

## INJURY RATES IN ADULT ELITE JUDOKA

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**Abstract.** The aim of the present study was to assess the injuries in British judo athletes (judoka) sustained during competition. Subjects were male (n=70) and female (n=46) elite judoka participating in a national judo tournament in the United Kingdom. Injury data were collected with simple check-off forms that describe the athlete, type, location and mechanism of injury. The Mann-Whitney U test was used to determine the difference in total injury rate between males and females. The Kruskal-Wallis test was used to determine the differences in injury rates between body regions. The men recorded a higher injury rate (48.54/1000 athlete-exposures) than the women (34.25/1000 athlete-exposures) ( $P<0.001$ ). The major injury type was the strain (4.85/1000 athlete-exposures) in the men. The body part most often injured in the women was the elbow (13.70/1000 athlete-exposures). The major injury mechanisms in the men were delivering a throw and impact with surface (14.56/1000 athlete-exposures each). The time-loss injury rate for the men was 4.85/1000 athlete-exposures and 13.70/1000 athlete-exposures for the women. The injury rates in this sample compare favorably to those reported by others for other martial arts.

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*Key words:* Judo – Injuries - Elite

### Introduction

Only a few prospective studies on judo injuries have been conducted with some of them more than four decades ago [10]. In possibly the largest prospective study on judo injuries to date, Barrault *et al.* [2] found a total injury rate of 122.63/1000 athlete-exposures for the combined sample of young and adult male judoka (judo athletes), and a rate of 130.60/1000 A-E for their female counterparts. No separate injury rates were reported for the young and adult judoka within each gender. One athlete-exposure (A-E) refers to one individual competing in one bout where

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he/she is exposed to the possibility of being injured. In a recent study, Pieter *et al.* [8] found a significantly higher injury rate for adult elite Asian female judoka (41.28/1000 A-E) compared to their male colleagues (25.18/1000 A-E). Pieter and De Créé [7] also reported a significantly higher injury rate for adult female judoka (125.00/1000 A-E versus 51.28/1000 A-E). The aim of the present study was to assess the injuries of elite British male and female judoka sustained during competition.

### Material and Methods

Subjects (70 men and 46 women) competed in a national judo tournament in the United Kingdom. A simple check-off injury data collection form was used that was a modification of one utilized in previous research on judo injuries [7]. This form included demographic data as well as information on injury type, body part injured, injury situation (what the player injured was doing at the time of injury) and mechanism (the actual cause of the injury). An injury was defined as any circumstance for which assistance was sought from the medical personnel. In addition, time-loss injuries as part of the total reported injuries were recorded. Time-loss injuries are defined as those that will keep the athlete from completing the present bout and/or subsequent bouts and from participating in judo for a minimum of one day thereafter. All injuries were diagnosed by the tournament physician.

Injury rates were calculated from matches fought using the basic rate formula:  $[\# \text{ injuries} / \# \text{ athlete-exposures}] \times 1000 = \# \text{ injuries per } 1000 \text{ athlete-exposures (A-E)}$ . To determine the differences in injury rate between men and women a Mann-Whitney U test was used. The Kruskal-Wallis test was used to determine the differences in injury rates between body regions. The level of significance was set at 0.05.

### Results

*All injuries:* Table 1 provides a summary of information on injury rates for both male and female judoka. The men recorded a higher total injury rate than the women ( $P < 0.001$ ). Table 2-5 show the distribution of injury rates by body region/part, type, situation and mechanism, respectively. There was no difference in the distribution of injury rates by body region within gender ( $P > 0.05$  for men and women each).



In the men, 80% of those who sustained an injury lost their bout. In the women, 60% lost their match when an injury was incurred.

**Table 1**

Injury rates for adult male and female judoka

	Male	Female
# Athletes	70	46
# Athlete-exposures (A-E)	206	146
# Injuries	10	5
Injury Rate:		
-- per 100 athletes	14.3	10.9
-- per 1000 athlete-exposures	48.54	34.25

**Table 2**

Distribution of injury rates per 1000 athlete-exposures by body region/part in adult male and female judoka

Men			Women		
Body region/part	N	Rate	Body region/part	No	Rate
<i>Head/neck</i>	4	19.42	<i>Head/neck</i>	2	13.70
Eye	1	4.85	Nose	1	6.85
Ear	1	4.85	Teeth	1	6.85
Face	1	4.85			
Mouth	1	4.85			
<i>Upper extremities</i>	3	14.56	<i>Upper extremities</i>	2	13.70
Shoulder	1	4.85	Elbow	2	13.70
Forearm	1	4.85			
Fingers	1	4.85			
<i>Trunk</i>	--	--	<i>Trunk</i>	--	--
<i>Lower extremities</i>	3	14.56	<i>Lower extremities</i>	1	6.85
Hamstrings	1	4.85	Lower leg	1	6.85
Ankle	1	4.85			



Knee	1	4.85		
Total	10	48.54	5	34.25

**Table 3**

Distribution of rates per 1000 athlete-exposures for injury types in adult male and female judoka

Injury type	Men		Women	
	No	Rate	No	Rate
Abrasion	1	4.85		
Bruise			1	6.85
Contusion	1	4.85	2	13.70
Dislocation	1	4.85		
Hyperextension			2	13.70
Laceration	2	9.71		
Poked eye	1	4.85		
Sprain	1	4.85		
Strain	3	14.56		
Total	10	48.54	5	34.25

