

# Study on Shoulder Joint Injury of Volleyball Athletes

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**Abstract** After studied volleyball athletes of Shandong province since 2000, we find that the ratio of shoulder joint injury has been reached 65%, it is higher in female than in male and most of them is rotator cuff injury, which are 25 cases(32%), aged from 14–18 years old. This study was based on the characteristic of shoulder joint structure and pathogenesis.

**Key Words** shoulder joint; injury; athletes

During exercise training, the athletes are bound to suffer from athletic injury in different degree for intensive training, overtrain and strenuous endurance training, especially in volleyball athletes whose ratio of suffering from injury of shoulder joint is higher than others. In this article, spending 3 years, we selected 120 volleyball athletes at random in different levels, different ages and to study the incidence and the pathogenesis of the shoulder joint injury.

## Object and Method:

**Object** Since 2000, 120 volleyball athletes was selected at random in group 1 to 3 of Shandong to survey, 56 of them are male and 64 are female, their age ranged from 11 to 21 years old, with the mean age of 16.4 years old, They have been training for 6 years and the beginning age of training is 9 years old.

**Methods** ① After inviting the experts, coaches and professor both inside and outside Shandong province, we design the "questionnaire of the shoulder joint injury" and send them to athletes by doctors to fill, and make clinical examination for injured athletes. We followed up for 3 years for this study and used statistics to analyze the data achieved.

## RESULTS

**Incidence of the injury:** In the 120 athletes, shoulder joint injury 78(65%), consisted of 28(50%) case of male and 50 (78%) case of female, and the incidence in female's is significantly higher than male ( $p < 0.05$ ).

Among shoulder joint injury of athletes (table 1), most of them IS rotator cuff injury 25 (32%), tenosynovitis 20(25.4%), soft tissue injury of shoulder joint 15 (19.2%).

## The age of sports injury

In this study, we find that the most of injury occurred the volleyball athletes aged 14–18 years old, which was 51 case, account for 65.4% of the incidence of injury, which is significantly higher than that in aged 11–14 years old (8, 10.3% of the incidence of injury) and over 18 years old (19, 24.3% of the incidence of injury) ( $p < 0.01$ ).

## The time of sports injury

The study show that most of the injury occurred during the training season in winter and during the competition and intensive exercise, 80% of the incidence of injury occurred in this season, and it is significantly higher than follow period ( $P < 0.01$ ).

## The classification of injury

The course of injury limited in two weeks is named acute injury, more than two weeks is called chronic injury. According the influence on training, the injuries may be divided into flesh injury, which has no influence on training, moderate injury which has influence on training partly, severe injury, which hamper training entirely. Among these volleyball athletes, most of the joint injury is acute parenchyme injury and moderate injury, the common symptom is: local pains, local swelling, hematoma, the press pain is obvious in clinic and combine with functions handicap in some degree.

Table 1 kinds of shoulder joint injury

Toponymy	classification		degree		
	acute	chronic	slightly	moderate	severe
Rotator cuff injury	13	12	13	10	2
tenosynovitis	19	1	8	10	2
shoulder Soft tissue injury	15		6	9	
Periarthritis of shoulder		5	3	2	
others	7	6	6	7	
Total (N)	54	24	36	38	4
Percent	69.2	30.7	46.1	30.7	5.1

### Discussion and analysis

Result analysis: The table 1 show that the incidence of injury in female athletes is higher than that in male athletes, which is probably related with female athletes's butch training and overload training. After analysing the racer age, we found that most of injury is occurred between the age of 14-18 when the athletes are highly developed; stressful training and overused shoulder during this period are important reasons leading to shoulder injury.

The structure characteristic of shoulder joint: shoulder joint has good mobility and it is easy to dislocation. The shoulder joint, made up of humeral head and cavitas glenoidalis of scapula, is a typical spheroidal joint, although cavitas glenoidalis is enlarged and deepened by a rim of fibrocartilage, the glenoidal labrum, which attached to its margins, it is small and retuse, only connect with 1/4-1/3 facies articularis of humeral head. So that the shoulder joint has more mobility and more injury ratio than others.

Capsula articularis is weak and flabby, it's superior wall has fibrous tissue incorporated stratum fibrosum, its anterior and posterior wall have tendon incorporated stratum fibrosum to increase the stability of shoulder joint; The inferior wall has no ligament and tendon to strengthen, so it is weak and cause downward subluxation of the humeral head and most of them are anterior dislocation (95%).

### The mechanism of shoulder injury

It is a little complex upon the reasons which leads to shoulder joint injury. After studying on the data about the mechanism of sport trauma around the world, we can conclude the mechanism of joint injury as following:

(1) the basic reasons: ① Do not attach the importance of preventing from sport trauma, neglect accurate training and ignore the principle and the rule of athletic sport. ② improper warming-up: has no warming-up or has not enough warming-up; the warming-up do not suitable for the game; overtrain; the interval is too long from the formal exercises so that the neural system or the endocrine system do not work enough to suit to the need of movement, so the muscle, ligament or joint is vulnerable to injury. ③ There's something errors or defect on special technic motion and go against the characteristic of structure or function, for example, in volleyball sport, once shoulder joint rotation motion isn't correct in drop shot that would lead to shoulder joint injury easily. ④ physical condition and psychological condition of athletes are not good enough, or be down in spirits, so they can not devote their mind to the movement. All of those was the inducement lead to muscle, ligament and shoulder joint injury combine with overload motion (especially in local). ⑤ In the competition, break the rule is another inducement which would lead to injury. ⑥ the weather is not fit to training or competition, in hot or humidity weather, athletes are vulnerable to tiredness, sunstroke and decompensate due to water losing; in low temperature or humidity condition, they have the tendency to ankylosis in the muscle and joint.

(2) inducement It is depend on the characteristic and weakness in physiology and anatomy combine with the characteristic of sport game. Rub against and squeeze the local tissue in movement is a potential reason which contribute to sport injury.

(3) direct reason Overload training and overuse in local (33 athletes, 42.3%) is the first efficient reasons, the seconds is the level of training is in-

sufficient (30 athletes, 38.5%), it is because at the beginning of special training, physical condition can not come up with the requirement of technical training, or there have some shortcoming, fault during exercises; the unhealth state in physical psychological condition in process of training or competition (6 athletes, 7.7%)

**The mechanism and prevention of shoulder joint injury** the movement of shoulder joint depend on many muscle and ligament, etc. Once any one of them injury, the shoulder mobility will be affected in some degree. Shoulder joint can make the motion of plexion, extension, adduction, abduction, lateral rotation, medial rotation and so on, it is the most mobility joint in human body. In arthletic sport, the rotate motion of shoulder is complex and large-scale, such as flying rings, horizontal bar, backstroke, butterfly stroke, jaculation, ect. For the shoulder joint rotation repetitive or over movement which lead to shoulder injury due to the tendon of rotator cuff and subacromial bursa's extrusion, attrition, and strain constantly by acromial or coracoacromial ligament. In sport, the smash or serve is the typical reason for shoulder joint injury. Most of the injury are caused by once or repetitive trauma and the symptom was aggravated gradually.

The preventive measure of shoulder joint is strengthening the strength exercises of shoulder joint and muscle to increase stability and fixity; Doing warming-up adequately, especially warm up their muscles by kinds of shoulder rotation exercises, using shoulder guard or retinaculum protection if necessary, avoiding overload or overrange's movement. Injury should be treatment in time, or else it will lead to chronic trauma such as periarthritis of shoulder, shoulder joint tenosynovitis, shoulder joint dislocation ect.

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