Musculoskeletal problems among recreational cricketers in Finnish cricket clubs

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Abstract

Cricket is a physically demanding sport involving repeated actions such as bowling, batting, and fielding, which can increase the risk of overuse injuries. The frequency of musculoskeletal (MSK) problems may vary depending on the player's position (batsman, bowler, etc.) and factors such as playing hours. The purpose of this cross-sectional quantitative study was to assess MSK problems among recreational cricketers and examine whether playing hours affect the development of MSK issues. The study also aimed to determine whether bowlers or batsmen experience more MSK problems. The sample consisted of male recreational cricketers from Finnish cricket clubs of ages 18-35 years, with training time of 2 days per week and playing cricket for more than 1 year were included in the study. Data was collected through a self-structured questionnaire, with the Nordic MSK questionnaire used to gather information on MSK problems. Data was analyzed by statistical test by using SPSS version 25. Chi-square was used to find out the association between musculoskeletal problems during the past 12 months between batsmen and bowlers. Point biserial correlation was used to find out the correlation between playing hours and the development of musculoskeletal problems during the past 12 months.

The results showed that shoulder pain, followed by lower back pain and knee pain, were the most prevalent MSK issues reported in the past 12 months and the past 7 days. Playing hours were not found to be correlated with the development of MSK problems over the last 12 months. Additionally, no statistically significant difference was observed in the frequency of MSK problems between bowlers and batsmen.

In conclusion, the study found that shoulder, lower back, and knee pain were the most common musculoskeletal issues among recreational cricketers in Finnish cricket clubs. Playing hours did not significantly affect the development of MSK problems over the past 12 months, and there was no notable difference in the prevalence of MSK issues between bowlers and batsmen.

Keywords/tags (subjects)

Musculoskeletal problems, cricketers, shoulder pain, low back pain

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1 Introduction

Because of the physical demands of their activity, athletes in sports such as football, cricket, and rugby are more likely to develop musculoskeletal issues and injuries. Cricket, although being a noncontact sport, carries a particular risk of chronic injury due to its rapid growth and high-intensity actions, such as batting, bowling, and fielding. These movements frequently put significant strain on the neck, back, shoulders, knees, and wrists, making these regions more vulnerable to accidents. (Kakouris et al., 2021; Rafferty, 2020). Cricket is an internationally popular sport, particularly in East Asia, that requires both physical endurance and strategic thinking to succeed. To improve performance, players frequently focus on maintaining high levels of physical fitness and strength, allowing them to accomplish the explosive movements required for the game. (Dhillon & Maini, 2023)However, the repetitive and high-impact nature of these activities raises the possibility of overuse injuries and chronic musculoskeletal problems. Addressing these issues is crucial, especially for recreational cricketers who may have limited access to professional training and rehabilitation options. (Ahmed, 2020)

Musculoskeletal difficulties are becoming a major health concern among recreational cricketers in Finland, particularly those who play for cricket clubs. This quantitative, descriptive cross-sectional study intended to investigate the frequency and kinds of musculoskeletal issues among recreational cricketers in this increasing group. Data collection included participants from various cricket teams in major Finnish cities who participated in the sport on a regular basis. With cricket becoming increasingly popular in Finland, it is critical to understand the physical health implications for participants. Cricketers frequently undergo physical strain as a result of repetitive motions and high-intensity play, which might predispose them to musculoskeletal problems affecting many body areas.(Rahman et al., 2019) By analyzing the types and frequencies of these disorders among players, this study hopes to provide light on the musculoskeletal concerns connected with recreational cricket. Highlighting these health problems is especially crucial for encouraging preventative tactics and emphasizing the significance of evidence-based treatment, which will allow players to better manage, reduce, or avoid injuries. These findings can help players, club administrators, and healthcare professionals raise knowledge about effective treatment, injury prevention strategies, and rehabilitation programs appropriate for this sporting demographic. Implementing preventative measures, like as training changes and focused conditioning, might improve long-term health

and player safety. The study emphasized the relevance of health education for recreational athletes and aims to develop a proactive culture of health management in cricket clubs throughout Finland, thereby allowing players to continue engaging in the sport safely.

This master's thesis is part of the Masters Degree Program in Jamk University of Applied Sciences. The study was carried out by Muhammad Raza Rind. Raza was responsible for data collection. The theoretical chapters were developed with an emphasis on expanding the overall knowledge base on musculoskeletal problems in cricketers. Data collection was conducted by Raza, and the data analysis was performed, ensuring thorough cross-checking throughout the analysis process.

2 Theoretical Basis

2.1 Cricket as a sport

Cricket, which has its roots in 16th-century England, has grown to be one of the most popular games in the world. Initially played in rural regions, it became more formalized and controlled in the 18th century with the establishment of official rules and regulations. Due to the sport's growth throughout the British Empire, cricket was initially introduced to several areas of Asia, the Caribbean, and Africa in the 19th century. The assimilation of cricket into these areas' cultures happened quite quickly (Alston & Williams, 2024).

In a 1597 court case, the sport was called "creckett," the first mention of it that has been found, indicating that young people in Surrey participated in it. This suggests that cricket was being played as early as 1550, at the very least. By the eighteenth century, cricket had become a structured sport with the establishment of the Laws of Cricket by the Marylebone Cricket Club (MCC) in 1788. These laws continue to regulate cricket matches today.(Mustafa, 2013) Millions of people watch major international competitions like the Cricket World Cup, which is organized by the International Cricket Council (ICC), which is in charge of cricket. The game is played in a variety of formats, including the traditional five-day Test matches, One Day Internationals (ODIs), and the shorter Twenty20 (T20) format, which has gained enormous popularity because it is exciting and fast-paced. (Basit et al., 2020).

Unbelievably, Finland has a long history with cricket. Helsinki Olympic Stadium hosted the first-ever game in history in 1953. Although there may have been some cricket activity in the 1960s, Helsinki Cricket Club was the name of the first recognized cricket club that was founded in 1972. However, larger-scale growth was sluggish, and further cricket clubs weren't established until the 1990s. Four member clubs created the Finnish Cricket Association (FCA) in 1999 as a direct result of this increasing participation. By the end of 2015, thirty registered cricket clubs, including Oulu CC and The Northern Lights CC in Oulu, covered every major city in Finland along with more remote places. In front of Mike Brearley, Lord Mervyn King, the MCC, and representatives of the Finnish government, the Kerava National Cricket Ground—the country's first entirely dedicated cricket ground—was formally inaugurated in 2014. The biggest turning point in Finnish cricket history was this occasion. The facilities must be up to international standards if the game is to endure in Finland in the long run.(ICC, 2024)

2.2 Structure and Gameplay

Cricket is a bat-and-ball game played on a rectangular field measuring 22 yards, with a wicket at either end. The field of play where the two primary actions of the game—bowling and batting—occur is established by this unique layout, which is crucial to how the game is played. The batting side's primary objective is to score runs by striking the ball that the opposing team bowls, while the fielding team aims to remove the batters and reduce their scoring opportunities. This dynamic leads to a complicated struggle between the two sides, where mental toughness, talent, and strategy are all crucial (Shah, 2017).

The eleven players from each of the two sides are further split into wicketkeepers, fast bowlers, spin bowlers, and batters. In addition to their assigned duties, players must field the ball for the length of their team's fielding session. Cricket matches take place on a rectangular pitch in the centre of an oval ground, with each side having 11 players. It contains batter, bowler, fielder, and wicketkeeper. After a run-up, the bowler throws a strong ball to the stumps 22 yards (20 m) away, with elbow straight and arm bent. The ball frequently bounces before hitting the batter. Batsmen score runs by hitting the ball with a unique wooden bat using various strokes. The fielders, especially the wicketkeeper behind the stumps, aim to prevent runs from being scored and knock down the batsman (Nasim et al., 2023).

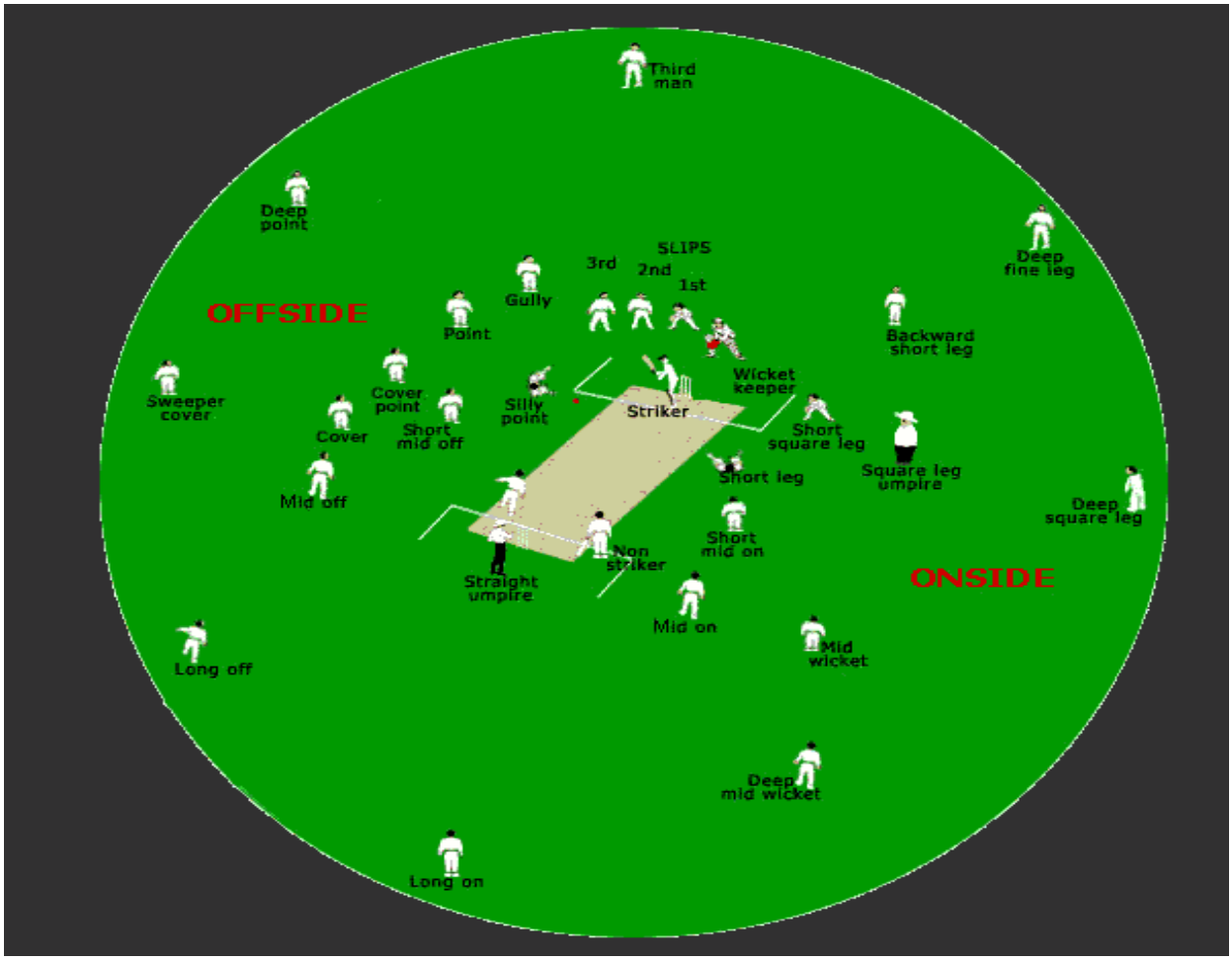


Figure 1 Cricket Fielding Positions(Prajapati, 2021)

Cricket is played in a variety of formats nowadays, including Twenty20 (T20), One Day Internationals (ODIs), and multiday contests such as Test cricket. T20 is a fast-paced format with 20 overs each side that usually lasts three to four hours, making it both exciting and commercially successful. ODIs include 50 overs each side and last roughly eight hours, delivering a balance of strategy and excitement. In contrast, multiday contests, such as Test cricket, last five days and emphasise stamina, technique, and long-term planning.(Olivier & Gray, 2018).

