

# Effect of acupuncture on neck muscle training and sports rehabilitation of freestyle skiing aerial skiers

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**Abstract:** To explore the effect of acupuncture therapy on strengthening the muscle groups around the cervical spine of freestyle skiing aerial skiers and preventing cervical spine injury of freestyle skiing aerial skiers, so as to ensure the reduction of injury. After neck injury, whether it can accelerate the rehabilitation of neck injury and reduce the time of sports rehabilitation. In this paper, through comparative analysis and literature analysis, we will carry out general resistance training and acupuncture therapy for freestyle skiing aerial skiers respectively, and then test and evaluate the muscle strength of the muscle group around the cervical spine through hand-held dynamometer and adjustable tension belt, so as to draw a conclusion that acupuncture therapy can promote the growth of muscle strength, The effect of acupuncture therapy in the early stage of athletes' sports injury rehabilitation is better than that of ordinary resistance training.

**Keywords:** Freestyle Skiing Air Skills Athletes, Cervical Spine Injury, Acupuncture

In 2008, China held the Summer Olympic Games in Beijing. After the dream of the Summer Olympic Games, China is full of expectations for the bid for the Winter Olympic Games. On November 3, 2013, the Chinese Olympic Committee proposed to bid for the 2022 Winter Olympic Games in Beijing. On 31 July 2015, Thomas Bach, President of the International Olympic Committee, declared Beijing the host city of the 2022 Winter Olympic Games. he successful bid for the 2022 Winter Olympic Games is of great significance to China 's ice and snow sports. In vigorously promote the Beijing Winter Olympics, improve the majority of sports enthusiasts on the ice and snow sports attention, let people realize the charm of ice and snow sports, greatly improve the ice and snow sports participation population. After the successful bid for the Beijing Winter Olympics, the cultivation of reserve talents for ice and snow sports has become particularly important. Freestyle skiing aerial skill athletes are also one of the main forces in the development of ice and snow sports in China. In order to prepare for the Beijing Winter Olympics, China ' s freestyle skiing aerial athletes have accumulated experience in domestic and international competitions and have achieved many excellent results in the competition. Our country is also actively cultivating excellent freestyle skiing reserve athletes. In this context, the competition among freestyle skiing aerial skill athletes is more intense. In order to better play the competitive level of athletes, we should actively and deeply explore and analyze the injury prevention and rehabilitation of athletes.

The sports injury of cervical spine is the most basic sports injury in freestyle skiing aerial skill athletes, Cervical injuries are mostly caused by long-term fatigue, ligament thickening or trauma. Freestyle skiing aerial athletes often do specific movements such as aerial rotation or forward-backward rotation combined with high-intensity training, resulting in high incidence of cervical spine injury of freestyle skiing aerial athletes, and the proportion is higher than that of athletes in other ice and snow sports.

Studies have shown that acupuncture at acupoints can promote muscle strength, if acupuncture therapy is applied to the daily training and rehabilitation of ice and snow athletes, it will significantly improve the performance, injury prevention effect and rehabilitation speed of freestyle skiing aerial skill athletes in China.

Therefore, this article will be through the freestyle skiing aerial skills athletes for ordinary resistance training and acupuncture point two training methods. Six weeks later, the muscle strength test data were compared and analyzed by hand-held dynamometer and adjustable tension band. Through data analysis, the effect of acupuncture and moxibustion therapy on the strength of the muscles around the neck, the prevention of cervical spine injury of freestyle skiing aerial athletes and whether the rehabilitation speed of acupuncture therapy on cervical injury after injury can be improved.

## **1. Selection basis**

### **1.1. Basis**

Beijing won the 2022 Winter Olympics in 2022, in the “ice and snow sports development plan” proposed 300 million people to participate in the ice and snow sports. It aims to improve the popularity of ice and snow sports and increase the number of ice and snow sports.[1] Under this planning, the heat of ice and snow sports continues to increase. In recent years, China's ice and snow sports enthusiasts and ice and snow athletes are increasing. Because beginners are unfamiliar with freestyle skiing skills, coupled with the athletes' high-intensity training and practice some specific aerial movements that have damage to the neck, the probability of sports injury is greatly increased. This reflects the importance of preventing sports injury and sports rehabilitation. Muscle strength is one of the important factors, and cervical spine injury is one of the most common injuries of freestyle skiers. Therefore, according to the neck is easy to cause sports injury in ice and snow training and competition, this paper studies the effect of acupuncture therapy to enhance muscle strength, prevent freestyle skiing aerial skills athletes cervical spine injury and reduce the recovery time of injury.

