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The impact of knee joint injuries on soccer players

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Abstract

Aim. This study aimed to identify the physiological effects of knee injuries among football players, investigate their impact on physical performance, and provide evidence-based recommendations for rehabilitation and treatment protocols. The research sought to establish a comprehensive understanding of the multifaceted consequences of knee injuries, examining both immediate physiological responses and long-term performance implications.

Material and method. A descriptive-analytical methodology was employed involving 27 football players from a First Regional League club. Data collection utilized literature review, specialist interviews, and a structured 12-question questionnaire addressing injury severity, anatomical distribution, causation, treatment modalities, and performance outcomes. Statistical analysis employed percentage calculations for frequency distributions across injury categories.

Results. Moderate and severe injuries dominated (70.36% combined), with muscular injuries comprising 44.44% of cases. Violent contact represented the primary injury mechanism (51.86%), while competitive environments generated 70.37% of injuries. Over half (51.86%) of injuries resulted in training cessation exceeding six months. Treatment approaches included physical therapy (37.03%) and surgical intervention (32.34%), though 66.67% of players lacked formal rehabilitation programs. Injury recurrence occurred in 55.55% of cases, with 40.74% reporting poor post-injury performance outcomes.

Conclusions. Training cessation due to knee injury resulted in significant physiological deterioration: 10% decrease in maximal aerobic capacity, 5% reduction in maximal heart rate, 12% decline in oxygen pulse, and 20% decrease in ventilatory threshold. Body fat percentage increased by 6%, negatively impacting weight-bearing activities. The hamstring-to-quadriceps strength ratio decreased significantly, increasing re-injury susceptibility. High injury recurrence rates and poor performance outcomes highlighted critical deficiencies in current rehabilitation practices, emphasizing the urgent need for comprehensive injury prevention strategies and evidence-based rehabilitation protocols in football.

Key words*: knee injuries*, *football players*, *physiological effects*, *rehabilitation*, *sports medicine*

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Introduction

Knee injuries are among the most frequent and severe problems encountered by football players and represent a major challenge in sports medicine and performance management (Makuch et al., 2024). High-intensity matches, physical contact, and inadequate preventive measures contribute to a significant risk of injury and prolonged recovery periods (Salamon et al., 2024). Numerous studies highlight that poor rehabilitation and early return to play are leading causes of recurrent injuries and reduced athletic performance (Ramos Pastrana et al., 2024).

This study focuses specifically on knee joint injuries within a regional football club, aiming to identify their main causes, severity, and physiological effects on players' fitness and performance. The research also provides evidence-based recommendations for effective rehabilitation and injury prevention strategies to support players' safe and optimal return to competition.

This study aims to identify the physiological impacts of knee injuries and to propose evidence-based recommendations for effective rehabilitation and prevention.

Materials and method

Research Design: A descriptive-analytical design was used to investigate the impact of knee joint injuries on the physical performance of football players.

Study Setting: The study was conducted at a First Regional League football club, established in 1973, with a regular training schedule from Sunday to Saturday (16:30–19:00).

Participants: A purposive sample of 27 football players with documented knee injuries participated in the study.

Data Collection: Data were collected using three tools:

A structured 12-item questionnaire (10 closed-ended and 2 open-ended questions) covering injury severity, anatomical location, causes, treatment, and performance outcomes.

Semi-structured interviews with sports medicine physicians, players, and club staff to verify and complement the questionnaire data.

A literature review to interpret physiological effects associated with training cessation.

Physiological Data: No direct physiological measurements (e.g., VO_2 max, heart rate, ventilatory threshold) were conducted in this study; estimated changes were inferred from existing literature on the physiological impact of detraining.

Data Analysis: Descriptive statistics (frequencies and percentages) were used to summarize the data.

Results

Question 1: What is the distribution of injury severity types among the study participants?

Table 1. Distribution of Injury Types

Cat	Freq	Percentage
Minor Injury	3	11.12%
Moderate Injury	10	37.03%
Severe Injury	9	33.33%
Chronic Injury	5	18.52%

Source: Sports Injury Database Analysis (n=27)

Table 1 shows that moderate injuries (37.03%) and severe injuries (33.33%) were the most common among players, together accounting for over 70% of all recorded injuries. Minor injuries were less frequent (11.12%), and chronic injuries were reported in 18.52% of cases.

Question 2: Which anatomical structures are most commonly affected by sports injuries?

Table 2. Anatomical Distribution of Injury Locations

Cat	Freq	Percentage
Joint Bones	5	18.12%
Tendons and Ligaments	6	28.22%
Cartilage	4	14.82%
Muscles	12	44.44%

Source: Sports Injury Database Analysis (n=27)

According to Table 2, muscle injuries represented the highest proportion at 44.44%, followed by injuries to tendons and ligaments (28.22%), joint bones (18.12%), and cartilage (14.82%).
Question 3: What are the primary mechanisms and causes leading to sports injuries?

Table 3. Primary Causes of Sports Injuries

Cat	Freq	Percentage
Inadequate Warm-up	7	25.93%
New Skill	5	18.5%
External Factors	1	3.70%
Violent Contact	14	51.86%

Source: Sports Injury Database Analysis (n=27)

Table 3 indicates that violent contact was the leading cause of injury (51.86%), while inadequate warm-up accounted for 25.93% and new skill learning for 18.5% of injuries. External factors contributed to 3.70%.
Question 4: In what contexts do most sports injuries occur during athletic activities?

Table 4. Contextual Settings of Injury Occurrence

Cat	Freq	Percentage
During Competition	19	70.37%
During Warm-up	1	3.70%
During Training	7	25.93%
Other	0	0%

Source: Sports Injury Database Analysis (n=27)

As shown in Table 4, the majority of injuries occurred during competitions (70.37%), with fewer injuries happening during training sessions (25.93%) and warm-ups (3.70%).
Question 5: How long do sports injuries typically keep athletes away from training activities?

Table 5. Training Disruption Duration Following Injury

Cat	Freq	Percentage
One Week	2	4.8%
More than One Week	3	11.12%
More than One Month	6	22.22%
More than 6 Months	14	51.86%

Source: Sports Injury Database Analysis (n=27)

Table 5 shows that more than half of the injuries (51.86%) resulted in training absence for over six months. Shorter disruptions included absences of more than one month (22.22%), more than one week (11.12%), and just one week (4.8%)
Question 6: What treatment modalities are most commonly employed for managing sports injuries?

Table 6. Treatment Approaches Utilized

Cat	Freq	Percentage
Physical Therapy	10	37.03%
Special Treatment Program	2	4.8%
Surgical Procedure	8	32.34%
Medications	7	25.93%

Source: Sports Injury Database Analysis (n=27)

Based on Table 6, physical therapy was the most commonly used treatment (37.03%), followed by surgical procedures (32.34%), medication (25.93%), and special treatment programs (4.8%).
Question 7: What proportion of injured athletes receive formal rehabilitation programs?

Table 7. Access to Formal Rehabilitation Programs

Cat	Freq	Percentage
Received	9	33.33%
Not Received	18	66.67%

Source: Sports Injury Database Analysis (n=27)

Table 7 demonstrates that only 33.33% of injured players received a formal rehabilitation program, while the majority (66.67%) did not
Question 8: What types of rehabilitation interventions are provided to athletes who receive formal programs?

Table 8. Types of Rehabilitation Interventions

Cat	Freq	Percentage
Swimming Exercises	0	0%
Balance Exercises	5	55.56%
Skill Training	2	22.22%
Other	2	22.22%

Source: Sports Injury Database Analysis - Rehabilitation Recipients Only (n=9)

Table 8 shows that among players who received rehabilitation, balance exercises were the most frequent intervention (55.56%), while skill training and other methods accounted for 22.22% each. No players reported using swimming exercises.
Question 9: How frequently do sports injuries recur in the studied population?

Table 9. Injury Recurrence Patterns

Cat	Freq	Percentage
Yes	15	55.55%
No	12	44.45%

Source: Sports Injury Database Analysis (n=27)

As presented in Table 9, more than half of the players (55.55%) experienced injury recurrence, while 44.45% did not report repeated injuries.
Question 10: What are the performance outcomes for athletes following sports injury recovery?

Table 10. Post-Injury Performance Outcomes

Cat	Freq	Percentage
Poor	11	40.74%
Average	9	33.33%
Good	7	25.93%
Excellent	0	0%

Source: Sports Injury Database Analysis (n=27)

According to Table 10, 40.74% of players rated their performance as poor after recovery, 33.33% as average, and 25.93% as good. None reported excellent performance levels.

Discussions

The present study highlights that moderate and severe knee injuries are common among football players and frequently lead to prolonged training cessation and decreased physical performance. This finding is consistent with recent research indicating that knee joint injuries, particularly anterior cruciate ligament (ACL) tears, represent a substantial share of football-related trauma (Makuch et al., 2024; Salamon et al., 2024).

Muscle injuries were also prevalent in this sample, aligning with previous studies showing that insufficient warm-up and high-contact situations increase muscle strain risks (Reddy et al., 2024). Similar to our results,

Mateos Conde et al., (2022) reported that most football injuries occur during competition rather than training sessions.

The high recurrence rate and poor post-injury performance observed emphasize the need for structured rehabilitation and strict return-to-play protocols(Ramos Pastrana et al., 2024). Physiological consequences, such as reduced VO_2 max and increased body fat, are well documented in athletes who stop training for extended periods (Barbieri et al., 2024; Olson et al., 2023; Ghosh et al., 2024).

However, this study relied on self-reported data and theoretical estimations of physiological variables rather than direct laboratory measures, which should be addressed in future research. To improve player safety and recovery outcomes, clubs must adopt evidence-based injury prevention programs and ensure that all injured players receive appropriate rehabilitation support (Da Fonseca, 2024).

Conclusions

Based on the findings of this study, knee injuries significantly affect football players by causing prolonged training cessation and declines in key physiological and performance parameters. Extended periods of inactivity result in decreased aerobic capacity and increased body fat percentage, which negatively impact players' physical performance and increase the risk of re-injury. To mitigate these effects, clubs should implement comprehensive, evidence-based rehabilitation programs and emphasize injury prevention strategies, proper recovery protocols, and continuous monitoring to ensure safe return to play and maintain optimal performance.

Recommendations

Based on the study results, the following recommendations are proposed:

Maintain cardiorespiratory fitness during training cessation:

Since training cessation due to knee injuries can cause significant declines in aerobic capacity (approximately 10–18%), it is recommended that athletes engage in appropriate low-impact activities and rehabilitation exercises to sustain cardiorespiratory fitness, avoiding unnecessary prolonged inactivity.

Implement timely and progressive rehabilitation:

In cases where compensatory training is not possible during the rest period, structured rehabilitation should begin as soon as full recovery is medically confirmed. Sufficient time should be allocated for gradual rebuilding of fitness levels before resuming competitive play to minimize the risk of re-injury.

Develop targeted leg strength programs:

As results indicate a decline in the hamstring-to-quadriceps strength ratio, training programs should specifically focus on strengthening both the anterior and posterior thigh muscles, with particular emphasis on hamstring conditioning to reduce knee joint injury risk.

Conflict of Interest Statement

The authors declare that there are no conflicts of interest regarding the research, authorship, or publication of this article.

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