2014). Symptoms include pain along the inner knee, swelling, tenderness, and knee instability, especially with side-to-side movements. Grading of MCL injuries ranges from I (mild) to III (complete tear). Most MCL injuries heal well with conservative treatment such as bracing, rest, and rehabilitation, though severe cases may require surgery.
- iv. **Patellofemoral Pain Syndrome (PFPS):** Also known as "runner's knee," PFPS is a common cause of anterior knee pain, especially among young athletes and physically active individuals (Dulay et al., 2015). It arises from overuse, mal-alignment, or muscular imbalances that affect the movement of the patella over the femur (Swenson et al., 2013). Symptoms include dull, aching pain around or behind the kneecap, particularly during activities like climbing stairs, squatting, or prolonged sitting. Management is typically conservative and includes physical therapy focusing on strengthening the quadriceps and hip muscles, patellar taping, and correcting biomechanical abnormalities.

## 2.4 Causes/Risk factors of knee injuries

Knee injuries are common in both athletic and general populations due to the complex structure and high mobility of the knee joint. These injuries can arise from a variety of mechanical, biological, and environmental causes, often influenced by individual risk factors.

### i. Traumatic Causes

Trauma is a major cause of knee injuries, particularly in contact sports like football, rugby, or basketball. Injuries may result from direct blows to the knee or sudden twisting, pivoting, or hyperextension. For example, anterior cruciate ligament (ACL) injuries often occur during rapid deceleration or directional changes without contact (Kezunovic, 2013).

## **ii. Overuse and Repetitive Stress**

Repetitive activities especially running, jumping, or squatting can lead to overuse injuries such as patellofemoral pain syndrome, tendonitis, and bursitis. These injuries often develop gradually as repetitive micro trauma surpasses the knee's capacity for repair (Fredericson& Yoon, 2006). Kraus et al. (2022) showed that repetitive stress of the quadriceps tendon on the tibial tuberosity is a risk factor for knee pain.

## **iii. Muscle Imbalance and Poor Biomechanics**

Imbalances or weakness in the quadriceps, hamstrings, or hip muscles can alter patellar tracking and load distribution, increasing stress on ligaments and cartilage (Kraus et al., 2022). For example, weak hip abductors and poor core stability are associated with a higher risk of runner's knee (Powers, 2010).

## **iv. Inadequate Warm-Up or Flexibility**

Failing to properly warm up before physical activity or having tight musculature (e.g., hamstrings, iliotibial band) can predispose the knee to strain and ligamentous injuries due to reduced joint mobility and muscle preparedness (Witvrouw et al., 2004).

## **v. Previous Injuries**

A history of knee injury significantly increases the risk of future injuries. Ligamentous injuries like ACL tears often result in chronic instability and altered neuromuscular control, making re-injury more likely (Paterno et al., 2010).

## **vi. Anatomical Factors**

Some individuals have structural predispositions such as valgus or varus alignment, flat feet, hyper mobile joints, or shallow femoral grooves, which can contribute to abnormal joint mechanics and increase the likelihood of injury (Shen et al., 2018). A previous study by Shen et al. (2018) and Gobbi et al. (2022) highlighted that a narrow intercondylar and a larger lateral tibial slope might be associated with prevalence of ACL.

### **vii. Age and Degeneration**

Degenerative conditions like osteoarthritis and meniscal degeneration are more prevalent with age and can result from cumulative joint stress, previous trauma, or loss of cartilage and joint integrity over time (Edison et al., 2022).

### **viii. Gender**

Female athletes are at higher risk of certain knee injuries, particularly ACL tears. This is attributed to differences in anatomy, joint laxity, hormonal influences, and neuromuscular control patterns (Prodromos et al., 2007).

## **2.5 Physiotherapy Management of knee injuries**

### **i. Pain and Inflammation Control**

The first goal of physiotherapy is to reduce pain and inflammation. This is achieved through the RICE protocol (Rest, Ice, Compression, and Elevation) and modalities like transcutaneous electrical nerve stimulation (TENS), cryotherapy, and ultrasound (Clark, 2015). These treatments help minimize swelling, improve circulation, and promote healing in the acute phase. Manual therapy, such as gentle mobilizations, may also help reduce stiffness and discomfort. Pain control is essential to allow patients to engage in further rehabilitation safely and effectively (Dai-Haojie and Bhattacharya, 2025). Non-steroidal anti-inflammatory drugs (NSAIDs) may also be recommended in conjunction with physiotherapy interventions.

### **ii. Range of Motion Exercises**

Restoring the full range of motion (ROM) is critical after knee injuries. Physiotherapists begin with passive ROM exercises and progress to active and resisted movements as tolerated (Sagee et al., 2021). Techniques may include heel slides, stationary cycling, and patellar mobilization to reduce joint stiffness. Stretching of the hamstrings, quadriceps, and calf muscles is emphasized to regain flexibility (Sagee et al., 2021). Early mobilization helps prevent adhesions and improves joint nutrition. A full range of motion is essential for restoring normal gait patterns and preparing the knee for strengthening and functional tasks during later phases of rehabilitation.

### **iii. Strengthening Exercises**

Muscle weakness, especially in the quadriceps, hamstrings, and hip muscles, is a major consequence of knee injuries (Firer, 2001). Physiotherapists implement targeted strengthening programs to restore muscle balance and joint stability. Isometric exercises are often introduced first, followed by isotonic and functional strength training like squats, lunges, leg presses, and resistance band work. Eccentric training is emphasized for tendon injuries. Strengthening the surrounding musculature enhances joint support, reduces re-injury risk, and supports return to functional activity. Progression depends on the injury type, severity, and patient response, with close supervision to ensure proper technique.

## 2.6 Empirical Literature Review of Prevalence of Knee Related Injuries among Athletes

AUTHOR/ YEAR/COUNTRY	TITLE	SAMPLE SIZE	AIM OF STUDY	STUDY TYPE	OUTCOME/MEASURE	FINDINGS
Almaawi et al./2020/Saudi Arabia	Prevalence of knee injuries among male college students in Riyadh, Kingdom of Saudi Arabia.	482 participants were recruited for the study	To identify the prevalence of knee injuries among male college students and to observe the demographic data associated with it.	Cross sectional design study	Structured questionnaire was used to collect data	The overall prevalence of knee injuries was 23.2% (n = 112), with the majority occurring during sports activities, particularly soccer. Notably, 68.7% of the injuries resulted from non-contact mechanisms. Among those who sought hospital care, most were diagnosed with contusions, followed by meniscus tears, anterior cruciate ligament (ACL) injuries, and collateral ligament injuries. The majority of cases were managed conservatively, with only 10.7% requiring surgical intervention.

