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Survey and analysis for sport injuries of long jumpers

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ABSTRACT

As one of the conventional sport events, long jump is loved by many sports enthusiasts. Long jump is a track and field sport that a sportsman runs up along the straight line, take off with single foot in front of the take-off board and behind the line, and then use both feet to land on the sandpit after the flight phase. Long jump is featured with fast speed, high strength and strong explosiveness. When a long jumper's body is at poor state in exercising, various sport injuries are liable to occur. Therefore, it's crucial for a sportsman to effectively reduce the sport injuries of long jumpers. In this study, the questionnaire method and enquiry method are used to conduct the survey and analysis for the sport injuries conditions of 210 long jumpers in total of Beijing City in 2013 and perform the statistical analysis for the occurring probability of sport injuries, occurring parts, degree of occurring injuries and occurring period. Based on this, this paper sets forth the measure of internal prevention in combination with external prevention, proposes that a sportsman shall focus on improving psychological quality and adopt the prevention method of active prevention coordinating with passive prevention, a coach, etc., shall train sportsmen in accordance with their aptitude, focus on caring for recovery and training conditions of "vulnerable" sportsmen, correct the sportsmen's reliance on fixed combinations to protection long jumpers, promote the healthy long-term development of long jump and make benefits for the process of national track and field sports cause.

KEYWORDS

Long jump; Injuries; Reason analysis; Prevention measure.



INTRODUCTION

Stretching across rivers or ditches, hunting or eluding the attack of beasts is the most instinctive and most primitive capacity of human beings. As a matter of course, long jump formed up after repeated practice on the basis of this capacity has become one of the oldest athletic sports and is always focused by people. Long jump includes actions of run-up, take-off, flight and land, etc^[1]. As shown in the Figure 1, one can jump longer and get better rank only by correctly completing the actions of each part of long jump technology.

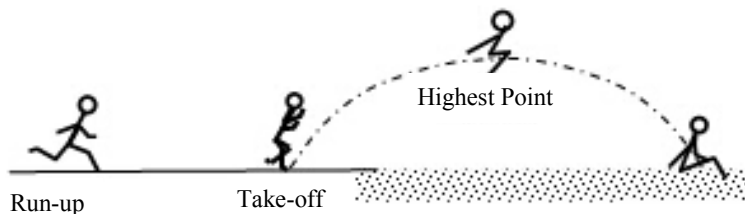


Figure 1 : The actions of each part of long jump technology

Long jump is featured with fast speed, high strength and strong explosiveness, especially at the moment of taking off on board and landing when lower limbs of a sportsman have to stand the impact force 4-11 times of his own weight. Any carelessness may easily lead to injuries of joint, muscle. For long jump beginners, such injuries are very common, even if high-level sportsmen are hard to get rid of such injuries^[2]. This study tries to overcome problems above, summarize type and features of sport injuries, find out causes of sport injuries mainly through the survey and analysis for totally 210 sportsmen of grade II, III and IV at different levels in Beijing City in 2013 and their sport injuries conditions, and set forth prevention measure based on this.

In this study, methods of questionnaire survey, interview and document literature are mainly used to conduct the survey and analysis for totally 210 sportsmen of three grades in Beijing City and their sport injuries conditions, including 70 high-level sportsmen, college students majoring in sports training, long jumpers from middle school respectively. Meanwhile, the author also interviewed a certain number of coaches and doctors of long jumpers in China, and referred to relevant books of library with the help of internet special database, sets forth the measure to prevent sport injuries of long jumpers relying on the solid data, coaches, doctors’ opinions and on the basis of predecessors’ studies.

SURVEY CONDITIONS AND PRELIMINARY ANALYSIS

In this study, the statistical analysis is made to 210 valid questionnaires taken back and the statistical results are shown as follows in the form of chart. The preliminary summary analysis is made according to the sequence of occurring probability of sport injuries, common occurring parts of sport injuries, degree and influence of sport injuries, occurring period of sport injuries and causes of sport injuries. The data and facts are used as the basis for further study.

