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Research article

Taekwondo techniques and competition characteristics involved in time-loss injuries

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Abstract
The purpose of this study was to assess time-loss injuries in young and adult taekwondo athletes. Participants were 2739 children (11-13 years), Junior (14-17 years) and adult males and females (18 years and older) competing in the national Greek championships. Injury data were collected by project staff with all diagnoses made by the tournament physician. Odds ratios were computed as well as 95% confidence intervals around the injury rates. The female Juniors had a higher time-loss injury rate (Fisher's Exact Test p = 0.033) than their adult counterparts. However, they were not at a higher risk of incurring a time-loss injury: OR = 0.143, 95% CI: 0.018-1.124. Collapsed over age, the females as a group recorded more time-loss injuries [11.36/1,000 A-E (95% CI: 6.25-16.47) versus 7.40/1,000 A-E (95% CI: 4.44-10.36)], but this was not significant (OR = 0.703, 95% CI: 0.383-1.293). In the Juniors, the boys only incurred time-loss injuries to the head and neck. There was no difference in the Junior girls in the distribution of time-loss injuries across body region, although they were at higher risk of sustaining an injury to the head and neck (OR = 1.510, 95% CI: 0.422-5.402) but this was not statistically significant. Although there were no statistical differences among age groups within gender, the Junior boys and girls (11-13 years) sustained more cerebral concussions. The Junior boys were at a higher risk of incurring a cerebral concussion than the boys (OR = 7.871, 95% CI: 0.917-67.583, Fisher's Exact Test p = 0.036). In the males, there was no difference between the men and Junior boys in injury rate for swing kicks compared to other techniques (OR = 2.000, 95% CI = 0.397-28.416). There also was no difference between the men and boys (OR = 4.800, 95% CI: 0.141-58.013). To help reduce the incidence of time-loss injuries in taekwondo, especially cerebral concussions, it is suggested for coaches to emphasize blocking skills. Educating referees, coaches and athletes plays an important role in helping to reduce taekwondo time-loss injuries.

Key words: Martial arts, taekwondo, time-loss, Greek, injuries.

Introduction

Taekwondo competition injuries have been studied using a case studies approach (e.g., Siana et al., 1986; Wirtz et al., 1988) and a prospective design (e.g., Kazemi and Pieter, 2004; Pieter et al., 1995; Zemper and Pieter, 1989). In the latter studies, males and females were compared relative to total injury rates, injury location, type and mechanism. However, information is scarce about the exact taekwondo technique used that led to injury as well as competition-related characteristics. For instance, the roundhouse kick has been found to be involved in most of the injuries sustained in competition (e.g., Beis et al., 2001; Pieter et al., 1995), including time-loss injuries (e.g., Zandbergen, n.d.). Pieter and colleagues (1990) as well as Koh et al. (2001) reported injury rates per weight division in adult *taekwondo-in* (taekwondo athletes), while Pieter and Lufting (1994) related weight divisions to time-loss injuries. 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 taekwondo for a minimum of one day thereafter.

Injuries by weight division in both young and adult *taekwondo-in* were investigated by our group before (Beis et al., 2001). It is suggested that the heavier the athletes are, the more injuries they might sustain, although this may only apply to children and adolescents (Pieter and Zemper, (1997b). Research on adult *taekwondo-in* has not found a consistent pattern in the association between weight division and injury occurrence (Beis et al., 2001; Koh et al., 2001; Pieter et al., 1990).

Pieter et al. (1995) reported that receiving the roundhouse kick was most often implicated in time-loss injuries in the men, while the spinning back kick was the main injury mechanism in the women. The purpose of this study, therefore, was to assess time-loss injuries in young and adult *taekwondo-in* as well as those by weight division and the specific techniques that led to the injuries.

Methods

Participants were 2739 young and adult males and females participating in the national championships of the Hellenic Federation of Taekwondo. The adult men and women were aged 18 years and older, while the junior boys and girls were 14-17 years and the boys and girls, 11-13 years. Table 1 shows the distribution of weight divisions by sex and age group.