Augustsson & Waldon/2017/Sweden	Weaker lower extremity muscle strength predicts traumatic knee injury in youth female but not male athletes.	225 athletes	to investigate the influence of LE muscle strength on traumatic knee injury in youth female and male athletes.	Case control study	The athletes recorded any traumatic knee injury that had occurred during their high-school period in a web-based injury form. A one repetition maximum (1RM) barbell squat test was used to measure LE muscle strength.	Weaker LE muscle strength predicted traumatic knee injury in youth female athletes, but not in males. This suggests that LE muscle strength should be included in injury screening in youth female athletes.
Bashir et al/2020/Nigeria	Pattern and risk factors of sport injuries among amateur football player in Kano.	118 male amateur football players participated in this study	evaluate football injuries and associated factors in male amateur football players in Kano, North West Nigeria.	Cross sectional design study	A modified post-season injury questionnaire was used to collect data on football injuries and associated factors.	The factor most commonly associated with football injuries among male amateur football players in Kano was rough tackle from an opponent, with knee being the most affected body part
Bram et al/2020/USA	Anterior cruciate ligament injury incidence in adolescent athletes		To identify the risk of ACL injuries in adolescent athletes by sport, sex,	Meta-analysis	Essentially, 3 online databases (Pub Med, Embase, and Cochrane Library) were searched for all studies of ACL injuries per athlete-exposure (AE) or hours of	The risk of ACL injuries overall approached nearly 1 per 10,000 AEs for female athletes, who were almost 1.5 times as likely as male

			and setting across a variety of common US and international sports.		exposure in adolescent athletes. Injuries were then pooled and incidence rates (IRs) reported per 1000 AEs or hours of exposure, with the relative risk (RR) of injuries calculated for sex-comparable sports. IRs per competitive setting (match vs. practice) was also calculated.	athletes to suffer an ACL injury across all adolescent sports. A multisport female athlete was estimated to have a nearly 10% risk of ACL injuries over her entire high school or secondary school career. Specifically, male and female adolescents playing soccer, basketball, lacrosse, and football appeared at particular risk of injuries, a finding that can be used to target an injury intervention.
John et al/2016/India	Epidemiological profile of sports-related knee injuries in northern India: An observational study at a tertiary care centre.	465 athletes	to identify common <u>injuries</u> sustained by Indian athletes participating in different sports and to study various associated demographic features.	Cross-sectional study (observational study).	Telephonic interviews were conducted with each athlete to enquire about <u>return to sport</u> and time lost in sport due to the knee injury. Factors associated with return to sport were investigated using statistical tests of association.	Knee injuries take a huge toll on an athlete's career as observed in this study. Prevention of knee injuries is of paramount importance and more focused epidemiological studies are needed for formulating policies to prevent sports injuries in both professional

							and amateur athletes.
Khatun et al./2024/India	Risk Factors for Knee Injuries in Sports and Intense Physical Exercise.	83 participants were recruited for this study	To determine the risk factors associated with knee injuries in sports and intense physical exercise.	Cross sectional design study	Data collection was performed via direct interviews utilizing a semi-structured questionnaire, which was subsequently analyzed using SPSS version 26, while adhering to ethical principles such as informed consent and confidentiality.	The study revealed that engaging in physical activities—such as regular sports participation, swimming, jogging, and physical training—significantly contributes to an increased risk of knee injuries.	
Lemoyne et al./2017/Canada	Analyzing injuries among university-level athletes: prevalence, patterns and risk factors.	82 athletes participated in the study	To identify the prevalence of injuries and its patterns among university athletes.	Cross sectional design study	A self-developed questionnaire that assess different types of injuries, prevalence, pattern and its associated risk factor	A total of 82 athletes participated in the study. On average, respondents sustained more than two injuries per year. Significant differences were observed based on the sport category and the type of injury sustained. However, no significant differences were found in relation to prior sport	

						participation.
Moafa et al./2022/Saudi Arabia	Prevalence of Training-related Knee Injuries among Jazan University Students with Determining Possible Related Risk Factors.	884 participants were recruited for this study	To determine the prevalence of training-related knee injuries among University students.	Cross sectional design study	A modified Arabic version of the Knee Injury and Osteoarthritis Outcome Score (KOOS) questionnaire was distributed online as a self-administered survey to collect data from the students.	The overall prevalence of knee injuries was 18%, with 156 reported cases. Of these, 92 injuries were attributed to sports activities. Males were 2.7 times more likely to experience a knee injury compared to females. Engaging in 2 to 3 hours of training per week increased the risk of knee injury by 1.7 times compared to those who were inactive or exercised for only one hour weekly. Additionally, a higher body mass index was found to be associated with an increased risk of knee injury.

Ndubuisi et al./2020/Nigeria	Prevalence of anterior cruciate ligament injury among amateur footballers in Enugu, South-East Nigeria: The need for injury prevention programs.	825 amateur athletes	To determine the prevalence of ACL injuries among amateur footballers in Enugu, Nigeria	Cross sectional design study	An oral interview and an adapted knee pain evaluation form were used to screen for knee injuries, followed by the Lachman and Pivot Shift tests to confirm the presence of an ACL injury.	The average age of the participants was 22.7 ± 3.1 years. The prevalence of ACL injury within the study population was 3.6%, with rates of 8% among females and 3.5% among males. Among those with a history of knee injuries, 56.6% had an ACL injury. Approximately 37.3% of injuries resulted from torsion or twisting classified as a non-contact mechanism, while 3.3% were due to overuse. Injuries caused by contact with a person accounted for 13.3%, and 10.0% were attributed to contact involving friction.
Rodrigo et al./2020/Brazil	Musculoskeletal injuries in athletes from five modalities: a cross-	627 athletes	to describe the prevalence of and identify the	Cross sectional design study	Athlete profiles and the prevalence of MSK-I were assessed using a self-reported questionnaire. Only	There is a high prevalence of tendinopathy and joint and muscle injuries among rugby, soccer,