2.2.1 Three Main Disciplines of Cricket

The three main sports of cricket are bowling, fielding, and batting. The unique tactics and abilities needed for each discipline add to the game's overall complexity.

1. Batting: The art of batting involves more than just hitting the ball; timing, placement, and technique must all be fully grasped. The batsmen must assess the bowler's style and adjust their approach appropriately. Remarkable hand-eye coordination and a thorough understanding of the

game are characteristics shared by effective hitters. These abilities enable players to make snap judgements that have the power to alter an innings' course.

Batting involves rapid acceleration, deceleration, and quick velocity changes. Dashing between the wickets is a fast-sprinting movement triggered by direction alterations that occurs often between intervals of relative calm in which the batter stands stretched over their bat. This hunched position may create soreness in the lower back. Strained muscles and impact injuries are the most prevalent batting injuries! Impact injuries include those to the head and eyes.

Reports of particular eye injuries include globe ruptures and retinal detachments. Other serious batting injuries include fractures of the ribs, phalanges, and distal third of the ulna, as well as soft-tissue injuries to the abdomen, testicles, and upper leg (Noorbhai, 2020).

2. Bowling: is a crucial aspect of the game. Pace bowlers and spin bowlers are the two main categories of bowlers. Pace bowlers attempt to pass the batter by creating barriers with their bounce and pace. To keep the hitter guessing, they employ delivery variations including Yorkers, bouncers, and slower balls. Spin bowlers, on the other hand, rely on their ability to mislead batters by using spin and flight to induce mistakes. Bowlers need to understand the condition of the pitch and the limits of the batsman in order to be effective.

The bowler moves swiftly by adducting and inwardly rotating his shoulder, as well as flexing and moving his back to the opposing side. The ground response force that a bowler must absorb during a bowling stroke consists of vertical and horizontal components that are approximately five and two times the weight of the body at front-foot and rear-foot impact, respectively. The trunk and hand momentum produce lots of bowling speed, and shoulder injuries are also rather common. Bowlers are particularly susceptible to lower back problems. Ankle and knee injuries to the lower extremities are also prevalent as a result of the high impact and rotational stresses encountered when jogging prior to bowling.

Fast bowlers are more prone to develop these problems as a result of poor posture, poor bowling ability, inadequate physical or psychological qualities, and high physical demand due to overuse.

To limit the possibility of injuries, bowlers must be taught fundamental movement skills and stress-focused workouts that may enhance dynamic balance, hence minimizing the likelihood of injury (Callaghan et al., 2019).

3. Fielding: The fielding of a cricket team is often regarded as its cornerstone. Effective fielding may result in dismissals, pressure the batting team, and prevent runs from being scored. Field players must possess strong throwing arms, quick reflexes, and agility. Strategic fielder positioning greatly influences the outcome of a game. Different fielding stances are commonly used by teams to counter specific bowling and hitting strategies.

Wicket keeping is one of the most difficult specialty duties in cricket, requiring exceptional skill, stamina, and concentration. Every time the ball is delivered, a wicketkeeper is likely to catch it, thus they must be entirely attentive. The distinctive playing stance involves frequent diving for the ball, as well as repeated stooping and rising up. The wicketkeeper is the only player on the fielding side who can wear gloves and external leg guards. To further reduce injuries, the wicketkeeper may opt to wear a helmet with vented facial protection. Because of their diving, throwing, and catching, wicketkeepers are prone to all of the problems described for other cricket players. However, due of his unique crouching stance, he is especially vulnerable to long-term strains on the joints in his lower leg and back, in addition to these diseases. A wicketkeeper can get injuries by being struck by the ball directly, being struck by an indirect ball hit, overuse injuries, or adopting unique positions during the game. Any part of a wicketkeeper's body can be physically hurt, but his hands are particularly vulnerable (Wong et al., 2022).

Wicketkeepers play a crucial role behind the stumps, with duties that include collecting balls, stumping batters, and offering strategic advice to bowlers. As the only player positioned directly behind the batter, the wicketkeeper must be agile and alert to quickly respond to fast deliveries, potential stumping opportunities, and run-out chances. Despite each player having a specialized role, cricket is a highly collaborative sport, as all team members must contribute during their fielding session. Wicketkeepers often work closely with bowlers, providing guidance on field placements and adjusting tactics based on the situation. The team’s success relies on seamless communication and collaboration, with each player's actions directly impacting the overall performance.

Additionally, flexibility is essential for cricketers, as they must adapt to a variety of situations that arise throughout a match. Whether fielding in different positions, adjusting to changing weather conditions, or dealing with unexpected in-game events, players must be prepared to shift strategies and positions rapidly. This adaptability is especially important for wicketkeepers, who may need to adjust to different types of deliveries or batting styles, requiring quick decision-making and excellent hand-eye coordination. Ultimately, the dynamic and cooperative nature of cricket, coupled with players' ability to adapt, makes it a sport that thrives on teamwork and versatility. (Bailey et al., 2023).

2.3 Impact of commercialization of Cricket

The commercialization of cricket over the last 10 years has led to a large rise in the number of matches played yearly. This expansion necessitates a more professional and systematic approach to training, game preparation, and recovery, with a greater emphasis on applying scientific principles to optimize player performance and health. However, the scientific research needed to improve the efficacy of these systems is still lacking, even in one of the most organized sports, cricket.

Due to the commercialization of cricket, researchers are increasingly examining the specific requirements of players in contemporary cricket, with a primary focus on bowling and fielding skills. These aspects of the game have become more important as the sport has expanded and players now have to deal with harder schedules and more competitive levels.

Research highlights that, despite the increasing professionalization of cricket, there is still a significant need for more evidence-based approaches to player development, particularly in injury prevention and performance enhancement. While advancements in training techniques and fitness regimes have been made, integrating scientific research into these areas remains underdeveloped in many parts of the sport. By bridging this gap and utilizing data-driven insights, the cricket community can enhance player wellbeing, reduce injury rates, and improve overall performance outcomes. Scientific research on biomechanics, nutrition, and recovery techniques can help refine training methods, ensuring they are more effective and safer for players. Additionally, a focus on injury prevention strategies, such as proper warm-up routines and load management, can extend

a player's career and minimize disruptions due to injuries. As these practices become more widely adopted, they will contribute to not only the health and longevity of individual players but also the long-term success and sustainability of the sport itself. In the future, the integration of scientific knowledge into all aspects of player development will likely play a crucial role in advancing cricket as a professional sport, ensuring both the performance and well-being of athletes are optimized. (Awan et al., 2021).

Cricket players today are breaking records and creating new landmarks, thanks to intense training that improves their performance. Cricket nowadays has grown extremely competitive, serving as an important platform for national and worldwide prominence. In this setting, each participant strives to outperform their opponents. Cricketers undergo intense training and practice regimens to improve their abilities and physical conditioning in order to match the physical demands of the sport. Although cricket is considered a non-contact sport, players suffer injury risks due to the variety of physical actions required, including sprinting, throwing, diving, and catching (Pardiwala et al., 2018).

2.4 Musculoskeletal Problems in cricketers

Musculoskeletal disorders (MSDs) are injuries or discomforts affecting the musculoskeletal system, which includes joints, ligaments, muscles, tendons, nerves, and supporting structures in the neck, back, and limbs. Cricket players can suffer musculoskeletal pain from a variety of causes, including being struck by a cricket ball or bat, performing quick rotations, sliding and diving, colliding with other players, and developing overuse problems. It is critical for players to recognize that prevention is superior to therapy. MSDs can affect several regions of the body, such as the back, shoulders, knees, and wrist. Common musculoskeletal problems in cricket include sprains, strains, stress fractures, ligament tears, and overuse ailments. The risk of these injuries is impacted by factors such as anthropometric traits, training experience, and weekly practice hours, showing the sport's complicated injury incidence pattern (Rao et al., 2020a).

Musculoskeletal pain encompasses acute or chronic pain impacting bones, muscles, ligaments, tendons, and nerves, stemming from various musculoskeletal disorders. This type of pain is prevalent and significant socioeconomic and medical challenge globally, covering a range of pain syndromes, from localizes discomforts to neuropathic conditions (Busse et al., 2020).

The mismatch between the physical and postural exertion and the human body's capacity to support an external load led to musculoskeletal issues. Following load intensity, load frequency, and load duration, the recovery phase is crucial (Hamstra-Wright et al., 2021). Sports injuries vary greatly in nature and location, with joint injuries occurring in 5-60% of cases, muscle injuries in 20-60%, and tendinopathy in 10-50%. Furthermore, there are characteristics unique to the athlete, such as the in the neuromuscular system (Gurau et al., 2023).

A player may get musculoskeletal injuries from being struck by a ball or bat, from fast rotational movements, from sliding and diving, from collisions with other players, from overuse injuries, and from ball handle injuries that cause micro damage and large-scale injuries to the body. A single powerful and successful play results in a higher degree of harm (Farooqi et al., 2021). All of these would contribute to more serious musculoskeletal issues, which can manifest as a range of uncomfortable symptoms, including pain, exhaustion, muscle weakness, stiffness and restricted movement, loss of sensation and numbness, or localized swelling and elevated body temperature due to inflammation. (Smrutimeera Sahoo & Khamer Anisa Fathima, 2023)

A recent study found a 61% prevalence of musculoskeletal issues, with the lower back being the most often affected body component. Other common player ailments include the shoulder and ankle. Lower limb injuries are particularly common, affecting players in a variety of roles, including batters, bowlers, and all-rounders. These findings highlight the need of studying the many musculoskeletal problems that afflict cricket players in order to create tailored preventative methods (Bhushan & Vishwanath, 2023). Musculoskeletal disorders (MSDs) can impact different body regions such as the back, shoulders, knees, and wrists. In cricket, common musculoskeletal injuries encompass sprains, strains, stress fractures, ligament tear and overuse injuries. Additionally, the prevalence of musculoskeletal injuries is linked to factors like anthropometric characteristics, training experience, and practice hours per week, indicating a multifaceted nature of injury occurrence in this sport.

The research has lately shown an increase in concern about the long-term effects of returning to sports after injury, particularly with relation to the development of osteoarthritis (OA) and persistent joint discomfort. When joint damage and other pertinent factors are taken into account, research indicates that athletes who played while injured are far more likely to be diagnosed with OA and to experience chronic joint pain than athletes who did not play while ill.

Athletes competing at all levels, including recreational and professional cricket players, can benefit from this correlation. Moreover, the research demonstrates a noteworthy distinction in the health-related quality of life (HRQoL) between athletes who have had injuries and those who have not. A tendency seen in both professional and recreational athletes was that individuals who kept playing sports after being injured had lower physical HRQoL components. However, the degree of this physical HRQoL decline does not always correlate with clinically meaningful outcomes, suggesting that while the differences are statistically significant, their application may vary (Bullock et al., 2020).

