University of Tehran Press
Sport Sciences and Health Research
EISSN:2981-0205
https://sshr.ut.ac.ir/

The epidemiology of injuries in Iranian taekwondo athletes: A narrative review

Mojtaba Ebrahimi Varkiani *, Sara Matinfard

Department of Sport Injury and Corrective Exercise, Faculty of Sport Sciences and Health, University of Tehran, Tehran, Iran.
(*Corresponding author: ✉ m.ebrahimi@ut.ac.ir, https://orcid.org/0000-0002-7843-5800)

Article Info

Review Article

Article history:
Received: 01 August 2024
Revised: 29 October 2024
Accepted: 03 Nobember 2024
Published online: 01 January 2025

Keywords:
epidemiology,
injury,
Iranian athletes
taekwondo.

Abstract

Background: Epidemiology studies the prevalence of a disease or injury in a particular society. In fact, the focus is on the study of injury type, body part of injury, the duration of an athlete's absence from sports, severity, treatment costs due to the injury, etc. Taekwondo is one of the most popular sports in Iran which has high injuries due to its contact nature.

Aim: This study aimed to identify gaps, and address challenges in the literature on injuries among Iranian taekwondo athletes. To achieve this, the study reviewed research on taekwondo injuries among Iranian athletes, with a specific focus on the incidence rate of injuries, the most commonly injured body locations, the types of injuries, and other epidemiological indexes.

Materials and Methods: To conduct the study, databases including "sid.ir", "Magiran", "Iran doc", "Google Scholar", "ScienceDirect", "Scopus", and "PubMed" were searched using keywords including "taekwondo", "taekwondo injury", "epidemiology", "injury rate", "Iranian taekwondo", "sport epidemiology" and "Iran epidemiology". Articles relevant to the subject published between 2005 and 2023 were selected for analysis, focusing specifically on studies related to the epidemiology of taekwondo injuries in Iranian athletes.

Results: Total of 70 research were found. The analysis showed sprain and strain with 38.70% and bruises with 30.60% as the most reported types of injury, lower extremity injured mostly with the average of 33.12%.

Conclusion: The gap of considering the injury type and severity was observed in most studies. The nature of injury and injury chronometry are of indexes paid less attention as well. Regard to the studies, injuries in the lower extremity are mostly occurred in Iranian taekwondo athletes. A study in epidemiology of taekwondo injuries included all epidemiological indexes in Iranian taekwondo athletes is necessary.

Cite this article: Ebrahimi Varkiani M, Matinfard S."The epidemiology of injuries in Iranian taekwondo athletes: A narrative review". *Sport Sciences and Health Research*. 2025, 17(1): 23-29. doi: https://doi.org/10.22059/SSHR.2024.373384.1126.

EISSN: 2717-2422 | Web site: https://sshr.ut.ac.ir/ | Email: sshr@ut.ac.ir

1. Introduction

The field of sports injury epidemiology involves examining the frequency and occurrence of sports-related injuries to develop and apply preventive measures. This area of study encompasses a wide range of characteristics, content, and objectives [1]. It can be categorized into two parts: descriptive epidemiology and analytical epidemiology. Descriptive epidemiology involves examining factors such as injury rates (during training and competition) based on age, gender, level of sports participation, playing position, and other relevant concepts [2].

Conversely, it's important to highlight that in these studies, emphasis is placed on the anatomical location, environmental circumstances, and timing of the injury. Additionally, the nature of the injury (acute or chronic) and the timing of the injury (e.g., time of day or during the competition) are prioritized. Moreover, injury type, duration of time lost due to injury, clinical outcomes, and economic costs are also crucial concepts in such studies [2].

The clinical results section takes into account the impact of re-injury, catastrophic effects, and residual effects of the injury upon data availability. Analytical epidemiology investigates the causes of different injuries (why and how) [3]. In addition, the epidemiologic studies are prospective or retrospective.

