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## A profile of injuries in collegiate taekwondo players of Haryana

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### Abstract

The purpose of this study is to evaluate the common injuries of collegiate Taekwondo players in Haryana. A total of 70 collegiate Taekwondo players participated in the study. There were a total of 342 injuries reported with a 100% incidence of at least one injury among the athletes. The most frequently reported injury types are sprains (30%), inflammation (18%) and strains (9%) while injuries most commonly occurred in the ankles (18%), hands (12%), feet (12%) and knees (10%). The high risk for injury is consistent with related studies on injuries in combat sports in general. The trend in type of injury and anatomical regions at risk is also similar to other studies specifically on Taekwondo injuries. As is common in combat sports, Taekwondo carries an inherently high risk of injury but this risk can be managed with proper coaching and sufficient protective equipment.

**Keywords:** Injuries, collegiate players, taekwondo

### Introduction

Sports injuries can result from acute trauma or repetitive stress associated with athletic activities mostly due to accidents, poor training technique, inadequate equipment, and overuse (Elmagd, 2016) [6]. Injury is a major cause for dropout in sports (Gould, 1987) [7] and the repeated bodily stress affects the quality of participation in both recreational and professional athletes. Sports and exercise participation oftentimes carries an inherent risk of injury but this risk is more pronounced in combat sports. Since Taekwondo was included as a medal sport in the 2000 Summer Olympic Games, participation in various levels has increased to around 80 million worldwide. There are two main types of Taekwondo competition-Poomsae and Kyorugi. Poomsae is non-contact and focuses more on forms with defined patterns of execution. Kyorugi, on other hand, is a full-contact type of Taekwondo competition that focuses on sparring.

It has been observed that combat sports that involve striking such as Taekwondo have greater injury incidence (Kazemi & Pieter, 2004) than combat sports that involve only grappling such as Judo and Wrestling (Jarret, Orwin, & Dick, 1998) [8]. Cynarski and Kudlacz (2008) [4] observed an 88.9% incidence of serious injuries in Kickboxing, Judo, Jiu Jitsu and Karate competitors' careers even when excluding minor injuries. This observation included a 21% occurrence of broken bones and 16% damage to knee ligaments. Dislocation and injuries to the neck, shoulders and elbows were found to be more frequent in non-striking styles while injuries to the wrists and hands were found to be more frequent in striking styles. Furthermore, sprains, strains, bruises and injuries to the lower limbs were very common in both groups. The risk of injury in combat sports like Taekwondo, Karate and Aikido seems to be less in beginner to intermediate level practitioners while more advanced practitioners are twice as likely to get injured. In Taekwondo, 18% of injuries have been observed to occur on the feet mostly in the form of contusions, dislocations or fractures (Burks & Satterfield, 1998) [3]. Many Taekwondo injuries on the feet occur due to stresses during kicks and jumps. Aside from the foot, the knee is also at risk due to increased mechanical overload in sports with lots of jumping and landing. Knee traumas in Taekwondo are predominantly soft issue in nature since it is prone to both accidental and intentional violent contact (Burke, Barfoot, Bryant, Schneider, Kim, & Levin, 2003) [2]. In a retrospective longitudinal study on Taekwondo injuries by (Kazemi, Chudolinski, Turgeon, Simon, Ho, & Coombe, 2009) [9], the three most

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commonly injured anatomical regions were the head (19%), feet (16%) and thighs (9%) while the most common types of injuries were contusions (36%), sprains (19%) and strains (15%). The most common causes of injury were from defensive kicks (44%) and offensive kicks (35%). In elite South Korean Taekwondo athletes, an average of 4.6 injuries per athlete per year was observed. Most injuries occurred in the lower extremities (65.5%), the trunk (16%), upper extremities (14%) and the head and neck area (4%). The more random and violent nature of sparring compared to non-contact drills or sessions present a greater injury risk to injury. As such, a common scenario of Taekwondo injury is a kick to the lateral aspect of the knee which may result in a fracture of the proximal fibula, contusion of the shin, or sprain to the knee joint (Birrner, 1996) <sup>[1]</sup>. Limited information is available on the common injuries of Filipino athletes in general (Duco, 2005) <sup>[5]</sup> and in combat sports in particular. Thus, the purpose of this study is to determine the common injuries of collegiate Taekwondo players in Haryana. Specifically, the study aims to determine the incidence rate, common injury types, and anatomical regions at risk through a retrospective injury inventory.