	sectional study		factors associated with MSK-I, including tendinopathy and joint and muscle injuries, in athletes.		previous MSK-I with imaging confirmation and/or a positive physical exam by a specialized orthopedist were considered.	combat sports, handball and water polo athletes. The analysis of associated factors (epidemiological, clinical and sports profiles) and the presence of MSK-I in athletes suggests an approximately 4–5-fold increased risk for athletes $\geq 30$ years of age
Tummala et al./2022/United States of America	Knee injuries and associated risk factors in National Basketball Association athletes.	More than 1000 athletes	To identify the prevalence of knee related injuries and its associated factors among NBA athletes.	Retrospective design study	Data were collected on player demographics, body measurements, basketball performance statistics, details of the knee injury, and history of other lower-extremity injuries.	Out of the total players assessed, a portion sustained structural knee injuries. After adjusting for possible confounding factors, structural knee injuries were linked to playing more minutes per game, higher usage rates, and reduced player efficiency ratings. Additionally, players who missed more games tended to play more minutes per

						game, scored fewer points per game, and had higher usage rates.
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## **CHAPTER THREE**

### **MATERIAL AND METHODS**

#### **3.1 Materials**

##### **3.1.1 Population**

The target population comprised of **all student-athletes** enrolled at the **University of Benin** who were actively participating in organized sports, such as football, basketball, athletics, volleyball, handball, and others, during this current academic session

##### **3.1.2 Participants selection**

The target population for this study comprised of male and female athletes above the age of 16 actively participating in football, basketball, volleyball, table tennis and track.

The minimum sample size for this study was calculated using the slovin's formula.

##### **3.1.2.1 Inclusion Criteria**

The following criteria was used to admit survey participants-

- i. Participants were aged 16 and above
- ii. Participants were student athletes who actively participate in football, basketball, volleyball, table tennis and track.
- iii. Participants were full time undergraduate students of University of Benin.
- iv. Participants gave informed consent to be involved in this research.

##### **3.1.2.2 Exclusion Criteria**

The following criteria was used to exclude survey participants-

- i. Participants who competed as professional athletes.
- ii. Participants with communication disorders which affect their ability to answer and understand questionnaire questions.
- iii. Participants who did not give their informed consent

##### **3.1.3 Description of Instruments**

The primary data collection instrument was a **structured, researcher-designed questionnaire**, adapted from validated tools used in prior epidemiological studies on sports injuries (e.g., NCAA Injury Surveillance System, WHO STEPS tool).

## Sections of the questionnaire

- i. **Section A: Socio-Demographic Data** – Age, gender, BMI, level of study, etc.
- ii. **Section B: Sports Participation Profile** – Type of sport, duration of participation, training frequency, etc.
- iii. **Section C: Knee Injury History** – Occurrence, type, mechanism, severity, and recurrence of knee injuries.
- iv. **Section D: Intrinsic Risk Factors** – History of previous injuries, flexibility (self-reported or tested), muscle imbalance, etc.
- v. **Section E: Extrinsic Risk Factors** – Surface type, use of protective gear, warm-up practices, training load, etc.

## Validation of the Instrument

The questionnaire was reviewed by three experts (in sports physiotherapy, orthopaedics, and health research) to check for clarity, relevance, and completeness. It was also be pretested on 10 student-athletes from Igbinedion University, Okada to ensure the questions were easy to understand. Feedback from both experts and students were used to improve the questionnaire.

## Reliability of the Instrument

The questionnaire was tested twice, two weeks apart, to check for consistency.

- i. **Cronbach's Alpha** ( $\geq 0.70$ ) measured how well related questions match.
- ii. **Test-retest reliability** ( $\geq 0.75$ ) showed if the results stay stable over time.

## 3.2 Methods

### 3.2.1 Research Design

This study employed a **descriptive cross-sectional survey design**, which was appropriate for assessing the **prevalence** and identifying **risk factors** associated with knee-related injuries within a defined population at a single point in time. This design allows for the examination of relationships between variables (e.g., intrinsic and extrinsic factors) and the occurrence of knee injuries among student-athletes.

### 3.2.2 Sampling Technique

This study used a combination of **stratified random sampling** and **convenience sampling** to ensure fair representation of different sports and to make data collection easier and more practical

#### **Stratified random sampling:**

Stratified random sampling was used to make sure that student-athletes from all the different sports at the University of Benin are fairly represented. First, the athletes were divided into groups (called **strata**) based on the sport they play (e.g., football, basketball, athletics, volleyball, handball, etc.).

Then, the number of athletes selected from each sport was based on how many people were in that sport—so that larger teams had more participants, and smaller teams had fewer. This made the sample more accurate and balanced.

After deciding how many athletes were to be chosen from each sport, the actual participants were selected using **convenience sampling**.

**Why this method?** It helped reduce bias and allows the results to reflect what's happening across different types of sports. It also made it possible to compare injury patterns between sports.

#### **Convenience sampling:**

Within each sport group, athletes were chosen based on who was available and willing to take part in the study. The researcher met athletes during their training sessions and team meetings and asked them to join the study if they were present and interested.

**Why this method?** It was a quick and practical way to collect data, especially when working with busy student-athletes who were not always available. It helped the researcher collect responses without disturbing their training schedules.

### 3.2.3 Sampling Size

The total number of athletes in University of Benin were 117 female athletes and 314 male athletes giving a total of 431 registered student athletes.

Sample size was calculated using the Slovin's formula;

$$n = N / (1 + N[e]^2)$$

Where;

n= Sample size

N= Population size

e= Margin of error

The margin of error I will be using is 0.05 or 5 percentage

Calculation;

$$n = 431 / (1 + 431[0.05]^2)$$

$$n = 431 / (1 + 431[0.0025])$$

$$n = 431 / (1 + 1.0775)$$

$$n = 431 / 2.0775$$

$$n = 207.41$$

The sample size of this study is approximately 207 athletes.

**Table 3.1: Sports and total number of students**

<b>SPORT</b>	<b>NUMBER OF PARTICIPANTS</b>
Football	108
Volleyball	95
Basketball	78
Athletics	52
Swimming	34
Table tennis	34
Handball	30

### 3.2.4 Ethical Considerations

Ethical approval for this study was obtained from the Ethics Research Committee of the University of Benin, Edo State. Following approval, eligible participants were provided with detailed information about the study's objectives, procedures, benefits, and their rights as participants. Informed consent was obtained from all participants prior to data collection, ensuring their voluntary participation and understanding of the study.

