



COMBINING BALANCE TRAINING PROGRAMME WITH FIBULAR REPOSITIONING TAPE IN PREVENTION OF ANKLE SPRAIN IN YOUNG FOOTBALL PLAYERS

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ABSTRACT

Context- Ankle sprains are the most common musculoskeletal injuries that occur in athletes, following Pain and functional disability, and they have a profound impact on health care costs and resources.

Aim - To find the combined effect of balance training programme with fibular repositioning tape in prevention of ankle sprain in young football players

Method and material – 80 subjects were included in the basis of inclusion and exclusion criteria and randomly divided into 2 groups, one intervention group and other is control group. Each had 40 subjects, where 20 subjects has history of prior injury and rest 20 has no prior injury. In Intervention group Balance training program and FRT is applied. Control group didn't perform any training protocol. Ankle injury data were collected after each exposure via AISS & VAS .Injury severity was determined by functional limitation, pain levels. During the 8 weeks study period and around 1000 exposure sessions, we were able to compare the number of the participants got injured in intervention and control group, injured subjects were excluded from further data collection due to the increased chance of reinjury.

Results –The intervention group sustained significantly less ankle injuries during the study period, intervention group sustained 6 injuries who has prior history of injury compared to 19 injuries in the control group where 12 participants with prior injury history and 7 participants with no history of prior injury.(Fisher exact test: $P = 0.0033$). The odds ratio of sustaining an ankle injury in intervention, as compared to control condition participants, was 0.1950.

Conclusion- the present study shows that by combining a balance training program followed by FRT will significantly reduce the risk of ankle sprains in young football players, and mostly participants who were injured in intervention group were those with prior ankle injury history.

KEYWORDS : Ankle sprain, FRT, Balance training program

INTRODUCTION

Ankle sprains (especially those involving the lateral ligament complex) have often been reported as the most common injuries in sport.¹ it has been suggested that such injuries are usually sustained in sports involving running, cutting, jumping,² and contact with other players, and this partly explains the high incidence of ankle sprains in football.³ Ankle sprains not only result in numerous visits to emergency care facilities and significant time loss from sports participation, but they can also cause long-term disability⁴ and have a major impact on health care costs and resources' only a limited number of studies that have the appropriate methodology to examine the effectiveness of ankle sprain prevention measures in general,⁵

Some studies have documented that ankle disk training will significantly reduce the risk of ankle sprains in adult athletes⁶. For successful sports performance, static balance is a key factor in the development for sensory-motor system. Especially in football, static balance play a fundamental role in sports specific posture control and contribute to efficient performance. Sports specific skill and environmental demand need balance which is necessary for safe and effective execution in sporting movements without losing balance. In football, specific skills involved static balance instability.⁷ Impaired stability and balance can be found in these sports specific movements. Researchers suggested that balance impairment has been one of the risk factor for injuries in a variety of sports LeleniSreekarini et al.⁷

Prophylactic methods in common use include taping, bracing, and a variety of orthotic devices. These devices are postulated to prevent ankle sprain through mechanical support, enhanced proprioception, and movement restriction.⁸ Ankle taping is considered as the treatment of choice by most of the

clinicians following acute inversion sprains due to its lower cost and greater functional independence when compared to braces and cast immobilizations (Olmstead et al,2004) and also considered effective in reducing both the incidence and severity of ankle injuries,39.Robbins et al,(1998) reported that ankle taping plays an important role in modifying impaired proprioception following inversion ankle sprains.

Despite limited literature, fibular repositioning tape (FRT), as described by Mulligan^{9, 10} is used clinically as a treatment following ankle sprains. Mulligan suggested that this taping method can correct an anterior positional fault of the fibula and also maintain correct fibular alignment. Therefore, it appears logical that if FRT is applied prior to activity to maintain optimal fibula position and prevent forward fibula displacement, then ankle injury prevention may be the resultant effect. Fibular reposition taping has previously been used in individuals with CAI and is believed to restore fibular alignment.¹¹

The primary objective of this study was to determine if combining balance training program with fibular repositioning tape (FRT) for prevention of ankle sprains in young male football players, would reduce the risk of ankle sprains or not.

AIM OF STUDY

The aim of the study was to find the combined effect of balance training programme with fibular repositioning tape in prevention of ankle sprain in young football players.

OBJECTIVE

- To find the effect of balance training program in prevention of ankle sprain in young football players
- To find the effect of FRT followed by balance training program in prevention of ankle sprain in young football players

HYPOTHESIS

Null Hypothesis

There is no significant effect of balance training programme with fibular repositioning tape in prevention of ankle sprain in young football players.