2.5 Injuries in cricketers

Cricket places tremendous physical demands on players, resulting in a high rate of musculoskeletal (MSK) injuries. These injuries, which range from acute damage to chronic overuse, are caused by the repetitive, high-intensity movements required in batting, bowling, and fielding.(Mansingh, 2023)

2.5.1 Acute injuries

Acute injuries, such as fractures, sprains, and dislocations, are frequently caused by high-impact activities like diving or being hit by a ball. For example, shoulder dislocations are frequently observed in fielders during diving attempts.(Prabhakar & Pandey, 2015)

2.5.2 Overuse injuries

Repetitive loading without sufficient recovery leads to overuse injuries. For instance, bowlers frequently suffer from rotator cuff tendonitis because of their delivery stride's constant overhead motion.(Song, 2021)

2.5.3 Injuries risk associated with batting in cricket

Batting is one of the most physically demanding aspects of cricket. Hitting the ball involves explosive power, accuracy, and agility, as well as quick spine rotation and extension and strong upper-

limb motions. Repeated batting actions can lead to shoulder, elbow, wrist, and lower back ailments. For example, frequent swinging of the bat and the stress of hitting the ball can strain muscles and joints, perhaps resulting in tendinitis, muscle strains, or overuse injuries. Furthermore, the continual need for focus and position changes can lead to tiredness, raising the risk of injury over time.(Juniarto & Nurulfa, 2021)

2.5.4 Injuries risk associated with bowling in cricket

However, bowling is recognized as the most physically taxing facet of cricket, particularly among fast bowlers. It entails high-speed, repeated motions that strain many bodily parts. Bowling involves a high level of flexibility, strength, and endurance, putting a lot of strain on the shoulder, elbow, and lower back. Fast bowlers, in particular, are prone to problems such rotator cuff tears, shoulder impingements, and lower back discomfort as a result of their strong delivery stride and repetitive spinal rotation and extension. Furthermore, the severity of these motions over time can result in stress fractures in the spine or muscle strains in the lower back, which frequently necessitate lengthy recovery periods.(Singha et al., 2021)

While professional cricketers are more likely to get these injuries because to the frequency and intensity with which they play, club-level players are still vulnerable. Although they may play less regularly or with less intensity, the motions required for the activity are still rigorous, and the risk of injury remains considerable. Club players, who frequently lack the specialized training and recuperation tools that professional athletes have, are more prone to overuse injuries caused by repetitive activities. They may sustain identical ailments to their professional counterparts, such as rotator cuff tears, lower back strain, and knee soreness, all of which can have a substantial influence on their performance and general health.(Senington et al., 2020)

2.5.5 Injuries risk associated with fielding in cricket

Fielding, while less physically demanding than hitting or bowling, has distinct problems for cricketers. Fielders are frequently asked to run, dive, and change direction fast, which puts stress on their lower limbs. Constant running, especially in lengthier game styles, can result in overuse injuries, particularly to the knees, ankles, and hamstrings. Furthermore, the movement of throwing the ball, which needs both strength and quickness, puts stress on the shoulder and elbow joints. These

motions might cause tendonitis or ligament problems, especially if the athlete has been fielding for a long time or performs these maneuvers repeatedly.(Kawthalkar et al., 2024)

Shoulder injuries are particularly prevalent in cricket due to the repetitive overhead throwing and fielding maneuvers. Two main types of shoulder injuries are often observed: overuse injuries, commonly referred to as “thrower’s shoulder,” and acute traumatic injuries from falls or dives. Thrower’s shoulder results from poor technique, shoulder muscle imbalances, or inadequate conditioning and involves the rotator cuff muscles, often leading to pain, instability, and potential inflammation. (McLeod et al., 2020)

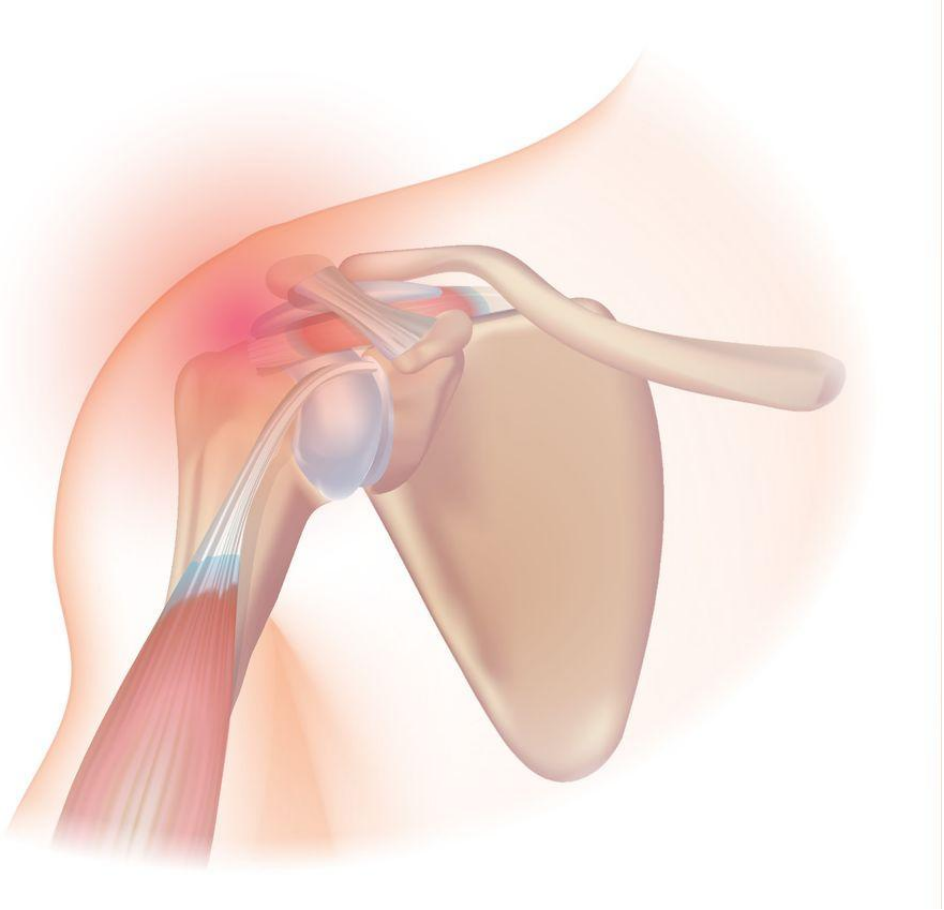


Figure 2 Thrower's Shoulder(Gormely, 2023)

Traumatic injuries in cricket are usually caused by rapid, powerful movements or mishaps while playing. One prevalent occurrence is when players fall while fielding, especially if they land on an outstretched arm.(Mall et al., 2013) This sort of fall can cause serious injuries, such as tendon rips, fractures, or joint dislocations. A torn tendon develops when the fibres that link muscles to bones become overstretched or burst. Because of the significant forces imposed on the shoulder during

the fall, the shoulder joint is particularly sensitive to such injuries when an arm is extended.(McLeod et al., 2020)

Figure 3 Shoulder Dislocation (Walden, 2024)

Head injuries, though less common than MSK injuries, are also of concern, especially in younger players. These injuries can result from high-speed impacts with the cricket ball, causing fractures, bruising, and sometimes concussions. Symptoms of concussion include memory loss, confusion, and poor coordination, and often require medical evaluation to rule out severe complications such as intracranial bleeding. (McLeod et al., 2020)

Lower back injuries are another area of significant concern, particularly for bowlers, who are prone to stress fractures, disc injuries, and spondylolisthesis due to the repetitive bending and twisting motions inherent in their bowling actions. These injuries are also seen in batsmen and wicketkeepers, who often experience similar physical strains. Poor bowling technique, overuse, and inadequate physical preparation can exacerbate these injuries, emphasizing the need for correct biomechanics and core strengthening exercises as part of a preventive approach.(Bee, 2024)

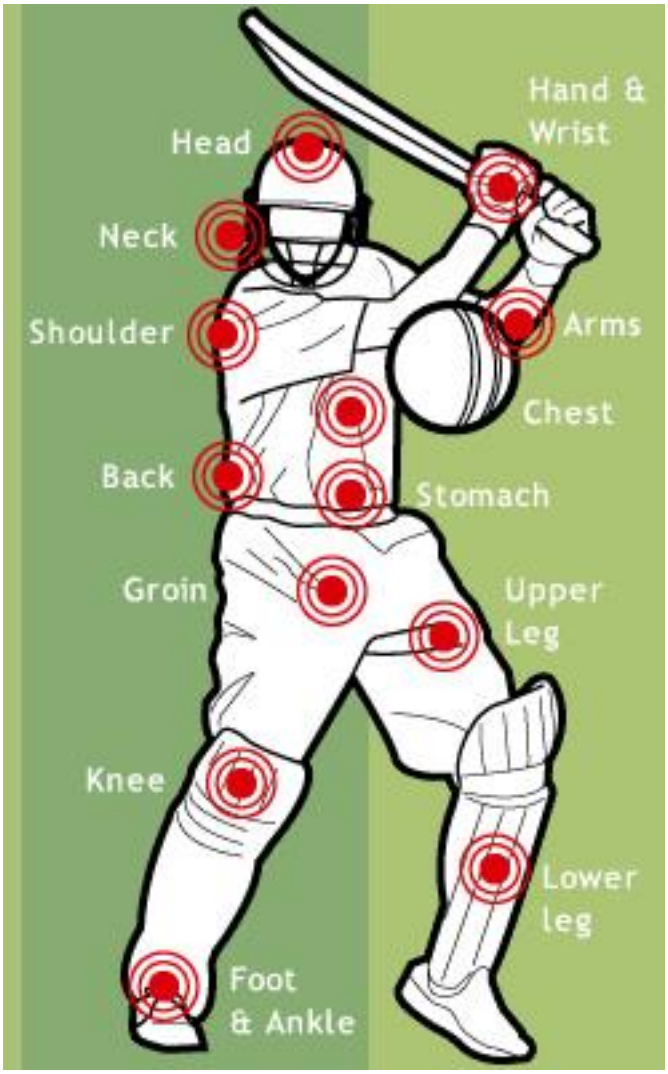


Figure 4 Injuries of Shoulder Joint("Cricket Shoulder Injuries.,")

Elbow injuries, including conditions like tennis elbow and thrower's elbow, arise from improper batting and bowling techniques and are exacerbated by overuse and strain on the forearm. These injuries cause localized pain in the elbow, which can radiate to the wrist and fingers, affecting grip and overall performance. Rehabilitation often includes physiotherapy to address muscle imbalances and correct technique, which can help reduce the risk of recurrence. Other common injuries include lower limb issues, such as knee and ankle injuries, which result from rapid direction changes and high-impact landings. These injuries, particularly common in fast bowlers and fielders, can include strains, sprains, and in some cases, fractures. For instance, jumper's knee, or patellar tendinopathy, is frequently seen in players who repetitively jump and land.

