

## **EFFECT OF PRECOMPETITION INJURY ON PERFORMANCE OF TAEKWONDO PLAYERS IN SUBSEQUENT TOURNAMENT**

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### **Abstract**

**Objective** -- To investigate the effects of injuries sustained by taekwondo players, and how previous injury affects performance in subsequent competition.

**Methods** – Taekwondo players of Pune, Jaipur, Bhopal, Patiala, Udaipur, Chandigarh, taekwondo tournament were given a comprehensive Questionnaire immediately before competition. Self reports of injuries sustained through taekwondo in the previous one year were determined.

**Results** – The injury prevalence was high, but comparatively less than reported for other contact sports such as rugby, football. However, one in 20 injuries was a closed head injury. No significant associations between prior injury and tournament outcome were found in our study.

**Conclusions** - Taekwondo can be a source of major or minor injury. However, the fact that prior injury did not appear to be associated with impaired tournament performance may militate against acceptance of control and regulation by competitors and coaches.

### **Introduction**

Taekwondo is a Korean martial art and the national sport of South Korea. In Korean, tae means "to strike or break with foot"; kwon means "to strike or break with fist"; and do means "way", "method", or "art". Thus, taekwondo may be loosely translated as "the art of the foot and fist" or "the art of kicking and punching". The origins of the Korean martial art of Taekwondo go back 1500 years. Originally Taekwondo was taught for warfare, self-defence, and physical fitness. Over the centuries, the art form has spread throughout the world. Today, an estimated 75-120 million children and adults worldwide participate in martial arts with an estimated annual growth rate of 20-25% (Birrner, 1996). Taekwondo is practiced in over 140 countries around the world and 120 nations are official members of the sport's major organizing body, the World Taekwondo Federation (WTF). Taekwondo reached the Olympic stage as a demonstration sport in the 1988 Seoul Olympics and the 1992 Barcelona Olympics. It became an official Olympic sport in the 2000 Sydney Olympic Games.

### **Methods**

## **Participants**

Sample members were players at the Inter University Taekwondo Championships held at Pune, Jaipur, Bhopal, Patiala, Udaipur and Chandigarh during the year 2010-11. Male and female players introduced the study during the opening ceremony on the morning of the first day. The sample was restricted to competitors 16 years old and over, but otherwise was open to males and females of all competing ranks. Prospective competitors were handed a package containing a consent form, a questionnaire, a pen, and an envelope. The competitors were invited to complete the questionnaire as soon as possible (that is, before their first fight), enclose it in the envelope and place the sealed envelope in a box at. The analyses presented here are restricted to the 120 players who had at least one fight during the tournament and who completed the questionnaire: 99 males (81 %) and 21 females (18 %), who ranged in age from 16 to 45 years (mean = 22.2, SD 5.71). A large proportion had experienced a period of unemployment in the last year (35 %), with an average of 4.5 months (SD 4.08), and 41% reported that it was 'somewhat' or 'very difficult' to support themselves financially at the moment. A fifth of the sample was married (18 %), and none of the female competitors reported being pregnant at the time of competition.

## **Description of Questionnaire**

The questionnaire administered was a modified version of the preseason questionnaire used in the rugby injury and performance project. The questionnaire comprised six sections: general background; taekwondo and other sport experience; specific tournament preparation; taekwondo related and other injury experience; health, lifestyle, and wellbeing; and attitudes and opinions about taekwondo and sports in general. Taekwondo injury experience was assessed by providing a list of commonly occurring sports injuries with the instruction that an injury was 'defined as a physical problem that caused you to miss (a) at least one taekwondo practice of scheduled training session OR (b) required at least one visit to a health professional for treatment.' Players checked all injuries that they had experienced in the previous one year as a result of taekwondo participation. This was followed by a list of injuries experienced in the previous year that required assistance from a health professional, in addition to those reported for taekwondo participation. Players were also asked if they had current injuries affecting their training ability or chronic long term injuries requiring special safety gear (for example, strapping or to help them train or compete while recovering from injury, if they had performed taekwondo against medical advice, and if they had difficulties obtaining medical advice for sporting injuries.

