

The effect of proprioceptive training associated with the mental imagery exercise programs on the prevention of ankle sprains in young soccer players

¹Mousa Dehghan, ¹Kavous Eydivandi and ²Gholamhasan Jaafarzadeh

¹Department of Physical Education, Behbahan Branch, Islamic Azad University, Behbahan, Iran

²Behbahan Khatemolambia Technology University, Iran

ABSTRACT

The aim of this study is to investigate the effect of proprioception training associated with the mental imagery on prevention of ankle sprain in young footballer. The present study is a quasi-experimental research carried out using the experimental and control groups. The research population is all of young soccer players of Khuzestan province in Iran among which 400 are selected randomly and divided into an experimental group (mental and proprioception) and a control group. In this study the electrogoniometer is used to determine the athlete's proprioceptive and proprioception training and mental imagery to improve proprioceptive in order to reduce sport injuries. Data analysis has been performed via the SPSS software. The t-test was used to compare the results of the control group and experimental group before and after the test. ANOVA has been used to compare the groups mean differences. The results survey show that using mental imagery and proprioception training improve the efficiency of proprioceptive system and reduce the injuries in young athletes. The results show that using mental and proprioception associated with the bodybuilding training is the best way to reduce the injuries.

Key words: training programs, proprioception, mental imagery, prevention, ankle sprain

INTRODUCTION

One of the most common sport injuries that occur in the athletes is ankle sprain. Several studies show that sports that require sudden stops and movements such as basketball, volleyball, and football have the highest percentage of these injuries[19]. Ankle sprain not only necessitate the emergency room and medical facilities for athletes but also has a major impact on costs and resources and also leads to decline of participation of athletes in sport activities in the short term (2to25 days) or long term (6to 8 months).The results of this study show that proprioceptive training reduces the risk of sport injuries[19]. Mental imagery training reduces anxiety, increase self-confidence and improve the readiness of the athletes at the championship level and result in a decline in sport injuries[2,6]. As the sport and athletic activities was improved, sport related injuries have also risen. Sport injuries are a limiting factor for the athletic activities and also they waste time, energy, and result in a lot of costs. So coaches and athletic physicians have a great emphasis on prevention of sport injuries. Their various programs and methods were provided for this purpose. There is no doubt that the desirable strength, endurance and flexibility improve athlete's performance and also has a significant impact on prevention of injuries. However the proprioceptive system, which is a combination of balance, coordination, and agility[14], has been less considered. Proprioceptive system is as the most important body senses that damaged in all types of the soft tissue injuries. Damages to the ligaments and joint capsule, Hemarthrits, joint swelling and premature Arthritis cause the defect of the proprioceptive system and instability of the joint dynamic[8,13,16]. Surgery treatment may also fail to ensure the stability of the joint dynamic totally if the athlete is suffering from injury[10]. If a defect in proprioceptive system does not rehabilitate in the rehabilitation and body building programs, it will cause to subsequent injuries [4]. Studies have shown that proprioceptive training is

available. In this type of training proprioceptive system should be involved. Many of proprioceptive training are performed on the lower limbs, including proprioception training on one leg and proprioception plan training. Based on this, proprioception training is used as an effective method for rehabilitation from sport injuries and prevention practices [12]. The proprioception training activates the different parts of the sensory and motor systems which involved in joint stability and improve the motor-sensory system function. Lack of the attention to the proprioception training disrupt the nerve-muscles system and result in repeated ligamentous lesions and subluxation. Furthermore the proprioception training can be performed in the bodybuilding in athletes' fitness programs [17]. Using all factors in achieving maximum efficiency in the shortest possible time is the main principle in rehabilitation and prevention practices. One of the ways to improve efficiency is the mental training which used as a supplement to the physical training in order to achieve the abovementioned principle. With due attention to the point that there is no need for any particular devices is required in mental training. Individual is able to repeat these exercises alone after training. This method reduces the costs of the rehabilitation and even prevention practice which appear in sport injuries [12,20].

MATERIALS AND METHODS

This research is a quasi-experimental research performed on an experimental group and a control group. Among the 30 football teams in Khuzestan province from ages 16 to 18 years, 16 teams are selected and randomly divided into two groups including one experimental group and one control group:

1) Mental and proprioception group 2 (control group) all groups include eight teams and each team include 25 players).

