

Sport Injuries of Karate During Training: An Epidemiologic Study in Iran

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Received: December 20, 2013; Accepted: May 24, 2014

Background: Karate is a public sport that has athletes in various age ranges and abundant active sport clubs in Iran. The pattern of injury in this sport in Iranian athletes seems different from other countries.

Objectives: This study was performed with the purpose of considering the incidence and type of injury of karate athletes aged below 30 years from Tehran, Iran clubs.

Materials and Methods: In a cross-sectional study, 10 karate clubs were selected in Tehran. Clubs were selected based on a cluster method from 5 different geographical regions of Tehran. All injuries were collected based on athletes' or clubs' weekly report with a designed questionnaire. The injuries were classified according to: low, medium and severe injury. Collected data was analyzed with SPSS software version 17.

Results: 620 athletes were studied totally and incidence rate of injury per athletes was 16.1% and 20.2 per 100 athletes. Ninety percent of injuries were during bout practice, 6% during fitness and 4% during kata. The rate of injury was more common in athletes with weight less than 70 kg and lower sport experience ($P \leq 0.05$). The commonest locations for injury were head and neck followed by trunk, lower and upper limb, respectively. Just 2 cases needed surgical intervention and no one led to decreased level of consciousness. The most common type of injury was contusion, bruise and superficial scratch (64%).

Conclusions: Severe injury was uncommon in this study and similar to other Iranian studies head and neck had the most injuries. Athletes with lower experience and lower weight were associated with higher injuries.

Keywords: Martial Arts; Wounds and Injuries; Incidence; Athletes; Iran

1. Background

Karate is one of martial arts which nowadays is included in international sports. Karate means "empty hands" and in term is a fight without using weapons against an opponent. In this sport a fight is performed by hand and foot strikes and blocking techniques. Therefore this sport is amongst combat sports. Although movements in this sport are controlled but in accordance to the degree of contact are divided into 5 types: mild contact, partial contact, to knock down without striking the head, to knock down with striking the head and free contact. Thus injuries in this sport are expectable. Injuries in this sport are divided into 2 types: 1-in bouts 2- in practices, which have different mechanisms. Various studies have been done on the bout time injuries and the injury rate has been reported from 0.13 to 0.32 per competitor in each bout (1-4). The rate of injury is different based on the injured limb and severity of injury. Almost in every accomplished study; during bouts most of injuries were mild and injury rates were lower in experienced contestants (2, 5). Also the lower limb injuries were more common (3, 5).

It seems that short duration of bout, usage of safe guards during bout, presence of referee and interven-

ing during foul moves account as preventing factors of injury incidence during bouts compared to practice. Based on this reason, it's expected that injuries during practice are more common and qualitatively variable. Even though lack of win or lose factor and result during practice can be a decreasing factor in incidence of injuries during practice. A few studies have been carried out about injuries during practice and the rates of injuries have been reported (5, 6). Karate is a public sport that has athletes in various age ranges and abundant active sport clubs in Iran. In spite of that few studies have been done and these studies concentrated on competitions.

2. Objectives

Therefore this study was performed with the purpose of considering the incidence and type of injury of karate athletes aged below 30 from Tehran clubs during training.

3. Materials and Methods

This study was carried out during a year in Tehran's ka-

rate clubs. Clubs were selected based on a cluster method from 5 different geographical regions of Tehran. All athletes of these clubs were perused. After explaining to club's principles the data of all athletes were collected weekly with designed questionnaire from each club. Collected data included demographic specifications (age, weight), sport experience in performing sport regularly, belt color, usage of safe guards, injury specifications (include location, severity and actions taken for injury). The data of injuries were gathered based on athletes' or clubs' report. The injuries were classified according to: (a) low injury severity (minor injury): any interruption in physical activity and return in same session; (b) medium intensity injury (moderate injury): cutting practice and interrupting a training session and 1 week off from the training, referral to the medical center for special diagnostic examination and/or outpatient therapeutic intervention; (c) severe injury: hospital admission, major surgery, fractures and/or loss of consciousness.

The consent of all injured athletes was collected orally for participating in this research. Collected data was analyzed with SPSS software version 17.

4. Results

Totally 620 athletes were studied and the number of injuries during this period was 125 injuries in 100 athletes. The overall incidence rate of injury was 20.2 injuries per 100 athletes and expressed as percentage of participants was 16.1%. The injured individuals' age ranged between 14 to 30 years with the average age of 20.7 ± 3.9 . The age 18 had most of the injuries. In the range of 14 to 19 years old 46%, 20 to 24 years old 31.7% and 25 to 30 years old 19.3% of injuries occurred ($P = 0.03$).