### 3.2.5 Procedure for data collection

Eligible participants who met the inclusion criteria were recruited for the study. Prior to participation, **informed consent** was obtained, and the purpose, procedures, and expectations of the study was clearly explained to each participant to ensure full understanding.

Participants then completed a set of **standardized questionnaires** comprising three sections:

i. **Section A: Socio-Demographic and Anthropometric Data**

This section collected information on age, gender, academic level (100–final year), height, and weight (used to calculate Body Mass Index - BMI).

ii. **Section B: Physical Activity Profile**

This part gathered details on the participant's activity level, frequency, intensity, and duration of training or sport participation.

iii. **Section C: Knee Injury History and Characteristics**

This section assessed injury-related information such as the mechanism of injury, use of warm-up and stretching, sport-relatedness, time since last injury, type of treatment received, affected knee structures, and pain characteristics (including severity on a 1–10 scale, relation to activity or rest, and need for assistive devices).

All questionnaires were **collected immediately after completion** to preserve data quality and minimize loss or misplacement.

### 3.2.6 Data analysis

Data was coded and entered into **Statistical Package for the Social Sciences (SPSS)** version 26.0 for analysis.

- i. **Descriptive statistics** (frequencies, percentages, means, standard deviations) was used to summarize prevalence, demographic characteristics, and distribution of risk factors.
- ii. **Chi-square tests** was used to assess associations between categorical variables (e.g., type of sport vs. injury occurrence).
- iii. **Binary logistic regression** was used to identify predictors of knee injuries among intrinsic, extrinsic, and socio-demographic variables.
- iv. **Level of significance** was set at  $p < 0.05$

## CHAPTER FOUR

### RESULTS

#### 4.1 Preamble

The primary aim of this study was to investigate the prevalence, risk factors and sociodemographic correlates of knee-related injuries among student athletes at the University of Benin. A total of 207 students were recruited across various departments in the university to participate in this study.

##### 4.1.1 Sociodemographic characteristics of the respondents

As presented in Table 4.1 respondents had a mean age of  $21.1 \pm 2.5$  years, with a mean height of  $1.7 \pm 0.1$  m, mean weight of  $68.0 \pm 11.3$  kg, and mean BMI of  $23.2 \pm 3.8$  kg/m<sup>2</sup>. A total of 109 (52.7%) were female, while 98 (47.3%) were male. The majority were drawn from Engineering (48; 23.2%), Life Sciences (42; 20.3%), and Basic Medical Sciences (39; 18.8%). Most respondents, 182 (87.9%), reported no chronic health condition, while asthma was the most common condition among those affected (19; 9.2%).

**Table 4.1: Sociodemographic characteristics of the respondents**

	<b>Range</b>	<b>Mean <math>\pm</math> SD</b>
Age	16 – 30	21.1 $\pm$ 2.5
Height	1.2 – 1.9	1.7 $\pm$ 0.1
Weight	45 – 100	68.0 $\pm$ 11.3
BMI	13.98 – 48.61	23.2 $\pm$ 3.8
	<b>Frequency</b>	<b>Percentage</b>
<b>Gender</b>		
Male	98	47.3
Female	109	52.7
<b>Department</b>		
Agric	4	1.9
Arts	2	1.0
Basic Medical Science	39	18.8
Education	28	13.5
Engineering	48	23.2
Environmental Science	6	2.9
Life Sciences	42	20.3
Management Science	6	2.9
Medicine	2	1.0
Pharmacy	4	1.9
Physical Science	15	7.2

Social Science	6	2.9
Veterinary Medicine	5	2.4
<b>Known chronic health condition</b>		
Yes	25	12.1
No	182	87.9
<b>Specific Condition</b>		
Asthma	19	9.2
Scoliosis	1	0.5

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#### **4.1.2 Sport participation profile of the respondents**

As presented in Table 4.2, football (49; 23.7%) and volleyball (34; 16.4%) were the most common sports among respondents, followed by basketball and tennis (28; 13.5% each). In terms of participation history, 64 (30.9%) had been involved for less than a year, while 50 (24.2%) reported five years or more. Training frequency was highest among those who trained 2–3 times per week (64; 30.9%), and training sessions typically lasted 1–2 hours for 64 (30.9%) respondents. Competitive participation was reported by 135 (65.2%), and 127 (61.4%) had not taken breaks from training; however, among those who did, the most frequent break duration was 1–2 months (32; 15.5%).

**Table 4.2: Sport profile of the respondents**

	<b>Frequency</b>	<b>Percentage</b>
<b>Sport Type</b>		
Athletics	25	12.1
Basketball	28	13.5
Football	49	23.7
Handball	24	11.6
Hockey	1	0.5
Running	1	0.5
Swimming	17	8.2
Tennis	28	13.5
Volleyball	34	16.4
<b>Years of participation</b>		
Less than a year	64	30.9
1 – 2 years	58	28.0
3 – 4 years	35	16.9
5 years and above	50	24.2
<b>Frequency of training per week</b>		
Once	60	29.0
2–3 times	64	30.9
4–5 times	39	18.8
Daily	44	21.3

**Training Duration**

<30 mins	42	20.3
30–60 mins	53	25.6
1–2 hours	64	30.9
More than 2 hours	48	23.2

**Participation in competitive matches**

Yes	135	65.2
No	72	34.8

**Had breaks or time off from training**

Yes	80	38.6
No	127	61.4

**Break duration**

< 1 month	19	9.2
1-2 months	32	15.5
3 - 6 months	27	13.0
1 year	1	0.5

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### **4.1.3 Knee Injury History**

As presented in Table 4.3, the majority of respondents, 185 (89.4%), reported a history of knee injury. Among these, injuries occurred most often once (72; 38.9%) or two to three times (61; 33.0%). Fracture was the most common injury type (84; 45.4%), followed by ligament tears (46; 24.9%) and meniscus injury (29; 15.7%). The predominant mechanisms were sports-related (55; 29.7%) and sudden movements (48; 25.9%). The left knee was most frequently affected (68; 36.8%).