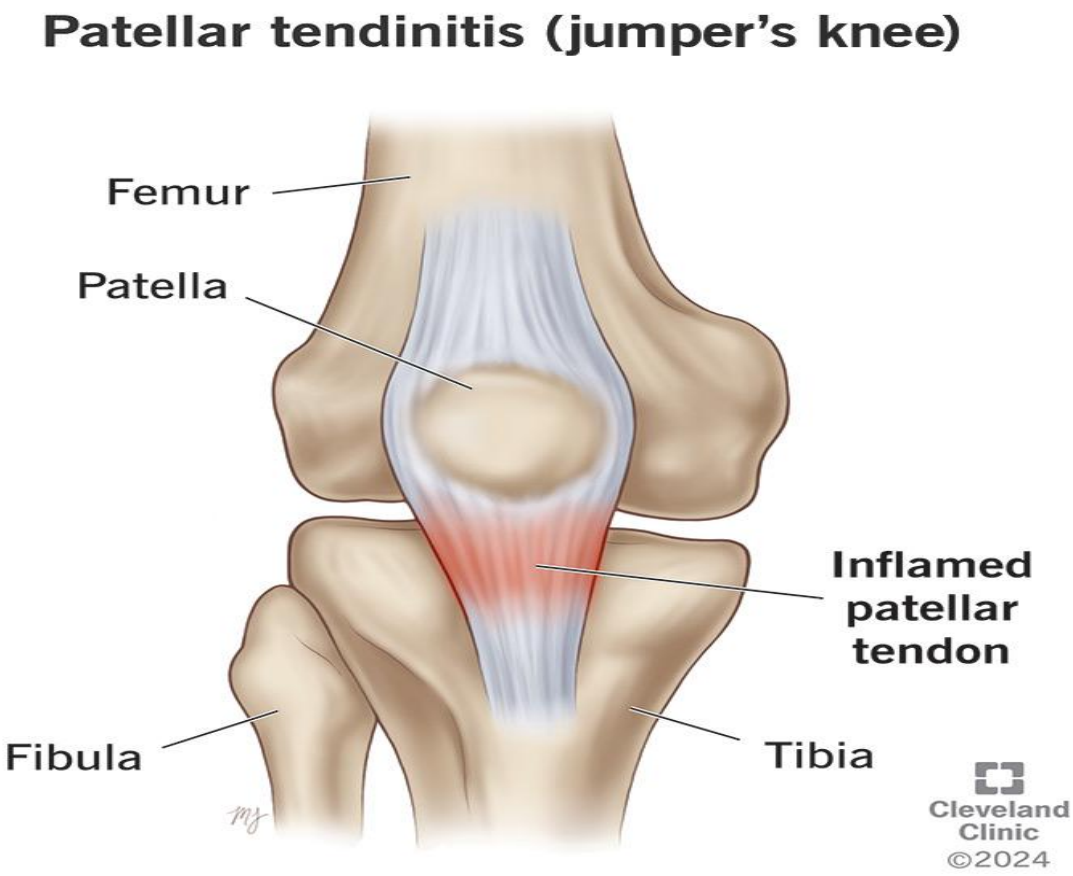


Figure 5 Patellar Tendinitis(*Patellar Tendinitis (Jumper's Knee)*, 2024)

Management of knee injuries typically involves rest, physical therapy, and the use of support braces. In addition to the lower back, shoulder, and limb injuries, cricket players are susceptible to injuries in other regions, such as the chest, abdomen, groin, hands, and wrist. Contusions and fractures in these areas can occur from direct impacts with the ball, while groin strains are common due to rapid lateral movements. Hand injuries, particularly fractures in the fingers, often occur from high-impact ball contact, especially for wicketkeepers and batsmen. (Kawthalkar et al., 2024)

Rehabilitation for these injuries includes rest, immobilization, and gradual reconditioning to ensure full recovery and prevent future occurrences. Overall, the complex and repetitive movements required in cricket put players at considerable risk for MSK injuries, underscoring the importance of injury prevention through proper technique, strength conditioning, and adequate recovery protocols. Understanding these injury mechanisms is crucial for developing role-specific

training and rehabilitation programs to mitigate risks, optimize performance, and enhance players' long-term health and resilience.(Smith-Ryan et al., 2020)

2.6 Risk factors for musculoskeletal problems in sports

In sports medicine, musculoskeletal injuries (MSK-I) are among the most serious health issues. They can have a negative impact on an athlete's performance, result in significant financial consequences, and force players to miss practice and competition. Depending on the sport, there are differences in the frequency of injury kinds and sites. For example, tendinopathy can cause 5–60% of injuries, joint injuries can cause 20–60%, and muscle injuries can cause 10–50%.
There are both modifiable and non-modifiable variables linked to MSK (Goes et al., 2020).

The number of overs (a set of six consecutive deliveries bowled by a single bowler) bowled, player position, weather, and playing time are examples of extrinsic influences. Postural abnormalities, bowling/batting technique, and physical fitness (muscular strength, flexibility, balance, and biomechanics) are examples of intrinsic risk factors.(Zondo et al., 2023) Players at the community level lack the necessary equipment, physiological adaptability, and training. As a result, they are more vulnerable to issues with upper extremity overuse brought on by frequent ball tossing as well as muscular tension and injury, particularly in the event that there is not enough downtime for recuperation. Moreover, injuries at the community level frequently go unreported and untreated; they might only appear during game time and be serious enough to require medical treatment (Olivier et al., 2020).

Cricket players are more likely to suffer from MSDs due to high-impact movements, repetitive motions, inadequate rest and recuperation, poor technique, overtraining, and inadequate fitness. Furthermore, participating in Weather and various surfaces, such as grass, artificial turf, and concrete, can raise the possibility of getting hurt (Ali et al., 2023). A range of variables have been linked to acute injuries in young cricket players, including overuse, insufficient preparation and training, incorrect technique, unsuitable musculoskeletal demands, and environmental factors. These investigations focused on ocular splenic rupture, acute multisystem injuries, and other diseases rather than musculoskeletal concerns. Extrinsic and intrinsic risk factors combine to predispose a person to sports-related injuries (Dube et al., 2018).

2.7 Influence of Training, Technique, and Physical Conditioning on Musculoskeletal Problems in Recreational Cricketers

The physical strain that recreational cricket players face might result in a number of musculoskeletal issues. To mitigate these problems and improve player performance, it is essential to comprehend the impact of training, technique, and physical fitness. This section examines the ways in which these variables interact to impact recreational cricket players' lifespan and general health.(Noorbhai & Khumalo, 2021)

2.7.1 Training Regimens

Effective training programs are essential for developing the strength, endurance, and agility required in cricket. A well-rounded approach includes:

Strength Training: It focusses on increasing physical endurance and explosive power. Squats, deadlifts, and specialized cricket drills all improve core stability and lower body strength, which is essential for both batting and bowling success. (Pasqualin Cavalheiro et al., 2024)

Conditioning Workouts: These activities enhance cardiovascular fitness and recuperation. Aerobic training, agility drills, and sport-specific motions assist players adapt to cricket's high-intensity bursts. For example, high-velocity strength training prepares muscles for the sudden acceleration and deceleration necessary during play.(Pasqualin Cavalheiro et al., 2024)

Pre-Season vs. In-Season Training: Training methods fluctuate greatly between the pre-season and during-season seasons. During the pre-season, players concentrate on developing a strong fitness foundation via increased strength and endurance training. In contrast, in-season training focusses on maintaining fitness levels while minimizing tiredness to avoid injuries(Pasqualin Cavalheiro et al., 2024).

2.7.2 Impact of Bowling and Batting Techniques

Bowlers are especially vulnerable because of the repeated nature of their motions, which can result in overuse injuries if not appropriately handled.

Bowling Technique: Proper biomechanics are essential for decreasing stress in the lower back and shoulders. Bowlers must maintain proper posture and use their legs correctly to produce force while minimizing strain. **Batting Technique:** Batsmen frequently sustain lower extremity injuries when running between wickets. Emphasizing excellent footwork and body mechanics might help reduce these hazards by ensuring that athletes engage their core and legs correctly during explosive movements(MacDonald, 2015).

2.7.3 Physical Conditioning

Physical fitness is critical in preparing cricketers for the demands of the game. A complete conditioning program should include the following:

Aerobic conditioning improves overall stamina and recovery capacity. Jogging, swimming, and cycling boost cardiovascular fitness, allowing players to perform at better levels during contests. Strength and Flexibility Training: Regular strength exercise strengthens muscles and joints, lowering the incidence of injury. Flexibility exercises improve range of motion, which is especially crucial for bowlers who need significant shoulder mobility. (Lim et al., 2023)

2.8 Physiological demands of cricket

Cricket is a physically demanding sport that requires a combination of strength, agility, endurance, and flexibility. The sport consists of repeated high-intensity motions including sprinting, throwing, and hitting, alternating with periods of low activity. Explosive power is required for bowling and striking the ball, whilst speed and agility are required for quick fielding and dashing between wickets. Additionally, shoulder and grip strength are essential for good bowling and keeping control during hitting. Cricket has a wide range of physiological demands that necessitate the use of both aerobic and anaerobic energy systems. Players require cardiovascular endurance to maintain performance during lengthy matches that can last several hours or even days. Anaerobic capacity is also essential for short bursts of vigorous activity, such as sprinting, bowling, or striking forceful shots.(Dar & Singh, 2024)

2.9 Prevalence of musculoskeletal problems in cricketers

Cricket, as a sport requiring complex movements involving batting, bowling, and fielding, imposes considerable stress on various body regions, leading to a notable incidence of MSK injuries. Studies examining the prevalence of MSK issues in cricket players provide valuable insights into the specific injury patterns associated with different playing roles. Previous studies have been conducted on cricketers which have determined musculoskeletal problems in cricketers.

2.9.1 Analysis of Pain severity and affected body regions

In a study done by (Ali et al., 2023) Based on the presented data, 77.6% of the cricket players reported experiencing moderate pain, 5.2% mild discomfort, and 17.2% severe pain on the visual analogue pain scale. Although the players' most sore spots varied, the lower back was the most often affected, with 35.3% of them saying that was where they felt the most pain. According to 26.7% of respondents, the upper limb (shoulder, elbow, and wrist) was the second most painful location. Of the athletes, 15.5% claimed to have the most pain in their upper back, while 18.1% experienced discomfort in their lower limbs (hip, knee, and ankle). Merely 4.3% of participants reported that their neck ached more than any other area. Upon examining specific player positions, the lower back was the most often cited source of difficulty among batters. Bowlers made up 26.7% of the participants, and their most prevalent complaint was shoulder soreness, followed by injuries to other body parts. In summary, it was discovered that a considerable number of Sindh cricket players suffered from musculoskeletal diseases, with lower back discomfort being a prevalent complaint among both bowlers and batsmen. This was probably brought on by the sport's high physical demands and repeated motions. Furthermore, bowlers often complained of shoulder pain, which may have resulted from the powerful and repeated overhead motions needed to bowl. The results emphasized the need of introducing injury prevention initiatives and focused interventions catered to the unique requirements of cricket players. It was concluded that the risk of musculoskeletal problems might be decreased by engaging in appropriate biomechanics training, strength and conditioning activities, and adequate warm-up procedures. Additionally, physiotherapy, sports medicine therapies, and customized rehabilitation techniques were essential in reducing the pain and suffering that cricket players were experiencing. (Ali et al., 2023)

Different pain patterns were shown by role-specific analysis: because batting requires bending and twisting, batsmen primarily reported lower back discomfort. However, because bowling involves a lot of kinetic energy and frequent overhead motions, bowlers reported the most discomfort in the shoulder area. Notably, bowlers made up 26.7% of the sample as a whole, and 38% of them experienced upper limb ailments, such as problems with the shoulder, elbow, and wrist. Due to their role's frequent, violent movements, which put a lot of strain on their joints, bowlers are particularly susceptible to upper limb injuries, as evidenced by this high prevalence. Overall, the results show that cricket players frequently experience moderate to severe discomfort, with the upper limb and lower back being the most commonly affected areas. The study emphasizes the critical need for focused interventions to avoid injuries and manage pain, especially for high-risk populations like bowlers. Optimized load control, enhanced procedures, strengthening and flexibility exercises, and early physiotherapy interventions are examples of effective strategies. These steps are crucial for lowering the chance of developing chronic pain, increasing player longevity, and raising cricket players' general performance.(Ali et al., 2023)