Ninety percent of injuries occurred during fight practice, 6% during warm-up and fitness and 4% during kata. Most of injuries happened in the weight range of 50 to 60 kg (43.4%). The mean weight of injured athletes was 62.9 ± 6.7 kg and only 16.3% of injured individuals weighed more than 70 kg. The incidence of injury in individuals weighted more than 70 kg was less and this difference was statistically significant ($P \leq 0.04$). The rate of injuries was more in low sport experienced individuals and only 11.2% of injured singles had more than 3 years sport experience. 88% of injured individuals had less than 3 years sport experience and from these athletes 44.8% had less than 1 year sport experience and this discrepancy was statistically significant ($P \leq 0.05$). The most prevalent injury locations were: head and neck area (61%), trunk (24%), lower limb (12%) and upper limb (9%). Two cases needed surgical intervention. No injuries led to decreased level of consciousness. Total recorded injuries were 125 so one person could have more than one type of injury. The types of injuries have been classified in Table 1. More than half athletes (56%) had previous sport injuries.

Table 1. Frequency Each Type of Injury in Karateka During Practice^a

Type of Injury	Frequency
Contusion, redness, bruise, superficial scratch	80 (64)
superficial wound, deep wound, bleeding	31 (24.8)
luxation, tendon stretching, fracture	14 (11.2)

^a Data are presented as No. (%).

5. Discussion

The purpose of this study was to evaluate the incidence rate and type of injury in below 30 years old karate athletes. The rate of injury was calculated as number of injured athletes on total athletes and number of injuries on bouts or practice duration. In this study the overall rate of injured participants was 16.1% and the incidence rate of injury per 100 athletes was 20.2. This rate was close to our previous study that was 18.3 (3), but was 44.6 in the Destombe *et al.* study (5) and 45.4 in Rahimi *et al.* study (4). This rate in study in children and adolescents was 5.6 per 100 athletes that was very lower than other studies (6). This study was performed during training not tournaments or formal competitions. The majority of studies have been about the rate of injury's incidence in competitions and a few studies have been done during practice. In the Destombe *et al.* study, 28.8% of injuries occurred during training and 75.9% during competition (5). In the Zetaruk *et al.* study the rate of injury's incidence is reported 3.7 in every 1000 hours practice (7).

In the study of Critchley *et al.* (1) rate of injury's prevalence was overall 0.13 and in those aged below 16 was 0.11. In the Stricevic *et al.* (2) study this rate was 0.3 which is more similar to Critchley *et al.* (1). Albeit the studied population in both mentioned studies have been included in all age ranges. Similar to Macan reports (8), in our study injury rate in younger athletes (less than 19 years) was higher than other groups and with increased age we found decrease in the rate of injury, although this finding was not significant in Macan's study. In some studies injuries were more common in older athletes (5, 6, 9). In our previous study on the female karateka, the age group between 16-20 years old had the highest injury rate and the injury rate decreased with increasing age of athletes (3).

In our study the experience of athletes had no impact on injury incidence even though some studies have shown more injury in karateka with more experiences (3, 5, 7, 9). A few studies' injury incidence decreases with more experience which is because of the athlete's ability in blocking opponent's strikes and settling in an attacking position (2).

Similar to Halabchi *et al.* (3) and the Critchley *et al.* (1) studies, in the present study injury in head and neck was more common than other locations. While, in other stud-

ies lower limb has higher injury rate in comparison to other locations (5, 10, 11). Other studies on Iranian karate athletes during tournaments show higher rate of head and neck injuries in comparison to other locations such as lower limbs (4, 12, 13). For example head and neck injuries were 79.5% in a study on Iran's national karate team during tournament (12) and in the study of Rahimi et al. (4) this rate was 49.5% (4). Usually, non-control, kyokushin karate is accompanied with higher rate of lower limb injury (13, 14). In addition, it seems injury in head and neck is more common in Iranian tournaments than other countries and referees should be aware of full implementation of judging roles during karate competition.

Similar to other studies (3-5, 13, 14), most of the injuries were minor in our study and the rate of severe injury was less than 1% that is much lower than other reports. Contusion and muscle strain in other reports similar to this study was the most common type of injury (3, 4, 11). However, Destombe et al. reported hematoma as the commonest type of injury in a retrospective study on karateka (5). The rate of injuries in Karnataka was reduced during recent years. Karateka usually wear mouthguards or some protective pads during competition. So it seems implementation of new rules could reduce the rate of injuries in Karnataka during recent years (8, 15) and it is not related to fist padding for the head, hands or feet. As secondary results, severe injuries had also been reduced during recent years (15).

In conclusion, the incidence rate of injury was 20.2 injuries per 100 athletes, which is lower than other studies in other countries. In similar previous studies in Iran, head and neck injury was the most common injury during training and severe injury was uncommon. Athletes with lower experience and lower weight were associated with higher injuries.

Acknowledgements

The authors thank the Sports Medicine Research Centre and Research Council of Tehran University of Medical Sciences which authorized and funded this study as a research project. The authors also gratefully acknowledge the karate athletes who participate in this study.

Authors' Contributions

Study Concept and Design: Vahid Ziaee, Sayed Montazer Shobbar. Acquisition of data: Sayed Montazer Shobbar, Seyed Mehdi Ahmadinejad. Data analysis and interpretation: Sara Lotfian, Vahid Ziaee. Manuscript preparation: Seyed Mehdi Ahmadinejad. Critical revision of the manuscript: Vahid Ziaee. All authors approved final version of the paper.

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