Taekwondo is widely regarded as one of the most popular martial arts in Iran. The Taekwondo Federation boasts over 201 official members, with 43 of them hailing from the Asian continent [4]. Iran has achieved notable advancements in taekwondo over the years, securing world championship victories in different years. The sport in Iran adheres to the international regulations of the World Taekwondo Federation, with tournaments taking place in various locations worldwide. Taekwondo, known for its physical contact, exhibits a higher injury rate compared to non-contact sports, as indicated by studies [5].

In a review study by Lister et al. (2009), taekwondo was found to have more injuries than American football, soccer, ice hockey, and basketball. Additionally, taekwondo was listed among the top five sports with the highest risk of injury during the 2008 Beijing Olympics [5, 6].

Alizadeh et al. (2012) focusing on injuries among elite taekwondo athletes, reported that 44.4% of injuries occurred in the lower extremities [7], while 9.33% affected the head and neck area [8, 9]. According to the explanations given, this field is among the sports with high injury and this can affect the performance of the athletes.

As studies have shown, for every injury (even the first injury occurred) in the competition, the probability of winning a medal by the injured athlete decreases by 88% [10]. Therefore, preventing these injuries is of utmost importance, and the study of sports injuries serves as a crucial tool for prevention.

Numerous epidemiological studies have investigated various aspects of taekwondo injuries. In these studies, there were different aspect of injuries investigated and there were no specific frame work to report information. This may cause conflict impression and missing some of important data. So, some gaps on epidemiology studies are this field too. Given the significance of this discipline in Iran, the current study aims to identify existing data and gaps in the epidemiological research on injuries in Iranian taekwondo.

2. Materials and Methods

2. 1. Procedure

This research used an applied approach in terms of its objective and utilized a descriptive-comparative method for data collection. To conduct the study, specialized databases "sid.ir", "Magiran", "Iran doc", "Google Scholar", "ScienceDirect" and "PubMed" were searched using keywords including "taekwondo", "taekwondo injury", "epidemiology", "injury rate", "Iranian taekwondo", "sport epidemiology" and "Iran epidemiology". Articles relevant to the subject, published between 2005 and 2024, were included for analysis. Inclusion criteria included studies which were about "Iranian taekwondo athlete", "taekwondo injuries", "epidemiology", "Iran epidemiology". The studies with non-standard data collection methods were excluded from the study.

3. Results

Total of 70 studies were found on this key bored among which based on mentioned inclusion criteria, 6 studies were chosen to be used on this study among which 5 of them were published in Iran and in foreign journals. The findings are presented in Tables 1-4 and Figures 1-2.

3.1. Incidence rate of injury

The incidence rates of taekwondo injuries, as observed in both prospective and retrospective studies, exhibit considerable variability over the years. The incidence rate ranged from 19.09 till 69.5 injury per 1000 athletes at risk in prospective studies. The data shows fluctuations in the incidence rates, with notable changes observed between different years and study types. This suggests a dynamic pattern in the occurrence of injuries within the sport. Further comprehensive analysis is warranted to identify any significant trends and to gain a deeper understanding of the factors influencing the fluctuating incidence rates over time. For a more comprehensive trend analysis, advanced statistical methods or access to a larger dataset would be necessary to determine if there is a significant trend in the incidence rate over the years.

Table 1. Incidence rate of taekwondo injuries in Iranian athletes

Reference	Year (Domain of study)	Type of study	Number of injuries	Incidence rate of injury
Ziaei et al. (2010) [4]	2004 (Premier league)	Prospective	93	**69.5**
Ebrahimi Varkiani et al. (2013) [11]	2009 (Premier league)	Prospective	22	**19.09**
Ebrahimi Varkiani et al. (2013) [14]	2008 (Nationwide)	Retrospective	1389	**8.57**
Ebrahimi Varkiani et al. (2013) [14]	2009 (Nationwide)	Retrospective	1493	**9.36**
Ebrahimi Varkiani et al. (2013) [14]	2010 (Nationwide)	Retrospective	1497	**8.66**
OmidvanChali & Minonezhad (2019) [13]	2014 (Nationwide)	Retrospective	1087	**N.A**
OmidvanChali & Minonezhad (2019) [13]	2015 (Nationwide)	Retrospective	1166	**N.A**
OmidvanChali & Minonezhad (2019) [13]	2016 (Nationwide)	Retrospective	1362	**N.A**
OmidvanChali & Minonezhad (2019) [13]	2017 (Nationwide)	Retrospective	1561	**N.A**

- Incidence rate of injury in prospective studies is per 1000 athletes at risk.
- Injury rate in retrospective studies is reported per 1000 athletes.

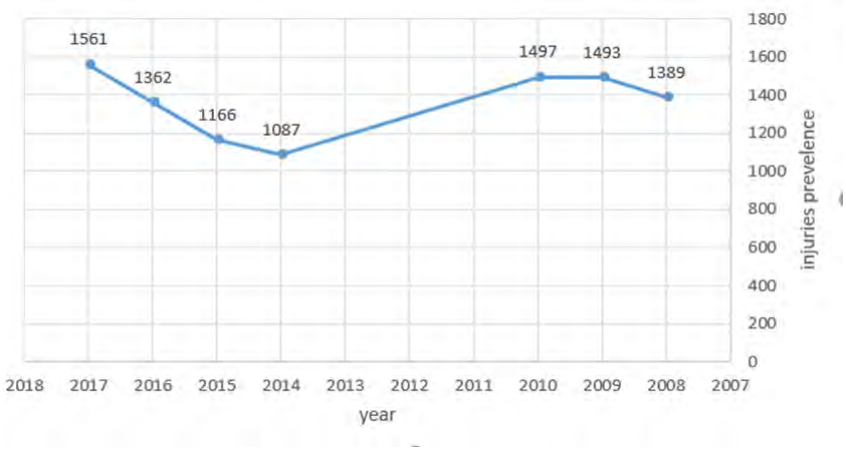

Figure 1. Number of taekwondo injuries in Iranian athletes in different years

Table 2. Types of injury in different years in Iranian taekwondo athletes

Reference (Study type)	Dislocation	Fracture	Anesthesia and concussion	Abrasion and scratches	Sprain/ Strain	Bruises	Nosebleed
Ziaee et al. (2020) [4] (Prospective)	7	9	3	9	10	41 (30.6%)	**1**
Ebrahimi Varkiani et al. (2013) [12] (Prospective)	3	1	1	1	5	8 (36.4%)	**3**
EbadiNargesi et al. (2018)* [1] (Retrospective)	103	141	0	35	240 (38/70%)	101	**0**

* The percentage of the most common type of injury is written.
*Posted among 102 Taekwondo League athletes

3.2. Type of injuries

There was inconsistency in how the injury type was classified, with different studies using different criteria. However, across various studies conducted in different years, strains and sprains (38.7%) and Bruises (30%-36%) were consistently reported as the most common types of injuries.

3.3. Injury location

Several studies categorized body regions into four parts [4, 15]: trunk, upper limbs, lower limbs, and head/neck. While the statistics varied across studies, with some reporting percentages and others using numerical data, the consistent finding across all studies was that the lower limbs had the highest injury rate.

3.4. Injurycosts

There is no study about Iranian taekwondo injuries report injuries costs and data on matter of incomplete, covering only the period from 2014 to 2017. However, these studies consistently indicated an annual increase in the cost of treatment. The study highlighted a lack of reporting on injury treatment costs, making it challenging to analyze cost trends over time.

Table 3. Body locations of Iranian taekwondo athletes' injuries

Reference	year	Trunk	Head and neck	Lower limb	Upper limb	Type of study	Total
Ziaee et al. (2010) [4] (Premier League)	2006	7 (7.52%)	7 (7.52%)	39 (41.93%)	40 (43.01%)	Prospective	**93**
Ebrahimi Varkiani et al. (2014) [14] (Premier League)	2007	2 (9/1%)	6 (27/3%)	6 (27/3%)	8 (36/4%)	Prospective	**22**
Ebrahimi Varkiani et al. (2013) [11]	2008	74 (5.32%)	228 (16.41%)	594 (42.76%)	493 (35.49%)	Retrospective (ISS)	**1389**
	2009	93 (6.22%)	269 (18.01%)	656 (43.93%)	475 (31.81%)	Retrospective	**1493**
	2010	68 (4/5%)	225 (15%)	670 (44/8%)	534 (35/7%)	Retrospective	**1497**
OmidvanChali & Minonezhad (2019) [13] (Nationwide)	2015	36	21	626	382	Retrospective	**1065**
	2016	40	15	667	393	Retrospective	**1115**
	2017	62	27	784	448	Retrospective	**1321**
	2018	50	26	879	621	Retrospective	**1576**

*ISS= injury surveillance System

* Body locations with the highest prevalence of injury are highlighted.

**These studies just reported the percentage of injuries.

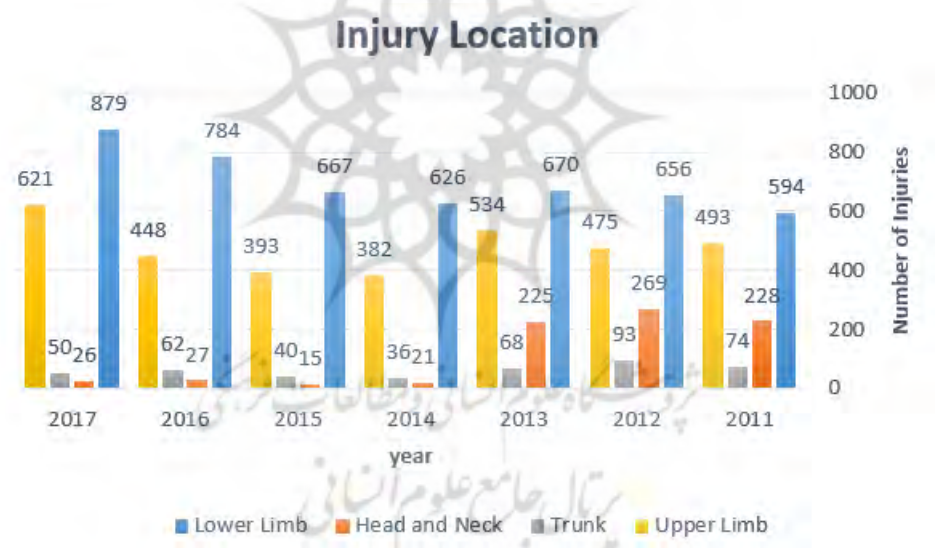

Figure 1. Number of injuries occurred in body locations

Table 4. Injury costs in Iranian taekwondo athletes

References	Male	Female	Type of study	Total injury costs (Rial)
OmidvanChali & Minonezhad (2019) [13] (Nationwide)	3065947902	1617072023	Retrospective	**4683019925**
OmidvanChali & Minonezhad (2019) [13] (Nationwide)	3611349076	1368964266	Retrospective	**4980313342**
OmidvanChali & Minonezhad (2019) [13] (Nationwide)	4172982478	2758912662	Retrospective	**6931895149**
OmidvanChali & Minonezhad (2019) [13] (Nationwide)	4977665335	2714870045	Retrospective	**7692535380**

3.5. Injury chronometry

According to the studies, 45.5% of injuries occurred at the start of the season, while 36.4% occurred at the end. This highlights the peak injury occurrence during the early and late stages of the season, underscoring the significance of implementing injury prevention measures during these periods.

3.6. Other indexes

Contact injuries accounted for the majority of injuries, while information on injury severity and treatment duration was limited due to research constraints.

3.7. Deficiencies of epidemiological indexes of taekwondo injuries in Iran

Deficiencies including inadequate attention to the nature of injury (acute or chronic), absence due to injury, injury severity, re-injury, catastrophic effects, and the factors influencing an athlete's absence and return to sport. Moreover, limited information on the type of sports injuries, coupled with the reliance on questionnaire-based studies focusing on specific athlete groups in localized regions, underscored the need for epidemiological studies encompassing all relevant indexes in Iranian taekwondo athletes.