Alternate Hypothesis

There is significant effect of balance training programme with fibular repositioning tape in prevention of ankle sprain in young football players.

MATERIALS AND METHODS

After approval of the study from the ethical committee of **SHRI USB COLLEGE OF PHYSIOTHERAPY**. 80 subjects, who fulfilled the inclusion and exclusion criteria, including anthropometric data, as well as sprain history, on each subject were taken for the study purpose.

Ankle ligament laxity was determined by anterior drawer test with the subject in a seated position, also configuration of the medial longitudinal arch was determined by using the Feiss line¹². Written informed consent was signed by each subjects before proceeding for the study procedure. Before starting the study a brief assessment was taken. Total 80 subjects were randomly divided into 2 groups, one intervention group and other control group. Each had 40 subjects, where 20 subjects has history of prior ankle injury and rest 20 has no prior injury.

Study setting: Adajan football ground, Surat

Source of data: Young football players

Study population: College going students

Sample size: 80 divided into 2 groups, 40 in each group

Sampling method: Convenient sampling

Study design: An intervention study

Sampling: Simple Random Sampling Technique

Inclusion criteria

- Male
- Football players
- 18-23 years old

Exclusion criteria

- Female
- Below 18 years
- Cardio patient
- Smoker
- Alcohol consummation
- Any respiratory disease
- Previous ankle injury not less than 12 month
- No surgery
- Skin rash

Ankle Injury Severity Scale (AISS) & Visual Analog Scale (VAS)

The Ankle Injury Severity Scale (AISS)¹³ was developed to provide a measure of ankle injury severity. This provided a subjective, retrospective measure of functional limitation following ankle injury. The AISS was based on the Olerud and Molander questionnaire and documented the degree of functional limitation endured in the initial 24 hours following injury. The injured subject selected 1 statement from each of the sections that most accurately described the symptoms experienced in the 24 hours following injury. Sections pertained to walking, stiffness, swelling, and running,

descending stairs, jumping, and sleeping activities. Overall scoring ranged from 0 to a maximum of 100, where 0 means no disability and 100 means maximum perceived disability.

Also VAS score immediately after injury, two hours post injury. Maximum pain score within 24 hours of injury. The VAS consists of a 10-cm line with the two endpoints labelled with verbal descriptors. The patient is required to place a mark on the 10 cm line at a point that corresponds to the level of pain intensity he or she presently feels. Number 0 being no pain and 10 being the maximum pain.

PROCEDURE OF THE TECHNIQUE AND TREATMENT PARAMETRES

One exposure consisted of participation in a football training or game session. Participating teams were collectively allocated to either the control or the Intervention group in a manner of convenience. In intervention group Balance training program and FRT is applied. Control group didn't perform ant training protocol. Upon completion of the football session, data were obtained via questionnaire on duration of court time, and the presence and side of ankle injury. Ankle injury was determined by participant report of any pain or discomfort in the ankle following a sudden uncontrolled movement of the ankle.

Injured participants were instructed to rate the pain level experienced immediately following ankle injury on a visual analogue scale (VAS). These participants were followed up by telephone to complete the AISS by reporting pain level at 2 hours post injury, the most severe pain experienced in the initial 24 hours. Each football session was considered exclusive; hence, most subjects were studied on more than 1 occasion. Injured subjects were excluded from further data collection due to the increased chance of reinjury.

The Balance Training Program

The balance Board that was used consisted of a wooden disk 16 inches in diameter with a 4-inch half sphere attached to the bottom (Fitter International, Calgary, Alberta, Canada). The sphere allowed approximately 17° of angulation in all planes.

Phase	Surface	Eyes	Exercise
I. Week 1	Floor	Open Open Open Open	Single-leg stance Single-leg stance while swinging the raised leg Single-leg squat (30°-45°) Single-leg stance while performing functional activities (dribbling, catching, kicking)
II. Week 2	Floor	Closed Closed Closed	Single-leg stance Swinging the raised leg Single-leg squat (30°-45°)
III. Week 3	Board	Open Open Open Open	Single-leg stance Swinging the raised leg Single-leg squat (30°-45°) Double-leg stance while rotating the board
IV. Week 4	Board	Closed Open Open Open	Single-leg stance Swinging the raised leg Single-leg squat (30°-45°) Single-leg stance while rotating the board

FRT (Fibular Repositioning Tape)

Position of the subject	High sitting with knee extension and foot in neutral position.
Position of the therapist	Near to the subject's foot

Hand placement	Grasp the foot the subject in neutral position fingers place in foot and thumb on lateral malleolus.
Procedure	Participate was in high sitting on chair or with the knee fully extended. The taping placed from lateral malleolus till behind the ankle joint and ended at front side of the foot.

