

Profile injuries and musculoskeletal abnormalities of elite wushu athletes

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Abstract. The objective of this study was to investigate the profile of sports injuries and postural abnormalities of elite wushu athletes. Participants were recruited purposefully (n = 51, age 16.3 (4.9 years, height 165.4 (13.9 cm and weight 52.6 (14.7 kg) and informed consent participated in the study. Injury report form (including type, anatomic site, etiology and mechanism of injury) was used to record the damage. Posture was assessed using Grid Chart, flexible ruler, calipers and mirror box were performed. In order to analyze the data, descriptive and inferential statistical methods, chi-square was used. 166 injuries and 167 postural abnormalities were recorded. Injury type, anatomical location, and mechanism of injury and abnormalities in elite status was significantly different ($P > 0.05$). 6.85 injuries per 1000 hours exposure and the risk of 8.91 injuries per 1000 athlete exposures was estimated. The most common types of injury were contusion (36.7%), hematoma (20.5%) and abrasions (13.3%) respectively. Based on the anatomic site of injury, lower extremities (47.6%), head and face (25.9%), upper extremities (13.9%) and trunk (12.7%) were injured mostly respectively. Opponent's Blow down technique (24.7%), previous injury (16.3%), lack of physical fitness (12.7%) and fatigue (12%) were in top priority. Receiving kicks (21%), Receiving punches (13.8%) and throwing technique by opponent (12%) were the most common mechanisms of injury. Flat foot (29.3%), uneven shoulders (25.7%) and scoliosis (16.2%) were the most common postural abnormalities.

Keywords. Injury, martial arts, postural abnormality.

Introduction

Wushu is the mother of all martial arts in the world. In fact, wushu (Chinese Kung Fu) is one of the East's exclusive arts and combat sports in the world of martial arts and it is particularly popular among different nations and cultures.

Participation in any sport is typically associated with sports injuries. Although it is sometimes difficult or even impossible to explain how injuries and damages in certain sports are caused, the patterns are often clear. When there are models of how the damage is induced, there are opportunities to reduce the risk of injury (Saadatian et al., 2014).

Pappas (2007) compared injury rates treated in Hospital Emergency Departments between different combat sports of boxing, wrestling, and martial arts. And he recited that: Martial arts had lower injury rates compared to boxing and wrestling for all diagnoses. Boxing had lower injury rates compared to wrestling for strains/sprains and dislocations. Boxing and wrestling had similar injury rates for concussions. Injury prevention efforts should consider the distribution of injuries and concentrate on preventing strains/sprains in wrestling, concussions in boxing and wrestling, and fractures for all three activities (Pappas, 2007).

Although physical activity is associated with an improved quality of life and an overall reduction in mortality and morbidity, there remains an associated activity-related risk of injury and re-injury. Injury prevention research plays an important role in the promotion of safe exercise participation by identifying risk factors for injury and re-injury (Bertelsen et al., 1998).

Gartland et al. (2001) determined the type and number of injuries that occur during the training and practice of Muay Thai kick boxing and to compare the data obtained with those from previous studies of karate and taekwondo.

And he recited that: A total of 152 people were questioned, 132 men and 20 women. There were 19

beginners, 82 amateurs, and 51 professionals. Injuries to the lower extremities were the most common in all groups. Head injuries were the second most common in professionals and amateurs. Trunk injuries were the next most common in beginners. The difference in injury distribution among the three groups was significant. Soft tissue trauma was the most common type of injury in the three groups. Fractures were the second most common in professionals, and in amateurs and beginners, it was sprained and strains ($p < 0.05$). Annual injury rates were: beginners, 13.5/1000 participants; amateurs, 2.43/1000 participants; professionals, 2.79/1000 participants. For beginners, 7% of injuries resulted in seven or more days of training; for amateurs and professionals, these values were 4% and 5.8% respectively. The results are similar to those found in karate and taekwondo with regard to injury distribution, type, and rate. The percentage of injuries resulting in time off training are less (Gartland et al., 2001).