## Methods and materials

### Subjects

The subjects were selected through convenience sampling. The criteria for the selection of research participants were current Taekwondo players. A total of 70 collegiate Taekwondo players participated in the study.

### Procedure

Data was obtained through a survey questionnaire and guided interviews using a sports injury questionnaire adapted from Duco (2005) <sup>[5]</sup>. The injury profile is divided into 20 anatomical regions with nine (9) types of injuries. For content validity, the instrument has been reviewed by a medical professional in a sports physical therapy clinic and was verified to meet the specific objectives of the study. After obtaining the subjects' informed consent, responses were gathered in their respective training venues. A brief overview about the specific objectives and procedure was given to all participants prior to data collection.

There are a number of limitations to consider in this study. The main limitation is the small sample size and therefore the results may not be widely conclusive to the general population. Another limitation is the nature of retrospective data which is affected by the subjects' ability to accurately recall past injuries. The authors attempted to minimize this limitation and thus the subjects were asked to recall injuries incurred only in the past competitive season (the last 12 months).

### Statistical analysis

Data was analyzed via descriptive statistics and presented in frequency and percentage distribution tables. Demographic data is presented in means and standard deviation.

### Results

Type of Injury: There were a total of 342 injuries reported with a 100% incidence of at least one injury among the athletes, an average of 4.9 injuries per athlete. The main observation is that the most frequently reported injuries were sprains (30%), inflammation (18%) and strains (9%). All other injuries were reported at an occurrence of 7% or less.

**Table 1:** Below summarizes the frequency and percentage distribution of all reported injuries.

S. No.	Type of Injury	Frequency	Percentage
1	Sprain	104	30
2	Inflammation	60	18
3	Strain	32	9
4	Crushing	25	7
5	Stress Fracture	25	7
6	Contusion	20	6
7	Abrasion	19	6
8	Dislocation	17	5
9	Tendonitis	17	5
10	Fracture	14	4
11	Others	9	3
	Total		100

Of the reported injuries, sprains were the most common and of these, majority were on the ankles (52%) but also in the knees (13%), wrists (8%) and hands (8%). Below, table 2 presents the percentage distribution of the occurrence of sprains.

**Table 2:** Percentage distribution of the occurrence of sprains

S. No.	Anatomical Region	Percentage
1	Ankle	52
2	Knees	13
3	Wrists	8
4	Hands	8
5	Feet	7
6	Others	12
	Total	100

The second most common injury were inflammations which make up 18% of all reported injuries. Inflammations were mostly reported in the feet (20%), knees (18%), hands (13%) and shin-calves (10%). The percentage distribution of the occurrence of inflammations can be seen in table 3 below

**Table 3:** Percentage distribution of the occurrence of inflammations

S. No.	Anatomical Region	%
1	Feet	20
2	Knees	18
3	Hands	13
4	Shin -Calves	10
5	Arms	8
6	Groin	7
7	Elbow	5
8	Shoulders	3
9	Wrists	3
10	Toes	3
11	Others	10
	Total	100

Strains are the third most common injury. These, however, make up just nine percent of all reported injuries. Strains were most commonly experienced in the thighs (59%), groin (13%) and lower back (13%). Table 4 below displays the occurrence of strains as reported.

**Table 4:** Percentage distribution of the occurrence of strains

S. No.	Anatomical Region	%
1	Thighs	59
2	Groin	13
3	Lower Back	13
4	Others	15
	Total	100

**Anatomical Region:** As for the anatomical regions at risk, injuries most commonly occurred in the ankles (18%), hands (12%), feet (12%) and knees (10%). All other injury sites were reported to be injured at a rate of nine percent or less. Table 5 below shows the frequency and percentage distribution of injuries by anatomical region.