Injuries were reported to have occurred most often more than a year prior (57; 30.8%), while 96 (51.9%) sought treatment, primarily with medication (22; 11.9%) or physiotherapy (18; 9.7%). At the time of the survey, 73 (39.5%) still experienced pain, usually during activity or both rest and activity. Half of the injured respondents (92; 49.7%) had used crutches or braces, and 52 (27.6%) reported their injury affected their ability to train or play at least slightly. Nevertheless, most (150; 81.1%) had returned to sport. The average self-reported injury severity was moderate ( $5.3 \pm 2.8$  on a 10-point scale).

**Table 4.3: Knee injury history among the respondents**

	<b>Frequency</b>	<b>Percentage</b>
<b>Ever had a knee injury</b>		
Yes	185	89.4
No	22	10.6
<b>Percentage of injured</b>		
<b>Frequency of knee injury</b>		
Once	72	38.9
2–3 times	61	33
More than 3 times	52	28.1
<b>Injury Type (multiple choice)</b>		
Fracture	84	45.4
Ligament tear	46	24.9
Meniscus injury	29	15.7
Patella dislocation	17	9.2
Other injuries	15	8.1
Tendonitis	14	7.6
<b>Injury mechanism</b>		
Accidental fall	45	24.3
During sport	55	29.7
Sudden movement	48	25.9
Unknown	37	20

**Injury site**

Both	59	31.9
Left knee	68	36.8
Right knee	58	31.4

**When injury occurred**

<3 months	48	25.9
3–6 month	34	18.4
6–12 months	46	24.9
Over a year	57	30.8

**Received treatment for injury**

Yes	96	51.9
No	89	48.1

**Type of treatment**

Medication/Drugs	22	11.9
Physiotherapy (± medication)	18	9.7
Compression/Support	16	8.6
Rest / Ice / Cryotherapy	17	9.2
Surgery (incl. ACL reconstruction)	12	6.5
Traditional/Local treatment	2	1.1
Wound care (dressing, iodine)	2	1.1

**Still experiencing pain**

Yes	73	39.5
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No	112	60.5
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**When pain is experienced**

At rest	22	11.9
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During activity	25	13.5
-----------------	----	------

Both	27	14.6
------	----	------

**Used crutches or braces**

Yes	92	49.7
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No	93	50.3
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**His injury affected ability to train or play**

Not at all	15	8.1
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Slightly	22	11.9
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Moderately	14	7.6
------------	----	-----

Severely	15	8.1
----------	----	-----

**Returned to sport?**

Yes	150	81.1
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No	35	18.9
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**Range                      Mean ± SD**

Injury severity	1 – 10	5.3 ± 2.8
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#### **4.1.4 Intrinsic knee injury risk factors**

As shown in Table 4.4, 127 (61.4%) respondents reported a history of lower limb injury, although only 32 (15.5%) had received rehabilitation for such injuries. Flexibility was most often rated as fair or good (55; 26.6% each), with 53 (25.6%) rating it excellent. A total of 63 (30.4%) reported experiencing muscle tightness or stiffness before training, while 30 (14.5%) had been diagnosed with muscle imbalance or weakness by a professional. Regarding foot posture, 67 (32.4%) reported flat feet or abnormal leg alignment, while 51 (24.6%) were uncertain of their status.

**Table 4.4: Intrinsic risk factors of knee injury**

	<b>Frequency</b>	<b>Percentage</b>
<b>History of other lower limb injury</b>		
Yes	127	61.4
No	80	38.6
<b>Received rehabilitation for previous injuries</b>		
Yes	32	15.5
No	175	84.5
<b>Self-rating of flexibility</b>		
Poor	44	21.3
Fair	55	26.6
Good	55	26.6
Excellent	53	25.6
<b>Feeling of lower limb muscle tightness/stiffness before training</b>		
Yes	63	30.4
No	144	69.6
<b>Diagnosed with muscle imbalance or weakness by a medical/sports professional</b>		
Yes	30	14.5
No	177	85.5
<b>Flat feet or abnormal leg alignment</b>		
Yes	67	32.4

No	89	43.0
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Not sure	51	24.6
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#### **4.1.5 Extrinsic knee injury risk factors**

As presented in Table 4.5, training most commonly took place on grass (65; 31.4%) and hard courts/tarmac (61; 29.5%). Almost all respondents wore proper sport shoes (181; 87.4%), while use of protective gear was limited, with 82 (39.6%) never using any. Warm-up routines were inconsistently practiced, as 84 (40.6%) reported warming up only sometimes, while stretching before training was also irregular, with 80 (38.6%) stretching sometimes and 69 (33.3%) never stretching.

Training intensity was mostly moderate (77; 37.2%), while fatigue during or after training was reported by 101 (48.8%). Most respondents trained under coach supervision (129; 62.3%). Excessive training load was reported by 72 (34.8%), while 66 (31.9%) experienced it sometimes.

**Table 4.5: Extrinsic risk factors of knee injury**

	<b>Frequency</b>	<b>Percentage</b>
<b>Training/play surface</b>		
Artificial turf	36	17.4
Grass	65	31.4
Hard court/tarmac	61	29.5
Mixed surfaces	45	21.7
<b>Wear proper sport shoes</b>		
Yes	181	87.4
No	26	12.6
<b>Use protective gear</b>		
Always	53	25.6
Sometimes	72	34.8
Never	82	39.6
<b>Warm-up before training or competition</b>		
Always	62	30.0
Sometimes	84	40.6
Never	61	29.5
<b>Stretching before training</b>		
Always	58	28.0
Sometimes	80	38.6
Never	69	33.3

**Training intensity**

Light	69	33.3
Moderate	77	37.2
Intense	61	29.5

**Fatigue during or after training**

Yes	101	48.8
No	106	51.2

**Coach-supervised training**

Yes	129	62.3
No	78	37.7

**Excessive training load**

Yes	72	34.8
Sometimes	66	31.9
No	69	33.3

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#### **4.1.6 Association between intrinsic risk factors and knee injury**

There was no significant association between the intrinsic risk factors of knee injury and history of injury occurrence among the respondents. (Table 4.6).

