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A Study to Evaluate the Effectiveness of Plyometric Training Program Versus Conventional Program on Pain and Ankle Instability Among Football Players – Randomized Controlled Trial (RCT)

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ABSTRACT: Ankle instability means repetitive ankle sprains or re-damage and the complaint of subjective feelings such as ankle giving away in daily living activities. Football players require dynamic muscular performance. Strength and performance can be improved by plyometric training. It involves physical activities that require muscles to contract with their maximal force for brief periods of time in order to improve dynamic performances.

The study was conducted at Indira Gandhi stadium, Uppalam, Puducherry, 64 football players were randomly recruited for this study (n=32 in each group – Group A&B). Group A received plyometric training program. Group B received conventional therapy for 6 weeks. VAS and CAIT were recorded before and after intervention of 6 weeks. Only the variables of pain severity and ankle instability were studied, and females were not included in the study due to its limited sample size. A similar study with a bigger sample size might make it easier to draw firm conclusions and establish generalisations. It could also be used to measure the strength, agility, and proprioceptive abilities of the ankle and to evaluate the exercise regimen for different sports players. The result shows that the VAS and CAIT scores are improved significantly in both groups, but the difference of improvement is higher in group A, who received plyometric training program. Plyometric training program is much better than the conventional therapy for the management of ankle instability.

Keywords: Ankle Instability, Football Players, Plyometric Training Program, Conventional Program, Visual Analogue Scale and Cumberland Ankle Instability Tool.

INTRODUCTION

An ankle sprain happens when the sturdy ligaments that support the ankle are overextended and damaged **(**Freeman *et al.,* 1965). Ankle sprain injuries are common in people of all ages (Yeung *et al.,* 1994). Functional ankle instability (FAI), a common symptom of recurrent ankle injury, may eventually progress to a chronic stage in affected individuals (Huang *et al*., 2014; Hiller *et al.,* 2011; Wikstrom *et al.,* 2009). Football players are more likely to get ankle sprains than other athletes, despite the fact that injuries are a part of all sports.

Football players, more than athletes in any other sport, frequently sprain their ankles due to quick stops and cutting motions. With football players, ankle instability is a relatively prevalent problem. Ankle instability is characterised by recurrent ankle sprains or injury as well as complaints of subjective sensations of an ankle giving way during regular activities (Kaminski and Hartsell 2002).

Football players who sustain ankle sprains are more likely to sustain another injury to the same ankle, which 20% to 50% of the time results in incapacity and/or persistent discomfort or instability (Boytim *et al*., 1991).

Grade I and II injuries, as well as lateral ligament sprains, can be treated conservatively. The right amount of rest, ice, compression, and elevation, tape, a brace, and AROM should all be applied to the ankle as soon as feasible. Plyometric training and peroneal strengthening can also help with lateral ligament sprains for grade I and grade II injuries (Munn *et al*., 2010). Reducing acute inflammation, regaining full ankle range of motion (ROM), increasing muscle strength, power, and improving proprioceptive abilities are the goals of therapy for ankle injuries (Mattacola and Dwyer 2002).

Another measure that is probably equally as helpful as braces and tape is plyometric exercise. This method is already utilised in the rehabilitation process after an ankle sprain to rebuild the injured ligaments and muscles around the ankle. Training is started to recover from ankle instability using a variety of materials created especially for this stage of recovery. During plyometric training, the agility ladder and cone are utilised. The use of these materials during training with a series of incremental activities can successfully return patients to a high functional level. The stretch-shorten cycle, a pattern of muscle contraction that involves stretching the muscle followed by an explosive contraction, is something that plyometric training teaches the muscle to carry out successfully (Chimera *et al.*, 2004).

Hence, stressing this idea during exercises aids in the development of the appropriate neuromuscular responses that can be transferred to the particular game-related skills. Exercises that involve plyometrics include jumps, hops, skips, bounds, and throws **(**Ismail *et al.*, 2010)**.**

Using ice after an ankle sprain is regarded as normal therapeutic practise, despite the fact that there is frequently little evidence to support its effectiveness. Cryotherapy is used to treat acute soft tissue damage. Plyometric exercises exploit the muscle's myotatic stretch response to create an explosive reaction, which is regarded to be the connection between speed and strength. One of the most popular approaches for conditioning in football is the plyometric approach **(**Adams *et al.*, 1992).

