

Evolving landscape of sports injuries and recommendations on injury preventions: A retrospective analysis in Singapore

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Dear Editor,

Sports have become increasingly integral to the daily lives of Singaporeans. According to the National Sport and Exercise Participation Survey, the percentage of Singaporeans exercising weekly rose from 54% in 2015 to 73% in 2023.¹ While this surge in sports activities brings numerous health benefits, it also results in a corresponding increase in sports-related injuries, which incur significant healthcare costs. Countries worldwide estimate spending between USD 1.58 billion and 2.4 billion dollars annually on the treatment of these injuries.²

In light of these trends, evidence-based injury prevention strategies are essential. Continuous monitoring of injury patterns is necessary for developing effective prevention measures, ultimately reducing the prevalence and economic burden of sports injuries. The recent COVID-19 pandemic has notably shifted exercise routines, with many individuals turning to home-based exercises and outdoor activities such as running and cycling.³ This change in exercise habits has altered the landscape of sports injuries, presenting an opportunity to explore how specific injury patterns correlate with different sports and to identify commonly associated injuries within popular sports.

Our study, conducted at the National University Hospital, Singapore, retrospectively analysed patients presenting with sports-related injuries for the first time between March 2019 and February 2021. The study aimed to provide insight into recent changes in injury patterns among paediatric and adult patients, thereby guiding healthcare resource allocation and enhancing the understanding of sports injuries. Ethical approval was obtained from the National Healthcare Group Domain Specific Review Board (DSRB Reference Number: 2022/00230).

A total of 10,432 medical records were reviewed, with 2000 records meeting the study's criteria for inclusion. The analysis revealed significant findings

related to the evolving landscape of sports injuries in Singapore (Table 1).

First, there was a notable increase in injuries associated with individual sports such as climbing, gym workouts and cycling from March 2020 to February 2021, compared to the previous year. In contrast, injuries resulting from team sports such as football decreased significantly during the same period. This shift likely reflects changes in sports participation patterns due to pandemic-related restrictions, which limited team sports activities and led to a rise in individual sports participation.

In terms of injury type, the study found a significant increase in back injuries, particularly among individuals who engaged in gym workouts and swimming. Multivariate analysis revealed that gym and swimming activities were associated with higher risks of back injuries, whereas football had a lower risk. The increase in back injuries among gym-goers may be attributed to the use of weight-training machines, which can restrict the range of motion and reduce the engagement of stabilising back muscles, potentially leading to injury.⁴ Similarly, certain swimming techniques, such as hyperextension of the spine or poor body balance may contribute to the increased risk of back injuries.⁵

Additionally, the study observed a decrease in anterior cruciate ligament (ACL) injuries, particularly in non-contact ball sports and martial arts. This decline may be linked to the reduction in team sports participation during the pandemic. However, multivariate analysis identified team-based ball sports, especially football and basketball, as being associated with higher risks of ACL injuries. The mechanisms underlying ACL injuries in these sports often involve high-impact rotational landing, valgus loading forces on the knees, and external rotation of the knee, all of which are common in non-contact team-ball sports.⁶

Shoulder labral injuries also saw a significant increase, with gym workouts and climbing sports being particularly associated with higher risks.

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Table 1. Multivariate analysis of sports associated with back, anterior cruciate ligament (ACL) and shoulder labral injuries.