**Table 4.6: Chi-square association between intrinsic risk factors and knee injury**

	<b>Knee Injury</b>		<b>X<sup>2</sup></b>	<b>p-value</b>
	<b>Yes</b>	<b>No</b>		
<b>History of lower limb injury (%)</b>				
Yes	117 (92.1)	10 (7.9)	2.624	0.105
No	68 (85.0)	12 (15.0)		
<b>Received rehabilitation for previous injury (%)</b>				
Yes	29 (90.6)	3 (9.4)	0.063	0.802
No	156 (89.1)	19 (10.9)		
<b>Flexibility (%)</b>				
Excellent	48 (90.6)	5 (9.4)	1.214	0.75
Good	50 (90.9)	5 (9.1)		
Fair	47 (85.5)	8 (14.5)		
Poor	40 (90.9)	4 (9.1)		
<b>Tightness or stiffness in the lower limbs (%)</b>				
Yes	59 (93.7)	4 (6.3)	1.746	0.186
No	126 (87.5)	18 (12.5)		
<b>Muscle imbalance or weakness (%)</b>				
Yes	26 (86.7)	4 (13.3)	0.270	0.603
No	159 (89.8)	18 (10.2)		
<b>Abnormal leg alignment (%)</b>				
Yes	60 (89.6)	7 (10.4)	3.9	0.142

Not	76 (85.4)	13 (14.6)
Not sure	49 (96.1)	2 (3.9)

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#### **4.1.7 Association between extrinsic risk factors and knee injury**

There was no significant association between the extrinsic risk factors of knee injury and history of injury occurrence among the respondents. (Table 4.7).

**Table 4.7: Chi-square association between extrinsic risk factors and knee injury**

	Knee Injury		X <sup>2</sup>	p-value
	Yes	No		
<b>Playing surface (%)</b>				
Artificial turf	34 (94.4)	2 (5.6)	4.654	0.199
Grass	57 (87.7)	8 (12.3)		
Hard court/tarmac	57 (93.4)	4 (6.6)		
Mixed surfaces	37 (82.2)	8 (17.8)		
<b>Wearing proper sport shoes (%)</b>				
Yes	163 (90.1)	18 (9.9)	0.708	0.4
No	22 (84.6)	4 (15.4)		
<b>Use of protective gear (%)</b>				
Always	51 (96.2)	2 (3.8)	3.64	0.162
Sometimes	62 (86.1)	10 (13.9)		
Never	72 (87.8)	10 (12.2)		
<b>Warming up before training or competition (%)</b>				
Always	56 (90.3)	6 (9.7)	4.231	0.121
Sometimes	71 (84.5)	13 (15.5)		
Never	58 (95.1)	3 (4.9)		
<b>Stretching before training (%)</b>				
Always	56 (96.6)	2 (3.4)	4.392	0.111

Sometimes	69 (86.3)	11 (13.8)		
Never	60 (87.0)	9 (13.0)		
<b>Self-rated training intensity (%)</b>				
Intense	56 (91.8)	5 (8.2)	5.247	0.073
Moderate	64 (83.1)	13 (16.9)		
Light	65 (94.2)	4 (5.8)		
<b>Fatigue during or after training (%)</b>				
Yes	90 (89.1)	11 (10.9)	0.014	0.905
No	95 (89.6)	11 (10.4)		
<b>Coach-supervised training (%)</b>				
Yes	117 (90.7)	12 (9.3)	0.633	0.426
No	68 (87.2)	10 (12.8)		
<b>Excessive training load (%)</b>				
Yes	68 (94.4)	4 (5.6)	3.003	0.223
Sometimes	57 (86.4)	9 (13.6)		
No	60 (87.0)	9 (13.0)		

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#### **4.1.8 Relationship between sociodemographic factors and knee injuries**

There was a significant association between sport type and the prevalence of knee injury among the respondents ( $X^2 = 17.12$ ,  $p = 0.029$ ). (Table 4.8).

**Table 4.8: Chi-square association between sociodemographic factors and knee injury**

	<b>Knee Injury</b>		<b>X<sup>2</sup></b>	<b>p-value</b>
	<b>Yes</b>	<b>No</b>		
<b>Age (%)</b>				
16 – 20	86 (87.8)	12 (12.2)	0.977	0.614
21 – 25	94 (90.4)	10 (9.6)		
26 – 30	5 (100)	0 (0)		
<b>Gender (%)</b>				
Male	85 (86.7)	13 (13.3)	1.363	0.243
Female	100 (91.7)	9 (8.3)		
<b>BMI</b>				
Underweight	15 (78.9)	4 (21.1)	5.163	0.160
Normal	122 (91.0)	12 (9.0)		
Overweight	43 (91.5)	4 (8.5)		
Obese	5 (71.4)	2 (28.6)		
<b>Level</b>				
100	41 (87.2)	6 (12.8)	5.60	0.347
200	37 (90.2)	4 (9.8)		
300	38 (84.4)	7 (15.6)		
400	34 (100)	0 (0)		
500	28 (87.5)	4 (12.5)		
600	7 (87.5)	1 (12.5)		

**Sport Type**

Athletics	23 (92.0)	2 (8.0)	17.12	0.029
Basketball	25 (89.3)	3 (10.7)		
Football	40 (81.6)	9 (18.4)		
Handball	24 (100.0)	0 (0.0)		
Hockey	0 (0.0)	1 (100.0)		
Running	1 (100.0)	0 (0.0)		
Swimming	16 (94.1)	1 (5.9)		
Tennis	27 (96.4)	1 (3.6)		
Volleyball	29 (85.3)	5 (14.7)		

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## 4.2 Hypotheses Testing

**Hypothesis 1:** There will be no significant association between intrinsic risk factors and the prevalence of knee injury

Alpha level: 0.05

Test statistic: Chi-square

Observed:  $p > 0.05$

Since the observed p value was greater than 0.05 Alpha level. The null hypothesis was therefore ACCEPTED.

**Hypothesis 2:** There will be no significant association between extrinsic risk factors and the prevalence of knee injury

Alpha level: 0.05

Test statistic: Chi-square

Observed:  $p > 0.05$

Since the observed p value was greater than 0.05 Alpha level. The null hypothesis was therefore ACCEPTED.

**Hypothesis 3:** There will be no significant association between sociodemographic factors (age, BMI, gender, level of study) and the prevalence of knee injury

Alpha level: 0.05

Test statistic: Chi-square

Observed:  $p > 0.05$

Since the observed p value was greater than 0.05 Alpha level. The null hypothesis was therefore ACCEPTED.