Before and after the championship season (which is approximately 6 months) the proprioceptive and the number of patients is calculated and measured. The digital electrogoniometer is used to determine the athlete's proprioceptive and Hickman processing method of training is used for mental imagery (1979). The criteria of selection for injured athletes are: grade 1 sprain, wrist pain but instability of the joint along with the mild sprain in anterior talofibular ligament. The grade two spraining ankle of painful ankle is with instability in ankle joint. The anterior talofibular ligament complete tearing and partial tearing of calcaneofibular ligament can be seen in the examination. The grade three ankles spraining of painful ankle is with instability in ankle joint. Complete tearing of both anterior talofibular ligament and calcaneofibular ligament can be seen in the examination.

RESULTS

The results of this study show that proprioception training associated with mental imagery is effective on increasing the proprioceptive ($P = .000$, $\alpha = .05$) (table 1, figure 1) and thereby, these exercises has reduced injuries ($P = .027$, $\alpha = .05$) (table 6, figure 6) compared with the control group.

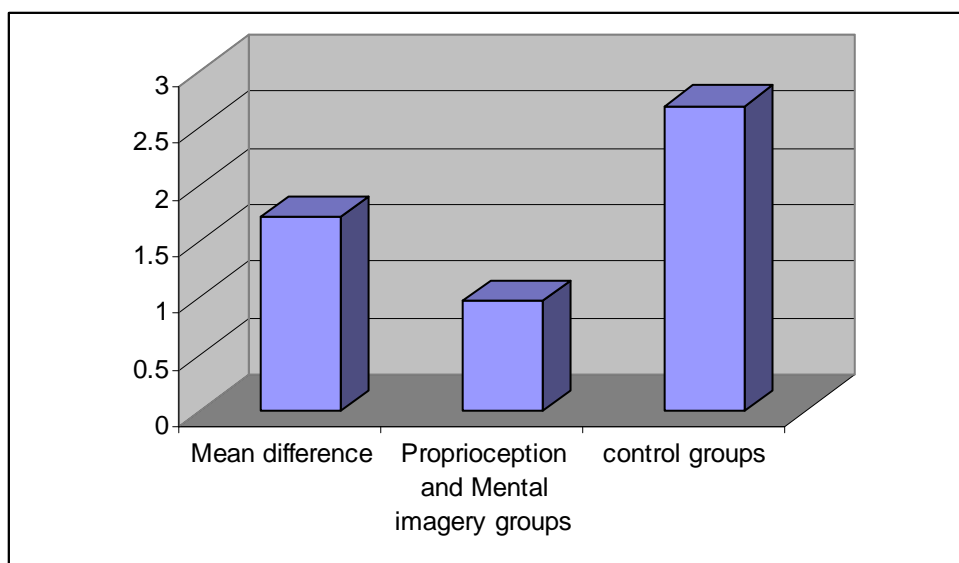


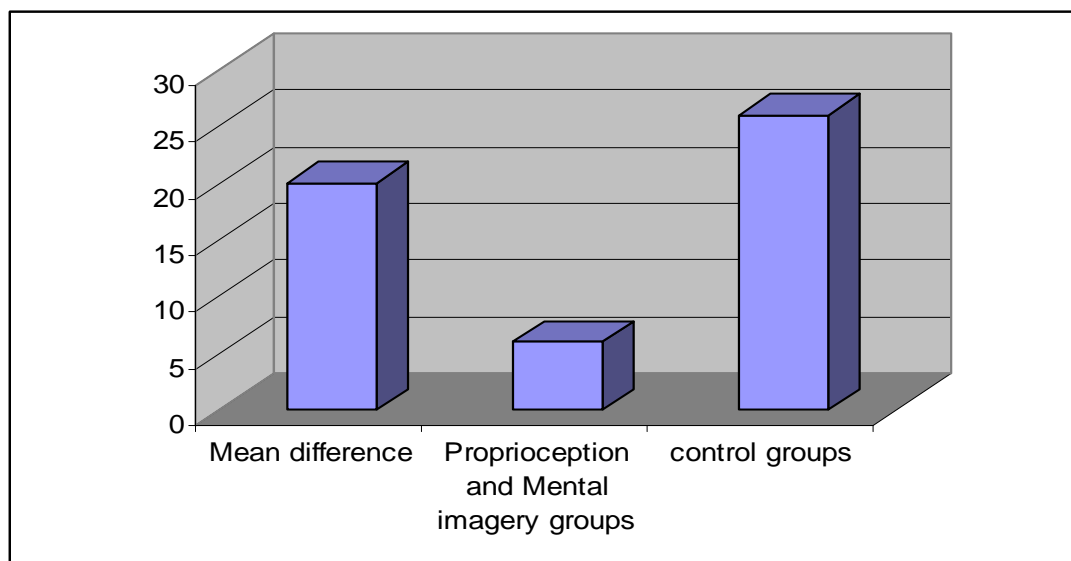
Figure 1. Mean difference of Movement error angle between control group and proprioception and mental imagery groups

Table 1. Mean comparison between proprioception training and mental imagery with control group through t-test. (proprioceptive measuring)

| P | t-test for Equality of means | | | |
|-------|------------------------------|-------|-----------------|---|
| | df | T | Mean difference | statistical indicators Variable |
| 0.000 | 140 | 31.53 | 1.715 | Mental and proprioception with control groups |

Table 2. Mean comparison between proprioception and mental imagery groups with control group. (The number of injuries)

| P | t-test for Equality of means | | | |
|-------|------------------------------|-----|-----------------|---|
| | df | T | Mean difference | Statistical indicator Variable |
| 0.027 | 197 | 3.6 | 20 | Mental and Proprioception with control groups |

**Figure 2.** Mean error of the number of injuries in control group and proprioception and mental imagery groups

CONCLUSION

The purpose of this study is ankle sprain prophylaxis in young footballer through using the proprioception programs (balance training) associated with mental imagery.

The results of this study are discussed in several parts. In this part, the results of the study were compared with the results of other researches and finally were examined. Just as it is considered in research finding part, proprioception training improves the efficiency of proprioceptive system and reduces the ankle sprain injury in young athletes. This means proprioception training has a positive impact on improving the efficiency of proprioceptive system and reduces the injury. The result of this study is consistent with the following research¹. In this study, the researcher justifies the influence of proprioception training on improving the efficiency of proprioceptive system and stated that proprioceptive system can inform the athletes from his motion position in order to give order to the muscle contraction for joint movement and its strength[2,3]. The proprioceptive causes the nervous-muscle system planning for controlling muscle movement and also proper muscle contractions which eventually these two factors cause the joint stability dynamically[4]. Any factor that reduce the proprioceptive can lead to instability of the mechanics and finally causes joint injury. In addition to ligamentous lesions in joint, the joint proprioceptive system is reduced further reversely[7]. According to the above mentioned points, it can be concluded that the proprioception training improves the proprioceptive and reduces the injury. Another result of this study is that the mental imagery training increase the proprioceptive and reduces the ankle injury in young athletes. It means mental imagery training has a positive impact on proprioceptive and also can reduce the injury. This result is consistent with the following researches[6,12,18]. The researchers explain the efficiency of proprioceptive system and reduction of the injuries using several theories. The adherents of mental-nervous-muscular theory claim that clear imagination of the events and behavior should create the nerve-muscle responses similar to the real experiences. Created image in mind transfer the momentum for the implementation of skills which lead to the better learning[1]. The adherents of the symbolic learning theory believe that mental imagery help athletes to improve the metabolism evolved in encode patterns of movement. This theory says that mental imagery improves the brain function neither by a little spark of muscles in your imagination, but through the creation of the program in central nervous system[5,11]. The followers