**Table 5:** Frequency and percentage distribution of injuries by anatomical region

S. No.	Anatomical Region	Frequency	%
1	Ankles	60	18
2	Hands	41	12
3	Feet	41	12
4	Knees	34	10
5	Thighs	30	9
6	Wrists	23	7
7	Arms	21	6
8	Shin-Calves	20	6
9	Shoulder	15	4
10	Toes	11	3
11	Lower Back	9	3
12	Elbows	8	2
13	Groin	8	2
14	Head/Face	7	2
15	Forearms	4	1
16	Others	10	3
17	<b>Total</b>	<b>658</b>	<b>100</b>

The ankles were the most commonly injured anatomical region with the majority incurred as sprains (90%) and a few as strains (3%) and tendinitis (3%). The hands and feet are the second most injured anatomical regions. Injuries on the hands were mostly sprains (20%), inflammation (20%), dislocations (19%) and fractures (17%). Injuries on the feet were mostly stress fractures (29%), inflammation (29%) and sprains (17%). Knee injuries were mostly sprains (41%) and inflammation (32%). All other anatomical regions are reported to be less frequently injured (9% or less) and represent a much smaller portion of the overall data.

### Discussion

There was a 100% chance of incurring an injury in the 12 months covered in the retrospective data with an average of 4.9 injuries per athlete. The high risk for injury is consistent with related studies, Cynarski & Kudlacz, 2008<sup>[4]</sup> on injuries in combat sports, especially in a style that involves striking. The rate of 4.9 injuries is also very similar to elite South Korean Taekwondo athletes who experienced 4.6 injuries per year. The high incidence rate is also suggestive of previously observed findings wherein advanced level practitioners, in this case competitive collegiate athletes, are at greater risk of injury compared to beginner and intermediate level practitioners. Most of the injuries were incurred at the ankles and feet area which combined for 30% of all anatomical regions reported to be injured. The concentration of many injuries in this area is also similar to previous research findings (Burks & Satterfield, 1998)<sup>[3]</sup> most probably due to repeated kicks and jumps in both offensive and defensive techniques. Another anatomical region at risk were the knees which experienced 10% of all reported injuries. Knee injuries were mostly sprains and inflammation (combined 73% of knee injuries) and this result is also similar to previous studies (Burke *et al.*, 2003)<sup>[2]</sup>. The hands, the second most injured region, were also prone to injury incurring mostly sprains, inflammation, dislocations and fractures (76% of all hand injuries). The violent nature of hand injuries is most probably

due to defensive actions by blocking an opponent's kicks as the hands are very rarely used for offensive techniques in Taekwondo. An interesting observation is the very low occurrence of head injuries (2%) even though one might expect that the head would be a common target. Head trauma is a serious health concern in many combat sports like boxing and mixed martial arts (Seifert, 2017) but this risk is apparently low in Taekwondo as also reported by Park and Song (2017). The low incidence of head injuries may be due to the protective headgear used in Taekwondo competition or because the body is a more common target since it is larger and thus easier to score on. However, this inference is not confirmed.

### Conclusion

The high incidence rate of injuries in Taekwondo participation is consistent across various related literature and practitioners should be aware of this risk especially in high level training and competition. To manage the risk of injury, strength and conditioning programs are recommended to focus on the lower extremities especially on the feet, ankles and knees. Lower extremities suffer the most injuries in Taekwondo and this should be mitigated by better protective gear. However, finding a good balance between the protection ability and non-restriction of movement of lower extremity protective equipment may be a challenge. Protective gear for the head seems to be very effective as is evident in the low incidence of head injuries across different studies. However, protective gear for the hands seem to be insufficient thus far since the hands incur injuries at a relatively high rate. Even with the apparent high risk for injury, the fact that the participants were all able to compete suggests that the injuries were all manageable within the time frame. As is common in combat sports, Taekwondo carries an inherently high risk of injuries but this risk can be managed with proper coaching and sufficient protective equipment.

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