

Musculoskeletal injuries in taekwondo athletes: a nationwide study in Portugal

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SUMMARY

BACKGROUND: Taekwondo is a martial art that emphasizes blows using the feet and fists, and it is characterized by direct and continuous body contact, which subjects their practitioners to a higher number of injuries. This study aimed to determine the incidence of musculoskeletal injuries in Portuguese taekwondo athletes and analyze its associated factors.

METHODS: The sample included 341 taekwondo athletes, aged between 4 and 62 years (18.77±12.77 years), 237 (69.5%) were male, and 104 (30.5%) female. A questionnaire was administered at a national level in taekwondo training and competitions via interview.

RESULTS: One hundred and thirty-two (38.7%) taekwondo athletes reported having suffered an injury since they began their practice, totaling 294 injuries. Seventy-six (22.3%) athletes had an injury in the previous 12-months period, with a total of 112 injuries. There were 2.15 injuries per 1,000 hours of taekwondo training. The most common of all injuries was muscle injury (strain, contusion) (58.6%), in the foot and fingers (18.9%). The attack technique (28.8%) was the most prevalent injury mechanism. Adult athletes presented a higher risk of sustaining taekwondo-related injuries than adolescents (odds ratio = 3.91; 95%CI: 1.13-13.55; p=0.032), and athletes who trained more than 1 hour had a risk 4.20 times greater (95%CI: 1.44-12.29; p=0.009) than those who trained up to 1 hour per session.

CONCLUSIONS: Injuries were frequent among Portuguese taekwondo athletes, with specific body areas affected, mainly caused by the attack technique. It is necessary to create injury prevention strategies, including specific training and the use of protective equipment.

KEYWORDS: Epidemiology. Incidence. Wounds and Injuries. Prevalence. Martial Arts.

INTRODUCTION

Martial arts are antique forms of combat often used for different fighting styles. Karate and taekwondo emphasize blows using the feet and fists. Jiu-Jitsu and judo emphasize maneuvers that use the arms, joint locks, and projection techniques. Mixed martial arts (MMA) are styles that blend the techniques mentioned above¹.

Taekwondo is a Korean martial art and combat

sport characterized by its emphasis on dynamic kicking techniques delivered from a mobile stance²⁻⁴. As of 2018, the global membership of the World Taekwondo Federation stands at 208 national member associations, spanning five continents⁵.

Taekwondo, like other martial arts, has grown in popularity and has unarguably become one of the most commonly practiced martial arts in the world^{2,3}.

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The increase of physical demands in combat sports requires athletes to workout close to the maximum exhaustion limits, and the characteristics of these martial arts (competitive aspects characterized by a high direct and continuous body contact) cause their practitioners to be more prone to injuries⁶.

Altarriba-Bartes et al.⁷ evaluated 48 taekwondo athletes of the Spanish national team during two Olympic periods, and verified the occurrence of 1,678 injuries in a period of 8 years, concluding that the practice of taekwondo is related to a high risk of injury.

Lystad et al.⁸ performed a meta-analysis and estimated an overall competition injury incidence rate of 79.3 per 1,000 athlete-exposures after adjusting to level of play, sex, and average age, and found that the most frequently injured body regions were the lower limbs and the head/neck region, while the most common types of injuries were contusions and joint sprains.

To our knowledge, there is no literature with regard to Taekwondo injuries in Portugal. As such, this study aimed to determine injury epidemiology and risk factors for musculoskeletal injury in Portuguese taekwondo athletes, as well as their type, location, and mechanism of injury and analyze the associated risk factors in order to develop appropriate preventive strategies.

METHODS

A retrospective cohort study was conducted to gather data on injuries at a national level. This study was approved by the Research in Education and Community Intervention (RECI) research unit.

Population

The study population consisted of Portuguese taekwondo athletes, who participate or not in competitions, of both sexes and any age.

The inclusion criteria were specified taekwondo athletes who had practiced taekwondo for at least one year, at least two times per week, who freely agreed to participate and signed the informed consent form (if under 18, the consent was signed by their guardian), and were present during the data collection days.