The relatively high incidence of injuries in combat sports has been well documented. The giving and receiving of high velocity blows seems to be the best correlation of whether a sport will have an increased risk of injury. Styles that include striking such as boxing (Bledsoe et al., 2005; Zazryn et al., 2003a), kickboxing (Gartland et al., 2001; Zazryn et al., 2003b), karate (Zetaruk et al., 2005), and taekwondo (Kazemi & Pieter, 2004) has been shown to have a higher incidence of injury than styles that involves grappling alone, such as collegiate wrestling (Jarret et al., 1998).

Given the importance of basic information on the epidemiology of sports injuries and postural anomalies, martial arts wushu. Unfortunately, few studies have been done in this regard.

So be aware of the damage and abnormalities common situation in the wushu elite of the sport including requirements to include preventive or corrective measures for safer and more successful in this sport is.

However, domestic research in this field on the damage and functional abnormalities in wushu very few and far between.

So that sufficient resources in this area for coaches, athletes, and researchers in the country are available.

The identification of injuries and postural abnormalities common in different sports and martial arts is essential in nature, So that preventive

and corrective interventions background information required to be provided to those involved in this area.

The following are the main Hypothesis of the study: 1) There is a significant difference between the types of injuries wushu athletes. 2) Injuries among elite athletes wushu anatomic areas there are significant differences. 3) There is a significant difference between causes damage wushu athletes. 4) There is a significant difference between the mechanisms of injury wushu athletes. 5) There is a significant difference between postural deformities wushu athletes.

Materials & Methods

This study enjoyed a descriptive approach. Elite Wushu athletes' profiles of injuries and postural abnormalities and questionnaires of sports injuries were employed to assess and investigate the participants' injuries in the year 2016. The participants of this study consisted of 51 male wushu athletes who had a history of winning at the national level. All the participants voluntarily participated in this study and were given a consent form to sign prior to the study.

Tools for data collection: digital scale, tape, Bone caliper, ruler, checkerboard, plumb line, flexible ruler, marker And Box Mirror. Descriptive statistics (mean and standard deviation) for the features and size of the samples and variables were used. Differences using the chi - square test in SPSS software was used at a significance level of alpha ($p < 0.05$).

Results

In Table 1, the average and standard deviation (SD) of the individual characteristics of subjects (51 males) is provided.

Table 1.
Wushu characteristics of elite athletes (mean and SD).

Variable	Mean	SD
Age (years)	16.3	4.9
Height (cm)	165.4	13.9
Weight (kg)	52.6	14.7

The first hypothesis: There is a significant difference between the types of injuries wushu

athletes. Information on injuries wushu athletes are given in Table 2.

Table 2

Types of injuries Wushu athletes.

Type of injury	Number	Percent
Contusion	61	36.7
Hematoma	34	20.5
Scratches (skin)	22	13.3
Concussion	16	9.6
Nose bleeding	12	7.2
Strain	8	4.8
Aspirin	7	4.2
Dislocation	4	2.4
Fracture	2	1.2
Total	166	100

Based on test results inferential Chi, a significant difference in injuries occurred among elite athletes wushu was observed. ($X^2 = 597.1$, ($p < 0.01$)). As soreness most fractures least amount of damage, respectively, so the first hypothesis confirmed.

The second hypothesis: Between the areas of anatomic injury elite wushu athletes there is a significant difference. Information on areas of anatomical damage wushu athletes are given in Table 3.

Table 3

Anatomical areas affected by elite athletes wushu.

Areas	Number	Percent
Lower limb	69	41.5
Craniofacial	53	31.9
Upper limb	23	13.9
Trunk	21	12.7
Total	166	100

Based on test results inferential Chi, a significant difference between the areas of anatomy, injuries occurred among Elite wushu athletes was observed ($X^2 = 419.9$, ($p < 0.01$)). These results indicate that the greatest damage was in the lower limbs and the lowest damage was observed in the trunk. Based on these results it can be claimed that the second hypothesis posed in this study is confirmed.

For more detailed anatomical analysis the body parts were divided into four different areas, the head and face, trunk, upper limbs and lower limbs.

Information on more minor injuries in different anatomical areas of elite wushu athletes is given in Table 4.

Table 4

Anatomical areas of minor injuries wushu athletes.

Areas	Number	Percent
Head	19	11.4
Nose	16	9.6
Leg	16	9.6
Thigh	14	8.4
Leg	14	8.4
Species	12	7.2
Ankle	9	5.4
Hips	7	4.2
Knee	6	3.6
Forearm	6	3.6
Hand	6	3.6
Reins	5	3
Neck	5	3
Elbow	4	2.4
Genitals	4	2.4
Lips	4	2.4
Slat	4	2.4
Wrist	4	2.4
Back	3	1.8
Jaw	3	1.8
Shoulder	3	1.8
Eyebrows	2	1.2
Total	166	100

Based on test results inferential Chi, a significant difference between anatomic areas more minor injuries in elite athletes wushu was observed. ($X^2 = 738.1$, ($p < 0.01$)). As the highest and the eyebrows lowest incidence of damage in areas anatomically realistic details so the second hypothesis was confirmed.

The third hypothesis: There is a significant difference between cause's injuries wushu athletes. Information on cause's injuries wushu athletes are given in Table 5.

According to the chi-square test results analyzed, no significant difference was observed between the causes of injuries in elite athletes wushu ($X^2 = 729.6$, ($p < 0.01$)). So that hit the opponent more damage and injury causes the least Salon temperature, so the third hypothesis was confirmed.

The fourth hypothesis: There is a significant difference between the mechanisms of injuries wushu athletes. Information about the injury for elite wushu athletes are given in Table 6.

Table 5
Causes injuries wushu athletes.

Injury	Number	Percent
Hit the opponent	41	24.7
A previous injury	27	16.3
Lack of adequate preparation	21	12.7
Extreme fatigue	20	12
The use of technical mistakes	14	8.4
Not warm up enough	10	6
Weight loss problems	8	4.8
Causes of mental preparation	7	4.2
Poor nutrition	6	3.6
Facilities inappropriate salon	4	2.4
Inadequate protective equipment	3	1.8
Watch inappropriate activity	3	1.8
Salon temperature	2	1.2
Total	166	100

Table 6
Mechanism of injury for elite wushu athletes.

Mechanism	Number	Percent
Hit the opponent's leg	35	21
Punch the opponent	23	13.8
Performing arts thrown by an opponent	20	12
Tap your foot athlete	18	10.8
Athlete beats his fist	9	5.4
Implementation delivery techniques by athletes	3	1.8
Dealing with objects and equipment	2	1.2
Acts of excessive force	14	8.4
Overactive	14	8.4
Fall	8	4.8
Rotate	7	4.2
Landing	6	3.6
Glide	5	3
Jump	2	1.2
Total	166	100

According to the chi-square test results analyzed, no significant difference was observed between injury in elite athletes wushu ($X^2 = 738.2$, $p < 0.01$). So that hit the opponent's leg had the most and jumping least the mechanism of injury, so the fourth hypothesis was confirmed.

Fifth hypothesis: There is a significant difference between postural abnormalities wushu athletes. Information on abnormalities elite wushu athletes are given in Table 7.

Table 7
Postural abnormalities elite wushu athletes.

Anomalies	Number	Percent
Flat feet	49	29.3
The uneven shoulders	43	25.7
Scoliosis	27	16.2
Valgus deformity	15	9
Genu Varum	14	8.4
Head forward	13	7.8
Kyphosis	3	1.8
Lordosis	2	1.2
Hip unequal	1	0.6
Total	167	100

The chi-square test results analyzed, no significant difference was observed between the abnormal situation in elite athletes wushu ($X^2 = 595.3$, $p < 0.01$). So that the Flat foot deformity had the highest incidence and prevalence of pelvic unequal least, the fifth hypothesis was confirmed.

Discussion

This study aimed at investigating the profile of sports injuries and postural abnormalities of elite Wushu athletes. The results indicated that the occurrence of injuries during the past year was 166. Skeletal abnormalities among elite wushu athletes and 167, respectively. Results showed a significant difference in the type of injury, anatomical location, causes and mechanisms of injury among elite athletes was found ($p < 0.05$). The findings related to postural abnormalities revealed significant differences in types of anomalies among the elite athletes of wushu ($p < 0.05$).

The rate of injuries per 1000 hours wushu athletes at risk for injury was 6.85. The injuries per 1,000 athletes vulnerable to elite athletes in wushu 8.91 injuries were reported. The above amounts of damage a year ago, and injuries to both practice and

the race has been included. Most of the injuries were: fatigue (36.7%), hematoma (20.5%) and scratches (13.3%), respectively.

The position of injuries, most damage in the areas of lower limbs (47.6%), face (25.9%), upper extremity (13.9%) and trunk (12.7%) was registered. In the leg by leg (11.4%), ankle (9.6%) and Ron (8.4%) had the highest. In the scalp, face and head (9.6%), nose (7.2%) and species (3.6%) were the highest. In the upper limb forearm (3.6%), Hand (3.6%), wrist (2.4%) and elbow (2.4%) had the most injuries.

The trunk is also lower (3%), neck (3%) and genitals (2.4%) had the highest. The technique causes damage to also hit the opponent (24.7%), previous injuries (16.3%), lack of adequate preparation (12.7%) and fatigue (12%) were the priority.

In examining the mechanisms of injury, hit the opponent's leg (21%), punch the opponent (13.8%) and implementation techniques thrown by an opponent (12%) had the highest. Evaluation of postural abnormalities among elite athletes in wushu, flat feet (29.3%), shoulder inequality (25.7%) and scoliosis (16.2%) had the highest.

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Check damage in subjects with different skill levels can show variable results.

Most studies of the prevalence and rate of injuries during races in other disciplines have studied martial. It can be seen that the rate of reported injuries per 1,000 athletes in all studies was much higher than the amount obtained in the present study. The main reason for this difference can be attributed to the time of data collection, as ranged combat sports incidence of injury greatly increases.

As can be seen in the study as well as the nature of sports, internal and external factors have the most important role.

It can be concluded that the nature of conflict and struggle martial disciplines, especially during competitions inevitably associated with injuries. And account for the largest share.

However, other factors are also significant contribution to the account that can be manipulated are included in this study was expressed, injury earlier in the second order were indicating a lack of rehabilitation proper injury later in athletes.

Hence, perhaps with effective rehabilitation of previous injuries prevent damage and reduce the incidence of injury. In addition, as in the present study was the lack of adequate preparation and tired the next priority causes of injury were the two factors as well as internal and manipulation, so that we can enhance the readiness and raise the threshold of fatigue and tolerance effective action will prevent injuries.

Common injuries among wushu athletes in this study include bruising, hematoma and skin abrasions. Due to the nature of the collision and struggle of the common type of injury is similar to other combat sports.

The common areas of lower extremity injuries, head and face, upper limbs and trunk were recorded. A variety of injuries in different parts of the body can result in differences in the implementation of martial arts techniques and rules are different. The technique causes damage to also hit the opponent, previous injury, lack of adequate preparation and fatigue were the priority. This means that the nature of the sport, internal factors and external factors ultimately contributed most to elite athletes in wushu in this study had injuries.

Increase knowledge about the mechanisms of injury of wushu and coaches may lead to the development and implementation of methods for the prevention of injury among them.

The result may be that high levels of martial arts wushu elite, with help, up to change the rules and the use of protective equipment and training programs to reduce the incidence of injury action.

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