**Hypothesis 4:** There will be no significant association between sport type and the prevalence of knee injury

Alpha level: 0.05

Test statistic: Chi-square

Observed:  $p < 0.05$

Since the observed p value was lesser than 0.05 Alpha level. The null hypothesis was therefore REJECTED.

## CHAPTER FIVE

### DISCUSSION, CONCLUSION AND RECOMMENDATIONS

#### 5.1 Discussion

The aim of this study was to investigate the prevalence, risk factors, and socio-demographic correlates of knee-related injuries among student-athletes at the University of Benin. The findings revealed a strikingly high prevalence of knee injuries, with 89.4% of the respondents reporting a previous history of knee injury. Football was the most commonly played sport among the student-athletes, which aligns with the findings of Owoeye et al. (2016), who similarly reported football as the dominant sporting activity among student-athletes. Given the physical demands, frequent contact, rapid directional changes, and high-intensity nature of football, it is unsurprising that it emerges as the sport most strongly associated with knee injuries.

Interestingly, the high prevalence of knee injuries observed in this study contrasts with findings from previous research. For instance, Almaawi et al. (2020) and Aslam et al. (2019) both reported a much lower prevalence of knee injuries among male college students in Saudi Arabia. Similarly, Nader and Mohammadi (2024) reported a prevalence rate of only 10.8% among school student-athletes. A longitudinal study also found the knee to be the most commonly injured region in student-athletes; however, the reported prevalence (32.9%) was significantly lower than the 89.4% found in the present study (McKay et al., 2017). Several reasons may explain these differences. First, contextual and environmental factors such as poor training facilities, substandard playing surfaces, and limited access to sports medicine services in Nigeria may contribute to the higher burden of knee injuries (Musa et al., 2022). Second, many student-athletes may return to sports prematurely after an initial injury due to limited access to rehabilitation or pressure to perform, increasing the likelihood of reinjury (Ogbonnaya et al., 2021). Also, differences in methodology, sample size, and the types of sports commonly played in each setting could also account for the discrepancies across studies.

The study further revealed that fractures were the most common type of knee injury, followed by ligament tears and meniscus injuries. This reported contradicts Aslam et al. (2019) and

Almaawi et al. (2020) who reported ligament tears as the Most common type of knee injury among student athletes. Interestingly, the literature has consistently documented ligamentous injury such as anterior cruciate ligament tear as one of the most common causes of knee injuries (Nicolini et al., 2014), however, ligament tears and meniscus injuries were less common among our respondents. This pattern highlights the significant biomechanical stresses placed on the knee joint during athletic participation, particularly in high-impact and contact sports. Fractures and soft-tissue injuries such as ligament and meniscus damage are often linked to inadequate protective equipment, poor playing surfaces, insufficient rehabilitation after prior injuries, and the lack of structured injury-prevention programs.

This study highlights several training-related risk factors that may contribute to the high prevalence of knee injuries among student-athletes at the University of Benin. A significant proportion trained on grass and hard courts/tarmac, surfaces known to increase impact forces and injury risk. Although most athletes wore proper sport shoes, the limited use of protective gear reflects a gap in preventive practices. This is concerning, as protective equipment plays a vital role in mitigating the risk of acute and overuse injuries. Similar findings were reported by Aslam et al. (2019), who observed a low prevalence of protective gear use among student-athletes, which contributed to elevated injury rates. Warm-up and stretching routines were inconsistently performed, despite evidence that structured programs like FIFA 11+ reduce lower limb injuries. Additionally, many athletes reported fatigue and excessive training load, both recognized predictors of injury, suggesting inadequate load management despite coach supervision. Together, these findings underscore the role of unsafe surfaces, insufficient protective measures, poor adherence to preventive routines, and overtraining in predisposing athletes to knee and musculoskeletal injuries.

The findings of this study show that more than half of the respondents (61.4%) reported a history of lower limb injury, yet only 15.5% had received rehabilitation. This finding is consistent with Owoeye et al. (2014), who reported that many Nigerian athletes return to play prematurely without adequate rehabilitation, thereby increasing the risk of reinjury. This gap suggests limited access to or underutilization of rehabilitation services, which could predispose athletes to recurrent injuries due to incomplete recovery. Flexibility levels were mostly rated as fair to good, though nearly a third reported muscle tightness or stiffness before training. Pre-existing muscle imbalance or weakness, diagnosed in 14.5% of athletes, represents another intrinsic risk factor, as such deficits compromise neuromuscular control and increase injury susceptibility. Additionally, abnormal foot posture or flat feet (32.4%)

and uncertainty about leg alignment (24.6%) highlight biomechanical issues that can contribute to excessive stress on the lower extremities, particularly the knee and ankle. These intrinsic factors, when combined with inadequate rehabilitation, may significantly explain the burden of injuries observed in this study and emphasize the need for preventive screening, early diagnosis, and structured rehabilitation programs for student-athletes.

Interestingly, none of the intrinsic or extrinsic factors assessed in this study showed a significant association with the prevalence of knee injuries among the respondents. This suggests that while factors such as muscle imbalance, flexibility, footwear, training surfaces, and warm-up practices are important considerations, they may not independently explain the high burden of knee injuries observed in this population. Instead, a significant association was found between knee injury prevalence and sport type. Given that the majority of respondents participated in contact sports, particularly football, it is expected that a high proportion would report knee injuries. Contact sports inherently involve rapid directional changes, high physical demands, and frequent collisions, all of which increase the likelihood of knee trauma. This finding is consistent with Chan et al. (2020) and McKay et al. (2018), who both reported that athletes involved in contact and collision sports are at a substantially higher risk of knee and lower limb injuries compared to those in non-contact sports. The results therefore emphasize the central role of sport type in determining injury risk, suggesting that preventive efforts should prioritize athletes in high-risk, contact-based disciplines.

## **5.2 Conclusion**

This study revealed an alarmingly high prevalence of knee injuries (89.4%) among student-athletes at the University of Benin, with football being the most strongly associated sport type. Fractures were the most common injury reported, differing from existing literature that highlights ligament injuries as predominant. Although several intrinsic and extrinsic risk factors such as muscle imbalance, inadequate warm-up, protective gear use, and training surfaces were identified, none showed a significant association with knee injury prevalence. Instead, sport type, particularly contact sports, emerged as the key determinant of injury risk.