	Injury of interest, no. (%)	Other injuries, no. (%)	Risk, mean (95% confidence interval)	P value
Sports associated with higher risk of back injury				
Gym	30 (13.6)	190 (86.4)	5.95 (3.60–9.83)	<0.01
Other sports	38 (2.6)	1432 (97.4)		
Swimming	5 (31.3)	11 (68.8)	11.62 (3.92–34.46)	<0.01
Other sports	63 (3.8)	1611 (96.2)		
Sports associated with lower risk of back injury				
Football	3 (1.2)	244 (98.8)	0.26 (0.08–0.84)	0.01
Other sports	65 (4.5)	1378 (95.5)		
Sports associated with higher risk of ACL injury				
Football	75 (30.4)	172 (69.6)	3.29 (2.40–4.51)	<0.01
Other sports	169 (11.7)	1274 (88.3)		
Basketball	44 (27.0)	119 (73.0)	2.45 (1.68–3.57)	<0.01
Other sports	200 (13.1)	1327 (86.9)		
Other ball sports	38 (21.0)	143 (79.0)	1.68 (1.14–2.47)	0.01
Other sports	206 (13.7)	1303 (86.3)		
Martial arts	24 (29.6)	57 (70.4)	2.65 (1.62–4.37)	<0.01
Other sports	220 (13.7)	1389 (86.3)		
Sports associated with lower risk of ACL injury				
Gym	12 (5.5)	208 (94.5)	0.31 (0.17–0.56)	<0.01
Other sports	232 (15.8)	1238 (84.2)		
Running	17 (6.4)	353 (95.4)	0.23 (0.14–0.39)	<0.01
Other sports	227 (17.2)	1093 (82.8)		
Cycling	1 (2.8)	35 (97.2)	0.17 (0.02–1.22)	0.05
Other sports	243 (14.7)	1411 (85.3)		
Sports associated with higher risk of shoulder labral injury				
Gym	31 (14.1)	189 (85.9)	3.19 (2.04–4.98)	<0.01
Other sports	72 (4.9)	1398 (95.1)		
Climbing	8 (26.7)	22 (73.3)	5.99 (2.60–13.81)	<0.01
Other sports	95 (5.7)	1565 (94.3)		

P values in bold are statistically significant

These injuries are often caused by unfavourable positions during common gym exercises or repetitive upper-limb movements on vertical terrain, as seen in climbing. The rise in shoulder labral injuries may be attributed to the growing popularity of high-intensity fitness trends such as high-intensity interval training, which have been linked to increased knee, ankle and shoulder injuries,

especially among amateurs lacking sufficient flexibility, mobility, core strength and muscle conditioning to perform these exercises safely.⁷

Based on these findings, we propose several preventive measures targeting specific injuries. For back injuries, core strength and trunk stabilisation exercises involving the transverse abdominal and lumbar multifidus muscles should be emphasised.

Studies have shown that such exercises can reduce the incidence of back injuries in sports such as swimming and gym workouts.⁸ Healthcare professionals, including gym instructors, physicians and physiotherapists should consider incorporating trunk stabilisation exercises into rehabilitation routines for patients with lumbar injuries. Additionally, improper exercise execution is a common cause of back injuries in gym workouts, highlighting the importance of correcting form and technique to prevent injuries, particularly among beginners.

For the prevention of ACL injuries, there is strong evidence supporting the effectiveness of injury prevention programmes, especially in non-contact ball sports. Successful programmes, such as the Fédération Internationale de Football Association (FIFA) 11+ programme, emphasise plyometrics, strengthening, flexibility, agility and feedback.⁹ These programmes have demonstrated success in reducing the risk of soccer-related injuries and should be advocated through targeted online infomercials by health agencies to promote awareness and risk reduction.

For shoulder injuries, warm-up routines that emphasise internal rotation range of motion, external rotator muscle strength and scapular muscle strength have been shown to reduce the likelihood of injuries. While these measures have primarily been studied in athletes participating in overhead sports, we suggest that individuals engaged in gym workouts or climbing activities could also benefit from such practices. Strengthening the rotator cuff and scapular muscles can enhance shoulder joint stability, reducing the likelihood of shoulder injuries.¹⁰

Our study's strengths lie in its large cohort size, rigorous methodology and focus on first-visit presentations, providing a comprehensive overview of the demographics of sports injuries. However, the study's scope was limited to a single tertiary centre, and future multicentre cohort studies would enhance the overall understanding of the demographic landscape of sports injuries in Singapore. Additionally, the study could have been strengthened by collecting information on patients' demographics and the specific mechanisms of injury, which would provide a better understanding of how certain injuries are commonly obtained, allowing for more targeted interventions.

This study highlights the evolving landscape of sports injuries in Singapore, emphasising the importance of continuous monitoring and the

implementation of targeted injury prevention strategies. By understanding these shifts, authorities and healthcare professionals can better anticipate future trends, implement effective public health interventions, and reduce the prevalence of sports injuries and associated healthcare costs. Hospitals and allied health services, such as sports medicine practitioners and physiotherapists, should be prepared to handle the changing demographic of patients presenting with sports injuries.

Declaration

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