Injury data were collected by project staff with all diagnoses made by the tournament physician. A form* was completed for every injury for which treatment was sought from the medical staff at the competition site. An injury was defined as any circumstance for which assistance was sought from the medical personnel and that would lead to time loss from taekwondo as defined above. Each bout lasted 3 rounds of 3 minutes with a 1-minute-break in between rounds.

Exposure data for calculating time-loss injury rates were gathered from records of bouts actually fought. Injury rates were calculated as (number of time-loss injuries/number of athlete-exposures) x 1,000 = number of injuries per 1,000 athlete-exposures (A-E). One A-E

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Table 1. Distribution of weight divisions (in kg) by sex and age group.

Division	Men (≥18 years)	Women (>18 years)	Jr. Boys (14-17 years)	Jr. Girls (14-17 years)	Boys (11-13 years)	Girls (11-13 years)
Fin	≤50.0	≤43.0	≤45.0	≤40.0	≤32.0	≤31.0
Fly	50.1-54.0	43.1-47.0	45.1-50.0	40.1-43.0	32.1-36.0	31.1-35.0
Bantam	54.1-58.0	47.1-51.0	50.1-54.0	43.1-47.0	36.1-40.0	35.1-39.0
Feather	58.1-64.0	51.1-55.0	54.1-58.0	47.1-51.0	40.1-45.0	39.1-43.0
Light	64.1-70.0	55.1-60.0	58.1-64.0	51.1-55.0	45.1-50.0	43.1-47.0
Welter	70.1-76.0	60.1-65.0	64.1-70.0	55.1-60.0	50.1-54.0	47.1-51.0
Middle	76.1-83.0	65.1-70.0	70.1-76.0	60.1-65.0	54.1-58.0	51.1-55.0
Heavy	>83.0	>70.0	>76.0	>65.0	58.1-64.0	55.160.0

refers to one athlete being exposed to the possibility of sustaining an injury while participating in a bout. Odds ratios were computed as well as 95% confidence intervals around the injury rates. The level of significance was set at 0.05.

Results

Total time-loss injury rates

Table 2 displays the time-loss injury rates of Greek young and adult *taekwondo-in*. No difference was found between the men and Junior boys in time-loss injury rate (OR = 0.769, 95% CI: 0.277-2.136). There also was no difference between the men and the boys (OR = 1.10, 95% CI: 0.407-2.973) or between the Junior boys and the boys (OR = 1.431, 95% CI: 0.548-3.736).

The female Juniors had a higher time-loss injury rate (Fisher's Exact Test p = 0.033) than their adult counterparts. However, they were not at a higher risk of incurring a time-loss injury: OR = 0.143, 95% CI: 0.018-1.124.

There was no difference between the women's time-loss injury rate and that of the girls' (OR = 0.257, 95% CI: 0.032-2.068). There also was no difference between Junior girls and girls in time-loss injury rate but the former were at a higher risk (OR = 1.800, 95% CI: 0.702-4.612), although it was not statistically significant.

Within age group, the men did not sustain more time-loss injuries than the women. However, they had a higher risk of getting injured (OR=2.861, 95% CI: 0.350-23.395), although it was not statistically significant.

There was no difference in time-loss injury rate between the Junior boys and the Junior girls (OR = 0.532, 95% CI: 0.207-1.362). In the children's group, the boys also did not record a higher time-loss injury rate than the girls (OR = 0.668, 95% CI: 0.256-1.745).

Collapsed over age, the females as a group recorded more time-loss injuries [11.36/1,000 A-E (95% CI: 6.25-16.47) versus 7.40/1,000 A-E (95% CI: 4.44-10.36)], but this was not significant (OR=0.703, 95% CI: 0.383-1.293).

Time-loss injury rates by weight division

Table 3 shows the distribution of injury rates by weight division. For ease of comparison, the original eight weight divisions were reduced to two: fin- to featherweight and light- to heavyweight. Injury rates were calculated by summing the athlete-exposures of each set of four weight divisions to comprise the denominator (see Table 1 for the original weight divisions).