The CAIT (Cumberland Ankle Instability Tool) survey. The CAIT consists of nine questions, and there are a total of 30 points available. More significant functional ankle instability is indicated by lower scores of less than or equal to 27, whereas the absence of FAI is indicated by a score of 28 or higher**.**

The aim of the study is to compare the effectiveness of a plyometric training programme and conventional therapy in treating football player's pain and ankle instability.

MATERIAL AND METHODS

At the Indira Gandhi Stadium in Uppalam, Puducherry, the study was carried out. 64 football players in total were taken from Indira Gandhi Stadium. All players pre test score have been recorded using Cumberland Ankle Instability Tool Questionnaire and Visual Analogue Scale. 32 football players participated in Group A supervised plyometric exercise programme, while 32 players in Group B merely got Conventional therapy (ice with crepe bandage and active exercise). The researcher instructed and led football players in doing the procedures. For a total of six weeks, the exercises were done on three alternative days each week.

Treatment procedure:

Group A: For a total of two weeks, cryotherapy treatments lasted for 15 to 20 minutes each, with crepe bandages being put at the conclusion. Plyometric exercise sessions lasted 40 to 60 minutes each and were scheduled from the third to the sixth week. Every week, three sessions were held. All of these exercises were done on three alternative days for each week with three sets of the exercises, each with 15 repetitions, would be performed. The initial five to ten minutes of training Warming up had done. After that, 40 to 60 minutes of plyometric training was performed, and the final 5 to 10 minutes were spent cooling down.

Table 1: Illustrates Program for Demonstrating Plyometric Training.

Phase (weeks)	Exercise / Intervention
I (weeks 1-2)	Cryotherapy Crepe bandage
II (weeks 3-4) low intensity training	Squat jump, Ankle jump, Jump for a distance, Split squat jump, Hop for a distance, Tuck jump, Diagonal hop, Jump on a step
III (weeks 5-6) moderate intensity training	Cycled single leg squat jump, Hop on a target, Box Jump, Forward zigzag hop, Jump for a distance and height, Lateral saw tooth hop, Agility ladder (hopping jump, side hopping jump, single leg hop jump, side single leg hop jump)

Group B: Conventional treatments, such as cryotherapy and crepe bandages, are administered; active exercise is also encouraged (Dorsi flexion, Plantar flexion, Inversion, Eversion). Three sets of the exercises, each with 15 repetitions were done on three alternative days each week for six weeks, would be performed.

DATA ANALYSIS

VAS: In Group A and B (for pain) calculated unpaired 't' value is 15.319 at 0.005 level significant difference between plyometric exercises and Conventional therapy in pain among football players with ankle instability.

Table 2: The VAS mean values of group A and group B are compared.

Groups	Improvement		S.D.	Unpaired 't' test
	Mean	Mean difference		
Group A	2.03	3.03	0.69	15.319
Group B	5.06		0.88	

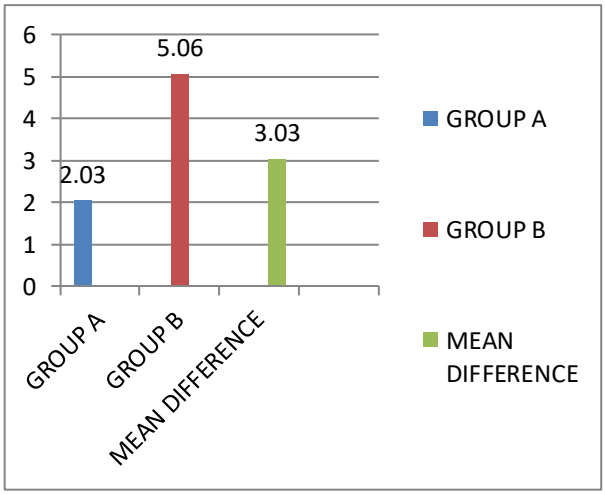

Fig. 1. Post-test mean VAS values for groups A and B are shown graphically.

CAIT: In Group A and B for CAIT calculated unpaired 't' value is 9.919 at 0.005 level significant difference between plyometric exercises and Conventional therapy in the management of ankle instability among football players.

Table 3: The cait mean Values of Group A and Group B are Compared.

Groups	Improvement		S.D.	Unpaired 't' test
	Mean	Mean difference		
Group A	27.47	3.19	1.34	9.919
Group B	24.28		1.22	

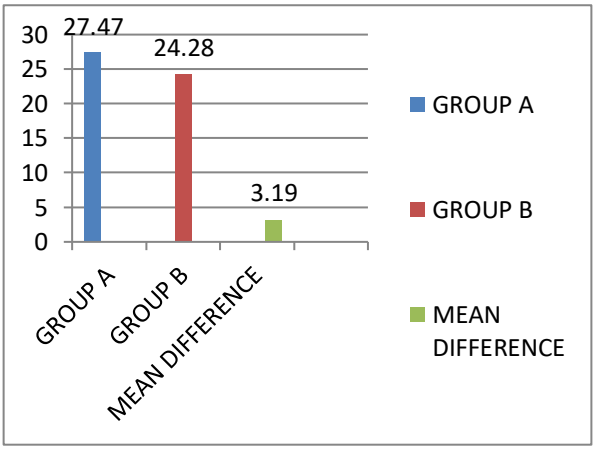

Fig. 2. Post-test mean CAIT values for groups A and B are shown graphically.

RESULTS

This study compared the effectiveness of plyometric exercise versus conventional training on football player's pain and ankle instability. For the study, 64 football players were gathered. Groups A and B of football players were arbitrarily split into two equal groups. A plyometric training regimen was applied to the group A. Conventional therapies were used to group B. The plyometric training programme showed considerable improvement and was superior to conventional therapy. As a result, the study was statistically significant at the 5% level. The improvement in the plyometric training programme for football players with ankle instability is evident from the statistical interpretation of mean and standard deviation.

DISCUSSION

The purpose of this study is to investigate how well plyometric training enhances ankle stability in football players with ankle instability. The results of the study revealed that ankle instability and pain were significantly reduced in the experimental group (plyometric training programme) compared to the control group (conventional therapy). These findings also suggest that plyometric activities may have a higher effect on variables linked to an increase in ankle stability. In general, ankle instability in football players is a new issue that requires careful analysis, prompt action, and the right kind of care. Football players who suffer from recurring ankle sprains might use exercise as a therapy to prevent and treat chronic ankle instability.

Additionally, the international evidence-based guidelines for the management of ankle sprain prescribe conventional treatment as the first line of defence against ankle sprain symptoms, including ice with crepe bandage and physical exercise. Yet only a few studies that were used to produce the guidelines, leading to a general consensus recommendation of exercise prescription for the management of ankle instability. The purpose of the current study is to investigate the influence of plyometric exercise on pain and ankle instability in football players.

On the Cumberland Ankle Instability Tool Questionairre domains, there were significant results in favour of the plyometric exercise programme group. Only a few research have looked into how standard therapy affects the treatment of recurring ankle sprain symptoms. The result of the current study is correlated with the other studies, (Krishnakumar, 2017) found that plyometric activities for six weeks significantly improved the CAIT Questionnaire categories in volleyball players with ankle instability.

Lee *et al.* (2020) on the impact of plyometric versus ankle stability training on lower limb biomechanics in taekwondo demonstration athletes with functional ankle instability supported this finding. According to this study, plyometric workouts might be used to help with ankle rehabilitation, which would enhance stability and shock absorption while reducing the risk of injuries during Taekwondo demonstrations.