### **1.2. freestyle skiing aerials athletes**

Freestyle skiing aerial skills this movement began in the early 20th century, athletes in the game from the high platform jump to the landing time to make a variety of air turn movement. This exercise has high requirements for body balance and control. The sport attracted a lot of fans because of its fantastic aerial movements.

### **1.3. Cervical injuries**

The cervical spine is located below the head and above the chest, with a total of seven pieces. The cervical spine supports our head, so that we can complete the movements of head up and head up. The cervical spine is connected to the head, thoracic spine and lumbar spine, and plays a connecting role. There are eight pairs of nerve roots in the cervical spine. If the cervical spine is damaged, resulting in nerve root compression, it will make our upper limbs suffer from soreness, numbness and other symptoms. Cervical injury, also known as cervical spondylosis or cervical vertebra syndrome, is the general name of cervical bone joint, cervical nerve root syndrome, cervical disc herniation. This syndrome is mainly due to long-term loss of the cervical spine, irregular use of the neck resulting in cervical disc prolapse, or acute external injury resulting in cervical deformation.[2] Because of the distribution of nerve in the neck, when the neck is abnormal, it can make the intervertebral foramen smaller, resulting in cervical nerve compression. Because the nerve is distributed in the upper limbs, chest, back, shoulder, when the neck nerve is compressed, these places will appear numbness or weakened motor function.

### **1.4. Common symptoms of cervical spine injury**

#### **1.4.1. Neck symptoms**

The range of motion of the neck decreased and appeared discomfort, followed by the feeling of pain and soreness, cervical stiffness, active neck will appear gag noise, neck muscle spasm, massage improved.

#### **1.4.2. Upper limb symptoms**

Upper limb movement range is limited, acid numbness, ant crawling, upper limb muscle strength decreases, hand weakness, finger numbness, can not lift weight.

#### **1.4.3. Shoulder symptoms**

Shoulder range of motion decreased, acid hemp swelling pain, pressing its parts have pain, sedentary symptoms will aggravate.

#### **1.4.4. Back symptoms**

Back muscles tense and stiff, back pain, sedentary symptoms aggravated.

### 1.5. Reasons for using hand-held dynamometer

The hand-held dynamometer measures the neck muscle force by directly reading the values [3]. The hand-held dynamometer can measure the maximum muscle force in multiple directions by cooperating with the adjustable headband. Hand-held dynamometer is relatively simple operation, low test cost, is widely used, and neck isokinetic muscle strength tester is less used.

## 2. Research objects and methods

### 2.1. Research objects

30 college students' freestyle skiing aerial skill athletes (sports career 5-8 years) were selected as the experimental subjects. Two different training methods (group A and group B, with 15 people in each group) were adopted. Group A was the general resistance training, and group B was the acupuncture and moxibustion training. The hand-held dynamometer was used to test and analyze the cervical muscle strength.

Table 1: Basic information of subjects (30 persons)

Peer group	Stature(cm)	body weight(kg)	Age (y)
Group A (resistance training)	178.50±5.12	68.70±4.67	20±3
Group B (acupuncture and moxibustion)	177.40±5.5	68.82±5.22	20±3

### 2.2. Research methods

#### 2.2.1. Comparative analysis

This study divides freestyle skiing aerial skill athletes into two parts. The first part is the neck resistance training, and the second part is the neck acupuncture training. Conduct a comparative study to better reflect the findings. Resistance training is widely used in the field of fitness, which is divided into three categories: isotonic training, isometric training and isokinetic training. Among them, isotonic training is applied more. Acupuncture therapy training is the acupuncture therapy of traditional Chinese medicine. Acupuncture and exercise training are integrated. Acupuncture and moxibustion are electrified, and the nerve is stimulated by electric current to make the muscle contract and increase the strength of the muscle.

#### 2.2.2. Documentation

Access to relevant information, sports journals and literature, the collection of Beijing Winter Olympics on the successful bid for the impact of China's ice and snow sports population, freestyle skiing aerial athletes neck injury, neck muscle strength test, neck resistance training, acupuncture therapy related data and integrated analysis, to understand the latest relevant information.

## 3. Training scheme and research results analysis

### 3.1. Resistance training program

Neck flexion resistance training: a group of two people, one arm stretched to the subject's forehead, arm force, let the subject do hinder head flexion movement, keep body balance.

Neck extension resistance training: two people in a group, one person will reach the arm at the back pillow of the head, arm force, let the subjects do impedance head extension action, keep the body balance.

Left and right neck flexion resistance training: in two groups, one man stretched his arm to the temporal side of the head, and the subjects should attach their ears to the shoulders. The subjects should resist the lateral bending of the head and keep their body balanced.[4] The order is flexion, extension, left flexion, right flexion, each direction training 5 times, each time 30 s, each time rest 30 s. The experiment lasted for 6 weeks, 3 times a week.