The men had a higher injury rate in the light- to heavyweight division for time-loss injuries compared to the lighter category but it was not significant (OR=0.564, 95% CI: 0.108-2.934). The Junior boys sustained more time-loss injuries in the light- to heavyweight category, but this was not significant (OR = 0.720, 95% CI: 0.170-3.048). Although the boys in the children's group recorded a higher injury rate for the light- to heavyweight division, this difference was not statistically significant (OR = 0.286, 95% CI: 0.059-1.384).

The girls in the Junior (0.662, 95% CI: 0.183-2.394) as well as in the children's groups (OR = 0.336, 95% CI: 0.067-1.685) had higher time-loss injury rates for the light- to heavyweight divisions, but they were not significant.

Time-loss injury rates by body region

Table 4 displays the distribution of rates by body region for time-loss injuries. Since not all body parts/regions sustained time-loss injuries, it was decided to compare the head and neck with the rest of the body. It was nevertheless not always possible to statistically analyze the distribution of injury rates across these body regions.

Among the adults, the women did not incur any time-loss injuries to the head and neck. In the men, there was no difference in the distribution of injuries between the head and neck versus the rest of the body, but there was a higher risk of incurring a time-loss injury to the head and neck (OR=1.336, 95% CI: 0.298-5.998), although it was not statistically significant.

In the Juniors, the boys only incurred time-loss injuries to the head and neck. There was no difference in

Table 2. Time-loss injury rates (95% CI) in young and adult Greek taekwondo athletes.

	Men (≥18 years)	Women (≥18 years)	Jr. boys (14-17 years)	Jr. girls (14-17 years)	Boys (11-13 years)	Girls (11-13 years)
Number of athletes	533	216	470	317	753	450
No. of time-loss injuries	7	1	8	10	9	8
# athlete-exposures (A-E)	1022	412	892	588	1460	854
Injury rate:						
time-loss/100 athletes	1.31	0.46	1.70	3.16	1.20	1.78
time-loss/1,000 A-E	6.85 (1.78-11.92)	2.43 (2.33-7.19)	8.97 (2.76-15.19)	17.01 (6.47-27.55)	6.16 (2.13-10.19)	9.37 (2.88-15.86)

Table 3. Distribution of time-loss injuries (95% CI) by weight division (in kg) in young and adult Greek taekwondo-in.

	Men (≥18 years)		Women (≥18 years)	
Weight division	**Number**	**Rate**	**Number**	**Rate**
Fin to Feather	2	4.72 (1.82-11.26)	--	--
Light to Heavy	5	8.36 (1.03-15.69)	1	4.03 (3.87-11.93)
	Junior Boys (14-17 years)		**Junior Girls (14-17 years)**	
	Number	**Rate**	**Number**	**Rate**
Fin to Feather	3	7.39 (0.97-15.75)	4	13.42 (0.27-26.74)
Light to Heavy	5	10.29 (1.27-19.31)	6	20.69 (4.13-37.25)
	Boys (11-13 years)		**Girls (11-13 years)**	
	Number	**Rate**	**Number**	**Rate**
Fin to Feather	2	2.73 (4.68-10.14)	2	4.67 (1.81-11.15)
Light to Heavy	7	9.62 (2.50-16.74)	6	14.08 (2.81-25.35)

the Junior girls in the distribution of time-loss injuries across body region, although they were at higher risk of sustaining an injury to the head and neck (OR=1.510, 95% CI: 0.422-5.402) but this was not statistically significant.

In the children, there was no difference in the distribution of time-loss injuries by body region in the boys (OR=1.252, 95% CI: 0.335-4.679) nor were there any in the girls, although the injury rate for the head and neck in the girls was higher than for the rest of the body (OR=3.027, 95% CI: 0.608-15.078) but this was not significant.