Data on the number of non-federated athletes in Portugal is unknown. Because of that, we used the latest data from the Portuguese Taekwondo Federation, from 2016. The sample size was determined using a population of approximately 4,127 federated

taekwondo athletes in Portugal⁹, an estimated injury prevalence of 60% (as reported in national and international studies)^{10,11} and assuming an error margin of 5% with a 95% confidence interval (CI). Based on these, the minimum sample size was 341 taekwondo athletes¹².

Instrument

Based on a previous exploratory study¹³, a specific questionnaire entitled “Taekwondo Injuries” was used. This previously developed questionnaire was applied to a sample of athletes of other martial arts (judo and jiu-jitsu practitioners). For our study, this questionnaire was evaluated by a group of three experts (with different backgrounds, namely Physiotherapist Ph.D. in Epidemiology, President of the Portuguese Taekwondo Federation, and taekwondo coach) and a pre-test was carried out (on ten athletes). Minor adjustments were made to clarify some issues, such as changing the order of the questions and adding a limit to describe a maximum of only three injuries fully. Data were collected between March and June 2017 in clubs/schools and in taekwondo championships.

The first part of the questionnaire involved items concerning age, gender, region, graduation, dominant upper and lower limbs, years of taekwondo practice, training regularity per week, hours of training sessions, performing other sports regularly at least twice a week, participation in competitions, and the type of competition [form (Taegyeuk/Poomsae) or combat].

The second part of the questionnaire focused on the occurrence/presence of injuries resulting from taekwondo practice in three different periods: 1. at the time of data collection; 2. over the whole taekwondo practice (lifetime prevalence); and 3. over the last 12 months.

The athletes who presented an injury in the past year had to describe its characteristics: the number of injuries; type and location; the moment of injury occurrence; if treatment was performed and, if so, the kind of treatment; the mechanism of injury and the technique that caused the injury. The categories of variables can be seen in the Tables (Results section). It was only possible for respondents to specify the characteristics of a maximum of three injuries (those considered most serious, or that required more time for recovery).

An injury was defined as any condition or symptom that occurred as a result of taekwondo practice and had at least one of the following effects: the athlete had to stop the taekwondo activity (training, competition) for at least one day; the athlete didn't have to

stop the activity, but had to change the activity (to fewer hours of practise or training, a lower intensity of effort, or was less able to perform certain gestures or manoeuvres/techniques); the athlete sought advice or treatment from health professionals to address this condition or symptom¹⁴.

The questionnaire was applied in a single moment by the researcher, and in the form of an interview (a structured interview), so as to allow to clarify the doubts without interfering with the respondents' opinions or producing biased answers.

Data analysis

Firstly, descriptive statistics were obtained regarding all variables in the study. Secondly, the injury proportion (IP) and injury rate (IR) were calculated. To determine the IP, the total number of participants who had at least one injury during the past 12 months was divided by the total number of participants. The IR refers to the total number of injuries divided by the total time for which the athlete was exposed to risk (usually per 1,000 hours). The calculation of the total hours of training per 12-month was done by multiplying the total average hours of training per week by the average number of times of training per week, multiplied by the 12-month period (42 weeks)¹⁵.

In our study, we described the injury rate as a measure of prevalence. Although this is not the typical means of reporting the injury rate in sports, it has been reported similarly in other sports studies¹⁶.

The influence of the variables on the presence of injury was assessed using binary logistic regressions, based on the Enter methods, and crude and adjusted odds ratios (by sex and age), and respective confidence intervals were calculated.

A final multivariate model was developed, using the Forward Likelihood Method, and its validity, quality of fitting and predictive capacity were assessed by Omnibus and Hosmer-Lemeshow tests, and the Nagelkerke correlation coefficient.

In all inferential analyses, statistical significance was set at 0.05.

The statistical analysis was performed with the Statistical Package for Social Sciences (SPSS), version 24.0.

RESULTS

Our sample comprised 341 taekwondo athletes (minimum sample size estimated), aged between 7 and 62 years (18.87 ± 12.67 years), 237 (69.5%) were male, and 104 (30.5%) were female.

