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Episodes of injuries and frequent usage of Traditional Chinese Medicine for Taiwanese elite wrestling athletes

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Running Title: *The Traditional Chinese Medicine study on Elite Wrestling Athlete's Medical Care Seeking Behavior*

Abstract

Background: Wrestling normally places extreme demands on the entire body, thus may cause injuries of various kinds. An in-depth understanding of the episodes of injured sites, types, timings, and treatment modalities would help participants beware of wrestling-related injuries occurrence so as to develop effective preventive measures. Therefore, this study aims to investigate the gender-specific injuries among elite wrestling athletes.

Methods: Subjects were selected from the 2009 Taiwanese National Wrestling Sport Championship. Participants were adolescent wrestling athletes, aging 16-18, who must have received at least one bronze medal at national level tournaments in 2008. A total of 118 respondents, 96 males and 22 females, completed and returned the questionnaire in which demographic data and information about the types, sites, and timings of injuries suffered and treatment modalities adopted were elicited. The data were analyzed with independent t-tests.

Results: The questionnaire results revealed a significantly higher injury rate for males than for females. The top three injured sites for males were waist (11.1%), ankle joint (10.1%) and finger (9.6%); while for females were ankle joint (13.6%), knee (12.5%) and waist (11.3%). Contusion was the most frequent type of injury: for males (73.5%) and for females (70.6%); followed by tendon inflammation for males (10.7%) and accumulated injuries for females (15.2%). During training and matching periods, the frequency of injuries for males (69.0%) is lower than that for females (81.8%). Traditional Chinese medicine (TCM) with acupuncture and moxibustion was the most common treatment modalities used for males (51.8%) and for females (68.0%); followed by orthopedics: for males (29.5%) and for females (18.0%).

Conclusions: The present study contributed as the first effort to reveal the potency of using TCM with acupuncture and moxibustion in wrestling competitions. To prevent possible brain and body injuries in wrestling, safety education, skills and rules, scoring systems may require further revision. Increased training of wrestling health professionals and advanced research and development of auxiliary training devices and protective equipment for wrestling athletes are also recommended.

Keywords: TCM, Medical Care Seeking Behavior; Wrestling injuries

Remarks: Z.-P. Lin and Yi-Hung Chen contributed equally to this work as co-first authors

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Introduction

Wrestling is a contact-and-collision sport, which can be rooted in the First Olympic Games in 776 B.C. Like other fierce sports (e.g., boxing, karate, taekwondo, and judo), wrestling can bring in considerable health benefits, including development of self-efficacy, increase of exercise capacity, reduction in falls, and enhancement of immune system and autonomic nervous system, among others (Burke et al., 2007). However, wrestling normally needs placing extreme demands on the entire body, thus it oftentimes cause injuries of different kinds.

Two typical wrestling styles are prevailing in the FILA (International Federation of Associated Wrestling Styles): freestyle and Greco-Roman, both with a common goal of pinning the opponent. A wrestling match may last up to 10 minutes, thus it can be a highly anaerobic sport requiring maximal power and strength for explosive attacks. Well-developed metabolic systems for the athletes, consequently, can play a key role in the success of wrestling matches (Grindstaff and Potach, 2006). A wrestling match normally takes place on a slightly unstable surface (e.g., a cushioned mat), and the situation is in single limb stance or it requires the athletes supporting their body weights with one or two hands for a prolonged period. Because of such unstable matching surface and precarious positions, joint injuries have compounded the risk in wrestling. Individuals with less strength, balance, proprioception, or neuromuscular control tend to have greater risk for injuries (Verhagen et al., 2004; Hewett et al., 2005; Whiems et al., 2005). To combat the risk, athletic injury prevention programs generally contain resistance, plyometric and balance training exercises (Hewett et al., 2005). Strength and conditioning professionals should keep in mind that injuries are common to wrestling. More importantly, they should realize that properly-designed, well-planned strength training and conditioning programs would help lower the high injury rates of wrestling, and, therefore, can reduce the risk of injuries while ameliorating the wrestlers' performance (Grindstaff and Potach, 2006).