## **Results**

The analyses presented here are largely categorical tests of association. Given the comparatively small numbers and the likelihood of obtaining cell frequencies of less than

five, Fisher's exact test results are reported rather than the more approximate  $\chi^2$  statistic (Chun, 1982; Park et al., 1989).

The background of taekwondo players includes, the average age 16-17 years, although a large proportion took it up at age 20 or older (32 %). Regarding rank, 40% of the sample was competing in the 'beginner colour-belt' division, 25% in the 'intermediate colour-belt' division, and 34% in the 'black belt' division. Of the black belt competitors, the majorities were 1st Dan (69%) and the remainders were 2nd Dan. Given the relatively small sample, analyses for rank were conducted with the dichotomy of black belt and above versus all lower ranks. Females were significantly over-represented at the senior level: 67% of the females fought in the black belt division compared with 26% of the males (Fisher's exact test,  $P = 0.045$ ). Over half of the competitors had fought previously in different tournaments (53 %). There was no significant difference in previous tournaments, ( $P = 0.470$ ). As would be expected, rank was significantly associated with prior tournament participation (Fisher's exact test,  $P = 0.0001$ ); 94% of the black belt competitors had fought previously compared with 32% of the lower ranks. Overall, 79% considered taekwondo to be their main sport, with no significant sex difference (Fisher's exact test,  $P = 1.000$ ). Taekwondo was the main sport for all at the black belt level compared with 73 % of those at the lower levels, a significant difference were observed (Fisher's exact test,  $P = 0.037$ ).

**Table-1**

**Body sites of taekwondo related injuries experienced in the previous one year**

S.N.	Site of Injury	Number of Players n=	Percentage %
1	Head	12	10
2	Neck	1	1
3	Shoulder/collarbone	12	10
4	Upper or lower back	13	11
5	Chest or abdomen	7	6
6	Wrist, hand, or digits	8	7
7	Upper or lower leg	42	35
8	Ankle, foot, or digits	19	16
<b>Total</b>		<b>77*</b>	

**Table-2**

**Types of injuries (taekwondo related) experienced in the previous one year**

S.N.	Type of Injury	Number of Players n=	Percentage %
1	Sprain, strain, other soft tissue	98	82
2	Fracture	8	7
3	Closed head injury	6	5
4	Laceration or graze	4	3
5	Dislocation	1	1
<b>Total</b>		<b>117</b>	

### Precompetition injury experience

In one year before the competition, over two thirds (71 %) of the players had experienced at least one taekwondo related injury of sufficient severity to make them miss training or seek treatment from a medical Practitioner. The injury prevalence estimates were virtually identical for males (71%) and females (69%); Fisher's exact test,  $P = 1.000$ . The differences in injury prevalence according to rank (black belt or lower) were also not significant; Fisher's exact test,  $P = 0.202$ . Of those who had been injured, 29% had sustained one injury, 44 % had sustained two, and 32 % a total of three or more. The maximum number of injuries sustained was six, experienced by one player. In total, 77 separate injuries were reported, giving an average of 2.29 injuries per injured competitor. As shown in Table-1, the most common site of injury was the upper or lower leg, followed by the ankle or foot. Nine injuries (13 %) were to the head or neck. Table-2 contains the injuries by type. Most of the injuries comprised soft tissue damage *i.e.* hematoma and sprains. Less common injuries include Fractures, closed head injury (concussion), cuts, and dislocations.

Over the previous one year, 39% of the study sample had at least one injury from taekwondo which required physician's advice. Non significant differences were observed between injuries and their sex (Fisher's exact test,  $P = 1.000$ ) or rank (Fisher's exact test,  $P = 0.206$ ). A total of 29 non-taekwondo related injuries were reported, giving an average of 1.7/injured person. The taekwondo related injuries, sprains and other soft tissue injuries predominated (77%), followed by fractures (19%). The most common sites for non-taekwondo taekwondo related injuries were the lower limbs (49%), followed by the upper limbs (17%), and head, neck, and collarbone (18%). Although 48% of those with a taekwondo related injury had sustained an injury from another activity compared with 18% of those without a taekwondo injury, the difference in proportions was not significant (Fisher's exact test,  $P = 0.177$ ).