The data were collected at a national level, 72 (21.1%) athletes belonged to the northern region of the country, 110 (32.3%) to the central region, and 159 (46.6%) to the southern region.

Regarding belt rank, 13 (3.8%) athletes had white belt, 13 (3.8%) white/yellow, 39 (11.5%) yellow, 40 (11.7%) yellow/green, 64 (18.8%) green, 26 (7.6%) green/blue, 27 (7.9%) blue, 18 (5.3%) blue/red, 26 (7.6%) red, 4 (1.2%) red/black, e 71 (20.8%) black belt.



FIGURE 1.



FIGURE 2.

Two hundred and ninety-two (85.6%) athletes were right-handed, 27 (7.9%) were left-handed, and 22 (6.5%) used both sides. Two hundred and sixty-two (76.8%) used the right side as the dominant side, 44 (12.9%) used the left side, and 35 (10.3%) both sides of the lower limb to practice taekwondo.

One hundred and thirty two (38.7%) taekwondo athletes had been practicing it for 1 and 2 years, 86 (25.2%) between 3 and 4 years, 35 (10.3%) between 5 and 6 years, 25 (7.3%) between 7 and 8 years, 14 (4.1%) between 9 to 10 years, and 49 (14.4%) individuals practiced taekwondo for over 10 years.

The duration of each training session ranged from 45 to 180 minutes (88.86 ± 26.71 min), and the weekly training frequency ranged from 1 to 7 times (2.45 ± 0.89 times a week).

One hundred and ninety-three (56.6%) individuals participated in taekwondo championships, and 148 (43.4%) never participated in one. Regarding the type of competition, 59 (30.6%) athletes participated in forms competitions, 67 (34.7%) of combat, and 67 (34.7%) of both types of competition.

Individuals who participated in competitions trained 1 to 6 times a week (2.68 ± 0.99 times), with a duration of between 45 and 180 minutes (95.28 ± 24.01 min) per session. Athletes who did not compete trained between 1 and 7 times a week (2.14 ± 0.61 times), with a duration between 60 to 180 minutes (80.47 ± 27.78 min).

One hundred twenty-seven (37.2%) individuals practiced another type of sport on a weekly basis (at least 2 times a week).

Twenty-four (7%) athletes said they were injured at the time of the data collection, and 132 (38.7%) reported having suffered some type of injury since the beginning of their taekwondo practice. Forty-eight (14.1%) individuals referred having sustained one injury, 40 (11.7%) reported two injuries, 10 (2.9%) three injuries, and 34 (10%) four or more injuries (totaling 294 injuries during their entire careers).

For the 12-month period, 76 (22.3%) athletes referred to having an injury related to taekwondo training or competition, with 48 athletes (14.1%) reporting only one injury, 21 (6.2%) reporting two injuries, 6 (1.8%) three injuries, and only 1 (0.3%) four or more injuries (totaling 112 injuries).

An injury proportion of 0.23 (CI 95%: 0.18-0.27) per athlete per 12 months was calculated. The injury rate obtained was 2.15 injuries per 1,000 hours of taekwondo training.

The average number of injuries per practitioner (total number of injuries / total number of athletes) was 0.33, and the average of injuries per injured athletes (total number of injuries / number of injured athletes) was 1.47.

Table 1 shows the relative and absolute frequencies of the type and location of the injuries. Each participant could describe a maximum of three injuries; the following table accounts for 111 injuries in total (only one individual mentioned four or more injuries).

Most of the practitioners (n=100; 90.1%) reported that the injury occurred during the training, 8 (7.2%) during the competition, 1 (0.9%) during the warm-up, and 2 (1.8%) during the cool-down.

Eighty-eight (79.3%) athletes received some type of treatment to treat the injuries. Of the 88 (100%) who received treatment, 34 (38.6%) rested or took medication, 24 (27.3%) received physiotherapy, 8 (9.1%) were immobilized, 5 (5.7%) received surgery, 3 (3.4%) non-conventional therapies, and 14 (15.9%) another type of treatment.

Table 2 shows the injury causes and techniques that caused them.