Occurring probability of sport injuries

From TABLE 1, you can see 185 of 210 people in total suffered from sport injuries and the injury probability reaches 88.1%. This shows that injuries occur very often in long jump. From the table, the occurring probability of sport injuries increases gradually as for high-level sportsmen, college students majoring in sports training and middle school student sportsmen. The injury probability for high-level sportsmen is the lowest, only 57.1%. This shows that sport injuries are closely connected with the technical level and training method of sportsmen themselves. Middle school students sportsmen are at the period of puberty development, their physical development is not complete and the technical level is very low, the occurring probability of injury is also the largest, i.e., as high as 91.4%^[3].

TABLE 1 : Occurring probability of sport injuries

Grade	Surveyed Number	Number of People Suffering from Sport Injuries	Probability of Sport Injuries (%)
Middle school student sportsmen	70	64	91.4
College students majoring in sports training	70	62	87.1

High-level sportsmen	70	40	57.1
Total	210	185	88.1

Occurring parts of sport injuries

From TABLE 2, we can see parts that sport injuries occur to the long jumpers are mainly ankle joint, waist, knee joint and foot, of which the occurring probability at foot is the largest, i.e., 34.06%; the one at ankle joint follows, i.e., 23.78%. The bodily injury parts caused by improper sports are shown as the Figure below (Figure 2):

TABLE 2 : Occurring parts and probability of sport injuries

Occurring Part	Occurring Number of People	Occurring Probability (%)
Ankle joint	44	23.78
Waist	35	18.92
Knee joint	43	23.24
Foot	63	34.06
Total	185	100

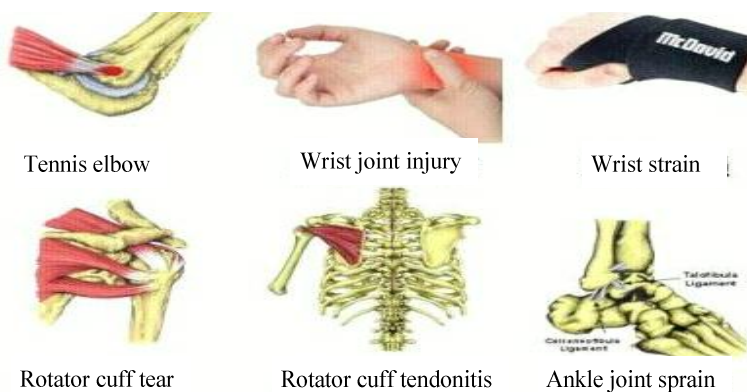


Figure 2 : The bodily injury parts caused by improper sports

With reference to the literature, causes of these 4 sport injuries are explored below.

Ankle joint injury: It's very common, especially lateral collateral ligament injury. With the reference to the literature in sports medicine, the ankle joint has potential instability and there is little muscle at anteromedial side. Thus, the ankle injury probability in long jump is very large. At run-up, a sportsman may injure his lateral collateral ligament when he sets foot in the concave place to make the ankle joint turned over and sprained internally due to the fast speed. For severe injury, a sportsman may fracture his ankle joint^[4].

Waist injury: The waist is the midpoint of human body. Lumbosacral joint is the only large joint bearing body weight in human body and is the hub of waist movement. Front leaning, hypsokinesis, lateral bending and turn-around all are related with waist. Either sports or activity, the joint herein bears more strength than any other one of the whole body. In addition, causes for waist injury also include physique of sportsmen themselves. For example, sportsmen having flatfeet are also liable to suffer from waist injury. In 35 sportsmen suffering from waist injury surveyed, 4 people have inconsistent leg length, 3 people have flatfeet, 12 people have poor body posture and 16 sportsmen said sand pit was too hard. From the perspective of anatomy, these factors lead to the fatigue of spine, causing injury accordingly.

Knee injury: Sports medicine indicates that knee ligament has strong tensile resistance and certain resilience. Its function is to maintain the joint stability and limit the activity beyond physiological scope. The ligament injury occurs when non-physiological violent activities occur or the endurance of pulling ligament is exceeded. Partial injury can be called as sprain. At complete break, the bone at the adhered part can be avulsed, and even subluxation or luxation may be caused. Long jump belongs to the non-physiological violent activity. In sports, it's liable to exceed the endurance degree of ligament, so the knee injury is liable to occur. Long jumpers shall warm up fully and scientifically and stop exercising in good time to avoid knee injury from occurring^[5].