2.9.2 Musculoskeletal Pain Patterns in Cricket Players: Insights into Affected Body Regions and Role-Specific Stress

In a study done by (Yadav & Kaur, 2023) examined a sample of 127 cricket players, categorizing them into three main roles: batsmen (45%), bowlers (10.6%), and all-rounders (44.4%). This distribution highlights a balanced representation of player roles, with a significant proportion being all-rounders, who typically engage in both batting and bowling, increasing their exposure to diverse physical stresses. The results indicate notable prevalence rates of pain across various anatomical sites, reflecting the common injury patterns observed in cricket due to repetitive strain and high-impact activities. Shoulder pain was the most frequently reported, affecting 44.10% of participants. This finding is consistent with previous research, emphasizing the high incidence of shoulder issues, particularly among bowlers and all-rounders who perform repetitive overhead movements. Wrist pain was reported by 27.50% of players, likely stemming from the gripping and impact forces during batting and fielding. Elbow pain was also prevalent, affecting 20.50% of participants, and is often associated with repetitive strain injuries like tennis elbow, exacerbated by frequent batting and throwing actions. Upper back pain was reported by 21.30% of the players, which may be linked to the muscle strain and poor posture during prolonged fielding or when bowling with suboptimal technique. Lower back pain was even more common, affecting

28.30% of the participants. This aligns with existing literature suggesting that lower back injuries are particularly prevalent among fast bowlers due to the high torsional forces exerted on the spine during the bowling action. Hip pain was experienced by 23.60% of the players, a common issue in cricket due to the sudden lateral movements required during batting, bowling, and fielding. Knee pain was reported by 30.70% of participants, reflecting the significant load-bearing demands placed on the knee joints during running, jumping, and landing activities, which are integral to cricket performance. Ankle pain affected 29.90% of the players, indicating the susceptibility of this joint to injuries during abrupt directional changes and the repeated impact of landing during bowling. The findings highlight the widespread nature of musculoskeletal pain among cricketers, affecting multiple anatomical sites and underscoring the need for comprehensive injury prevention strategies. This includes targeted conditioning programs, enhanced technique training, and appropriate load management to address the specific demands placed on different body regions, particularly for players who engage in both batting and bowling. The high prevalence of pain across various sites also suggests that early intervention and continuous monitoring are essential to prevent the progression of minor discomfort into more severe and chronic injuries.

2.9.3 Demographics and Injury Patterns in Cricket Players: Age, Role, and Regional Prevalence of Injuries

The findings of the study done by (Rahman et al., 2019) reveal key insights into the demographics, injury patterns, and management strategies among cricket players, emphasizing the prevalence of injuries within specific age groups and player roles. The data indicate that the peak age group for injuries was among players aged 18-20 years, accounting for 45% of all recorded cases. This suggests that younger players, who are likely involved in intense training and matches as they establish their professional careers, may be at greater risk due to the physical demands of the sport and the potential lack of fully developed musculoskeletal strength. Bowlers were identified as the most affected group, making up 60% of the total injuries. This finding is consistent with previous literature that highlights the high incidence of injuries among bowlers due to the repetitive and high-impact nature of bowling actions, which place significant stress on the upper and lower body. Shoulder injuries were the most common regional injury, reported by 40% of the participants, with a significant proportion (25%) diagnosed with rotator cuff injuries. The high rate of shoulder injuries aligns with the biomechanical stress placed on this joint during overhead movements such as bowling and throwing. Rotator cuff injuries, in particular, are often associated

with repetitive strain and overuse, exacerbated by improper technique or inadequate muscle conditioning.

In addition to shoulder injuries, hand and finger injuries were prevalent, affecting 20% of the players, with metacarpophalangeal (MCP) joint injuries reported in 16% of cases. These injuries are typically sustained during fielding and catching, where the fingers and hands are subject to sudden impact forces. Thigh and hip injuries were also common, with groin pain reported by 30% of the players. Groin injuries are frequently observed in cricket due to the sudden lateral movements required during running, batting, and fielding. Knee and leg pain affected 20% of the participants, highlighting the impact of repetitive jumping, running, and landing activities inherent in the sport. (Rahman et al., 2019). The study also found that the majority of injuries (71%) were classified as indirect or overuse injuries, underscoring the importance of workload management and the need for adequate rest and recovery periods. Overuse injuries are often a result of cumulative strain from repetitive activities without sufficient time for tissue repair, which is a common issue in sports with prolonged training schedules. Regarding the severity of injuries, the study observed that 45.2% of the cases were classified as moderate injuries, indicating that while many injuries did not require immediate surgical intervention, they nonetheless resulted in significant functional impairment and time away from the sport. This highlights the need for effective rehabilitation protocols to prevent the progression of moderate injuries into chronic issues that could hinder long-term performance. Interestingly, a high percentage of participants (98%) reported regular engagement in warm-up and cool-down exercises, with 54% dedicating at least 16 minutes to these activities. This adherence to warm-up and cool-down routines suggests widespread recognition of their importance in injury prevention, as these activities are known to enhance flexibility, increase blood flow, and prepare.(Rahman et al., 2019)

2.9.4 Injury Patterns and Management in Cricket Players: Insights into Age, Role-Specific Risks, and Seasonal Trends

The study by (Rao et al., 2020b) offers a thorough examination of cricket injuries, emphasizing the players' anthropometric traits, injury trends, and risk variables. The average age, height, and weight of the cohort were 24.71 years, 173.51 cm, 68.40 kg, and 22.70 kg/m2, respectively. They also had an average of 5.60 years of cricketing experience. 35 serious injuries were documented in the study, with the shoulder accounting for 22.85%, the lumbar spine for 17.14%, the knee for 11.42 percent, and the thigh for 8.57 percent. The high frequency of lumbar spine

and shoulder injuries is in line with previous research, which attributes them to cricket's frequent rotational motions and repetitive overhead motions. There was a considerable burden of soft tissue damage, with muscle injuries accounting for 40% of all injuries, followed by fractures (28.57%), tendon (14.28%), and ligament injuries (11.42%). According to a role-specific analysis, the most common injuries were sustained by batters and medium pacers (25.71%), fast bowlers (20%), and wicketkeepers (8.57%). 42.85% of injuries occurred during fielding exercises, whereas 40% occurred during bowling, indicating that high-intensity sports raise the risk of injury. The majority of overuse injuries (62.86%) occurred in medium and fast bowlers, with players between the ages of 18 and 24 accounting for 37.14% of these instances. Additionally, the study discovered that players who were dominant with their right hand (74.28%) and right leg (77.14%) were more likely to sustain injuries, with the contralateral side of the dominant limb showing a significant pattern of injuries. Younger players (18–24 years old) were especially affected by lumbar spine injuries, which caused the largest loss of play days (34.64%), accounting for 45% of injuries and 56% of lost playtime, highlighting their susceptibility to serious injuries. The greatest percentage of lost play days (45.95%) was incurred by medium pacers, highlighting the risk and physical demands of this position. According to a seasonal study, injuries peaked in December (20%), most likely as a result of more intense training and games. Physiotherapy and medicine were the mainstays of injury management, with 11.42% of instances involving surgical interventions. These results emphasize the need for improved conditioning programs and conservative treatment approaches to reduce recovery time and preserve player longevity in the sport. They also highlight the significance of customized injury prevention strategies that focus on age-related vulnerability, role-specific demands, and dominance patterns to improve player safety and performance.

2.9.5 Prevalence and Patterns of Musculoskeletal Injuries Among Club-Level Cricket Players: Role-Specific Risks and Injury Prevention Implications

A cross-sectional study conducted on 125 male cricket players by (Sathya & Parekh, 2017) at the club level sought to determine the prevalence of MSK problems in this population, utilizing the Modified Nordic Musculoskeletal Questionnaire to capture comprehensive data on pain and discomfort in various body regions. The findings indicated that 61% of players reported experiencing cricket-related MSK issues over the past 12 months, underscoring a significant burden of injury within this group. Among the reported injuries, the lower back, ankles, and knees emerged as the most commonly affected areas, suggesting that cricket-related physical demands heavily impact

these regions. The study aligns with previous research, which has similarly identified the lower back as a particularly vulnerable area due to the twisting, bending, and load-bearing movements involved in batting and bowling. The study also highlighted differences in injury prevalence across player roles. All-rounders exhibited the highest incidence of MSK problems at 70%, followed by bowlers at 60% and batsmen at 42%. These findings suggest that all-rounders, who participate in both batting and bowling activities, face compounded physical demands, making them more susceptible to injury. Specifically, the study noted that ankle and foot injuries were most common among all-rounders, while lower back pain was a significant issue for both bowlers and batsmen. This pattern is consistent with previous literature, which identifies that repetitive bowling and high-impact batting actions impose strain on the lower back, leading to higher injury rates in this region among bowlers and batsmen. In terms of injury types, strain and sprain were the most frequently reported, with rates of 42% and 26%, respectively. This finding echoes earlier studies that have shown strains and sprains to be prevalent in sports requiring dynamic and repetitive motions. Strains, often resulting from overuse or sudden high-intensity movements, and sprains, due to rapid shifts and impacts, are common in cricket, where players frequently change direction, accelerate, and decelerate. These types of injuries are known to impact player performance and may require extensive recovery time, emphasizing the need for effective injury prevention strategies. (Sathya & Parekh, 2017) Overall, this study adds to the growing body of evidence that cricket players, particularly at the club level, experience a high prevalence of MSK problems. The findings reinforce the importance of tailored injury prevention and management programs that address the unique physical demands of each playing role. By highlighting the high rates of lower back, ankle, and knee injuries, as well as the prevalence of strains and sprains, this research underscores the need for targeted conditioning, strength training, and recovery protocols to mitigate injury risks and promote long-term player health.

3 Research Question, Purpose and Objectives

Regarding the prevalence of musculoskeletal issues among Finnish recreational cricket players, there is currently no published literature. Comprehensive study in this area can be beneficial, though, in a few distinct ways. The aim of this study is to find out how common musculoskeletal issues are among recreational cricket players in Finland and to look into any possible links between playing time and the occurrence of musculoskeletal injuries. This study intends to give useful insights for healthcare professionals, including physiotherapists, to better understand and address the difficulties faced by cricket players, especially with regard to common musculoskeletal complaints like shoulder, back, and neck pain. In the end, the results will aid in the creation of training plans and safety regulations, enhancing the general well-being and productivity of Finnish cricket players.

The main research question of this study was

1. What is the prevalence of musculoskeletal problems among cricket players playing in finish cricket clubs?
   An additional research question is:

2. Is there any correlation between the number of playing hours and the prevalence of musculoskeletal problems in the past 12 months cricketers?
   And other additional research question is:

3. Does bowlers report more musculoskeletal problems in past 12 months compared to batsmen in cricket?

4 Material and Methods

4.1 Study Design

This study used a quantitative research technique, which included numerical examination of data using statistical tools. Quantitative approaches are useful in research that seek to explain, describe, map, compare, or forecast different components, features, experiences, or events. This strategy allows for a wide comprehension of the correlations and contrasts between variables (Ghanad, 2023). The decision to use a quantitative technique in this study was motivated by the research objective, purpose, and questions. Descriptive cross-sectional study design was used. It is an appropriate design when the goal is to describe the characteristics of a specific population at one point in time (Ali et al., 2023).

4.2 Player Recruitment

The sample size for this study was calculated using Raosoft, a statistical tool often used for calculating ideal sample sizes in research. According to Raosoft's suggestions, a sample size of 80 participants was recommended, when the margin of error was set to 5%, confidence interval 95%, population size 100 and the response distribution was 50%. The study used non-probability convenience sampling to collect information, which was a realistic decision that permitted data collection within time and resource limitations. This selection strategy entailed selecting participants who were conveniently available and eager to participate, allowing for a more efficient procedure that was appropriate for the study's design and time frame (Stratton, 2021).

Data collecting lasted three months, from June to August 2024, and was aimed especially at Finnish cricket clubs. This setting provided a constant and appropriate population sample to investigate the study topics. The study also developed certain inclusion criteria to assure participant relevance and consistency. Cricketers were eligible to participate provided they matched specified criteria related to the study's topic. These criteria served to ensure data quality by ensuring that only participants who satisfied the study's established parameters participated to the findings.