Rates by type of time-loss injury

Table 5 depicts the distribution of type of time-loss injury rates by age and gender. Although there were no statistical differences among age groups within gender, the Junior boys and girls sustained more cerebral concussions. The Junior boys were at higher risk of sustaining a cerebral concussion compared to the men (OR = 5.720, 95% CI: 0.666-49.140), but this was not statistically significant.

The Junior boys were at a higher risk of incurring a cerebral concussion than the boys (OR=7.871, 95% CI: 0.917-67.583, Fisher's Exact Test p=0.036). Even though the Junior girls were at a higher risk than the girls to sustain a cerebral concussion (OR = 4.290, 95% CI: 0.444-41.430), this was not statistically significant.

Time-loss injury rates by type of technique

Table 6 displays the distribution of time-loss injuries by type of technique. Since not all techniques led to time-loss injuries, it was decided to compare the roundhouse plus spinning hook kicks (together called 'swing kicks') with the rest of the techniques as a group (called 'other'). It was nevertheless not always possible to statistically analyze the distribution of injury rates across these techniques. To help elucidate the individual contribution to time-loss injuries of the roundhouse and spinning hook kicks, separate injury rates (95% CI) are provided, although the analysis was done using 'swing' kicks.

In the males, there was no difference between the men and Junior boys in injury rate for swing kicks compared to other techniques (OR = 2.000, 95% CI: 0.397-28.416). There also was no difference between the men and boys (OR = 4.800, 95% CI: 0.141-58.013). There was no difference between the Junior boys and boys in injury rate for swing kicks compared to other techniques (OR=2.400, 95% CI: 0.303-19.041). Nevertheless, the OR's in all these comparisons seem to suggest a higher injury risk for swing kicks.

Since the swing kicks were not involved in any time-loss injuries in the women, comparisons were made between Junior girls and girls. There was no difference between Junior girls and girls in the injury risk of swing kicks compared to other techniques (OR = 3.889, 95% CI: 0.543-27.866), although the Junior girls seemed to be injured more as a result of swing kicks.

There was no difference between Junior boys and Junior girls in injury risk of swing kicks (OR = 1.286, 95% CI: 0.158-10.450). There also was no difference between boys and girls in injury risk of swing kicks (OR = 2.083, 95% CI: 0.298-14.549).

Discussion

Table 7 displays comparative time-loss injury rates in taekwondo and karate. Due to variations in overall and cell sample sizes, and therefore exposure, some of the injury rates have wide confidence intervals. With this in mind, it is nevertheless instructive to compare the time-loss injury rates depicted in the table.

Table 4. Distribution of time-loss injuries (95% CI) by body region in young and adult Greek taekwondo-in.

	Men (≥18 years)		Women (≥18 years)	
Weight division	**Number**	**Rate**	**Number**	**Rate**
Head and Neck	4	3.91 (0.07-7.75)	--	--
Rest of body	3	2. 94 (0.38-6.26)	1	2.43 (2.33-7.19)
	Junior Boys (14-17 years)		**Junior Girls (14-17 years)**	
	Number	**Rate**	**Number**	**Rate**
Head and Neck	8	8.97 (2.76-15.19)	6	10.20 (2.04-18.37)
Rest of body	--	--	4	6.80 (0.13-13.47)
	Boys (11-13 years)		**Girls (11-13 years)**	
	Number	**Rate**	**Number**	**Rate**
Head and Neck	5	3.43 (0.41-6.45)	6	7.03 (1.41-12.65)
Rest of body	4	2.74 (0.06-5.43)	2	2.34 (0.91-5.59)

Table 5. Distribution of time-loss injuries (95%CI) by type in young and adult Greek taekwondo-in.