It is important for the athletes to win the wrestling competitions; however, it is more important for all participants—coaches, referees, athletes and league executives—to scrutinize

the potential risk factors affecting the incidences of injuries in wrestling so as to develop effective measures to prevent the likely injuries. An in-depth understanding of the episodes of wrestling injured sites, types, timings, and treatment modalities can help participants beware of the injuries occurrence so as to develop effective preventive measures. The purpose of this study is to conduct an in-depth investigation on the episodes of injured sites, types of injuries and treatment modalities adopted for Taiwanese elite wrestling athletes during training and competition periods. Gender-specific wrestling injuries are also identified. It is hoped to assist the coaches to educate the wrestling athletes in reducing the injury rates, particularly the brain sites. The subsequent sections introduce the questionnaires surveyed on the subjects, followed by the analytical results of gender-specific injuries. Some important policy implications are then discussed based on the results.

Methods

Subjects

The wrestling champions in the 2009 Taiwanese National Wrestling Sport Championship were recruited for this study. All participants must be adolescent wrestling athletes, aging 16-18, ever receiving at least one bronze medal in the national level tournaments in 2008. A total of 118 effective respondents, 96 males and 22 females, returned the questionnaires distributed. The mean age of all subjects was nearly 17 years old. Their mean height and weight were 170 cm and 57 kg, respectively. The duration of training was 3.37 ± 2.28 years (Table 1).

Instrumentation

The aim of the questionnaire survey was to clarify the detailed history of the subjects' sport-related injuries in wrestling. Thus, the injury data collection form was used to disclose the detailed history of sport injuries in the subjects, including site and cause of previous sport injuries, treatment modalities adopted, and latest outcomes related to training and competition phases in 2008.

Procedure

The questionnaire comprised two major parts. (1) History and sites of injuries: the "Site" section described the human body in terms of twenty-one parts, twenty from the head through the soles of the feet, plus "Others." (2) Classification of injuries: the "Injury condition" section classified common wrestling injuries into five categories, including contusion and pull injuries, fracture and bone break, muscle inflammation, muscle sprain, and chronic accumulated injury (Table 2).

Statistics

To investigate the current status of sport injuries, the data were analyzed by t-tests at significance level $p < 0.05$.

Results

Gender-specific difference in types of injury

Effective questionnaires were returned by 118 subjects. A total of 491 episodes of injuries were reported, of which males and females were 403 and 88, respectively. The questionnaire results revealed a significantly higher injury rate for males than for females (67.90 ± 14.47 vs. 5.0 ± 5.41 , $t = 2.13$, $p < 0.05$).

Table 3 summarized the episodes of injured sites by gender. Note that waist (11.1%), ankle joint (10.1%) and finger (9.6%) were the top three injured sites for males. In contrast, ankle joint (13.6%), knee (12.5%) and waist (11.3%) were the top three injured sites for females.

Table 4 further detailed the injury types by gender. Contusions, the most common type of injury, accounted for 73.5% and 70.6% of injuries for males and females, respectively. The second most common type of injury was tendon inflammation for males (10.7%) and accumulated injury for females (15.2%).

Injuries sustained during training and competition

The timing of injury was related to injury episodes. During competition and training periods, the frequency of injuries for males is 69.0%, lower than that for females (81.8%) (Table 5).

Treatment modality adopted

Traditional Chinese medicine (TCM) with acupuncture and moxibustion was the most common treatment modalities used for males (51.8%) and for females (68.0%); followed by orthopedics: for males (29.5%) and for females (18.0%) (Table 6).

