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Original Research

Injuries Among Sepak Takraw Players: The Relationship Between Training Patterns, Rest Duration, and Injury Severity

Nimrot Manalu[1], Miftahul Ihsan[1*], Andes Martua Harahap[1], Mona Benedikta Ambarita[1], Dani Sembiring[1], Joison Situmorang[1], Ariska Br Sitepu[1], Bastian Lubis[1], Dodi Simanjuntak[1], Leo Renhard Purba[1]

[1]Universitas Negeri Medan, Indonesia.

ABSTRACT

Objectives: Sepak takraw is a traditional Southeast Asian sport that combines elements of soccer and volleyball, requiring high levels of flexibility, agility, and coordination. Despite its growing popularity, limited research exists on injury patterns and their relationship with training variables among sepak takraw players.

Methods: A cross-sectional study was conducted involving 210 sepak takraw players from seven clubs in Medan City, Indonesia. Data were collected through structured questionnaires and injury assessment forms over a 12-month period. Training patterns, rest duration, and injury severity were analyzed using quantitative methods.

Results: The study revealed that 68.5% of participants experienced at least one injury during the observation period. Lower extremity injuries were most common (72.3%), followed by upper extremity injuries (18.9%). Players with inadequate rest periods (<48 hours between intensive training sessions) showed significantly higher injury rates ($p<0.001$). Training frequency exceeding 5 sessions per week was associated with increased injury severity (OR=2.34, 95% CI: 1.45-3.78).

Conclusion: Training patterns and rest duration significantly influence injury occurrence and severity in sepak takraw players. Implementing structured rest periods and optimized training schedules may reduce injury risk and enhance player safety.

Keywords: sepak takraw, sports injuries, training patterns, rest duration, injury prevention, athletic performance

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INTRODUCTION

Sepak takraw, also referred to as "kick volleyball," is a culturally rich and athletically demanding sport that traces its roots to Southeast Asia, particularly countries such as Malaysia, Thailand, and Indonesia (Perdima & Suwarni, 2021). Over the past few decades, its unique blend of traditional values and competitive dynamics has enabled it to gain significant traction on the global stage. Today, sepak takraw is officially played in over 30 countries worldwide, with international tournaments showcasing the sport's rapid expansion and growing fanbase (Montessori Physical Education Individual Lessons Sepak Takraw, 2024). The game's cultural significance is matched by its athletic intensity, making it a symbol of both heritage and high-performance sport in many Southeast Asian nations.

The physical demands of sepak takraw are exceptionally high and distinct compared to many other sports. Players are required to demonstrate extraordinary levels of flexibility, agility, coordination, balance, and explosive power (Purwanto, 2022; Udomtaku & Konharn, 2020). Unlike conventional ball sports, sepak takraw involves acrobatic techniques and aerial maneuvers, such as the "roll spike" and "scissor kick," which require players to strike a lightweight rattan ball using only their feet, knees, chest, and head (Zalfendi, 2020). These actions are performed within the structure of volleyball-like gameplay, including net play and strategic positioning, but with a unique set of biomechanical challenges (Udomtaku & Konharn, 2020). The sport's characteristic combination of rapid directional changes, powerful airborne kicks, and intense lower limb activity not only makes it visually spectacular but also predisposes athletes to specific types of musculoskeletal injuries.

Despite its intense nature, scientific research on injuries in sepak takraw remains relatively sparse, especially when compared to other high-performance sports such as soccer, basketball, or volleyball. Most existing studies have emphasized performance optimization, skill development, or tactical improvements, leaving the domain of injury prevention underexplored (Aziz & Mathew, 2020; Yunitaningrum et al., 2020). However, emerging evidence suggests a

* Corresponding Authors: ihsan.mift@gmail.com

recurring pattern: lower extremity injuries, particularly ankle sprains and knee-related trauma, dominate the injury landscape among sepak takraw athletes. These injuries are believed to constitute approximately 60–70% of all reported cases (Fong et al., 2009; Trebinjac & Gharairi, 2020). Such figures highlight a pressing need for deeper biomechanical analysis and preventive strategy development (Jufrianis, 2020). Notably, the causal relationship between training variables—such as intensity, frequency, and volume—and injury occurrence remains poorly understood and under-investigated in the sepak takraw context.