Foot injury: According to the documentary record, a sportsman endures the counteractive force from the ground is about 16 times of its own weight and such strong force is an important factor causing the foot injury obviously. In addition, a sportsman's take-off posture and skills also have an impact on the occurring probability of foot injury.

Degree and influence of sport injuries

From TABLE 3, we can see, once injuries occur, the rate of no influence on matches is only 14.05%. Sport injuries have severe influence not only on sportsmen's body, but also on their mentality. Therefore, it's crucial for sportsmen to reduce sport injuries as far as possible.

TABLE 3 : Questionnaire for degree of sport injuries

Degree of Sport Injuries	Number of People	Percentage (%)
No influence on matches	26	14.05
Little influence on matches	56	30.27
Large influence on matches	89	48.11
Impossibility to participate in matches	14	7.57
Total	185	100

Occurring period of sport injuries

From TABLE 4, we can see sport injuries mainly occur at two periods, i.e., take-off and land, especially land when the occurring probability reaches 64.87%. At take-off, a sportsman endures great acting force from the ground. This is the strength unbearable for human and it's liable to injure human body; a sportsman also endures great acting force from the ground when landing from the heights. In addition to the factor such as hard sand pit, etc., great injury will be caused to the body^[6]. In the flight period, injuries seldom occur generally. In this survey, only one sportsman is found to suffer from injuries in flight due to nonstandard operation. Some injuries will occur to some sportsmen because they are not well prepared.

TABLE 4 : Statistical table for period where sport injuries occur

Period when sport injuries occur	Number of People	Percentage %
Run-up	18	9.73
Take-off	46	24.86
Flight	1	0.54
Land	120	64.87
Total	185	100

Causes analysis of sport injuries

From TABLE 5, we can see insufficient warm-up accounts for large proportion in the causes of injuries. The main reason is that the progressive principle is not followed. If insufficient warm-up is made, muscles and bones can't be stretched out and the body can't enter working state quickly and it's hard to improve strength of muscle and flexibility of joint. Thus, it's necessary to make some warm-up before long jump^[7]. In this survey, the proportion for other causes of sport injuries is also very large. In this survey, it's found out some sportsmen participate in matches with illness, seriously influencing the exertion and normal operation of body. Some sportsmen also said the external environment influence is also very large, such as causes of hard sand pit, etc.

TABLE 5 : Causes of injuries

Cause of Sport Injuries	Number of People	Percentage %
Insufficient warm-up	57	30.81
Physical fatigue	43	23.24
Overexertion	19	10.27
Poor psychological state	15	8.11
Others	51	27.57
Total	185	100

PREVENTION MEASURE FOR SPORT INJURIES

The survey for sport injuries implemented to long jumpers indicates the occurring probability of sport injuries is very large and it's closely related to nature of sport itself. Therefore, while we fully warm up, we should also strengthen the technical guidance and special training to sportsmen to reduce the occurring of sport injuries as far as possible. As for the preliminary judgment concluded from survey and analysis, this study sets forth the solutions for common sport injuries occurring to sportsmen in two aspects, i.e., internal prevention and external prevention. The former one starts from the sportsmen's perspective and the latter one starts from the perspective of other physical educators including coaches, etc.

Internal prevention

Strengthen mental quality training, view routine training and athletics correctly

Long jumpers shall focus on and attach importance on how to improve level and skills of long jump, establish the faith "God help those who help themselves," "More efforts, more happiness", eliminate the adverse effects due to scale, level of long jumpathletics, leaders' expectation, etc., believe their own capacity, strengthen confidence continuously, correct motives for training and matches, encourage themselves continuously, participate in training and matches with full positive energy and adopt their own mental states to the training and matches.

Attach importance to warm-up, arouse sport cell

Sportsmen shall fully warm up before the training or matches to increase the body temperature and muscle temperature, reduce the glutinousness of muscle, strengthen elasticity of muscle, increase the blood flow volume in the systemic circulation, strengthen the oxygentransportation capability and enhance the reaction speed of skeletal muscle, arouse sport cell, tissue and muscle, etc. involved in long jump and make them enter working state. The warm-up can effectively reduce the occurrence of sport injury.