Ismail *et al*. (2010) did a study on Plyometric Training Vs Resistive Exercises after Acute Lateral Ankle Sprain, which corroborated this finding. Functional tests were evaluated both during and following training. According to the study's findings, plyometric activities were more successful than resistive ones at enhancing athletes functional performance following lateral ankle sprains. According to the results of the current study, plyometric training programmes are preferable than conventional therapy for football players who have ankle instability.

CONCLUSIONS

The current study demonstrates that plyometric training programmes have been successful in reducing ankle sprain among football players, even though strengthening is a crucial factor in the treatment of ankle sprains that have weak ankles. Plyometric training programmes help athlete's ankle stability while also enhancing their neuromuscular, neuro-motor, and sensory-motor systems, improving their static and dynamic balance, and reducing the risk of injury recurrence in patients with injured ankles. According to the statistical findings, plyometric exercise significantly improved ankle stability and pain levels in football players with ankle instability (Group A) compared to those who underwent conventional therapy (Group B).

FUTURE SCOPE

It will be a highly beneficial treatment for a sports person who has sprained their ankle.

Conflict of Interest. None.

REFERENCES

Adams, K., O'Shea, J. P., O'Shea, K. L. and Climstein, M. (1992). The effect of six weeks of squat, plyometric and squat-plyometric training on power production. *The Journal of strength & conditioning research*, *6*(1), 36-41.

Boytim, M. J., Fischer, D. A. and Neumann, L. (1991). Syndesmotic ankle sprains. *The American journal of sports medicine*, *19*(3), 294-298.

Chimera, N. J., Swanik, K. A., Swanik, C. B. and Straub, S. J. (2004). Effects of plyometric training on muscle-activation strategies and performance in female athletes. *Journal of athletic training*, *39*(1), 24.

Freeman, M. A. R. (1965). Instability of the foot affer injuries to the lateral ligament of the ankle. *The Journal of bone and joint surgery. British volume*, *47*(4), 669-677.

Hiller, C. E., Kilbreath, S. L. and Refshauge, K. M. (2011). Chronic ankle instability: evolution of the model. *Journal of athletic training*, *46*(2), 133-141.

Huang, P. Y., Chen, W. L., Lin, C. F. and Lee, H. J. (2014). Lower extremity biomechanics in athletes with ankle instability after a 6-week integrated training program. *Journal of Athletic Training*, *49*(2), 163-172.

Ismail, M. M., Ibrahim, M. M., Youssef, E. F. and Shorbagy, K. M. E. (2010). Plyometric training versus resistive exercises after acute lateral ankle sprain. *Foot & ankle international*, *31*(6), 523-530.

Kaminski, T. W. and Hartsell, H. D. (2002). Factors contributing to chronic ankle instability: a strength perspective. *Journal of athletic training*, *37*(4), 394.

Krishnakumar, K. (2017). *Effectiveness of Plyometric Training Program to Improve Ankle Instability among Volleyball Players* (Doctoral dissertation, Mohamed Sathak AJ College of Physiotherapy, Chennai).

Lee, H. M., Oh, S. and Kwon, J. W. (2020). Effect of plyometric versus ankle stability exercises on lower limb biomechanics in taekwondo demonstration athletes with functional ankle instability. *International Journal of Environmental Research and Public Health*, *17*(10), 3665.

Mattacola, C. G. and Dwyer, M. K. (2002). Rehabilitation of the ankle after acute sprain or chronic instability. *Journal of athletic training*, *37*(4), 413.

Munn, J., Sullivan, S. J. and Schneiders, A. G. (2010). Evidence of sensorimotor deficits in functional ankle instability: a systematic review with meta-analysis. *Journal of Science and Medicine in Sport*, *13*(1), 2-12.

Wikstrom, E. A., Naik, S., Lodha, N. and Cauraugh, J. H. (2009). Balance capabilities after lateral ankle trauma and intervention: a meta-analysis. In *Database of Abstracts of Reviews of Effects (DARE): Quality-assessed Reviews [Internet]*. Centre for Reviews and Dissemination (UK).

Yeung, M. S., Chan, K. M., So, C. H. and Yuan, W. Y. (1994). An epidemiological survey on ankle sprain. *British journal of sports medicine*, *28*(2), 112-116.

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