of the plan suggested that players can learn the optimal level of physiological arousal during the mental imagery. Mental imagery prevents ones from thinking about irrelevant factors and encourage one's to consider the relevant factors. Based on this theory, cognitive and physiological aspects of mental imagery combined with each other. According to the above theories, it can be concluded that mental imagery training like proprioception training has a positive impact on proprioceptive system and reduces the amount of ankle injuries. The results of this study show that mental training has the same effect on balance progress compared with the physical training. There are similar results in some other studies. The results of the most studies showed that the progress in the mental training was much more than physical training although mental training has shown much more progress compared with control group[15]. The progress of mental group is also considerable. There are many factors which are effective in comparing the mental group with the physical group to achieve good results. Our population was young and active groups. The most daily activities are similar to the milder balance reactions which performed by balance training. On the other hand, a little amount of physical training can enhance the mental training. These factors may involve in obtaining good results by mental group[9]. Another result of this study that discriminates it from other research is the comparison between proprioception training and proprioception training associated with the mental imagery. As well as the comparison between mental imagery, mental and proprioception training. After analyzing data, it becomes clear that integration of the proprioception training and mental training is the most effective method to improve the efficiency of proprioceptive system and reduces the injuries in athletes. In this study, the researchers were unable to find a similar research in order to compare it with its results. In addition to the mentioned reasons for obtaining good results by mental imagery, other reasons can be cited for obtaining good results by integrative training. Mental training can improve the efficiency of physical training[9]. Based on the Bohan's studies, mental training is more effective in the early stages of learning. With due attention to the point that the present study has been done in short term, it seems that this feature of mental training is effective in enhancing the efficiency of integrative training.

Acknowledgment

This article which has been derived from a study underwritten by Behbahan Islamic azad university has been conducted

REFERENCES

- [1] Arnold MB, *Journal of Abnormal Social Psychology*, **1946**,41:107-128.
- [2] Bar-Eli M, Dreshman R, Weinstein Y, *Applied psychology*, **2002**,51(4), 567
- [3] Bohan M, Pharmed JA, Stokes AF, *Percept Mot Skills* **1999**, 88(2):651-8.
- [4] Buntun EE, Pitney WA, Cane AW, *J Athletic Training*, **1993**, 28: 10-20.
- [5] Cratty BJ, *Psychology In Contemporary Sport: Guidelines For Coaches and Athletic*, Englewood Cliffs, NJ: Prentice-Hall, **1973**.
- [6] Eun-young Yoo, Bo-in Chung, *Clinical Rehabilitation*, **2006**, Vol. 20, No. 5, 388-397
- [7] Hickman IJ. How to elicit supernormal capabilities in athletes, Coach Athlete, and the Sport Psychologist, University of Toronto, Ontario, Canada, **1979**
- [8] Hogervorst T, Brand RA, *J Bone Joint Surg Am*, **1998**,80(9): 1365-79.
- [9] Jackson PL, Lafleur MF, Malouin F, Richards C and Doyon J, *Arch Phys Med Rehabil*, **2001**, 82(8): 1133-41.
- [10] MacDonald PB, Hedden D, Pacin O and Sutherland K. *Am J Sports Med*, **1996**; 24(6): 774-8.
- [11] Martens R, *Imagery In Sport*, Presented at the medical and scientific aspects of elitism in sport conference, Brisbane, Australia, **1982**.
- [12] Niktab AR, Salari A, *Journal of Kerman University of Medical Sciences*, **2003**, 10(3):172-179.
- [13] Pai YC, Rymer WZ, Chang RW and Sharma L, *Arthritis Rheum*, **1997**, 40(12): 2260-5.
- [14] Peggy A, Houghlum, *Traputic exercise for athletic injuries*, **2001**, 268-283.
- [15] Perry C, Morris T, *Mental imagery in sport*, In: Morris T and Summers J (eds), *Sports psychology Theory, applications and issues*, Sydney, John Wiley & Sons, **1995**; PP: 335- 85.
- [16] Schutte MJ, Hoppel LT, *Clin Sports Med*, **1990**; 9(2): 515.
- [17] Scott E Ross, Brent L Arnold, J Troy Blackburn, Cathleen N Brown, and Kevin M Guskiewicz. Enhanced balance associated with coordination training with stochastic resonance stimulation in subjects with functional ankle instability: an experimental trial, **2007**; 4: 47.
- [18] Sütbeyaz S, Yavuzer G, Sezer N, Koseoglu B, *Mirror Therapy Enhances Lower-Extremity Motor Recovery and Motor Functioning After Stroke: A Randomized Controlled Trial*, **2007**, 62(4) 269 -67
- [19] Timothy A, James S, *The American Journal of Sports Medicine*, **2006**, Vol. 34, No7.
- [20] Weinberg RS, Gould D, *Foundations of sport and exercise psychology*, 2nd ed, Champaign Illinois, Human Kinetics Publishers, **1999**, pp:265-84.