- Male cricketers
- Ages between 18- 35 years
- Training time of 2 times per week (or 1 hour per week)

- Playing cricket for more than 1 year

Those cricketers who meet the following criteria as described below were excluded in the study

- Recent injury/facture to lower extremity during the last 6 months
- Recent injury/fracture to upper extremity during the last 6 months
- Receiving physical therapy for musculoskeletal injuries

Cricket players who met the inclusion criteria were enrolled as part of the data collection process.

4.3 Data Collection

The method of gathering demographic information was through a self-structured questionnaire. Participant's age, height, weight, playing hours, and playing days per week were recorded in this self-structured questionnaire. The Nordic Musculoskeletal Questionnaire (NMQ) is a standardized tool used to measure discomfort in various body areas. It was designed to assess the prevalence of musculoskeletal disorders (MSDs) and identify patterns of discomfort in the neck, shoulders, upper back, lower back, arms, and legs.(Kuorinka et al., 1987) Participants were questioned about their experiences with pain or discomfort in these regions for a certain time period, generally the last 7 days or 12 months, with an emphasis on the impact of these symptoms on daily activities or work performance and visit to the physician due to these problems in past 12 months. These basic questions give an overview of the respondent's musculoskeletal health, assisting in the identification of both acute and chronic disorders, as well as any healthcare needs resulting from these symptoms.

Following the core questions, NMQ includes 36 specialized questions that investigate pain and discomfort in various body locations. The NMQ examines nine key areas, including the neck, shoulders, upper back, elbows, wrists/hands, lower back, hips/thighs, knees, and ankles/feet, using three primary dimensions: the presence of symptoms, their impact on daily functioning over the previous 12 months, and whether the respondent sought medical consultation during that time. By addressing each region in this level of detail, the NMQ creates a complete profile of musculoskeletal complaints that includes both localized and general disorders. This granular method sheds light on how musculoskeletal discomfort may impact the respondent's quality of life, everyday activities, and potential need for healthcare intervention. The systematic emphasis across body parts allows health providers to uncover trends in musculoskeletal pain, which informs focused prevention or treatment efforts for populations affected by these illnesses.

The NMQ was created to be simple to administer and has since become frequently utilized in epidemiological studies, occupational evaluations, and clinical research to track musculoskeletal health across populations (Kuorinka et al., 1987).

All the players enrolled in the study signed an informed consents and all the information gathered was considered confidential, and it was used for research study only.

5 Statistics

IBM Statistical Package for social sciences (SPSS) version 25 was used to analyze data after data collection.

Descriptive statistics were used to summarize the participants demographic and activity-related variables, such as age, height, weight, BMI, number of days played per week, and hours played per week. The mean and standard deviation for each of these variables were computed in order to present an overall picture of the sample's characteristics.

To analyze musculoskeletal (MSK) issues over time, frequency distributions were calculated. Frequencies were found for MSK issues reported in the previous 12 months and the previous 7 days. Furthermore, frequencies were determined for activities that were canceled owing to MSK difficulties in the previous 12 months, as well as the number of physician consultations for MSK symptoms during the same time period.

To examine the correlation between playing hours and the prevalence of musculoskeletal problems during the past 12 months, point biserial correlation test was applied. Playing hours were used as continuous variable and musculoskeletal problems of each body region were used as categorical variables. Interpretation of the value of correlation coefficient was done by according to the guidelines. In which 0.00-0.10 (very weak correlation), 0.10-0.39 (weak correlation), 0.40-0.69 (Moderate correlation). 0.70-0.89 (Strong correlation), 0.90-1.00 (very strong correlation)(Schober et al., 2018).

To determine whether bowlers or batsmen had greater MSK issues, a Chi-square test was used. A p-value of less than 0.05 was used to determine statistical significance. It was carried out to investigate whether there were any significant variations in the prevalence of MSK disorders across bowlers and batters. Player role (batsman or bowler) was set as in the row variable and the specific region (e.g., neck problem) was set in the column variable.

6 Results

Questionnaires were distributed to eighty-four male cricket players who were active members of Finnish cricket clubs. Cricket players were requested to fill out the research questionnaire during a

cricket match in Jyvaskyla, and more participants were contacted via online forms to gather data. In the end, 75 completed forms that fulfilled the participation requirements were added to the study. Since the remaining nine forms didn't fit the criteria to be included in the study, they were excluded.

6.1 Players Characteristics

The demographic features and play frequency of the research participants were as follows

Table 1 Demographics details of cricketers

Variables	**Mean**	**Std. Deviation**
Age (years)	27.35	±5.13
Height(cm)	176.81	±8.82
Weight(kg)	75.19	±11.90
BMI	24.16	±4.20
Playing days/week	2.44	±0.72
Total hours played/week	6.96	±3.76

The average age was 27.35 years (±5.13). The average height was 176.81 cm (±8.82), while the average weight was 75.19 kg (±11.90). The average Body Mass Index (BMI) was 24.16 (±4.20), which is considered normal. Participants reported playing an average of 2.44 days per week (±0.72) for a total of 6.96 hours per week (±3.76). These data describe the individuals' general physical and training qualities, offering a complete picture of their profiles.

6.2 Position of Player

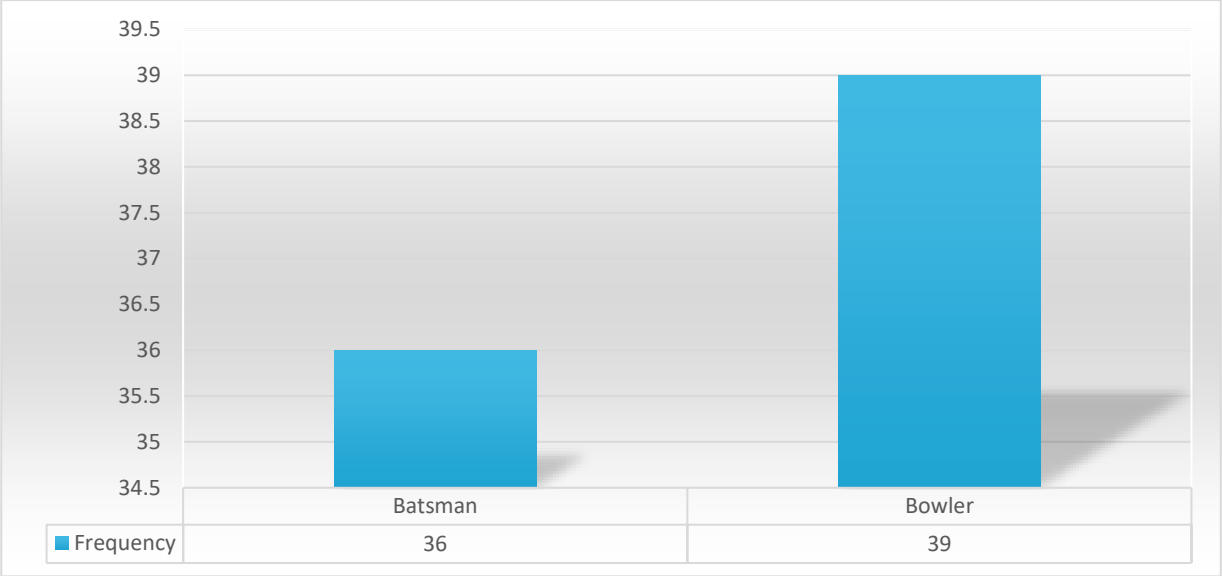
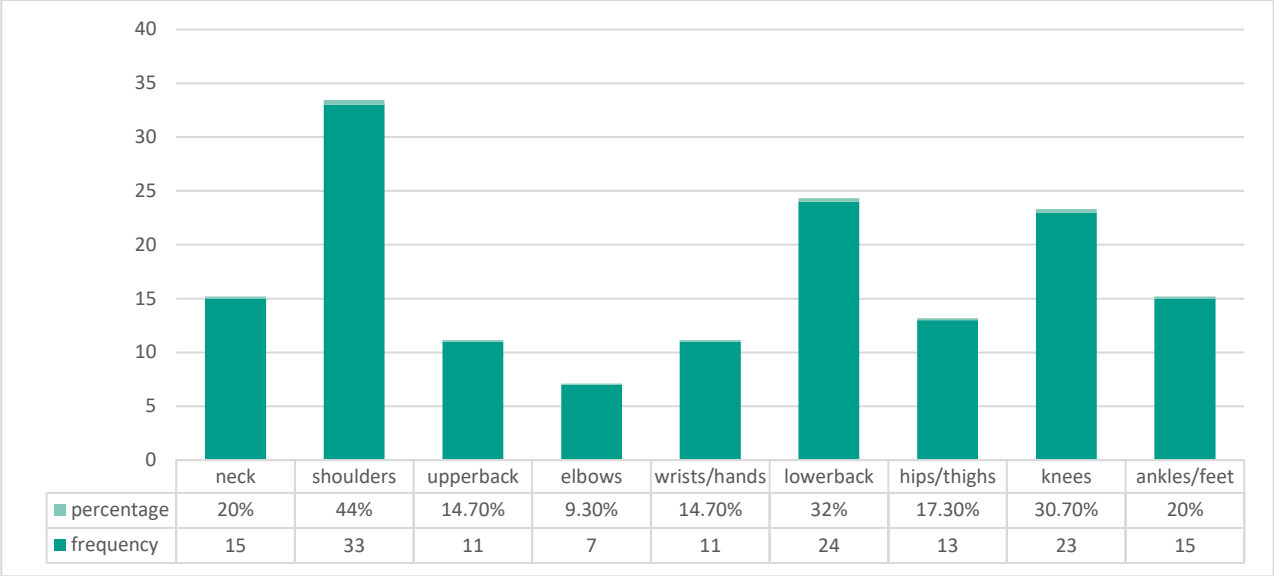


Figure 6 Position of players

In the study, the sample consisted of 75 recreational cricketers, with 36 players identified as batsmen and 39 players as bowlers. The distribution of players across these two positions reflects the common roles in cricket, with a slightly higher number of bowlers compared to batsmen.

6.3 Frequency of Musculoskeletal Problems during the past 12 months



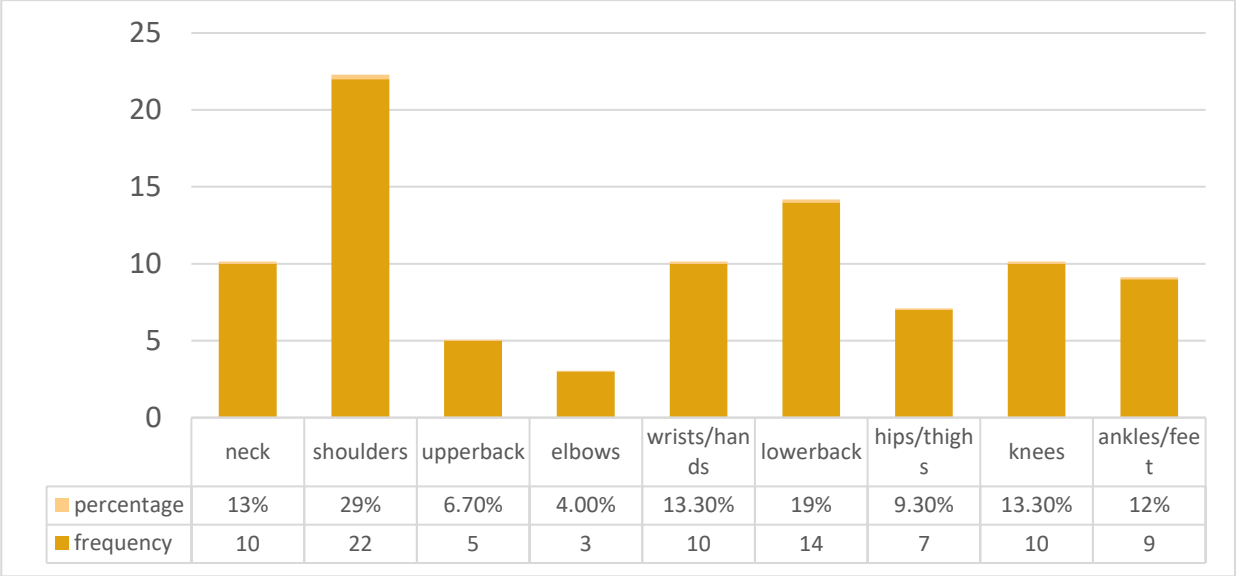
	neck	shoulders	upperback	elbows	wrists/hands	lowerback	hips/thighs	knees	ankles/feet
percentage	20%	44%	14.70%	9.30%	14.70%	32%	17.30%	30.70%	20%
frequency	15	33	11	7	11	24	13	23	15

Figure 7 Frequency of Musculoskeletal Problems during the past 12 months

The study's participants reported a variety of musculoskeletal disorders affecting various body areas during the past 12 months. The shoulders were the most frequently afflicted location, with 44% of subjects reporting shoulder problems.