4. Conclusions

Evaluations expose significant variability in taekwondo injury incidence rates and highlights inconsistencies and limitations in the available data. The findings underscore the need for comprehensive epidemiological studies that encompass all relevant indexes like incidence rate, type of injury, body location, injury severity, nature (acute or chronic), chronometry, costs and residual effects and etc. to improve the understanding and management of injuries in Iranian taekwondo athletes. This will facilitate the development of effective injury prevention strategies and contribute to the overall well-being of taekwondo athletes in Iran.

Conflict of interest

The authors declared no conflicts of interest.

Authors' contributions

All authors contributed to the original idea, study design.

Ethical considerations

The authors have completely considered ethical issues, including informed consent, plagiarism, data fabrication, misconduct, and/or falsification, double publication and/or redundancy, submission, etc.

Data availability

The dataset generated and analyzed during the current study is available from the corresponding author on reasonable request.

Funding

This research did not receive any grant from funding agencies in the public, commercial, or non-profit sectors.

Reference

[1] EbadiNargesi H, HematiNezhad M, Daneshmandi H. "Investigating the amount and causes of sports injuries in relation to their financial cost in the Iranian Taekwondo League". Iran Doc: Gilan University; 2018.

[2] www.isss-sportsurfacescience.org/../6EGQHIOVRC_Milner.

[3] Caine DJ, Harmer PA, Schiff MA. *Epidemiology of Injury in Olympic Sports*. John Wiley & Sons. 2009.

[4] Ziaee V, Rahmani SH, Rostami M. "Injury rates in Iranian taekwondo athletes; A prospective study". *Asian Journal of Sports Medicine*. 2010; 1(1). 23-28. doi: https://doi.org/10.5812%2Fasjsm.34877.

[5] Junge A, Engebretsen L, Mountjoy ML, Alonso JM, Renström PA, Aubry MJ, Dvorak J. "Sports injuries during the summer Olympic Games

2008". *The American Journal of Sports Medicine*. 2009; 37(11): 2165-72.

[6] Lystad RP, Pollard H, Graham PL. "Epidemiology of injuries in competition taekwondo: A meta-analysis of observational studies". *Journal of Science and Medicine in Sport*. 2009; 12(6): 614-21.

[7] Alizadeh MH, Shirzad E, Sedaghati P. "Epidemiology of head, neck and torso injuries in taekwondo, karate and judo". F*eyz Journal of Kashan University of Medical Sciences*. 2012; 16(4).

[8] Kazemi M, Pieter W. "Injuries at a Canadian National Taekwondo Championships: A prospective study". *BMC Musculoskeletal Disorders*. 2004; 5: 1-8.

[9] Zemper E, Pieter W. "Injury rates during the 1988 US Olympic Team Trials for taekwondo". *British Journal of Sports Medicine*. 1989; 23(3): 161-4.

[10] Kazemi M. "Relationships between injury and success in elite taekwondo athletes". *Journal of Sports Sciences*. 2012; 30(3): 277-83.

[11] Ebrahimi Varkiani M, Alizadeh M, Pourkazemi L. Epidemiology of Sport Injuries of Iran's Athletes via IRI Sport Medicine Federation Database: 21 Sports in 2009-2011. MA. thesis Tehran: University of Tehran. 2013.

[12] Ebrahimi Varkiani M, Alizadeh MH, Pourkazemi L, Moradi Shahpar F. "Assessment of sport injury cost in soccer via Sport Medicine Federation injury surveillance system in Iran". *Journal of Applied Health Studies in Sport Physiology*. 2015; 1(1): 27-3.

[13] OmidvanChali M, Minonezhad H. "Epidemiology of injuries of 15 sports disciplines of Iranian athletes in the years 97-1394". Iran Doc: University of Tehran; 2019.

[14] Ebrahimi Varkiani M, Alizadeh M, Nazari A. "Comparison of sports injuries in two seasons of the Premier League of Taekwondo and investigation of the effect of protective equipment in it: leagues of 2015 and 2016". *Research in Sports Medicine and Technology*. 2014; 7(4): 19-28

[15] Varkiani M, Alizadeh M, Kazemi M, Nazari H, Ghafoorian A. "Taekwondo competition injuries in Iranian premier league: a prospective study". *International Journal of Sport Studies*. 2013; 3(5): 542-8.