The players injury status on the day of competition, 42 individuals (35%) noticed that they had a recent injury that was affecting their ability to perform, and eight of those players required special help to enable performance. 18 individuals (15%) reported that they had used something to help them continue taekwondo training while, recovering from an injury. Nineteen players (17%) noticed that they had continued to train or compete against specific medical advice. Twenty three players (19 %) reported that they had difficulty obtaining health advice for sporting injuries.

**Table-3. First round competition outcome in relation to possible factors associated with success or failure**

S. Injury Types N	Outcome of the Tournament		
	Success N=60	Failure N=60	Fisher's Exact test (P)
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1	History of taekwondo injury in previous one year	43 (71 %)	42 (67%)	1.000
2	Other non-taekwondo injury in previous one year	20 (33%)	25 (42% )	0.766
3	Current injury at the time of tournament entry	28 (46%)	15 (25%)	0.227
4	History of using something to compete or train while injured	8 (13%)	10 (17%)	1.000
5	History of performing taekwondo against medical advice	8 (13%)	13 (21%)	0.701
6	Prior Inter University tournament experience	30 (50%)	34 (57%)	0.772

### **Outcome of the Tournament**

In different weight divisions with a small number of players, the opening round was also the final. In other divisions, players had up to two combat before their final. In our investigation, each player's success or failure at the tournament was defined in terms of their official first round win or loss record. The finding gave 60 players with a first round win, and the same number with a first round loss and elimination. Fight outcome was not significantly associated with age in years ( $t = 0.32$ , 48 df,  $P = 0.7654$ ). For it a series of bi-variate analyses were carried out to determine whether fight outcome were associated with previous injury experience and other characteristics. As described in Table-3, the fight outcome was non- significantly associated with any of the given: a history of any taekwondo related injury in the previous one year; any other non-taekwondo related injury experienced in the previous one year; and a current injury at tournament entry.

The players, who used something to help them compete or train while, injured and those who had a history of performing taekwondo against health advice were no more or less likely to win their opening round. The success rate of fight was also not associated with a history of previous tournament experience.

### **Discussion**

The purpose of the study was to investigate the effects of previous injuries on the performance of university level male and female taekwondo players in subsequent tournaments. Birrer et al., (1981) revealed that 'Taekwondo is a safe sport However, Oler et al., (1991) have been criticized this view. In response to Birrer and Halbhook, (1988) asserted that 'all forms of martial arts are safe', while, Oler et al., (1991) argued that the martial arts' transition from a means to kill and disable to a sport was 'incomplete', and some of the injury risks in the combative athletics were unwarranted and preventable. The findings of our study also consistence with Birrer et al., (1983) that taekwondo is a safe sport. There were no sport considered ' safe' if seven out of 10 players (as in our study) had received an injury in the previous one year which was severe enough to preclude training or require health assistance. Whereas, present study confirmed the findings of other studies that contusions, sprains, and strains to the lower extremities were the most common taekwondo related injuries (Birrer, 1981; Zemper and Pieter, 1983) one in 20 injuries was a closed head injury - further evidence that taekwondo is a