## **5.3 Implication of finding**

The findings highlight the vulnerability of student-athletes in contact sports to knee injuries, reflecting contextual challenges such as inadequate rehabilitation services, limited use of protective gear, and substandard playing facilities. These results underscore the urgent need

for evidence-based preventive strategies, structured rehabilitation, and routine screening to mitigate injury risk. Importantly, the findings contribute to the growing body of knowledge on sports injury epidemiology in low-resource settings and provide a baseline for future research and policy development in sports medicine in Nigeria.

#### **5.4 Recommendations**

1. **Preventive Programs:** Implementation of structured injury-prevention programs such as the FIFA 11+ should be mandated for student-athletes to reduce lower limb injury risk.
2. **Rehabilitation Access:** Universities should strengthen access to sports rehabilitation services, ensuring injured athletes receive adequate recovery before returning to play.
3. **Protective Equipment:** Awareness campaigns and policies promoting consistent use of protective gear during training and competitions should be introduced.
4. **Safe Training Environments:** Improvement of sports facilities, including provision of standard playing surfaces, should be prioritized to reduce impact-related injuries.
5. **Coach and Athlete Education:** Training workshops should be organized for coaches and athletes on load management, warm-up routines, and safe return-to-play practices.
6. **Future Research:** Further studies with larger, multi-institutional samples are recommended to explore causal pathways of knee injuries and evaluate the effectiveness of preventive strategies in this context.

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**APPENDICES**  
**INFORMED CONSENT**

My name is **ISAH ETSENOSHIOLUAME JASMINE**, a final year student of the Department of Physiotherapy, College of Basic Medical Sciences, University of Benin, Benin City Edo State. I am carrying out a research title “**PREVALENCE AND RISK FACTORS OF KNEE INJURIES AMONG THE UNIVERSITY OF BENIN ATHLETES**”. This research study will be conducted as part of the requirement for the award of Bachelor of Physiotherapy (B.PT). Your participation is voluntary and you are free to ask questions about the study and you are also free to withdraw at any time you desire. Your response will be strictly confidential and will be used solely for the purpose of this research. Please kindly include your signature and date if you are willing to participate.

Participant’s signature

.....

Researcher’s signature

.....

## Structured Researcher Designed Questionnaire

### Section A: Socio-Demographic Data

1. **Age:** \_\_\_\_\_ years
2. **Gender:**  
 Male     Female
3. **Level \_\_\_\_\_ of \_\_\_\_\_ Study:**  
 100    200    300    400    500    600 (if applicable)
4. **Department/Faculty:** \_\_\_\_\_
5. **Height (in cm):** \_\_\_\_\_
6. **Weight (in kg):** \_\_\_\_\_
7. **Do you have any known chronic health condition (e.g., asthma, diabetes)?**  
 Yes     No  
    o If yes, specify: \_\_\_\_\_

### Section B: Sports Participation Profile

1. **What type of sport do you actively participate in?**  
 Football    Basketball    Athletics    Volleyball    Handball    Tennis    Other: \_\_\_\_\_
2. **For how many years have you been participating in this sport?**  
 <1    1-2    3-4    5+
3. **How often do you train per week?**  
 Once    2-3 times    4-5 times    Daily
4. **How long does each training session typically last?**  
 <30 mins    30-60 mins    1-2 hours    More than 2 hours
5. **Do you participate in competitive matches?**  
 Yes    No

6. **Have you had any breaks or time off from training in the past year?**

Yes  No

○ If yes, for how long? \_\_\_\_\_

### Section C: Knee Injury History

1. **Have you ever had a knee injury?**

Yes  No

2. **If yes, how many times?**

Once  2–3 times  More than 3 times

3. **What type of knee injury did you experience?** (You may tick more than one)

Ligament tear (e.g., ACL, MCL)

Meniscus injury

Patella dislocation

Tendonitis

Fracture

Other: \_\_\_\_\_

4. **What was the main cause/mechanism of the injury?**

During sport  Accidental fall  Sudden movement  Unknown

5. **Was the injury on:**

Left knee  Right knee  Both

6. **How long ago did the most recent injury occur?**

<3 months  3–6 months  6–12 months  Over a year

7. **Did you receive any treatment?**

Yes  No

○ If yes, specify type: \_\_\_\_\_

8. **How severe was the injury at the time?** (Rate 1–10): \_\_\_/10

9. **Are you still experiencing pain?**

Yes  No

○ If yes, when?

During activity  At rest  Both

10. **Have you ever used crutches or a knee brace?**  
 Yes  No
11. **Has the injury affected your ability to train or play?**  
 Not at all  Slightly  Moderately  Severely
12. **Have you returned fully to sport?**  
 Yes  No

#### **Section D: Intrinsic Risk Factors**

1. **Do you have a history of any lower limb injury (other than knee)?**  
 Yes  No
2. **Did you receive rehabilitation for previous injuries?**  
 Yes  No
3. **How would you rate your flexibility?**  
 Poor  Fair  Good  Excellent
4. **Do you often feel tightness or stiffness in your leg muscles before training?**  
 Yes  No
5. **Have you been told by a medical or sports professional that you have muscle imbalance or weakness?**  
 Yes  No
6. **Do you have flat feet or abnormal leg alignment (e.g., bowlegs, knock knees)?**  
 Yes  No  Not sure

#### **Section E: Extrinsic Risk Factors**

1. **What kind of surface do you usually train or play on?**  
 Grass  Hard court/tarmac  Artificial turf  Mixed surfaces
2. **Do you wear proper sports shoes for your sport?**  
 Yes  No
3. **Do you use protective gear (e.g., knee pads, braces)?**  
 Always  Sometimes  Never
4. **Do you warm up before training or competition?**  
 Always  Sometimes  Never

5. **Do you do stretching exercises after training?**  
 Always  Sometimes  Never
6. **How would you describe your training intensity?**  
 Light  Moderate  Intense
7. **Do you feel fatigued during or after most training sessions?**  
 Yes  No
8. **Is your training supervised by a qualified coach?**  
 Yes  No
9. **Do you feel your training load is too much for your body?**  
 Yes  No  Sometimes