**Table 4**

Distribution of injury rates per 1000 athlete-exposures by situation in adult male and female judoka

Situation	Men		Women	
	No	Rate	No	Rate
Performing throw	3	14.56		
-- <i>leg throw</i>	2	9.71		
-- <i>unknown</i>	1	4.85		
Being Thrown	3	14.56		
-- <i>arm throw</i>	1	4.85		
-- <i>leg throw</i>	1	4.85		
-- <i>unknown</i>	1	4.85		



Ground Work	2	9.71		
-- scarf hold	1	4.85		
unknow	1	4.85		
Impact with opponent	1	4.85		
Fall	1	4.85		
Counter throw			1	6.85
Prohibited action			1	6.85
Choke			1	6.85
Arm lock			2	13.70
-- straight arm lock			1	6.85
-- unknown			1	6.85
Total	10	48.54	5	34.25

**Table 5**

Distribution of injury rates per 1000 athlete-exposures by mechanism in male and female judoka

Mechanism	Men		Women	
	No	Rate	No	Rate
Delivering Throw	3	14.56		
-- leg throw	2	9.71		
-- unknown	1	4.85		
Receiving Throw	2	9.71	1	6.85
-- leg throw	1	4.85		
-- unknown	1	4.85	1	6.85
Ground work	1	4.85		
Impact with opponent	1	4.85		
Impact with surface	3	14.56	1	6.85
Delayed athlete action			1	6.85
Chronic onset			1	6.85
Prohibited action			1	6.85
Total	10	48.54	5	34.25



*Time-loss injuries*

The time-loss injury rate for the men was 4.85/1000 A-E as a result of a dislocated shoulder. The injury situation was performing a throw and the mechanism, delivering a throw. The estimated time lost was 21 days or more. In the women, the time-loss injury rate was 13.70/1000 A-E owing to a hyperextension of the elbow. The injury situation was an arm lock with the mechanisms being delayed athlete action (6.85/1000 A-E) and overuse (6.85/1000 A-E). The estimated time lost was 7 days or less.

**Discussion**

The total injury rates for the British judoka are among the lowest compared to those found in other prospective studies on martial arts injuries in general and judo injuries in particular.

Table 6 displays comparative total injury rates reported in prospective studies involving single (inter)national tournaments. Apart from those in the studies by Pieter and De Crée [7] and Pieter *et al.* [6], all subjects were elite athletes. More research is needed with larger sample sizes to be able to arrive at conclusions regarding injury risk in the martial arts investigated.

**Table 6**

Comparative total injury rates per 1000 athlete-exposures in martial arts based on prospective studies\*

Study	Men	Women
Judo (this study)	48.54	34.25
Judo [2]	115.08	--
Judo [7]	51.28	125.00
Judo [8]	25.18	41.28
Karate [5]	168.87	158.54
Karate [2]	65.48	--
Karate [4]	135.56	--
Taekwondo [6]	51.28	47.62
Taekwondo [9]	139.54	96.49
Taekwondo [12]	127.36	90.09



\*Except for our own studies, injury rates are estimated based on the information provided by the authors

The major injury situations and mechanisms in the current study corroborate those reported by others. For instance, throwing and groundwork were also implicated in injuries sustained by elite Asian [8] as well as recreational British judoka [7]. Although Witak and Sturm [11] also mentioned groundwork as a mechanism of injury, most injuries occurred as a result of defensive maneuvers in encounters while in the upright position. Changes in game plan and emphasis on techniques over the years may have contributed to the difference between studies.

Impact with surface and injuries sustained as a result of throwing may be related to incorrect falling technique used by the player, incorrect throwing technique, or maybe the suitability of the mat, as suggested by Koiwai [3] in a retrospective study on time-loss judo injuries. Possible implementation of soft helmets could be one option to try and help decrease head injuries, especially concussions. Another option would be to concentrate on playing surface (mats) used in judo. By making the mat softer or more elastic in composition, the severity of head injuries could be reduced. Also laying the mats onto a sprung gym surface might increase the 'give' in the playing surface, therefore possibly reducing the severity and rate of head injuries. This area certainly warrants further investigation.

The time-loss injury rates compare to those reported for elite Asian judoka (men: 3.60/1000 A-E; women: 9.17/1000 A-E) [8]. For the men, it is much lower than those found by Pieter *et al.* [9] (27.13/1000 A-E) and Zemper and Pieter [12] (23.58/1000 A-E) in Olympic taekwondo. The time-loss injury rate for the women, however, is comparable to those in taekwondo: 8.77/1000 A-E [9] and 13.51/1000 [12]. Research with larger sample sizes for both judo and taekwondo is needed before definitive conclusions may be drawn.

The arm lock was implicated in time-loss injury in the current study. It is a quick and effective way to win a judo contest, and requires a submission by the athlete, which can be seen by a tapping of the athlete's foot or hand on the mat. However, in some circumstances, the referee(s) may be unable to see the submission when it occurs, which may cause the judoka applying the arm lock to increase the leverage on the elbow. Therefore, great care should be taken by the judoka when applying this technique. The addition of a verbal submission by the judoka may be useful in aiding the speed at which a match is stopped.



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