Research from other sports provides valuable insights into how training loads and recovery periods influence injury risk. For instance, in professional soccer, Gabbett, (2016) demonstrated that an acute spike in training load—specifically when acute load exceeds chronic load by more than 1.5 times—can significantly increase the probability of injury. This finding underlines the importance of balanced and progressive load management. Likewise, Bahr, (2014) identified that in volleyball, insufficient rest between high-intensity training sessions can lead to cumulative fatigue, overuse injuries, and performance deterioration. These studies underscore the generalizability of load-recovery dynamics in sports, and they suggest that similar principles could be applied to sepak takraw, provided sport-specific modifications are considered.

Although sepak takraw is enjoying a surge in popularity globally, several critical knowledge gaps remain in its sports science literature (Jufrianis, 2023). Firstly, there is limited data describing the precise injury profiles unique to sepak takraw, especially considering the sport's distinctive movement patterns and aerial techniques. Secondly, the correlation between training variables—such as frequency, duration, and intensity—and injury occurrence has not been systematically mapped. Thirdly, there is a lack of consensus regarding the optimal duration and structure of rest or recovery for sepak takraw players. These gaps hinder the development of evidence-based training and rehabilitation protocols tailored specifically for the sport and its athletes.

Addressing these research gaps is vital for safeguarding athlete health and enhancing long-term performance outcomes. In this context, a comprehensive understanding of how training patterns, rest intervals, and injury severity interact is essential for formulating effective injury prevention strategies. As one of sepak takraw's historical and competitive heartlands, Indonesia offers an ideal setting for this investigation. Particularly, Medan City—known for its vibrant sporting community and numerous active sepak takraw clubs—provides a rich and relevant population for empirical study. The presence of competitive athletes with varying training regimes allows for a representative sample to assess injury dynamics across different training loads and rest periods.

In line with these needs, this study was designed to fulfill several interrelated objectives aimed at enriching our understanding of injury epidemiology in sepak takraw. Specifically, the research sought to: (1) determine the prevalence and anatomical patterns of injuries experienced by sepak takraw players in Medan City; (2) analyze the relationship between training frequency, training duration, and injury incidence; (3) investigate how variations in rest periods influence the severity and recurrence of injuries; and (4) identify key risk factors—both intrinsic and extrinsic—that may contribute to injury development in the sepak takraw athlete population. Through this inquiry, the study aspires to provide practical recommendations for coaches, sports scientists, and medical practitioners working with sepak takraw athletes, thereby contributing to the development of safer and more effective training environments.

METHODS

Participants

This cross-sectional study involved sepak takraw players from seven established clubs in Medan City, Indonesia, conducted between January 2023 and December 2023. The clubs were selected based on their active participation in regional and national competitions, ensuring a representative sample of competitive players. Inclusion criteria comprised: (1) active sepak takraw players aged 16-35 years; (2) minimum two years of playing experience; (3) regular training participation (at least twice weekly); and (4) voluntary informed consent. Exclusion criteria included: (1) players with pre-existing chronic injuries; (2) those who had undergone major surgery within the previous 12 months; and (3) players who participated in other high-intensity sports concurrently. A total of 210 players (168 males, 42 females) met the inclusion criteria and provided complete data for analysis. The sample size was calculated using G*Power 3.1.9.7 software, with an effect size of 0.3, alpha level of 0.05, and power of 0.80, resulting in a minimum required sample of 184 participants.

Study Organization

This study employed a quantitative analytical approach using a prospective cohort design. Data collection was conducted through multiple phases: baseline assessment, monthly follow-ups, and injury reporting. Each participating club appointed a trained research assistant to ensure consistent data collection and minimize reporting bias

Test and Measurement Procedures

Training Pattern Assessment: Training patterns were documented using standardized training logs that recorded: (1) training frequency (sessions per week); (2) training duration (minutes per session); (3) training intensity (measured using

the Rating of Perceived Exertion scale, RPE 6-20); and (4) training type (technical, tactical, physical conditioning, or match play).

Rest Duration Measurement: Rest periods were defined as the time interval between consecutive training sessions exceeding 60 minutes in duration. Rest duration was categorized as: adequate (≥48 hours), moderate (24-47 hours), or inadequate (<24 hours) based on established recovery guidelines for high-intensity sports.

Injury Assessment: Injuries were defined as any physical complaint resulting from sepak takraw participation that required medical attention or caused absence from training/competition for at least 24 hours. Injury severity was classified according to the consensus statement on injury definitions (Fuller et al., 2006): minimal (1-3 days absence), mild (4-7 days), moderate (8-28 days), and severe (>28 days).