Lower back pain was also common, affecting 32% of participants, followed by knee difficulties, which were reported by 30.7%. Neck and ankle/foot difficulties were reported by 20% of individuals, while 17.3% reported hip or thigh pain. Upper back and wrist/hand symptoms were reported by 14.7% of individuals, whereas elbow concerns affected just 9.3% of the population. These data show that shoulder, lower back, and knee difficulties are the most common MSK concerns in this population.

6.4 Frequency of Musculoskeletal Problems during the last 7 days



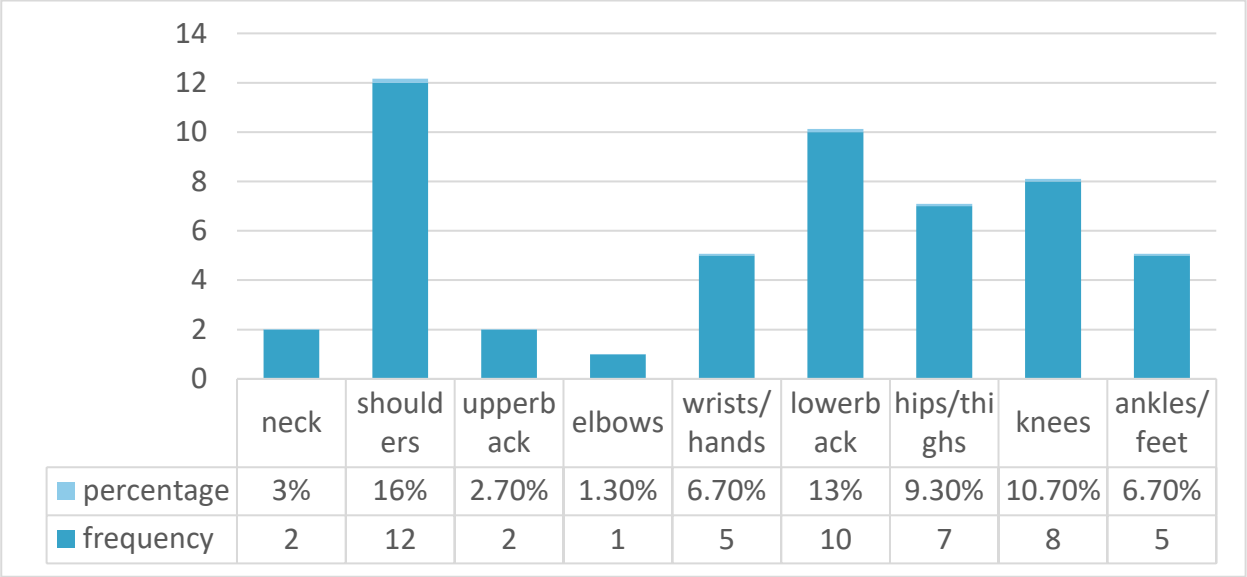
	neck	shoulders	upperback	elbows	wrists/hands	lowerback	hips/thighs	knees	ankles/feet
percentage	13%	29%	6.70%	4.00%	13.30%	19%	9.30%	13.30%	12%
frequency	10	22	5	3	10	14	7	10	9

Figure 8 Frequency of Musculoskeletal Problems during last 7 days

Participants in the study reported a range of musculoskeletal problems affecting various body locations in the previous 7 days. The shoulders were the most frequently impacted area, with 29% of individuals reporting shoulder problems.

Lower back pain was the next most common complaint, affecting 19% of individuals, while 13.3% had knee problems. 13% of people reported neck and wrist/hand problems, while 9.3% reported hip or thigh pain. Upper back problems were less prevalent, involving 6.7% of the population, while elbow pain was reported by just 4%. These data show that shoulder, lower back, and knee problems were the most common musculoskeletal issues in this group of cricketers.

6.5 Activities prevented during the last 12 months because of musculoskeletal problems



	neck	shoulders	upperback	elbows	wrists/hands	lowerback	hips/thighs	knees	ankles/feet
percentage	3%	16%	2.70%	1.30%	6.70%	13%	9.30%	10.70%	6.70%
frequency	2	12	2	1	5	10	7	8	5

Figure 9 Activities prevented during the last 12 months

Figure 9 shows activities that were hampered by musculoskeletal difficulties throughout the previous 12 months. The most prevalent activity constraint was shoulder pain, with 16% of individuals reporting difficulties in their activities. Lower back pain was the second leading cause of activity restriction, affecting 13% of individuals. 10.7% of people reported having knee difficulties, while 9.3% had hip/thigh problems. 6.7% of participants were unable to participate due to wrist/hand problems or ankle/foot concerns. Neck and upper back problems were the least common cause of activity limits, accounting for 3% and 2.7% of cases, respectively. Elbow pain was the least prevalent cause of activity limitation, cited by just 1.3% of respondents.

6.6 Visited physician for the musculoskeletal condition for past 12 months

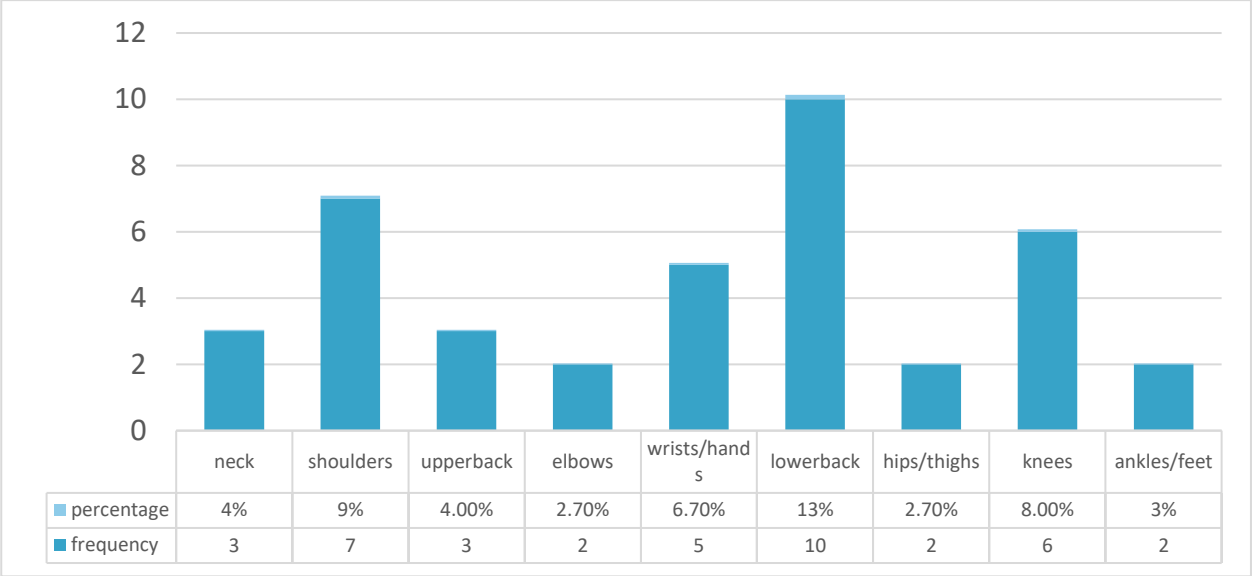


Figure 10 Visited physician for the condition for past 12 months

The lower back was the most prevalent reason for physician meetings, with 10 individuals (13%) seeking treatment for their problem. Shoulder problems were reported by 7 individuals (9%), prompting them to seek medical attention. Knee problems were reported by 6 individuals (8%), while wrist/hand concerns prompted 5 participants (6.7%) to see a doctor. Neck and upper back pain each prompted three visits (4% for neck and 4% for upper back). Elbow, hip/thigh, and ankle/foot problems were less commonly related with physician visits, with just two participants (2.7%) seeking medical attention for these conditions. According to these data, lower back, shoulder, and knee disorders were the most prevalent causes for medical visits among participants in the previous 12 months.

6.7 Comparison of Musculoskeletal Problems in Bowlers and Batsmen over Past 12 Months

Table 2 Comparison of musculoskeletal problems in bowlers and batsmen over past 12 months

Pain in Region during past 12 months	Problem	Batsman	Bowler	X2	p-value
Neck	**Yes**	9	6	1.08	0.29
	No	27	33		
Shoulder	**Yes**	19	14	2.16	0.14
	No	17	25		
Upper Back	**Yes**	6	5	0.22	0.63
	No	30	34		
Lower Back	**Yes**	10	14	0.56	0.45
	No	26	25		
Hips/Thighs	**Yes**	8	5	1.1	0.28
	No	28	34		
Knees	**Yes**	12	11	0.23	0.63

	No	24	28		
Ankle/Feet	**Yes**	8	7	0.21	0.64
	No	28	32		

Table 2 shows musculoskeletal discomfort in various body locations among cricket players over the last year, data were collected for both batters and bowlers to see whether there were any notable differences. Chi-square test was used to compare the frequency of reported pain among locations, with p-values indicating statistical significance for each comparison.

Neck pain was reported by 9 batters and 6 bowlers, although the difference was not statistically significant ($X^2 = 1.08$, p= 0.29). Shoulder pain was reported by 19 batters and 14 bowlers, but there was no significant difference ($X^2 = 2.16$, p = 0.14), although batsmen were somewhat more likely to have it. Only 6 batters and 5 bowlers had upper back discomfort, with no significant difference between the two groups ($X^2 = 0.22$, p = 0.63).

Wrist and hand pain occurred in a similar manner, with 8 occurrences among batters compared to 3 among bowlers, approaching but not reaching statistical significance ($X^2 = 3.1$, p = 0.07). Lower back pain was widespread across both groups, affecting 10 batters and 14 bowlers, although the difference was not statistically significant ($X^2 = 0.56$, p = 0.45). Eight batters and five bowlers reported hip and thigh pain, but there was no significant difference ($X^2 = 1.1$, p = 0.28). Knee discomfort was reported by 12 batters and 11 bowlers, with no significant difference ($X^2 = 0.23$, p = 0.63). Eight batters and seven bowlers reported ankle and foot pain, but there was no significant difference ($X^2 = 0.21$, p = 0.64).

The findings show a unique pattern in which elbow pain is much greater among batters, probably due to the repeated and stressful actions associated with batting. Other body locations showed no statistically significant changes, indicating that these pain kinds may be similarly frequent in both

groups. This data might help lead tailored injury prevention methods based on the unique requirements of each cricket job.