### 3.2. Acupuncture training

Acupuncture therapy training requires acupuncture at Dazhui point, Fengchi point and Jingjiaji point. operation, the subjects need to sit upright. Using two-way square wave, 50Hz, 200us intermittent wave ( 15 : 5s ) endurance intensity for 20min / time, 1 / d, 5 / w, for six weeks.

### 3.3. Experimental equipment

Hand-held dynamometer, adjustable headband.

The hand-held dynamometer was connected with the adjustable headband. In the test, the subjects were sitting upright in the chair, paying attention to preventing the movement of the body. The adjustable headband was fixed at the center of the forehead to measure the strength of the neck flexor, fixed above the occipital protuberance to measure the strength of the neck extensor, fixed above the left ear to measure the strength of the left muscle of the neck, and fixed above the right ear to measure the strength of the right muscle of the neck.

### 3.4. Experimental environment

- (1) The subjects were asked to have the same living environment in the six weeks of the experiment.
- (2) Subjects were required to have the same training except these two training types.
- (3) Need six weeks of acupuncture and acupuncture training operators for the same person.

### 3.5. Test results and analysis

The maximum muscle strength of the subjects in different directions was measured by the combination of a hand-held dynamometer and a adjustable headband. The anterior flexion muscle strength, the right flexion muscle strength, the extension muscle strength and the left flexion muscle strength of the neck were measured respectively. The muscle strength in different directions was measured three times time interval of 5 min. The average value of the three muscle strength was taken as the value of the neck muscle strength measured in this study.

Table 2: Effects of two kinds of training on neck muscle strength of ice - snow athletes

		anteflexion	right flexion	posterior extension	Left bend
pre-experiment	Group A	11.64±0.76	17.32±0.48	21.45±0.75	16.81±0.61
	Group B	11.67±0.65	16.97±1.01	21.35±1.05	16.96±1.03
After the experiment	Group A	14.64±0.73	20.23±0.68	28.36±0.50	21.38±0.54
	Group B	14.79±0.78	20.07±0.61	28.51±0.64	21.66±0.62

## 4. Conclusions and suggestions

(1) With the announcement of the Beijing Winter Olympics in China, the reserve of ice and snow reserve athletes has increased, and the number of athletes who have joined the freestyle skiing aerial skill project has also increased. The neck is one of the most basic sports injuries of freestyle skiers. Therefore, strengthening the neck muscle strength is crucial to freestyle skiers, which is also the premise to maintain the sports ability of ice and snow athletes.

(2) Through the above data shows that ordinary resistance training and acupuncture therapy training can increase neck muscle strength, acupuncture therapy in athletes sports injury rehabilitation effect is better than ordinary resistance training.

(3) Six weeks of acupuncture and moxibustion therapy training to stimulate Dazhui point, Fengchi point and neck Jiaji point can make neck muscle strength increased significantly; this not only has a certain effect on the rehabilitation training of freestyle skiing aerial skill athletes with neck injury, but also reduces the time used for rehabilitation, and plays a great role in the prevention of neck injury. This is very important for the maintenance of muscle strength and the recovery of neck motor function of freestyle skiing aerial athletes.

(4) The influence of neck sports injury on freestyle skiing aerial skill athletes is multifaceted. The

most direct aspect is the pain of the neck. More importantly, it will lead to the limitation of the movement function of the neck, shoulder, upper limb and back, leading to the failure of some technical movements and affecting the training effect. Therefore, in the training of freestyle skiing aerial skill athletes, acupuncture therapy training should be added to strengthen neck muscle strength training to avoid neck injury to the greatest extent.

(5) If the resistance training and acupuncture therapy training are combined with the daily training of freestyle skiing aerial skill athletes, the strength growth of the cervical muscle group can reach a peak. The strength growth of the cervical muscle group plays a very important role in maintaining the stability of the cervical spine. When freestyle skiing aerial skill athletes do some actions that have great harm to the neck, they can protect the neck to a greater extent. The prevention of neck injury can prolong the career of freestyle skiing aerial athletes and prevent a series of complications caused by neck injury. So coaches should pay attention to neck muscle strength training.

(6) The proposal of ' 300 million people participating in ice and snow sports ' has set off a wave of ice and snow sports, which plays a vital role in the increase of the sports population of ice and snow sports, and makes the general public participating in ice and snow sports more and more. According to the above research results, it is concluded that acupuncture therapy has a good effect on the prevention and rehabilitation of athletes ' neck injury, so it has broad application prospects in the public.

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