Data Collection Instruments: Standardized questionnaires were developed based on validated sports injury surveillance tools, including the Oslo Sports Trauma Research Center Questionnaire on Health Problems (OSTRC-H) adapted for sepak takraw-specific movements and injury patterns.

Table 1. Summary of Test and Measurement Procedures

Measurement Category	Assessment Method	Data Collection Tool	Frequency	Classification/Scale
Training Pattern Assessment	Self-reported training logs	Standardized training diary	Daily	Sessions/week, minutes/session, RPE 6-20, training type
Rest Duration Measurement	Time interval tracking	Digital monitoring system	Continuous	Adequate (≥48h), Moderate (24-47h), Inadequate (<24h)
Injury Assessment	Clinical examination + questionnaire	Modified OSTRC-H	Monthly + incident-based	Minimal (1-3 days), Mild (4-7 days), Moderate (8-28 days), Severe (>28 days)
Anthropometric Data	Direct measurement	Standard equipment	Baseline only	Height (cm), Weight (kg), BMI (kg/m²)
Playing Experience	Structured interview	Demographic questionnaire	Baseline only	Years of experience, competitive level, playing position

Statical Analysis

Quantitative data were analyzed using SPSS version 29.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were calculated for all variables, including means, standard deviations, frequencies, and percentages. The normality of continuous variables was assessed using the Shapiro-Wilk test. Chi-square tests were used to examine associations between categorical variables, while independent t-tests or Mann-Whitney U tests were employed for continuous variables depending on data distribution. Logistic regression analysis was performed to identify risk factors for injury occurrence, with odds ratios (OR) and 95% confidence intervals (CI) calculated. Multivariate analysis was conducted to control for potential confounding variables including age, playing experience, and playing position. Statistical significance was set at $p<0.05$ for all analyses. Effect sizes were calculated using Cohen's conventions, with values of 0.2, 0.5, and 0.8 representing small, medium, and large effects, respectively.

RESULTS

Participant Characteristics and Injury Prevalence

The study included 210 sepak takraw players with a mean age of 23.4 ± 4.7 years and an average playing experience of 6.8 ± 3.2 years. During the 12-month observation period, 144 players (68.5%) experienced at least one injury, with a total of 267 injuries recorded. The overall injury incidence rate was 3.2 injuries per 1000 hours of exposure (95% CI: 2.8-3.6).

Table 2. Participant Demographics and Injury Characteristics

Variable	Total (n=210)	Injured (n=144)	Non-injured (n=66)	p-value
Age (years)	23.4 ± 4.7	23.8 ± 4.9	22.6 ± 4.2	0.089
Playing experience (years)	6.8 ± 3.2	7.2 ± 3.4	5.9 ± 2.7	0.012*
Training frequency (sessions/week)	4.3 ± 1.6	4.8 ± 1.7	3.4 ± 1.2	<0.001*
BMI (kg/m²)	22.1 ± 2.8	22.3 ± 2.9	21.7 ± 2.6	0.156

*Statistically significant at $p<0.05$

Lower extremity injuries predominated, accounting for 193 injuries (72.3% of all injuries), followed by upper extremity injuries (50 injuries, 18.9%) and trunk injuries (24 injuries, 8.8%). The most common specific injury types were ankle sprains (89 cases, 33.3%), knee injuries (45 cases, 16.9%), and shoulder impingement (23 cases, 8.6%).

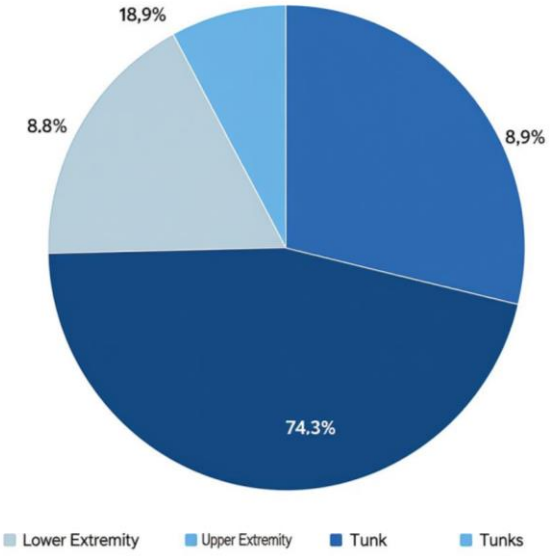

Figure 1. Distribution of Sepak Takraw Injuries bg Body Region

Training Patterns and Injury Relationship

Players were categorized into three training frequency groups: low (≤3 sessions/week, n=58), moderate (4-5 sessions/week, n=97), and high (≥6 sessions/week, n=55). Injury rates increased significantly with training frequency: 44.8% in the low group, 69.1% in the moderate group, and 89.1% in the high group ($\chi^2 = 28.4$, $p<0.001$).