For Elbow pain, Fisher's exact test was used because (50%) cells have expected count less than 5.the p value was 0.05 which means that there was statistically significance between elbow pain and batsmen and bowlers.

6.8 Impact of Playing Hours on the development of musculoskeletal problems over past 12 months

Table 3 Correlation of playing hours on the development of musculoskeletal problems over past 12 months

Pain Region during last 12 months	**Correlation Coefficient (r)**	**p- value**	**Interpretation**
Neck (yes/no)	0.07	0.52	Very weak correlation
Shoulder (yes/no)	0.96	0.41	Very strong correlation
Upper back (yes/no)	0.06	0.96	Very weak correlation
Elbows (yes/no)	0.15	0.19	Very weak correlation
Wrists/Hands (yes/no)	0.004	0.97	Very weak correlation
Lower Back (yes/no)	0.03	0.74	Very weak correlation
Hips/Thighs (yes/no)	0.23	0.84	Weak correlation

Knees (yes/no)	0.62	0.59	Moderate correlation
Ankle/Feet (yes/no)	0.84	0.47	Very strong correlation

7 Discussion

The intention of this study was to find out MSK problems among cricket players playing in Finnish cricket clubs. Based on the results of this study, it appears that MSK issues were common among male cricket players in Finnish cricket clubs, with specific body regions more frequently affected than others. Shoulder, lower back, and knee issues were most prevalent, reflecting the high physical demands placed on these areas by cricket activities. These findings suggest a need for targeted injury prevention strategies, particularly for the shoulder and lower back, which showed high rates of both reported pain and related activity limitations.

The findings from this study on the frequency of MSK problems in cricket players reveal both similarities and distinctions when compared to the results reported(Sathya & Parekh, 2017). Both studies identified high rates of MSK issues in key body regions, particularly in the lower back and knees, although the primary affected regions vary slightly between the two groups. In this study, shoulder pain was the most commonly reported complaint, affecting 44% of players, followed by lower back pain and knee pain. In contrast, Sathya & Parekh, (2017) observed lower back pain as the most frequent issue, affecting 29% of players, followed by pain in the ankles/feet and knees. This difference suggests a higher prevalence of shoulder issues in this study's cohort, potentially due to different training practices or positional demands specific to these players. Further analysis of MSK prevalence by player roles highlighted some distinctions in injury patterns. While both studies observed high levels of lower back pain across all player roles, this study noted a higher frequency of elbow pain among batsmen, aligning with the repetitive, forceful movements involved in batting. Sathya & Parekh, (2017) however, did not find as prominent a pattern of elbow pain in batsmen. Their study reported high rates of knee and hip/thigh pain among all-rounders, while bowlers experienced more shoulder and lower back pain—patterns that are consistent with

those found in this research. In both studies, lower back pain was prevalent among batsmen, suggesting that this region is particularly vulnerable to strain across playing roles.

Further analysis indicated a distinct pattern in which elbow pain was significantly more common in batsmen compared to bowlers. This may be attributed to the repetitive, high-impact movements involved in batting. On the other hand, for other regions such as the lower back, knees, and ankles, there were no significant differences between the two groups, suggesting these issues may be inherent to cricket as a whole rather than role-specific.

Interestingly, the analysis showed no significant association between playing hours and MSK discomfort across all body regions. This lack of association suggests that factors beyond just the amount of playtime a cricket player is playing there are other factors, such as playing technique, training practices, and possibly individual physical conditioning, may play more substantial roles in injury development and not only playing time causes musculoskeletal problems.

The findings of the current study were consistent with the work done by (Ali et al., 2023) Both studies underscore that cricket players frequently experience MSK discomfort, particularly in the lower back and upper limb areas, which are subject to high physical demands. the lower back emerges as the most frequently affected region, making it the primary site of discomfort among players. This commonality suggests that the repetitive motions inherent in cricket, such as the twisting and bending involved in batting and bowling, place significant stress on the lower back. This prevalence highlights the need for lower back strengthening exercises and biomechanics optimization as part of cricket-specific training regimens.

Similarly, upper limb discomfort, especially shoulder pain, is a prominent issue in both studies, particularly among bowlers. The previous study (Yadav & Kaur, 2023) identify shoulder pain as a prevalent complaint, likely due to the repetitive overhead movements in bowling, which involve high-impact, forceful actions that strain the shoulder joint. This finding is consistent with the current study's observation of high shoulder pain frequency, further supporting the role of bowling mechanics in upper limb injuries.

In summary, this study highlights the need for cricket-specific, role-tailored approaches to injury prevention, with an emphasis on techniques and interventions aimed at reducing shoulder, lower back, and elbow injuries. Further research could expand on these findings by exploring additional factors contributing to injury risk, which may aid in developing more effective injury mitigation strategies for cricketers.

7.1 Strength weakness and reliability of study

The study's strengths include the use of credible data sources and detailed methods, which provide robustness in outcome assessments and significance for understanding musculoskeletal (MSK) concerns among cricket players. The Nordic Musculoskeletal Questionnaire, the major data collecting instrument, is widely considered as a credible approach for detecting MSK symptoms and has been validated in several research, which lends credence to self-reported pain and injury sites. Given the nature of MSK discomfort, athletes are more likely to recall the occurrence and afflicted areas properly, especially for recurrent or severe injuries.

Furthermore, the study's sample includes club-level cricket players who regularly participate in competitive matches, offering a genuine picture of MSK concerns within this group. The sample size is large for this level, which increases the trustworthiness of the results and their generalizability to similar cricket-playing groups. By focusing on individual player roles (e.g., batsmen and bowlers), the study provides a more nuanced knowledge of how varied playing demands relate to distinct injury risks. This role-specific approach is crucial since it allows for tailored insights that can guide specialized preventative efforts.

While retrospective data collection can frequently restrict the accuracy of injury history owing to recollection bias, utilizing a structured, validated questionnaire reduces this risk by focusing responses on particular, well-defined injury areas and severity levels. Furthermore, the role-based analysis enables this work to be used as a foundation for future MSK research in cricket, allowing for longitudinal studies or comparisons across different areas.

A potential limitation is that small injuries may be underreported because players believe they are less serious or time-consuming to report. However, because the study focuses on more important

MSK concerns, any little underreporting would have a minimal impact on the major research findings. Overall, the technique and organized data collection methods used in this study provide a solid foundation for repeatability in future cricket-related injury research, making it transferable to similar studies in various areas or playing levels.

8 Conclusions

This study conducted a thorough analysis of musculoskeletal (MSK) issues encountered by cricketers, focusing on their prevalence, impact on activities, and the necessity for medical care. The data found that shoulder, lower back, and knee pain were the most often reported MSK concerns in the previous 12 months and 7 days. These issues had a significant influence on participants' capacity to execute everyday activities, with shoulder and back pain being the most common contributors to activity limits. Furthermore, lower back pain was the most prevalent cause for seeking medical attention, followed by shoulder and knee problems. This shows the critical role MSK health plays in the general well-being of cricketers, as well as the need of proper injury treatment and prevention strategies.
Further findings discovered no statistically significant association between the number of playing hours and the development of musculoskeletal discomfort in various body locations among cricketers. These data show that, within the scope of this research, greater playing hours may not be the predominant cause in the beginning of musculoskeletal disorders in cricketers, indicating the possible involvement of other factors that require further exploration.

The comparison of bowlers and batters revealed some significant differences, notably in elbow pain, with batsmen being more susceptible to elbow injuries. This shows that certain parts of the body, such as the batsman's elbow, require tailored preventative measures. Most other MSK concerns, such as shoulder and lower back pain, showed no significant difference between the two groups, showing that these injuries occur in a variety of playing positions. Overall, this study gives useful insights into cricketers' musculoskeletal health, laying the groundwork for better injury prevention and treatment tactics in the sport. Addressing the widespread MSK problems found in this study will better enable cricket players to preserve their health, performance, and career longevity.

8.1 Further study on the topic

Future study on musculoskeletal (MSK) disorders in cricket players could benefit from include more performance-based and biomechanical variables to better understand recovery and injury recurrence in athletes. Along with re-injury rates and pain levels, tracking playing time over multiple seasons can provide a practical and simple indicator of functional recovery that cricket players

are likely to appreciate. Evaluating playing minutes before and after injury could reveal if players recover to their pre-injury performance levels, which may be a more useful standard than merely comparing them to uninjured players. Adding a standardized questionnaire for data collection ensures uniformity and allows detailed data collection. Digital technologies or tools can be used to minimize errors. Participants screening is a vital concept for systematic data collection.

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Appendices

Appendix 1. Informed Consent

Informed Consent Form

Title of Study: Frequency of musculoskeletal problems among recreational cricketers playing in cricket clubs of Finland

Investigator: Muhammad Raza Rind

Description of study: You are invited to participate in a research study being conducted by above mentioned investigator. The purpose of this study is to check the prevalence of musculoskeletal skeletal pain among cricket players. Your participation will involve completing few questionnaires. During this session, the researcher will answer any question you may have and if you are willing to take part.

Potential benefits: This study will highlight the prevalence of musculoskeletal problems among cricket players. As the prevalence of musculoskeletal problems will be brought to attention the cricket players can seek appropriate treatment for their musculoskeletal problems which will eventually improve their sports participation.

Risks and discomforts

There are no known risks associated with this research.

Protection of confidentiality

We will do everything we can to protect your privacy. All information that is collected about you during the research will be kept strictly confidential. Your personal information which might identify you will be removed in data entry and analysis. Your identity will not be revealed in any publication resulting from this study.

Voluntary participation

Your participation in this research study is voluntary. You may choose not to participate and you may withdraw your consent to participate at any time. You will not be penalized in any way should you decide not to participate or to withdraw from this study.

Consent I have read this consent form and have been given the opportunity to ask questions. I give my consent to participate in this study.

Signature of participant_____

Appendix 2. Self Structured Questionnaire

Name: _____ Age: _____

Gender: _____

Height: _____ Weight: _____

Club name: _____

Are you currently playing as_____

NOTE: Are you suffering from any of the following conditions?

History of Fracture within past year Y/N

History of previous surgery within past year Y/N

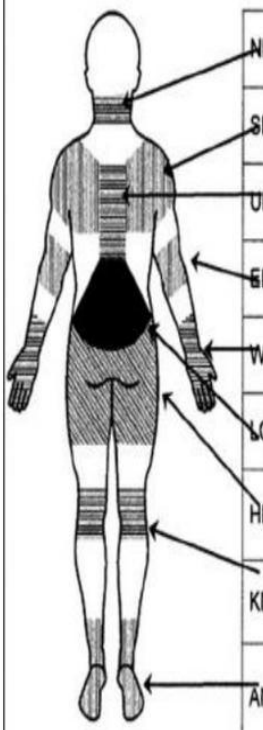
History of neurological injury within past year Y/N

How many days do you play cricket in a week_____

How many hours do you play cricket in a week_____

Appendix 3. Nordic Musculoskelatal Questionnaire

NORDIC MUSCULOSKELETAL QUESTIONAIRE



	Have you at any time during the last 12 months had trouble (such as ache, pain, discomfort, numbness) in:	During the last 12 months have you been prevented from carrying out normal activities (e.g. job, housework, hobbies) because of this trouble in:	During the last 12 months have you seen a physician for this condition:	During the last 7 days have you had trouble in:
NECK	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes
SHOULDERS	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes
UPPER BACK	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes
ELBOWS	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes
WRISTS/ HANDS	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes
LOWER BACK	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes
HIPS/ THIGHS	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes
KNEES	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes
ANKLES/ FEET	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes