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Common injuries and prevention strategies in football training for Saigon University students

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Abstract
Objectives: This study aims to establish a multidimensional analytical framework regarding the prevalence of football injuries at Saigon University (SGU) and to identify specific pathomechanisms related to the interaction between intrinsic factors (physical fitness, anatomy) and extrinsic factors (artificial turf, tropical climate).
Methods: The study employed a literature review combined with secondary data analysis from internal medical reports, anthropometric studies on SGU male students, and environmental monitoring data in Ho Chi Minh City. Injury mechanisms were cross-referenced with modern biomechanical models and FIFA sports medicine guidelines.
Results: Data indicates that injury rates are predominantly concentrated in the lower extremities, specifically the ankle (16.2–39.3%) and knee joint (10.8–24.9%). The root causes were identified as a convergence of three factors: The "Weekend Warrior" syndrome and Gluteal Amnesia; Discrepancies in shoe-surface interaction on artificial turf; and The impact of Heat Stress and PM2.5 particulate matter leading to impaired neuromuscular control.
Conclusions: Student football injuries are a preventable issue through a synchronous intervention strategy: standardization of the FIFA 11+ warm-up, regulation of competition footwear standards, and a transition to a "Sports Club Model" for physical education.

Keywords: Sports injuries, biomechanics, artificial turf, FIFA 11+, Saigon University

Introduction

Football, often dubbed the "king of sports," is not merely a physical conditioning activity but a profound socio-cultural phenomenon within the Vietnamese student community in general, and at Saigon University (SGU) in particular. As a multidisciplinary university located in the heart of Ho Chi Minh City, SGU gathers a large population of dynamic students. Football activities here take various forms: from formal Physical Education (PE) classes and traditional faculty-level or university-level tournaments to weekly recreational pickup games on artificial turf pitches scattered throughout the city.

This popularity brings immense benefits regarding cardiovascular health, endurance, motor coordination, and teamwork skills. However, the downside of this rapid, uncontrolled expansion is an increasing injury burden. Unlike professional environments where athletes are supported by medical teams, nutritionists, and strength coaches, SGU students often participate in matches with inadequate preparation, limited knowledge of sports medicine, and inconsistent field conditions. While offering significant cardiovascular and social benefits, the surge in amateur participation is accompanied by an alarming injury rate (Doan *et al*., 2022) [5]. Lacking the medical support systems and knowledge of recovery cycles available to professionals, SGU students face potential risks to their musculoskeletal systems.

This study addresses three structural issues that have not been fully elucidated in previous reports

Firstly, the transition of playing surfaces. Over the past decade, Ho Chi Minh City has witnessed a complete shift from compacted earth or natural grass fields to artificial turf. While this surface is more durable and weather-resistant, it fundamentally alters the mechanics of shoe-surface interaction, increasing the coefficient of friction and changing the ground reaction forces acting on the joints. This leads to specific injury patterns rarely encountered by previous generations.

Secondly, physiological characteristics and lifestyle. University students are in their prime physical age (18-22 years). However, the modern lifestyle characterized by academic pressure, sleep deprivation, imbalanced nutrition (fast food, micronutrient deficiency), and the post-match alcohol consumption culturehas impaired the musculoskeletal system's recovery capacity. The discrepancy between competitive intensity (psychological drive) and the body's physiological tolerance is a leading cause of injury.

Thirdly, the knowledge gap. Although medical information is available online, a synthesized, systematized document ailored specifically to the context of Saigon University students remains absent. Students typically only concern themselves with treatment post-injury, rather than engaging in proactive prevention.

Methods

The study employs a comprehensive analytical approach based on the following data sources

Biomedical & Anthropometric Data: Synthesized from empirical studies on male SGU students, including Body Mass Index (BMI) and physical fitness test results (explosive power, speed endurance) (Tran & Huynh, 2023).

Environmental Data: WBGT indices and PM2.5 concentrations in Ho Chi Minh City were extracted from regional hydro-meteorological monitoring stations and environmental reports (To *et al*., 2019).

Theoretical Framework: Applying principles of Clinical Biomechanics and Functional Anatomy to analyze injury mechanisms, cross-referenced with international protocols such as the FIFA 11+ (Bizzini & Dvorak, 2015) [3].

Results

1. Anthropometric Characteristics and Physical Fitness of SGU Students

Data from Tran & Huynh (2023) indicates that male SGU students possess average morphological indices within the normal range (172.00/pm 3.41 cm; 61.24/pm 6.35 kg). However, functional parameters reflecting football-specific strength and endurance are generally lower than the physiological demands of the sport, predisposing students to injuries during high-intensity activities.

2. Injury Epidemiology

Comprehensive analysis reveals a high prevalence of non-contact injuries, accounting for 55–60% of total cases.

