The Rate of Prevalence and Causes of 
Sport Injuries in Males Karate Kumite Players

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Abstract: For research purpose, 40 men karate kumite with mean age 24.7 ± 2.4 years, weight 75.2 ± 5.6 kg, 178.5 ± 4.7 cm and the sport experience 12.5 ± 3.7 years, participated in this study. The subjects had several phases of choice to the final stages of camp were invited and ready to attend the World Karate Championships in Turkey (2010). The data in this study was based on three different close questionnaires. Each sportsman should mark the number of his injuries during a year in the related columns. The results using chi-square test indicated that muscular injuries (65.4%) were significantly more than other injuries ($\chi^2=158.7, p=0.01$). Also, injuries in head and face organic (32.4%) were significantly more than other body parts ($\chi^2=150.6, p=0.031$). Moreover, the results showed that the most injuries included trauma (38.4%), contusion (15.1%), tension (7.5%) and strain ($\chi^2=223.5, p=0.007$). High pressure (26.9%), improper warming up (22.4%) injuries per partner (14.9%) were the most injuries reasons. Also, the most important mechanism of injury incidence was related to opponent's kick and punches blow (56.9%), athlete kick and punch (33.3%) and fall down to the ground (9.8%). With improving coaches and athletes awareness of the prevailing injuries in this sport, preventing the athlete from return to training and match before being fully healed.

Key words: Karate players - Kumite players - Sport injuries - Athletes

INTRODUCTION

Vulnerability is probable injuries most sports. Injuries in high-contacted sports are unavoidable. Although, from peoples’ point of view, the martial arts are known as the sport with most contacts and with the highest injuries [1,2], studies and statistics show converse results. Based on the studies, injuries in karate are less than injuries in most sports with few contacts. Most injuries in karate are in form of trauma and muscle contusion and mild local injuries, but serious injuries like fracture, strain and sprain is more in sports such as football, wrestling, weight lifting, ski, track and field, Taekwondo, judo and even volleyball and basketball [2].

Injuries in the karate are reported in some research and based on them; scientific advices are offered to prevent them [3,4]. Oler et al. [5] and Bebary [1] questioned the safety of the martial arts at championship level [1,5]. On the other hand, Birrer [6] five-year study indicates safety of the martial arts. He asserted that it is true in the martial arts, limbs are injured a lot, but most of the injuries are slight [6]. Merrilee et al. [7] also expressed in his research that the karate for cadet and junior, sport is relatively safe provided that the principles be taught [7].

In their study, conducted on the five martial arts, Zetaruk et al. [8] reported the least damage in karate after tai chi and the probability of several injuries in taekwondo was three times as much as in karate. They also, introduced head and face, upper limb and soft tissues as the points most likely of being injured Karate [8]. In their study with the title of "Injury profile in competitive karate" and by analyzing three successive world matches, Arriaza and Leyes [9] reported punch blows (82.7%) as the main cause of injuries, head and face as the injured areas (72.5%) and contusion as the main type of injury (50.3%) [9]. Also, the 6-year study of Macan et al. [10] demonstrated that new judgment rules have caused reduction of injuries in karate matches. They asserted that
strict judging and heavy penalties for uncontrolled blows, particularly for the youngest competitions, can significantly decrease the risk of injury [10]. Arriaza et al. [9] in their study showed that applying the new competitive rules karate, with dramatic declines in injury rates has been accompanied by a karate competition for athletes, is safer [11].

In their report, Arriaza [12], head of the medical committee of world karate federation (WKF) said: In world championship of the cadet and junior age group in Bulgaria (1999), Greece (2001) and France (2003), in each turn, the injury rate decreased considerably [12]. Pieter [13], reported that injuries on head and neck of elite male and female Karate player as the most frequent injury [13]. On the study that Pappas [14] conducted on three important sports and games-boxing, wrestling and the martial arts - injuries in the martial arts were less than the two other sports [14]. In their extensive study on four popular sports, Tenvergert et al [15] concluded that the rate of injuries in the martial arts is less than sports such as football, volleyball and gymnastics [15]. By extensive research in the martial arts, Pieter [16] and Pieter [17] reported that injury on head and neck had the highest rate. He introduced punches blow as the highest injury mechanism [16,17]. Destombe et al. [3] in their study showed that injuries karate somewhat common but are usually more minor injuries at the tournament to occur during training and prevention important and more critical look [3].

But in another study by the McPherson and Picket [18] as a descriptive epidemiological study was conducted in martial arts, most martial arts injuries in karate and at the lowest damage were as tai chi [18].

Thus, according to the different and sometimes conflicting results [1,2,5-7,10,18] conducted research on the one hand and the sports champions of the national capitals which can be effective in sports development countries have, on the other hand the researchers had to make it on the prevalence and causes of sports injuries among elite athletes to study karate pay.