Discussion

Compared with other fierce fighting sports, the episodes of injuries for wrestling are dissimilar. In Taekwondo and judo, Kazemi et al. (2005) observed a higher rate of injury to the head, face and lower extremity from practicing Taekwondo than practicing judo. The lower extremities were found the most frequently injured sites in the body (32.0/1,000 A-E), followed by the head and neck (18.3/1,000 A-E). The backbone (neck) was the most frequently injured area for males, while for females it was the lower extremities (13.8/1,000

A-E). Sprain was found the most frequently occurring injuries in a Male Canadian National Taekwondo Championship (Pierer et al., 1996). Sprain ranked top three of all occurring injuries across several tournaments (Pierer et al., 1996). In karate, contusion was found the most occurring injury, followed by laceration for males and epistaxis for females (Emery et al., 2005). Strain for males and abrasion for females were also sustained most often (Pierer et al., 1993). In wrestling, our results showed a significantly higher injury rate for males than for females. The top three injured sites for males were waist, ankle joint and finger; while for females were ankle joint, knee and waist. Contusion was the most frequent type of injury for both genders; followed by tendon inflammation (males) and accumulated injuries (females). During training and matching periods, the frequency of injuries for males was lower than that for females.

Wrestling tournaments emphasize limited contact, protective equipment, and medical supervision, and thus are relatively safe compared with other fierce sports (Oler et al., 1991). However, various kinds of injury are still inevitable. The sites and types of injury occurred in the Taiwanese elite wrestling athletes, according to this study, compare favorably to those found in other literature. Previous studies found that the body region incurring the greatest percentage of injuries is the head/spine/trunk (ranging from 24.5% to 48%), followed by the upper extremity (ranging from 9.3% to 42%). The next highest is the lower extremity (ranging from 7.5% to 45.1%) and lastly the skin (ranging from 5% to 21.6%) (Powell, 1999; Pasque and Hewett, 2000). Concussions and other head injuries have occurred from 1% to 8% of all wrestling injuries (Pasque and Hewett, 2000). Many wrestlers are inexperienced, especially at the middle- and high-school levels, and thus close attention to proper technique is essential for a safe competition (Hewett et al., 2005). Recently, better attention by wrestling officials to rules infractions and dangerous moves can also be crucial in preventing serious injury (Hewett et al., 2005). Wroble (1996) discussed beginning practices earlier in the season, and delaying the onset of competition to allow for wrestlers to be better prepared for competition. Pasque and Hewett (2000) showed that limiting the amount of time in practicing live wrestling may decrease the incidence of injuries occurring during practice. Boden et al. (2002) found that teaching the wrestlers to keep their heads up when performing shooting or takedowns can avoid axial compression or flexion of the spine that would otherwise lead to serious injuries.

Our study showed relatively high rates of injuries in both genders for Taiwanese elite wrestling athletes. The results showed significant gender-specific difference in the sites and types of injury, although the injury rates and treatment modalities adopted for both genders during the training and competition periods were rather similar. In any circumstance, enhanced training of wrestling health professionals and advanced research and development of auxiliary devices and protective equipment for wrestling athletes are deemed necessary.

The ultimate goal for wrestling tournaments should minimize sport injuries while maintaining the spirit of sporting competition, should this sport be remained successful and

sustainable. Some researchers advocated prohibiting the attacks to the head or neck to reduce serious injuries in wrestling. Some internal medicine specialists even argued that wrestling matches must be held near or with easy access to the hospital facilities such that head or neck injuries can receive immediate treatment. Striking the protective helmet with adequate force causing serious injury was not easy and it rarely took place. Nonetheless, it can never be overemphasized that prevention of head or neck injuries is the highest priority (James et al., 2003). The coaches should instruct the wrestling athletes, not only basing on the technical and tactical needs of athletes, but also providing with sufficient protection to enable the athletes to maintain peak-performance conditioning for competition and, in the meantime, to avoid serious, especially head or neck, injuries. Safety education of preventive measures and testing equipment for preventing head injuries (especially, concussions) are of two major concerns, which are urgently needed among athletes, trainers, and referees (Kazemi et al. 2005; McLatchie et al. 1994).