	Men (≥18 years)		Women (≥18 years)	
Type of injury	**Number**	**Rate**	**Number**	**Rate**
Concussion	1	0.98 (0.94-2.90)	--	--
Contusion	4	3.91 (0.07-7.75)	1	2.43 (2.33-7.19)
Epistaxis	1	0.98 (0.94-2.90)		
Laceration	1	0.98 (0.94-2.90)		
	Junior Boys (14-17 years)		**Junior Girls (14-17 years)**	
	Number	**Rate**	**Number**	**Rate**
Concussion	5	10.29 (1.27-19.31)	3	5.10 (0.67-10.87)
Contusion	1	1.12 (1.08-3.32)	1	1.70 (1.63-5.03)
Dislocation			1	1.70 (1.63-5.03)
Epistaxis			1	1.70 (1.63-5.03)
Fracture (suspected)	2	2.24 (0.87-5.35)		
Laceration	2	2.24 (0.87-5.35)	1	1.70 (1.63-5.03)
Sprain			1	1.70 (1.63-5.03)
	Boys (11-13 years)		**Girls (11-13 years)**	
	Number	**Rate**	**Number**	**Rate**
Concussion	1	0.68 (0.66-2.02)	1	1.17 (1.13-3.47)
Contusion	4	2.74 (0.06-5.43)	5	5.86 (0.73-10.99)
Epistaxis	1	0.68 (0.66-2.02)	1	1.17 (1.13-3.47)
Fracture (suspected)	1	0.68 (0.66-2.02)		
Fracture	1	0.68 (0.66-2.02)		
Laceration	1	0.68 (0.66-2.02)	1	1.17 (1.13-3.47)

For instance, the injury rate for the men in the current study is significantly lower than that of the males investigated by Koh et al. (2001), while there was no difference between the Korean and Greek women. The overall sample size in the study by Koh and colleagues was 330 for the males and 233 for the females, the latter of which is comparable to that of the Greek women. However, almost three times as many time-loss injuries were sustained by the Korean men, while seven Korean women incurred time-loss injuries. On the other hand, there was no difference between the men and women in the current study and those investigated by Pieter and Lufting (1994) with an overall sample size of 273 men (12 time-loss injuries) and 160 women (3 time-loss injuries).

The Junior taekwondo athletes investigated by Pieter and Zemper (1997c) ranged in age from 6-16 years. If the Juniors and children in the present study were combined, their injury rates would be 7.23/1,000 A-E (95% CI: 3.79-10.67) for the males and 12.48/1,000 A-E (95% CI: 6.71-18.25) for the females, respectively, both of which are significantly lower than those of their American counterparts.

One reason for this difference may be related to the minimum age of the participants: 6 years for the Americans and 11 years for the Greeks. The tournament physicians may have been more conservative in their diagnoses when dealing with younger competitors (Pieter and Zemper, 1997b). The higher minimum age of the Greek children may also be reflective of better tactical awareness (Gummerson, 2005), which has been suggested to be involved in (time-loss) injuries in taekwondo (Pieter and Zemper, 1997c).

Arriaza and Leyes (2005) investigated karate injuries across three world championships for senior men and women. The authors did not distinguish the time-loss injuries by gender and reported an overall rate of 4.40/1,000 A-E (95% CI: 2.67-6.13). The combined rate for men and women in the current study would be 5.58/1,000 A-E (95% CI: 1.71-9.45), which is not

Table 6. Distribution of time-loss injuries (95% CI) by type of technique in young and adult Greek taekwondo-in.

	Men (≥18 years)		Women (≥18 years)	
Technique	**Number**	**Rate**	**Number**	**Rate**
Swing kicks	6	5.87 (1.17-10.57)	--	--
-Roundhouse	4	3.91 (0.07-7.75)		
-Spinning hook	2	1.96 (0.75-4.67)		
Other	1	0.98 (0.94-2.90)	1	2.43 (2.33-7.19)
	Junior Boys (14-17 years)		**Junior Girls (14-17years)**	
	Number	**Rate**	**Number**	**Rate**
Swing kicks	6	6.73 (1.35-12.11)	7	11.91 (3.09-20.73)
-Roundhouse	3	3.36 (0.45-7.17)	5	12.32 (1.53-23.12)
-Spinning hook	3	3.36 (0.45-7.17)	2	4.93 (1.90-11.76)
Other	2	2.24 (0.87-5.35)	3	5.10 (0.67-10.87)
	Boys (11-13 years)		**Girls (11-13 years)**	
	Number	**Rate**	**Number**	**Rate**
Swing kicks	5	3.43 (0.43-6.43)	3	3.51 (0.47-7.49)
-Roundhouse	3	2.26 (0.30-4.82)	1	1.17 (1.13-3.47)
-Spinning hook	2	1.51 (0.58-3.60)	2	2.34 (0.91-5.59)
Other	4	2.74 (0.06-5.43)	5	5.86 (0.73-10.99)