Table 3 shows the relationship between the occurrence of injury in the last 12 months and gender, age group, participation in a competition, years of taekwondo practice, weekly frequency of training, duration of training per session, and belt rank obtained based on the application of the binary logistic regression model. We chose to divide belt rank into the following categories: beginners/intermediates (included white, yellow, and green belts) and advanced (included blue, red, black belts).

The final model was considered mathematically valid, but with a relatively weak predictive capacity, because the values obtained in the Omnibus test states that all coefficients of the equation are not null ($p=0.000$), the values of Hosmer-Lemeshow confirm that there are significant differences between predicted and observed values ($p=0.147$) and the Nagelkerke value obtained shows that the model is able to explain about 13% of the variance recorded in the dependent variable ($R^2=0.130$). However, statistical significance was observed in some variables analyzed in the binary logistic regression.

It was found (adjusted by sex and age) that adult taekwondo athletes had 3.91 times higher probability (95% CI: 1.13-13.55; $p=0.032$) of having an injury than adolescent athletes, and taekwondo athletes who trained more than 1 hour had 4.20 times more

TABLE 1. AREA AND TYPE OF INJURY

Area of injury	Fracture	Muscle injury (strain, contusion)	Joint injury (cartilage, meniscus, ligament injury/ sprain, luxation)	Tendinopathy	Others	Total
Face	-	-	-	-	2 (40%)	2 (1.8%)
Thorax/ chest/ribs	-	1 (1.6%)	-	-	-	1 (0.9%)
Lumbar spine	-	1 (0.9%)	-	-	-	1 (0.9%)
Shoulder	-	-	3 (13%)	4 (28.6%)	-	7 (6.3%)
Elbow	-	-	2 (8.7%)	-	-	2 (1.8%)
Wrist	-	2 (3.1%)	-	1 (7.1%)	-	3 (2.7%)
Hand & fingers	1 (25%)	-	-	-	-	1 (0.9%)
Pelvis	-	7 (10.9%)	1 (4.3%)	1 (7.1%)	-	9 (8.1%)
Thigh	-	16 (25%)	-	1 (7.1%)	-	17 (15.3%)
Knee	-	6 (9.4%)	5 (21.7%)	2 (14.3%)	-	13 (11.7%)
Leg	-	11 (17.2%)	3 (13%)	-	3 (60%)	17 (15.3%)
Ankle	-	4 (6.3%)	8 (34.8%)	5 (35.7%)	-	17 (15.3%)
Foot & fingers	3 (75%)	17 (26.6%)	1 (4.3%)	-	-	21 (18.9%)
Total	4 (3.6%)	65 (58.6%)	23 (20.7%)	14 (12.6%)	5 (4.5%)	111 (100%)

TABLE 2. INJURY CAUSES AND TECHNIQUES

Cause of injury	N (%)
Direct impact with another athlete	21 (18.9%)
Falling	13 (11.7%)
Breaking techniques	3 (2.7%)
Attack	32 (28.8%)
Counterattack	4 (3.6%)
Defense	4 (3.6%)
Others	34 (30.6%)
Injury technique	N (%)
Ap Chagi	7 (6.3%)
Dollyo Chagi	17 (15.3%)
Yop Chagi	6 (5.4%)
Naeryo Chagi	9 (8.1%)
Twit Chagi	1 (0.9%)
Mondollyo Dollyo Chagi	3 (2.7%)
Bandal Chagi	17 (15.3%)
Block (Maki)	1 (0.9%)
Other	35 (31.5%)
Does not remember	15 (13.5%)
Total	111 (100%)

probability of injury (95% CI: 1.44-12.29; $p=0.009$) than those who trained up to 1 hour per session.

DISCUSSION

To our knowledge, this is the largest Portuguese national survey to date to investigate taekwondo injuries in all regions of the country (North, South, Center, and Lisbon area, except the islands), involving different ages. There were 112 injuries reported in the previous year by 76 (22.3%) Portuguese athletes.

The data of other studies revealed a higher percentage of injured athletes, compared to those observed in the present study. Lystad et al.¹⁰ evaluated 152 Australian amateur taekwondo athletes, aged 12 years or more, and found that 88 athletes (57.9%) reported having incurred one or more injuries during the previous 12 months, totaling 307 injuries. The study of Kazemi et al.¹¹ evaluated 28 Canadian male and female Taekwondo athletes competing in a national tournament, and the results showed that 79% of athletes reported having experienced an injury. The discrepancy between the findings may be related to differences in style of combat, level of skill and experience, physical build, and training methods. For example, in the study by Kazemi et al.¹¹ all of the athletes of the sample were black belts.

Another study by Kazemi et al.¹⁷ verified that the competitor experience level influences the presence of single versus multiple injuries, as black belt competitors sustained significantly more multiple injuries (28.99%) than color belts (9.09%).

The types of sampling methods and data collection used in previous studies have limitations that could affect the results obtained. The non-randomized sampling method used does not represent the population studied. In the study by Lystad et al.¹⁰, an online questionnaire was applied, and the higher prevalence of injuries obtained in this last study could be explained by the fact that the questionnaire was filled out mainly by athletes who had an injury and possibly felt more motivated to answer the questionnaire. In the study by Kazemi et al.¹¹, the athletes

TABLE 3. RELATIONSHIP BETWEEN THE EVENT, THE PRESENCE OF INJURY, AND VARIABLES ON NON-MODIFIABLE SAMPLE FACTORS AND TAEKWONDO PRACTICE CHARACTERISTICS

Variables	OddsRatio crude (CI 95%); p-value	Odds Ratio adjusted** (CI 95%); p-value	Odds Ratio adjusted*** (CI 95%); p-value
Gender (male*) female	1.07 (0.62-1.85); 0.817	---	---
Age group (children*) adolescent (adolescent*) adult	3.67 (1.24-10.84); 0.019 10.19 (3.46-30.02); ≤0.001	---	1.69 (0.50-5.67); 0.399 3.91 (1.13-13.55); 0.032
Participated in championships (no*) yes	1.53 (0.89-2.59); 0.117	1.11 (0.63-1.97); 0.715	---
Years of practice (< 5 years*) ≥ 5 years	2.66 (1.47-4.81); 0.001	1.72 (0.91-3.23); 0.095	---
Weekly training (≥ 3 times*) up to 2 times	1.27 (0.75-2.15); 0.376	1.03 (0.59-1.79); 0.929	---
Duration of training per session (up to 1 hour*) more than 1 hour	7.55 (2.95-19.36); ≤0.001	4.47 (1.52-13.18); 0.007	4.20 (1.44-12.29); 0.009
Belt rank (beginner/intermediate*) advanced	2.92 (1.72-4.96); ≤0.001	1.71 (0.95-3.09); 0.072	---

* Class reference; ** adjusted for gender and age group (Enter model); *** Forward LR model

were invited to participate by the current author and his assistants.

Another fact that can explain these results differences in prevalence values between these studies could be the type of competition that the athletes in the studies participated in. In the study by Lystad et al.¹⁰, there was no information about how many athletes participated in form or combat competitions; in our study, 31% of athletes participated in form competitions, which does not cause injuries by direct contact. We suppose that if Lystad's study¹⁰ involved a greater number of athletes who participated in combat competitions, they would be more likely to be injured because of the direct contact with another athlete, and this would explain the difference in the injury prevalence values obtained in these studies.

Regarding to injury rate, the value obtained in this study was 2.15 injuries per 1,000 hours of taekwondo training, which differs from those found in the systematic review carried out by Pieter et al.¹⁸, which revealed that the values of injury rates for elite men varied from 20.6/1,000 athlete-exposures to 139.5/1,000 athlete-exposures and, for elite women, the rates varied from 25.3/1,000 athlete-exposures to 105.5/1,000 athlete-exposures (95% CI 89.8 to 121.1). Another study¹⁹ evaluated injuries in a Canadian National Taekwondo Championships (n=318), and the overall rate of injuries was 62.9/1,000 athlete-exposures. These studies were also based on injuries in elite black belts, not color belts.