Conclusion

In this study, TCM was found the most common treatment modalities used by Taiwanese elite wrestling athletes. In fact, TCM is a form of Complementary and Alternative Medicine (CAM), which has long been used in China and other countries, particularly as an alternative solution to chronic medical problems. It deserves more explorations on the use of TCM as treatment modalities for different sport injuries. Our conclusions were based upon 118 subjects; investigation on more subjects is deemed necessary for future study to reach more robust conclusions. Moreover, a comparative analysis of the injury episodes among different fighting sports deserves further attempt so as to gain insights into the consequences of injury and to propose more effective countermeasures. Last but not least, to improve safety for wrestling, especially to prevent the brain injuries, there are still some avenues for enhancing the safety education, revising the skills and rules, and changing the scoring systems in wrestling tournaments.

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Table 1: The age and training time of subjects

Gender	Age (years)*	Training time (Years)*
Male (96)	16.22±0.8	3.09±1.44
Female (22)	16.61±1.1	3.79±2.20
Total (118)	16.9±1.7	3.37±2.38

*Data presented as mean± standard deviation.

Table 2: Classification of injury conditions

Category	Injury condition
1	Contusion, pull injury
2	Fracture, bone break
3	Muscle (tendon, tough, ligament) inflammation
4	Muscle sprain (including muscle torn)
5	Chronic accumulated injury

Table 3: The episodes of injured sites by gender

Injured site	Male	Female
Head	10 (2.4)	3 (3.4)
Neck	27 (6.6)	6 (6.8)
Chest	6 (1.5)	1 (1.1)
Rib	9 (2.2)	0 (0.0)
Upper back	5 (1.2)	1 (1.1)
Lower back	4 (0.9)	0 (0.0)
Waist	45 (11.1)	10 (11.3)
Upper arm	24 (5.9)	5 (5.6)
Elbow	24 (5.9)	7 (7.9)
Forearm	7 (1.7)	1 (1.1)
Wrist joint	24 (5.9)	9 (10.2)
Palm	9 (2.2)	0 (0.0)
Thumb	32 (7.9)	7 (7.9)
Finger	39 (9.6)	6 (6.8)

Thigh	20 (4.9)	4 (4.5)
Knee	38 (9.4)	11 (12.5)
Shank	17 (4.2)	2 (2.2)
Ankle joint	41 (10.1)	12 (13.6)
Heel	17 (4.2)	0 (0.0)
Sole	3 (0.7)	3 (3.4)
Others	2 (0.4)	0 (0.0)
Total	403 (100.0)	88 (100.0)

Data presented as number (percentages).

Table 4: The injury types by gender

Injury type	Male	Female
Contusion	315 (73.5)	65 (70.6)
Fracture	34 (7.9)	1 (1.0)
Tendon inflammation	46 (10.7)	12 (13.0)
Muscle torn	11 (2.5)	0 (0.0)
Accumulated injury	22 (5.1)	14 (15.2)
Total	428 (100.0)	92 (100.0)

Data presented as number (percentages).

Table 5: The injured timings by gender

Injury timing	Male	Female
Only during training period	26 (26.8)	3 (13.6)
Only during matching period	4 (4.1)	1 (4.5)
During both periods	67 (69.0)	18 (81.8)
Total	97 (100.0)	22 (100.0)

Data presented as number (percentages).

Table 6: Treatment modalities adopted by gender

Treatment modality	Male	Female
TCM (acupuncture and moxibustion)	72 (51.8)	19 (68.0)
Orthopedics	41 (29.5)	5 (18.0)
Physical treatment	14 (10.1)	0 (0.0)
Others	7 (5.0)	1 (3.6)
None	5 (3.6)	3 (10.7)
Total	139 (100.0)	28 (100.0)

Data presented as number (percentages).