

# Hand and Wrist Injuries in Boxing and the Martial Arts



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## KEYWORDS

• Hand • Injury • Boxing • Judo • Taekwondo • Karate • Prevention

## KEY POINTS

- Hand and wrist injuries in martial arts are a reflection of the combat nature of this discipline.
- There is clear evidence to support that hand protection reduces the risk of hand injury in martial arts.
- A key component of injury prevention in martial arts is the use of proper techniques for both striking and grappling.

## INTRODUCTION

A wide variety of hand injuries are encountered in combat sports. These are often specific to the combat and contact techniques that are unique to each sport. With the introduction of mixed martial arts in the 1990s, the blending of disciplines has introduced an increasing number of hand and wrist injuries that reflect the violent nature of modern combat sports.

A 2012 survey of martial arts participants demonstrated that 53% of upper extremity martial arts injuries occur in the hand and wrist, followed by the shoulder and elbow at 27% and 19%, respectively.<sup>1</sup>

Overall injury rates in martial arts are less frequent than those reported in soccer, volleyball, and gymnastics but perhaps are substantially underreported.<sup>2,3</sup> Most studies investigating injury statistics in martial arts report primarily tournament competition and do not accurately include training injuries. Therefore surveys performed among martial arts participants at all levels may

offer further insight into the prevalence of related injuries.

The Olympic combat sports include boxing, judo, taekwondo, and wrestling (Greco-Roman and freestyle). For purposes of discussion, wrestling is not included in this narrative, as much of this sport has been introduced into mixed martial arts competition and carries a similar injury profile to judo. Combat sports can be classified into 3 main categories: striking sports, grappling sports, and hybrids of these 2 sports. The hand and wrist injuries associated with these categories are unique to these methods of combat.

Striking sports include boxing, kickboxing, karate, and taekwondo. Grappling sports include Brazilian jiu-jitsu and judo. Hybrids of striking and grappling are generally referred to as mixed martial arts, and these include combinations of striking, kicking, and grappling to achieve submission of the opponent.

Most combat sports have evolved to include the use of some type of protective gear on the hands,

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Disclosure: None of the authors have any commercial or financial conflict of interest to disclose.

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Hand Clin 33 (2017) 97–106

<http://dx.doi.org/10.1016/j.hcl.2016.08.004>

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to potentially reduce the risk of injuries to the extremity when performing a strike, and reduce the risk of injury to the head or other organs. Boxing requires padded gloves of specific weight depending on the level of competition. Taekwondo participants often wear forearm pads, as they use this portion of the extremity frequently to inflict strikes and defend them (Fig. 1).

Diesselhorst and colleagues,<sup>1</sup> in a survey among martial arts participants, found that the use of hand protection significantly reduced the likelihood of injury to the hand during participation, and recommended the use of hand protection during training and competition. However, they did note a slight increase in injuries to the arm and shoulder, which was attributed to possible force dissipation more proximal in the limb with the use of hand protection. Other investigators have noted an actual potential increase in injuries with the use of hand protection in striking sports. Johannsen and Noerregaard<sup>4</sup> noted in their study that the use of knuckle pads in karate competition did not change the overall rate of injury, but head injuries were slightly increased with the use of knuckle pads, noting that the pattern differed significantly, with more contusions and fewer nasal fractures and lacerations reported. However, they noted that hand injuries were reduced dramatically with the use of knuckle pads, with only 1 hand injury reported in 2 tournaments in which knuckle padding was used, compared with 17 injuries in the 2 tournaments conducted previously in which no hand protection was used.

Diesselhorst and colleagues<sup>1</sup> also noted in their survey of 758 martial arts participants that the most common injury patterns to the hand in competition and practice were sprains/strains (47%) and bruises/abrasions (26%). Thirty-nine percent of their respondents reported sustaining fractures of the upper extremity during



**Fig. 1.** Taekwondo athlete demonstrating the use of forearm padding to protect the ulna when blocking a kick.

participation, and 47% reported upper extremity dislocations. More injuries were noted during defensive positions than offensive maneuvers, and these more commonly occurred from strikes (56%) than from grappling submissions (33%). Zetaruk and colleagues<sup>5</sup> compared 5 different martial art disciplines and noted that the overall risk of injury in martial arts participation increased with years of participation, doubling once engaged in the sport for more than 3 years. These findings were supported in other studies that showed as the level of training and competition increases, so does the inherent risk of injury to the upper extremity requiring surgery, as well as the risk of cumulative and chronic injuries to the hand and wrist.<sup>1,6</sup> However, Stricevic and colleagues<sup>7</sup> noted that in karate competitions, acute injury rates decreased as the skill level of the participant increased.

Gender differences exist for both the rates and type of upper extremity injuries sustained during combat sport competition. Diesselhorst and colleagues<sup>1</sup> noted that male participants were more likely to injure their hand and fingers, whereas female participants were more likely to injure their shoulder or elbow, and that male participants had a significantly higher rate of upper extremity injuries requiring surgery. Similar findings were also observed by Birrer.<sup>6</sup>

The term Iron Palm training is unique to striking martial arts, particularly those with Chinese origins. It refers to the practice of conditioning the palm of the hand through repetitive striking of progressively harder objects, followed by application of herbal liniments that are often of a closely guarded mixture of specific substances. This training is concurrent with striking technique that concentrates force and maximizes strength.<sup>8</sup>

Mixed martial arts is a modern combat sport that represents combat using a variety of martial art disciplines that combine striking and grappling techniques. Bledsoe and colleagues<sup>9</sup> reported an overall injury rate of 28.6 injuries per 100 fights in mixed martial arts, with 13% of those reported being hand injuries. Lystad and colleagues<sup>10</sup> found similar overall rates and patterns of hand injuries related to mixed martial arts. The specific injuries of mixed martial arts are not different from those described herein for the various specific grappling and striking martial arts, and thus are not discussed under separate headings.

## **Boxing**

### **History and epidemiology**

Boxing was introduced as an Olympic sport in 688 BC, and remained a popular sport in ancient Roman times for nearly 300 years before it waned.

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