Table 7. Comparative time-loss injury rates per 1,000 athlete-exposures (95% CI) in young and adult taekwondo athletes.

Sport/Study	Men (≥18 years)	Women (≥18 years)	Jr. boys (14-17 years)	Jr. girls (14-17 years)	Boys (11-13 years)	Girls (11-13 years)
Taekwondo						
This study	6.85 (1.78-11.92)	2.43 (2.33-7.19)	8.97 (2.76-15.19)	17.01 (6.47-27.55)	6.16 (2.13-10.19)	9.37 (2.88-15.86)
Koh et al. (2001)	33.56 (18.85-48.27)	14.22 (2.84-25.60)	--	--	--	--
Pieter & Bercades (1997)	25.64 (9.90-61.18)	23.81 (22.86-70.48)	0.00	0.00	5.56 (5.33-16.45)	26.32 (25.26-77.90)
Pieter et al. (2004)	20.41 (0.41-40.41)	21.74 (0.44-43.04)	--	--	--	--
Pieter et al. (1995)	27.13 (7.03-47.23)	8.77 (8.42-25.96)	--	--	--	--
Pieter & Lufting (1994)	22.90 (9.94-35.86)	9.68 (1.27-20.63)	--	--	--	--
Pieter & Zemper (1997c)	--	--	25.54 (21.52-29.56)	29.91 (21.27-38.55)	--	--
Pieter & Zemper (1999)	33.45 (27.31-39.59)	23.03 (15.71-30.35)	--	--	--	
Zemper & Pieter (1989)	23.58 (5.09-42.07)	13.51 (1.78-28.80)	--	--	--	--
Karate						
Dah & Djessou (1989)	1.98 (1.91-5.87)	--	--	--	--	--
Pieter (1997)	--	--	2.63 (1.01-6.27)	0.00	--	--
Pieter & Kim (2005)	11.32 (4.92-17.73)	2.44 (2.34-7.22)	--	--	--	--
Tuominen (1995)	5.77 (0.76-12.30)	8.93 (8.57-26.43)	--	--	--	--

significantly different from that found by Arriaza and Leyes (2005). It is of concern that the time-loss injuries in taekwondo and karate are comparable, since the latter is a semi-contact sport as opposed to taekwondo, which is full-contact. A perusal of Table 7 seems to support this contention when time-loss injuries are considered by gender, especially in the adults.

No information is available on time-loss injuries by weight division. As mentioned above, previous research has shown no consistent pattern of general injury rates by weight division in taekwondo (Beis et al., 2001; Koh et al., 2001; Pieter et al., 1995; Pieter and Zemper, 1997b), while none was reported for karate either (Arriaza and Leyes, 2005). Pieter and Zemper (1997b) found a tendency for injuries to increase with increasing weight in junior taekwondo athletes but this was not statistically verified in the present study. Arriaza and Leyes (2005) found higher injury rates in the lower weight divisions. It is suggested that the small cell sizes in the present study may be related to the absence of any statistically significant differences between weight divisions in time-loss injury rates.