Combination of active protection and passive protection measures

On the one hand, long jumpers shall take protection measures actively. They shall wear professional training outfit, shoes with suitable size and ankle guard articles, underlay article with buffer function on shoe soles. All these measures can effectively reduce the occurrence of sport injuries. On the other hand, sportsmen shall also pay attention to passive protection measures, namely, a sportsman shall reduce the training strength when his body is at the state of fatigue, because the sportsman is hard to concentrate at this moment, reacts slowly and the sport injuries are liable to occur. Therefore, arranging training scientifically and ensuring sufficient sleep and rest not only can make sportsmen relaxed, but also can reduce the occurrence of sport injuries.

External prevention

Teach sportsmen in accordance with their aptitude, step by step

For sportsmen whose level is not high enough, long jump coaches shall give more theoretical guidance, carry out the training according to the sequence from small intensity to medium one and make sportsmen adopt to the training accordingly. For sportsmen at high level, we can conduct special training. For example, some sportsmen often suffer from injuries in landing, so some guidance and training related to landing shall be implemented.

Focus on recovery and training conditions for "vulnerable" sportsmen

More attention shall be paid to the "vulnerable" sportsmen. On the one hand, the recovery conditions of vulnerable sportsmen shall be cared, the scientific recovery training plan shall be formulated, the training content shall be timely adjusted according to the recovery conditions and recovery state of old injuries shall be tracked and judged scientifically, preventing participation in matches with illness under the pressure of superior leaders; on the other hand, some vulnerable sportsmen tend to be caused by a sort of fixed combinations they maintain for a long time. Over a long period of time, muscle tissue, blood and skeleton, etc. work under high-strength environment. Therefore, as for these vulnerable sportsmen, the long jump skills shall be timely improved and the flexibility and transformation shall be increased, the reliance on a sort of fixed combinations shall be overcome and adaptability and creativity in different conditions shall be encouraged, so that the vulnerable sportsmen can be prevented from being injured again.

Strengthen hardware construction

Some sport injuries of sportsmen are caused by the unsuitability of field for long jump. Therefore, to avoid the occurrence of injuries of long jumpers, the improvement work for long jump training field shall be strengthened to promote the training filed to suit sports and have sufficient hardness and elasticity, the take-off area to be flat and solid, take-off line visible and land area soft and flat, and ensure no sundries exist. Effective protection measures shall be taken at strengthen training and good training and match environment shall be created for long jumpers through hardware construction, preventing the occurrence of sport injury accordingly.

CONCLUSION

On the basis of survey analysis, this paper concludes that the occurring probability of injuries to long jump beginners is the largest, parts for sport injuries are mainly ankle joint and foot and the occurring period is mostly concentrated on take-off and land periods, etc. Relying on solid data and coaches, doctors' opinions, on the basis of predecessors' studies, this paper sets forth new measures to prevent injuries of long jumpers. Firstly, the internal prevention of long jumpers. The author especially emphasizes the importance for sportsmen to strengthen mental quality training and thinks sportsmen shall cultivate the mental quality suitable for routine training and athletics and attach importance to the warm-up before long jump to timely arouse the cell, muscle tissue and skeleton at the standby state at the same time. Moreover, sportsmen shall actively wear professional outfit of long jump and also prevent conducting high-strength practice at over fatigue, combining active prevention with passive prevention. Secondly, employees in sports including coaches, etc., shall carry out the external prevention. Coaches shall follow the method of step by step and teaching sportsmen in accordance with their aptitude. They shall formulate different training plan, sets forth different expectation objectives as for different long jumpers. Thirdly, attention shall be paid to the recovery and training conditions of "vulnerable" sportsmen. Especially for the sportsmen maintaining a sort of fixed combinations, the adaptability and creativity at different conditions shall be encouraged. Finally, employees in long jump all shall pay attention to strengthen the hardware construction of long jump and create good and solid conditions for the long-term development of long jump.

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