Table 1: Distribution of injuries by anatomical location at Saigon University

Anatomical Location	Prevalence (%)	Typical Clinical Pathologies
Ankle	16.2 – 39.3	Lateral Ankle Sprain (LAS), Achilles Tendinopathy (Brieflands, 2022) [4].
Knee	10.8 – 24.9	Anterior Cruciate Ligament (ACL) Rupture, Meniscal Tear (Lanzetti *et al*., 2017) [8].
Thigh	11.0 – 20.0	Hamstring Strain Injury (HSI), Adductor Strain (Ekstrand *et al*., 2021) [7].
Other	< 15.0	Low Back Pain (LBP), Head/Neck Injuries.

3. The "Red Zone" Periods

Data identifies two peak risk intervals during a match: the final 15 minutes of each half (minutes 30–45 and 75–90). During these critical windows, glycogen depletion induces Central Nervous System (CNS) fatigue, resulting in delayed reaction times of joint-stabilizing muscles, thereby escalating the risk of sprains and ligament ruptures.

Discussion

1. Biomechanical Mechanism Analysis

Shoe-Surface Interaction: This is the most critical extrinsic risk factor on artificial turf surfaces in Ho Chi Minh City. The use of Firm Ground (FG) cleats on hard surfaces generates excessive rotational traction. During pivoting maneuvers, the foot becomes "fixed" to the surface while the knee continues to rotate due to body inertia, creating torque that exceeds the physiological tolerance of the Anterior Cruciate Ligament (ACL) (Thomson *et al*., 2015) [11]. Conversely, thin-soled canvas shoes lack Ground Reaction Force (GRF) absorption capabilities, leading to periostitis and heel pain.

The "Valgus Collapse" Mechanism and the Role of Hamstrings: ACL injuries often occur via the "Dynamic Valgus Collapse" mechanism (knee buckling inward).

SGU students typically exhibit a low H: Q (Hamstring-to-Quadriceps) strength ratio. Weak hamstrings fail to generate sufficient posterior tibial shear force to support the ACL during landing phases (Lanzetti *et al*., 2017) [8].

2. Intrinsic Factors: The "Weekend Warrior" Syndrome & Gluteal Amnesia

Weekend Warrior: A sedentary lifestyle during the week reduces the viscoelasticity of connective tissues. When subjected to intense physical exertion on weekends, these structures experience "acute loading shocks," leading to tendon/muscle ruptures.

Gluteal Amnesia: Prolonged sitting causes neuromuscular inhibition of the gluteus maximus (McGill, 2007) [10]. Through a compensatory mechanism, the hamstrings and lumbar extensors must overload to perform hip extension, resulting in hamstring strains and chronic low back pain.

3. Impact of the Urban Environment

Heat Stress: WBGT indices in HCMC frequently exceed 32°C. Dehydration and electrolyte loss reduce plasma volume, causing early onset fatigue and impaired cognitive function, which leads to technical errors (Lindner-Cendrowska *et al*., 2024) [9].

PM2.5 Particulate Matter: High PM2.5 concentrations trigger a systemic inflammatory response and reduce oxygen transport capacity, exacerbating muscle fatigue during anaerobic exercise (To *et al*., 2019).

4. Proposed Solutions

Pedagogical and Physical Interventions

Standardization of Warm-up: Mandatory implementation of the FIFA 11+ protocol in all classes and tournaments. Exercises such as the Nordic Hamstring and Plank help reprogram the neuromuscular system and enhance eccentric strength (Bizzini & Dvorak, 2015; Al Attar *et al*., 2016) [3].

Sports Club Model: Transitioning PE towards movement-based games to improve base fitness and engagement (Doan *et al*., 2022) [5].

Equipment and Medical Management

Footwear Standards: Mandatory recommendation of Turf (TF) or Artificial Grass (AG) stud configurations on synthetic pitches. Ban on FG/SG cleats.

P.E.A.C.E & L.O.V.E Protocol: Complete replacement of the R.I.C.E protocol. Avoid NSAIDs and cryotherapy (icing) in the first 48 hours (P.E.A.C.E phase) to optimize the natural inflammation and tissue repair process. Transition to early mobilization and rehabilitation (L.O.V.E phase) (Dubois & Esculier, 2020) [6].

Nutrition and Environment

Encourage Vitamin C and Collagen/Gelatin supplementation pre-training to support collagen synthesis for tendons (Baar, 2019) [2].

Avoid competition during peak hours of heat and air pollution in Ho Chi Minh City.

Conclusion

This study asserts that football injuries at Saigon University are the consequence of a complex interplay between biological, mechanical, and environmental factors. Addressing this issue necessitates a paradigm shift from a reactive to a proactive approach: transitioning from "symptomatic treatment" to "root-cause prevention" leveraging contemporary sports medicine knowledge. The implementation of the FIFA 11+ protocol and a proper understanding of equipment standards are prerequisites for safeguarding these future human resources.

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