Due to the small cell sizes, no statistically significant differences were also found for injury rates by body region. However, it is very worrying that the head and neck seem to incur most of the time-loss injuries. The time-loss head and neck injury rates in American men was 12.62/1,000 A-E (95% CI: 8.84-16.39) and in women, 8.49/1,000 A-E (95% CI: 4.05-12.94) (Pieter and Zemper, 1997a). American junior taekwondo athletes sustained time-loss head and neck injuries of 8.57/1,000 A-E (95% CI: 6.24-10.90) for the boys and 9.10/1,000 A-E (95% CI: 4.33-13.87) for the girls (Pieter and Zemper, 1997c).

The results for cerebral concussions seem to support the contention that the head and neck incur most of the time-loss injuries. Kicks to the head, face and jaw led to cerebral concussions in all age groups and both genders. Oler and colleagues (1991) recorded a fatal injury as a result of a kick to the head and subsequent fall on the hard surface. The casualty occurred within 24 hours post injury. Koh and Cassidy (2004) found middle school boys and girls to be more likely to receive head kicks and incur concussions than their older counterparts, which seem to confirm the findings of the present study. It is of concern that the world governing body for Olympic taekwondo recently decided to award two points for head kicks and an additional point for knock downs (http://www.wtf.org/site/cms_file/images/default/0_99/20/wtf_competition_rules_english.pdf).

Swing kicks have been related to general (Beis et al., 2001; Koh et al., 2001; Pieter et al., 1998; Pieter et al., 1995) as well as time-loss injuries (Pieter and Bercades, 1997; Pieter et al., 1995; Pieter et al., 2004) in taekwondo competition. The roundhouse kick, categorized as one of the swing kicks in the current study, has been reported to be the most frequently used technique in competition (e.g., Koh et al., 2001; Zemper and Pieter, 1989). It generates higher velocities compared to thrust kicks, such as the side kick (Matsubayashi and Lieu, 1993; Pieter and Pieter, 1995) and, therefore, higher acceleration of the impacted target (Whiting et al., 1988). Contrary to the current findings, however, Koh and Watkinson (2002) reported the axe kick to be most often implicated in head blows, followed by swing kicks in adult *taekwondo-in*.

To help reduce the incidence of time-loss injuries in taekwondo, especially cerebral concussions, it is suggested for coaches to emphasize blocking skills (e.g., Zemper and Pieter, 1989; Pieter and Zemper, 1997a). Koh and Cassidy (2004) found that those who used blocking skills were less likely to sustain cerebral concussions. The authors suggested that points should be given for successful blocking techniques.

The decision of the World Taekwondo Federation to award more points for kicks to the head is contrary to the call for rule changes to curb time-loss injuries, especially as a result of blows to the head (e.g., Oler et al., 1991; Zemper and Pieter, 1991). Koh and Cassidy (2004) suggested for referees to more strongly enforce the rule of discontinuing the match after two head blows. The importance of this should be clear if one considers that those who have sustained a cerebral concussion before might be more susceptible to second impact syndrome (e.g., McCrory and Berkovic, 1998). Educating referees, coaches and athletes plays an important role in helping to reduce taekwondo time-loss injuries (e.g., Pieter, 1996; Koh and Cassidy, 2004).

Conclusion

In conclusion, the female Juniors (14-17 years) had a higher time-loss injury rate than their adult counterparts (18 years and over). However, they were not at a higher risk of incurring a time-loss injury. Collapsed over age, the females as a group recorded more time-loss injuries, but this was not statistically significant. To help reduce the incidence of time-loss injuries in taekwondo, especially cerebral concussions, it is suggested for coaches to emphasize blocking skills. Educating referees, coaches and athletes plays an important role in helping to reduce taekwondo time-loss injuries.

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Key points

- The purpose of this study was to assess time-loss injuries in young and adult taekwondo athletes.
- Collapsed over age, the females as a group recorded more time-loss injuries but this was not significant.
- The Junior boys were at a higher risk of incurring a cerebral concussion than the boys.
- To help reduce the incidence of time-loss injuries in taekwondo, especially cerebral concussions, it is suggested for coaches to emphasize blocking skills.
- Educating referees, coaches and athletes plays an important role in helping to reduce taekwondo time-loss injuries.

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