MATERIALS AND METHODS

Research were The subjects of this study consisted of 40 elite karate players at national level, in karate national team camp for for dispatch members to the top of the world karate championships in Turkey (2010) they had average age: 24.7 ± 2.4 years, weight: 75.2 ± 5.6 kg, Height 178.5 ± 4.7 cm and had 12.5 ± 3.7 years history of karate kumite playing. Questionnaire for sports injuries, e specially martial arts by the Bebary [1] prepared and has been developed [1] was used. The questionnaire is comprised of three parts. The first part involves personal information of each athlete including duration of sports activity, the highest rank and place, height, weight and age. The second part involved the offered tables classified under four type of strain, sprain, bone and skin injury in head and face, torso and spine and upper and lower limb injuries in which each athlete should check the took place number of his injuries during the last year; And the third part including 11 questions about test preparation, causes of injury, type of first aid, after-injury and rehabilitation actions, in the injured limb.

By presenting at the camp site of the national team and offering related explanation, the researcher contributed the questionnaires among the subjects (champions of Iran’s karate national team), collected the data and the evaluated it.

To statistical analyze the data, descriptive statistics shown as mean and standard deviation and non parametric statistics (chi-square) were used. Significant level was P=0.05 for all the calculations and all the statistical tests were conducted using SPSS software (Version 16).

RESULTS

Results of this study showed that in general 82.5% of the elite karate players had injury in their trainings and matches during the last year and only 17.5% did not have any injury.

The percentage frequency of the injury spread in different parts of the body (Figure 1).

According to the figures, head and face (32.4%) comprise the highest rate in injury significantly (χ²=150.6, p=0.031) and torso and vertebral column has the least rate injury (12.6%) and lower limbs’ and upper limbs’ injuries were 28.5% and 26.5%, respectively.

The percentage of injuries in different body parts of Iran’s elite karate players in senior national team’s camp are presented in table 1.

According to the classification of each limb, torso and spine injury in karate players was 12.6% and in head and face was 32.4%. The most injured part in head and face is cheek, in torso and spine is Loin, in upper limb are fingers and in lower limb are knee and Kneecap.
Fig. 1: Occurrence of different types of injuries in different body parts of Iran’s elite Karate players’ in senior national team’s camp

Fig. 2: Offered measures after injury occurrence

Table 1: Scattering distribution of injured body parts of Iran’s elite Karate players’ in senior national team’s camp

<table>
<thead>
<tr>
<th>Limb</th>
<th>Frequency</th>
<th>Percent</th>
<th>Total percentage of each organ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head and Face</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cranium (Head)</td>
<td>1</td>
<td>0.7</td>
<td>32.4</td>
</tr>
<tr>
<td>Cheek (Face)</td>
<td>12</td>
<td>7.9</td>
<td></td>
</tr>
<tr>
<td>Jaw</td>
<td>7</td>
<td>4.6</td>
<td></td>
</tr>
<tr>
<td>Tooth</td>
<td>2</td>
<td>1.3</td>
<td></td>
</tr>
<tr>
<td>Nose</td>
<td>9</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Gob</td>
<td>10</td>
<td>6.6</td>
<td></td>
</tr>
<tr>
<td>Eye</td>
<td>5</td>
<td>3.3</td>
<td></td>
</tr>
<tr>
<td>Ear</td>
<td>3</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Body and Spine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neck</td>
<td>3</td>
<td>2</td>
<td>12.6</td>
</tr>
<tr>
<td>Back region</td>
<td>2</td>
<td>1.3</td>
<td></td>
</tr>
<tr>
<td>Loin</td>
<td>7</td>
<td>4.6</td>
<td></td>
</tr>
<tr>
<td>Ribs</td>
<td>5</td>
<td>3.3</td>
<td></td>
</tr>
<tr>
<td>Chest</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Abdominal muscles</td>
<td>1</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>Sides</td>
<td>1</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>Upper limb</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shoulder</td>
<td>7</td>
<td>4.6</td>
<td>26.5</td>
</tr>
<tr>
<td>Arm</td>
<td>3</td>
<td>2</td>
<td></td>
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<tr>
<td>Elbow</td>
<td>4</td>
<td>2.7</td>
<td></td>
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<tr>
<td>Forearm</td>
<td>2</td>
<td>1.3</td>
<td></td>
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<tr>
<td>Wrist</td>
<td>7</td>
<td>4.6</td>
<td></td>
</tr>
<tr>
<td>Fingers</td>
<td>17</td>
<td>11.3</td>
<td></td>
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<tr>
<td>Lower limb</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pelvis</td>
<td>1</td>
<td>0.7</td>
<td>28.5</td>
</tr>
<tr>
<td>Leg</td>
<td>7</td>
<td>4.6</td>
<td></td>
</tr>
<tr>
<td>Knee and Kneecap</td>
<td>14</td>
<td>9.3</td>
<td></td>
</tr>
<tr>
<td>Foreleg</td>
<td>4</td>
<td>2.7</td>
<td></td>
</tr>
<tr>
<td>Ankle</td>
<td>5</td>
<td>3.3</td>
<td></td>
</tr>
<tr>
<td>Toes</td>
<td>12</td>
<td>7.9</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>151</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>
Four fold injury rates are shown in the samples. According to this figure, bony injuries with the least percentage (6.3%) and muscular injuries with the highest percentage (65.4%) comprise the highest rate of injuries significantly ($\chi^2=158.7, p=0.01$) and skin and articulation injuries comprise 20.8% and 7.5% of the total percentage of injuries (Figure 2).