source of potentially disabling injury. However, the findings of present study do need to be interpreted in relation to other sporting activities. Zemper and Pieter, (1983) noticed that among eight collegiate sports, the 'time loss' injury rate for males (23.6/1000 athlete-exposures) placed taekwondo third after wrestling (31.8) and American football (31.0) as a source of competition injury, and ahead of soccer (18.7) and ice hockey (15.7). Among seven sports, the women's injury rate for taekwondo (13.5) was ranked third after gymnastics (18.1) and soccer (15.3), and ahead of field hockey (7.2) and lacrosse (7.0). Gerrard et al., (1994) reported that 84.4% of male rugby players and 59.6 % of the female players in the RIPP study experienced at least one rugby related injury in the previous year. So that, for males, taekwondo, while not 'safe', is at least safer than rugby (a contact sport in which striking the opponent with the intent to injure is illegal). It is a matter of interest that, the difference in injury prevalence between males and females in previous study was significant, but there were no significant sex differences were observed in our study. There may be various factor affects to it (i.e., relative to males, female rugby players have different exposure rates, or differences in technique when playing the game), but one intriguing possibility is that a significant proportion of rugby injuries may in fact be intentional, foul behaviour perhaps being more common among male players. Taekwondo may be safer than a sport such as football, rugby because the competition environment is more controlled, with the referee contending with only two players rather than 22 or 30 respectively. Another possibility is that the lower level of injuries compared to rugby may be a result of the extensive protective equipment worn in taekwondo competition. Taekwondo participants often train (and sustain injuries) at the 'no contact' or 'light contact' levels which have less stringent requirements for the use of protective equipment. There is also some evidence to suggest that some martial arts equipment serves to protect the attacker rather than the defender, allowing for greater force than would otherwise be applied (Zemper and Pieter, 1988; Oler et al., 1991). The findings of present study with assisted to the prediction of competition success are of critical importance to those interested in developing injury control strategies and preventive interventions. Largely on the basis of descriptive studies, several investigators have made blanket recommendations for the prevention of injury in taekwondo and the martial arts in general. These have included: banning spinning kicks to the head," (Zemper and Pieter, 1988) banning head contact for children and limiting it to certain experienced adults, (Oler et al., 1991) and banning kicks to the face (Siana et al., 1986). From the perspective of competitors and coaches, it is more likely that regulation would be accepted if it could be clearly shown that prior injury had a deleterious effect on performance. However, the objectives of present study: none of the injury related variables was significantly associated with competitive success or failure. It may be that the use of only first round outcome measures does not give sufficient discriminatory

power. It is also possible that those who had received the most severe injuries during the competition did not enter, or may even have dropped out of the sport altogether. Given the growing popularity of martial arts training, further research in this area is needed, and the application of prospective methodology, may be ideal (Cho, 1968). A cohort of taekwondo students could thus be followed throughout the year in order to obtain detailed information obtained about injury experience, competition and training exposure, periods of nonparticipation, and drop-out.

#### **References:**

- Birrer RB.** Trauma epidemiology in the Martial Arts, The result of an eighteen-year international survey. *The American Journal of Sports Medicine.* 1996, **24**: S-72-79.
- Cho SH.** Korean karate: free fighting techniques. Rutland VT: Charles E Tuttle, 1968.
- Chun R.** Advancing in tae kwon do. New York: Harper and Row, 1982.
- Park YH, Park YH and Gerrard J.** Taekwondo: the ultimate reference guide to the world's most popular martial art. New York: Facts on File Publications, 1989.
- Lucas J.** Taekwondo, pelote Basque/jai-alai, and roller hockey - three unusual Olympic demonstration sports. *J Phys Educ Recreation Dance* 1992, April: 80 - 82.
- Oler M, Tomson W, Pepe H, Yoon D, Branoff R, Branch, J.** Morbidity and mortality in the martial arts: a warning. *J Trauma* 1991; 31: 251 - 3.
- Serina ER, Lieu ER.** Thoracic injury potential of basic competition taekwondo kicks. *J Biomech* 1991; 10: 951 - 60.
- Zemper ED, Pieter W.** Injury rates during the 1988 US Olympic Team Trials for taekwondo. *Br J Sports Med* 1989; 23: 161 - 4.
- Siana JE, Borum R, Kryger H.** Injuries in taekwondo. *Br J Sports Med* 1986; 20: 165 - 6.
- Johannsen HV, Noerregaard FOH. Prevention of injuries in karate. *Br J Sports Med* 1988; 22: 113 -5.
- Birrer RB, Birrer CD.** Unreported injuries in the martial arts. *Br J Sports Med* 1983; 17: 131- 4.
- Waller AE, Feehan M, Marshall SW, Chalmers DJ.** The New Zealand Rugby Injury and Performance Project: I. Design and methodology of a prospective follow-up study. *Br J Sports Med* 1994; 28: 223 - 8.
- Fisher RA.** Statistical methods for research workers. Edinburgh: Oliver and Boyd, 1941.
- Snedecor GW, Cochran WG.** Statistical methods, 7th ed. Ames IA: Florida State University Press, 1980.
- Birrer RB, Birrer C, Son DS, Stone D.** Injuries in tae kwon do. *Physician Sports Med* 1981; 9: 97- 103.
- Birrer RB, Halbrook SP.** Martial arts injuries. *Am J Sports Med* 1988; 16: 408 - 10.