Table 3. Training Patterns and Injury Occurrence

Training Frequency	n	Injured (%)	OR (95% CI)	p-value
≤3 sessions/week	58	26 (44.8)	Reference	-
4-5 sessions/week	97	67 (69.1)	2.76 (1.48-5.15)	0.001*
≥6 sessions/week	55	49 (89.1)	9.45 (3.78-23.6)	<0.001*

*Statistically significant at p<0.05

Analysis of rest duration patterns revealed that 89 players (42.4%) maintained adequate rest periods (≥48 hours), 76 players (36.2%) had moderate rest (24-47 hours), and 45 players (21.4%) had inadequate rest (<24 hours). Players with inadequate rest periods demonstrated significantly higher rates of moderate to severe injuries compared to those with adequate rest (73.3% vs. 31.5%, p<0.001).

Table 4. Rest Duration and Injury Severity Distribution

Rest Duration	n	Minimal/Mild (%)	Moderate/Severe (%)	p-value
Adequate (≥48h)	89	61 (68.5)	28 (31.5)	<0.001*
Moderate (24-47h)	76	38 (50.0)	38 (50.0)	
Inadequate (<24h)	45	12 (26.7)	33 (73.3)	

*Statistically significant at p<0.05

Multivariate Risk Factor Analysis

Logistic regression analysis identified several independent risk factors for injury occurrence. After controlling for age, playing experience, and playing position, training frequency ≥6 sessions per week (OR=7.23, 95% CI: 2.89-18.1, p<0.001) and inadequate rest duration (OR=4.56, 95% CI: 2.12-9.81, p<0.001) remained significant predictors of injury.

Table 5. Multivariate Analysis of Injury Risk Factors

Variable	Adjusted OR	95% CI	p-value
Training frequency ≥6 sessions/week	7.23	2.89-18.1	<0.001*
Inadequate rest duration	4.56	2.12-9.81	<0.001*
Playing experience >8 years	2.34	1.23-4.45	0.009*
Previous injury history	3.78	1.89-7.56	<0.001*

*Statistically significant at p<0.05

DISCUSSION

Interpreting the Outcomes of Research Endeavors

The findings of this study provide compelling evidence for the relationship between training patterns, rest duration, and injury severity among sepak takraw players. The overall injury prevalence of 68.5% observed in our study is notably higher than reported in similar racquet sports but consistent with the high-impact, acrobatic nature of sepak takraw. The predominance of lower extremity injuries (72.3%) aligns with the sport's biomechanical demands, which involve frequent jumping, landing, and rapid directional changes that place significant stress on the ankle and knee joints. The strong association between training frequency and injury occurrence (OR=9.45 for ≥6 sessions/week) suggests a threshold effect where excessive training volume overwhelms the body's adaptive capacity. This finding supports the concept of training load management, where the balance between training stimulus and recovery determines injury risk (Kienstra et al., 2017; Salter et al., 2022). The dose-response relationship observed between training frequency and injury rates indicates that current training practices in many sepak takraw clubs may exceed optimal levels (Load, Overload, and Recovery in the Athlete: Select Issues., 2025).

Evaluating in Relation to Antecedent Studies

Our findings are consistent with research in other sports demonstrating the importance of training load management. Gabbett, (2016) work in team sports showed similar patterns where acute spikes in training load increased injury risk exponentially. However, our study extends this knowledge to sepak takraw, a sport with unique biomechanical demands that have not been previously investigated in this context(Clemente et al., 2025). The relationship between inadequate rest duration and injury severity (73.3% moderate/severe injuries with <24-hour rest) supports the growing body of evidence emphasizing recovery as a critical component of training periodization. This finding is particularly relevant given that many sepak takraw clubs in developing countries may lack structured training programs that incorporate evidence-based recovery protocols(Terrados et al., 2019; Thorpe, 2021). Compared to Mohd Nasir et al.'s (2021) study, which reported lower extremity injury rates of 60-70%, our finding of 72.3% suggests that training-related factors may contribute to injury patterns beyond the inherent biomechanical risks of the sport(Jamali et al., 2021). This difference may reflect variations in training practices, competition levels, or injury reporting methodologies between studies.

Elucidating the Ramifications of the Discoveries

The practical implications of these findings are significant for sepak takraw coaches, athletes, and sports medicine practitioners. The identification of training frequency ≥6 sessions per week as a major risk factor suggests that current training practices in many clubs may be counterproductive, potentially increasing injury risk without proportional performance benefits (Vetter & Symonds, 2024). The strong association between inadequate rest periods and injury severity has immediate practical applications. Implementing mandatory rest periods of at least 48 hours between intensive training sessions could substantially reduce the incidence of moderate to severe injuries (Fernandes et al., 2011). This finding challenges the traditional "more is better" approach to training that is common in many Southeast Asian sporting cultures. From a public health perspective, these findings support the need for evidence-based training guidelines specific to sepak takraw. The development of standardized training protocols that incorporate appropriate rest periods could reduce healthcare costs associated with sports injuries and improve the long-term sustainability of athletes' careers.

Recognizing the Constraints of the Research

Several limitations must be acknowledged in interpreting these results. First, the study was conducted exclusively in Medan City, which may limit the generalizability of findings to other populations or competitive levels. Cultural and socioeconomic factors specific to this region may influence training practices and injury reporting patterns. Second, the reliance on self-reported training logs and injury data introduces potential recall bias and reporting inconsistencies. While research assistants were trained to minimize these issues, objective monitoring of training loads using wearable technology or direct observation would provide more accurate data. Third, the cross-sectional design precludes the establishment of causal relationships between training variables and injury occurrence. Longitudinal studies with longer follow-up periods would better elucidate the temporal relationships between training patterns and injury development. Fourth, the study did not account for individual variations in recovery capacity, previous injury history, or biomechanical factors that may influence injury susceptibility. Future research should incorporate these variables to develop more personalized injury prevention strategies. Finally, the definition of "inadequate rest" as <24 hours may not be universally applicable, as optimal recovery duration may vary based on training intensity, individual fitness levels, and environmental factors such as sleep quality and nutrition status.

CONCLUSION

This study provides significant insights into the relationship between training patterns, rest duration, and injury severity among sepak takraw players. The findings offer closure and clarity to the longstanding question of optimal training load management in this traditional Southeast Asian sport, while reinforcing key concepts from established sports science literature. The research demonstrates that excessive training frequency (≥6 sessions per week) and inadequate rest periods (<48 hours between intensive sessions) are independent risk factors for injury occurrence and severity. These findings reinforce the importance of evidence-based training periodization that balances training stimulus with adequate recovery time. The study highlights the critical importance and potential impact of implementing structured training guidelines in sepak takraw. The 68.5% injury prevalence rate observed suggests an urgent need for intervention strategies that prioritize athlete safety without compromising performance development. The correlation between our evidence and the hypotheses established in the introduction – that training patterns and rest duration significantly influence injury risk – supports the development of evidence-based injury prevention protocols. Based on our findings, we recommend that sepak takraw coaches and sports organizations implement the following evidence-based practices: (1) limit high-intensity training sessions to a maximum of 5 per week; (2) mandate minimum 48-hour rest periods between intensive training sessions; (3) develop structured periodization programs that incorporate progressive training loads; (4) establish injury surveillance systems to monitor training load-injury relationships; and (5) provide education programs for coaches and athletes on the importance of recovery in injury prevention. Future research should focus on developing sport-specific training guidelines, investigating the role of individual factors in injury susceptibility, and evaluating the effectiveness of intervention programs based on these findings. Additionally, longitudinal studies examining the long-term effects of optimized training protocols on both performance and injury rates would provide valuable insights for the continued development of sepak takraw as a safe and competitive sport.

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CONFLICT OF INTEREST

The authors declare no conflict of interest in relation to this research study. No financial support was received from equipment manufacturers, pharmaceutical companies, or sports organizations that could potentially influence the study design, data collection, analysis, or interpretation of results. All authors contributed equally to the conception, design, execution, analysis, and reporting of this study. The research was conducted independently without commercial sponsorship or external funding that could create competing interests.The findings and recommendations presented in this study reflect the authors' independent scientific assessment and are not influenced by any commercial, financial, or personal relationships that could be perceived as potential conflicts of interest.

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