Four fold injury types are divided to different parts and percentage of each injured part is observed. According the table, the most frequent types of injuries are trauma (N=61 and 38.4%), contusion (N=24 and 15.1%) and strain and dislocation (each case N=12 and 7.5%) ($\chi^2=223.5, p=0.007$), respectively. In articulation injuries, dislocation (7.5%) comprises the highest and sprain (twist) (6.3%) comprises the lowest percentage of the injuries. In muscular injuries, trauma (38.4%) and tear (4.4%) comprise the highest and the lowest percentage of the injuries, respectively. In bone injuries, closed fracture (4.4%) and open fracture (0.6%) were the most and the least frequent injuries; And in skin injuries wound and ulcer comprise 4.4% and 3.1% of the total percentage of injury (Table 2).

Research findings also suggest that some of the factors involved in injuries. By surveying elite karate champions, it was found that 24.2% of the champions have taken part in the preparation test while 75.8% of them had not taken part in it. To them, 26.9% of the injuries has occurred as a result of high pressure while training, 22.4% of the injuries has occurred when the body had not been warm enough and 19.4% has occurred because of the training partner ($\chi^2=179.7, p=0.002$). The influence rate of factors involved in occurrence of injuries in elite karate champions (Table 3).

The survey on the role of having or not having time for a match (training) on injury occurrence showed that 57.5% of the injuries occurred while training and out of match time, since 42.5% of them occurred in match time.

Results obtained from the survey on the type of first aid offered when an injury occurs demonstrate that in 48.9% of the injuries ice is used, in 26.7% the injured limb is immobile organ, in 11.1% the injured limb is bandaged and in 13.3% the injured athlete is transferred to therapeutic centers.

The survey on the issue that who has offered the first aid illustrated that the first aid is offered by the doctor (21.6%), the coach (27.4%), the athlete, himself (45.1%) and other people (5.9%), respectively.
A survey was also carried out to ask the subjects about the offered measures after the injury occurrence that showed, reducing the activity (36.2%) and injecting (6.9%) has the highest and lowest percentage of the measures, respectively (Figure 3).

The results obtained from the survey on the offered measures at rehabilitation period shows that measures offered involved heat therapy (7.9%), physiotherapy (27%), therapeutic massage (9.5%), therapeutic exercise (25.4%), aquatic therapy (15.9%) and sauna (14.3%) (Figure 4).

Another survey was also carried out to ask the subjects if they immediately continued their match or training after being injured during the match or training. 54.5% of the athletes’ responses were positive and 45.5% were negative. Moreover, 87.9% of these national champions started their sport activity before being improved fully and just 12.1% of them continued their sport activity after complete healing of their injuries.

In addition, finding of the study demonstrated that 42.5% of the elite karate athletes in senior karate national team’s camp still felt pain, 6.4% had inflation, 27.7% had motion limit in the injured limbs and only 23.4% had not trouble in the injured limb.

Finally, the results obtained from a survey on the issue that what kind of movement caused the injury showed that the injuries occurred by the competitors’ kick (25.5%), the competitor’s punch (31.4%), falling on the ground (9.8%) (Barai), the injuries due to the athlete's punch blow (11.8%) and the injuries due to the athlete's kick blow (21.5%).

**DISCUSSION**

Injuries in sport occur and are one of the common difficulties in championship sports. Analyzing the results of sport injuries in the present study demonstrates that 82.5% of Iran’s male karate players in senior national team’s camp that were to be sent to world karate championship in Turkey (2010) in kumite field (fight) during last year had injured and just 17.5% had no injury.