This difference between these studies mentioned above can be explained because the denominator data might have different numbers according to the study. To calculate a valid injury rate, the number of injuries experienced (numerator data) is linked to a

suitable denominator measure of the amount of athletic exposure to the risk of injury; consequently, a rate consists of a denominator and a numerator over a period of time²⁰. The denominator value can be the number of athletes in a club or team, the number of games played, the number of minutes played, or the number of player appearances. The choice of denominator affects the final value²⁰. Another factor that may explain the differences found between these studies and ours may be the type of sample studied, involving only competitive athletes, whereas our data also involved amateurs and children.

The most common types of injuries found in this study were muscle injuries with strains and contusions (58.6%), and joint injuries involving cartilage and meniscus, and ligament structures, sprains, and luxations (20.7%). These findings can be explained by the greatest numbers of offensive and defensive techniques that are the main cause of this injury type^{21,22}.

Furthermore, the strain could happen as the result of kicking actions above the waist or above the opponent's head to obtain the highest scores in taekwondo²¹.

Ji²³ evaluated 512 taekwondo athletes, and the data showed that contusions (48.4%), strains (13.5%), and sprains (11.4%) were the most frequent injury types. Altarriba-Bartes et al.⁷ found similar results, with contusions (29.3%), cartilage (17.6%), and joint (15.7%) injuries the most common types. Kazemi and Pieter¹⁹ data revealed that the most common type of injury in men were sprains and, in women, contusion. In another study, Kazemi and Pieter¹⁹ observed that sprains/strains (45%), followed by contusions, fractures, and concussions were the most common types.

The most frequent locations of injuries observed in this study were the foot and fingers (18.9%), thigh, leg, and ankle (15.3% each one). This finding could be explained by the nature of taekwondo, which uses mostly kicks to score points during combats²¹.

Results found by the Ji study²³ revealed that the foot was the location of more injuries (16%), following by the knee (14.8%), ankle (13.8%), and thigh (11.1%). Altarriba-Bartes et al.⁷ study revealed that knee (21.3%), foot (17.0%), ankle (12.2%), and thigh (11.4%) were the areas most affected by injuries. Several studies showed that the most common injury location was the lower limb^{5,8,11,18,19,24}. Some studies do not specify the area of the body affected, including the lower limbs, upper limbs, trunk, and head, making it difficult to compare with the data obtained in this study.

Taekwondo athletes are equipped with a padded trunk protector, protective padded headgear, protective gloves, and shin guards^{7,25}; although there was protective equipment for taekwondo practice, it was observed during the data collection that athletes did not use protective material during training, only when in combat. In addition, although there are also foot protectors, some athletes do not have this equipment, and it does not provide specific protection for the toes. There is no protective material for the thigh either, one of the sites referred to as the most injured. Future studies should verify if athletes use protective equipment during training to verify their effectiveness in reducing the number of injuries.

Regarding the moment when injuries occurred (training or competition), most of the athletes (90.1%) reported that the injury occurred during training, which was consistent with the results of Lystad et al.¹⁰ and Kazemi et al.¹¹ due to non-use of the protective material during training, as mentioned.

Most athletes in this study received some sort of treatment (79.3%), the most used were resting or medication (38.6%), and physiotherapy (27.3%). Similar results were found by Lystad et al.¹⁰, with 60.3% of athletes receiving some treatment and physiotherapy the most used treatment.

According to our study data, the offensive technique was the more prevalent cause of injury (29%), followed by a direct impact with another athlete (19%). The Altarriba-Bartes et al.⁷ study revealed that the main injury mechanism in taekwondo was through direct contact. The data obtained by Yiemsiri et al.²⁴ showed that the most common mechanism of injury

in men was from delivering a kick and in women were both from receiving a kick and delivering a kick, whereas the literature review study by Pieter et al.¹⁸ reported turning kick. The injury mechanism classification in these studies is different, making a more specific comparison difficult.

Future studies should use a standardized injury classification system, including the same classification for the mechanism of injury and the technique that caused it.