In this study, results of the investigation on different vulnerable body parts of Iran’s karate national champions show that rate of occurred injuries in head and face is more than other parts of the body, significantly. These results are consistent with the study's results of Pieter [17], Halabchi et al. [19], Pieter [16], Zetaruk et al. [8], Arriaza and Leyes [9], Arriaza [12], Pieter [13], Critchley et al. [20] and Hillman et al. [21] [8,9,12,13,16,17,19-21]. Based on the results of this research many injuries are reduced in karate if like Taekwondo, Kung fu, Wushu and the similar martial arts, protective equipment are used in...
head and face areas in this field; the same way that the
use of mouth guard in matches became compulsory since
1994 and caused a reduction in serious tooth injuries.

In the offered figures of the study and their obtained
results, a comparison was made between different type of
injuries classified under muscular, articulation, skin and
bone. Rate of muscular injuries is higher than other types
of injury significantly and trauma (58.7%) and muscle tear
(6.7%) comprised the most and the least frequent type of
muscular in injuries. This finding is consistent with the
result of the previous research. As such, high percentage
of muscular injuries suggest that muscular system plays
a main and crucial role in all sports particularly karate in
which muscular system is in danger of being injured more
than the other parts since karate involves regular
contacts, clash of punch and kick, using pressure to take
Barai in order to deviate and fall each other on the ground
(tatami) during exercise and match. Therefore, the
important role of a desired and systematic physical
preparation in muscular system should be particularly
addressed.

Results of this research deals with some factors that
influence the occurrence of injuries in elite karate players
in this field. The obtained results show that 26.9% of the
injuries occurred under training over-exertion, so over-
exertion is an effect factor and coach's attention should be
attracted to this issue that they should try their best to
stop training in case of excessive fatigue. Research
conducted by Routley and Valuri [22], Heiss [23] and
Charles et al. [24] showed that training over-exertion and
excessive fatigue is the most important cause of sport
injuries [22-24].

Inappropiate warm up and injury by training partner
are other reasons involved in occurrence of injuries in
karate national champions that comprise 22.4% and 19.4%
of the injuries. As a result, coaches’ and athletes’
attention and care should be attracted to this important
point that athletes should warm their whole bodies up
systematically before exercise and match. In this regard,
Alter [25] asserted that warm up along with stretch
movement before sport activities cause reduction of many
injuries while performing the technique [25]. Hergenroeder
[26] offered strategies to reduce sport injuries that
warming up and cooling down body by using PNF stretch
movements can cause 75% reduction in occurrence of
sport injuries and even reduce 80% of medical expenses
[26]. Therefore, teaching true methods of warm up to
athletes and increased attention of coaches to this issue
plays a crucial role in reduction and prevention of sport
injuries [2]. Also, athletes should try to make the best use
of a technical and appropriate training partner during
training condition, because the finding of research show
that 57.5% of the injuries occurred not during match
(training). And this result is consistent with the results of
Nouzari [2] and Charles et al. [24] study. Thus, during
performance of training, technical and tactical programs,
coaches should have more care and supervision on
athletes’ training procedure and engage in offering
strategies that reduce injuries while training.

Another noticeable point of this research was
offering 45.1% of first aid by the injured athlete and 5.9%
by people other than coaches or doctors that can be
involved in their further injury. And this rate corresponds
to the almost the same rate presented in Nouzari [2]
research.

Lack of involvement of 75.8% of the athletes in
preparation test and return of 87.9% of them to training
and match before complete improvement is very effective
on occurrence of further injuries and 42.5% of them still
felt pain, 27.7% influenced by motion limit and 6.4% had
inflation in their injured limbs.

Moreover, the results illustrated that competitor’s
kick and punch blow and falling on the ground comprised
66.7% of the injuries. These results are consistent with
those of Bebary [1], Halabchi et al. [19], Pieter [16],
Arriaza and Leyes [9], Pieter [13], Hillman et al. [21].

Unlike people’s idea that view karate as a violent,
contacted sport with lots of injuries, the comparison made
between this sport and other sports such as football,
handball, hockey, gymnastic and wrestling shows lower
percentage and intensity of injuries in karate. Hence, it
seems that issue of injury in karate that is among
important and popular sports should be addressed by
supervisors, responsibles, technical managers, coaches
and athletes more carefully.

CONCLUSION

Considering that the study results showed 82.5% of
elite karate players during training and competition in a
kind of last year were injured suffered, head and face with
a 32.4% most of the damage won, 26.9 and 22.4 percent of
the injuries, respectively, while occurred under training
over-exertion and inappropriate warm up and return 87.9%
of conservatives to karate practice and competition before
healing was complete, In sum, it can be concluded from
the results of the study that more awareness of coaches
and athletes regarding common injuries in this sport,
preventing the athlete from return to training and match
before being fully healed, according to the duration of rest
to recover energy reserves lost during training and
competition, increase muscle strength sport karate suit,
warm up body before practice and competition, along with
the use of protective equipment in the head and face,
mental preparedness and safety can be more than many
in the sport reduce injuries.

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