Regarding the risk factors for sustaining injuries, this study found that adult taekwondo athletes had 3.91 more probability of suffering an injury than adolescent athletes, and taekwondo athletes who trained more than 1 hour had 4.20 times more probability of injury than those who trained up to 1 hour per training session. The data obtained by binary logistic regression using the odds ratio crude (non-adjusted) revealed that athletes with more years of practice, with a longer duration of the training, and at more advanced levels are more likely to have an injury. The athletes who have more years of practice and who are at more advanced levels are generally older, and the training load (longer duration) may also be related to the likelihood of developing injuries as it implies greater work stress. Thus, these results can be explained by the different dynamics and skillsets required for performance in advanced levels and also by the specific competition time and training methods associated with different weight classes²⁶.

The study by Lystad et al.¹⁰ showed that neither age, gender, nor level of practice were related to the occurrence of injury; similar results obtained by Lystad et al.¹⁰ revealed no relationship between sustaining an injury and demographic variables as gender, age, and years of experience. However, the data from Altarriba-Bartes et al.⁷ revealed that chronological age and weight category could be considered risk factors for sustaining injuries in elite taekwondo athletes.

This study contains some limitations, including the data collection approach of an interview relying on the memory of the participant. This memory bias occurs when there is a memory differential in information for cases and controls and is a limitation of retrospective studies. Furthermore, as reported injuries were not evaluated by health professionals, the reliability of the injury classification may be questionable.

CONCLUSIONS

This is the first nationwide study in Portugal investigating taekwondo-specific injuries. There were 1.16 injuries per 1,000 hours of taekwondo training, and 22% of the participants suffered at least one injury over a 12-month period. The most common injuries were muscle injuries (sprains and contusions), and joint injuries (cartilage and meniscus injuries, ligament rupture, sprains and luxation), most involving the foot and fingers, thigh, leg and ankle, and the offensive technique and direct impact with another athlete were the principal mechanisms of injuries.

This type of study can help devise injury prevention strategies during training and competition, such as some modifications to the competition rules and mandatory use of protective equipment since competition

protection equipment is rarely used during training sessions. The lack of security equipment in training and competitions associated with psychosocial aspects are among the risk factors that can increase injuries in taekwondo practice.

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RESUMO

INTRODUÇÃO: O Taekwondo consiste numa arte marcial que enfatiza os golpes com os pés e punhos, sendo caracterizada pelo contato corporal direto e contínuo, fatores que podem ocasionar lesões. O objetivo do estudo foi determinar a incidência de lesões musculoesqueléticas em atletas portugueses de taekwondo e analisar os fatores associados.

MÉTODOS: A amostra foi constituída por 341 atletas de taekwondo, com idades entre 4 e 62 anos (18,77±12,77), sendo 237 (69,5%) do sexo masculino. O instrumento de medida consistiu num questionário, aplicado sob a forma de entrevista, em nível nacional.

RESULTADOS: Cento e trinta e dois (38,7%) atletas relataram terem sofrido lesões desde que iniciaram a prática, totalizando 294 lesões. Setenta e seis (22,3%) atletas referiram presença de lesões no período de 12 meses, totalizando 112 lesões. Foram registradas 2,15 lesões por 1.000 horas de treinamento de taekwondo. O tipo de lesão mais frequente foi a lesão muscular (57,7%) e as localizadas no pé e dedos (18,9%). A técnica de ataque (28,8%) foi o mecanismo de lesão mais prevalente. Os adultos apresentaram maior risco de sofrer lesões comparados aos adolescentes (odds ratio = 3,91; IC 95%: 1,13-13,55; p=0,032), e os atletas que treinaram mais de uma hora tiveram um risco de 4,20 (IC 95%: 1,44-12,29; p=0,009) do que aqueles que treinaram até uma hora por sessão.

CONCLUSÕES: Os dados do estudo revelaram que as lesões foram frequentes em atletas portugueses de taekwondo, com áreas corporais específicas afetadas, e causadas principalmente pela técnica de ataque. Torna-se necessário elaborar estratégias de prevenção de lesões, incluindo treinamentos específicos e uso de material de proteção.

PALAVRAS-CHAVE: Epidemiologia. Incidência. Ferimentos e lesões. Prevalência. Artes marciais.

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