FRT was applied after IVth phase and Vth phase of balance training protocol was continued.

The FRT method was applied to both ankles. The FRT method involved 20-cm lengths of tape.

V.	Board	Closed	Single-leg stance
Week 5		Open	Single-leg squat (30°-45°)
(FRT is applied)		Open	Single-leg stance while rotating the board
		Open	Single-leg stance while performing functional activities (dribbling, catching, kicking)

- Phases 1 through 4 consisted of 5 exercise sessions per week for 4 weeks.
- FRT is applied
- In phase 5 (maintenance phase), the subjects performed the program 3 times per week for 10 minutes for 4 more weeks.
- In all phases, each exercise was performed for 30 seconds, and the legs were alternated during a 30-second rest interval between each exercise.

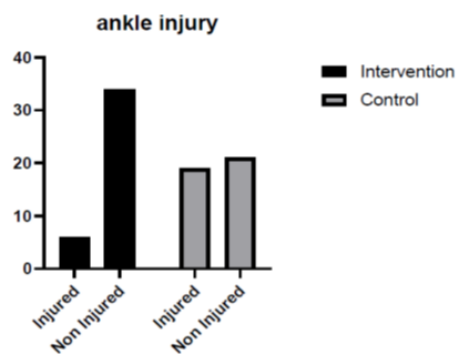
STATISTICAL ANALYSIS AND RESULTS

Total 80 participants included in the study randomly divided into 2 groups, one intervention group and other is control group. Each had 40 subjects, where 20 subjects has history of prior injury and rest 20 has no prior injury. Data analysis was performed using a statistical software (GRAPHPAD PRISM 8.1.2). A Fisher exact test was used to determine whether there was a significant difference in the distribution of injury severity between both groups. Statistical Significance was set at $P < .05$ for all analyses

FISHERS EXACT TEST (Table 1)

P value	0.0033		
Odds ratio	0.1950		
Data analysed	Intervention	Control	Total
injured	6	19	25
Non Injured	34	21	55
Total	40	40	80

Graph1



Summary of fisher exact test. Statistical findings shows overall changes to have statistically significant ($p=0.0033$).

RESULTS

The intervention group sustained significantly less ankle injuries during the study period of 8 weeks and around 1000 exposure sessions. Individuals in intervention group

sustained 6 injuries who has prior history of injury compared to 19 injuries in the control group where 12 participants with prior injury history and 7 participants with no history of prior injury.

A Fisher exact test was used to determine whether there was a significant difference in the distribution of injury severity between both groups. (Fisher exact test: $P = 0.0033$). The odds ratio of sustaining an ankle injury in intervention, as compared to control condition participants, was 0.1950. Consequently, intervention group participant was less likely to sustain an ankle injury during football participation. We also found that in the training protocol significantly reduced the rate of recurrent ankle sprains in those participants who had prior ankle sprains. Most injured participants reported a previous history of ankle injury.

DISCUSSION

The results of this study document that a simple, inexpensive, balance training program followed with prophylactic use of FRT will reduce the rate of ankle sprains in young football players. Ankle sprains represent the highest rate of time loss injuries in this population of athletes. Many of the athletes in high schools across the country do not have access to the equipment or the skilled personnel necessary to participate in an ankle sprain prevention program. Balance boards and nonstretch sports tape for FRT are not expensive (One roll of tape is sufficient to apply FRT to 17 players), and balance boards will last for several years. Purchasing 10 to 12 balance boards and few non stretch sports tapes would allow many members of a team to use. Finally, the 5-phase program¹⁴ used in this study is time efficient and can easily be adapted to most athletic team practices and physical education class settings. Young football population has been sparsely studied regarding prevention of ankle sprains. In fact, this study is the first to show that balance training, followed with FRT as an Intervention, will significantly reduce ankle sprains in this population.

Provision of support, restriction of range-of-motion extremes, and proprioceptive input are the main purported mechanisms that enable traditional taping to prevent injury.¹⁵ In addition to these mechanisms, it has been proposed that the effectiveness of FRT may result from prevention of fibular displacement. Mulligan¹⁶ postulates that when the foot is forcibly inverted the mechanical stress is transferred to the anterior talofibular ligament, pulling the fibula forward, which creates an anterior positional fault. Limited support for this hypothesis can be found in studies demonstrating an anterior positional fault of the fibula in ankle instability and after ankle sprain.¹⁷ However, some studies have described a posterior fault.¹⁸ This contradiction has been explained by the variation in measurement techniques and so direct comparison cannot be made between these studies. If the fibula were to displace posteriorly during a typical ankle sprain, then taping the fibula into this direction would be likely to increase the incidence of injury, which is not what was found in this study. In contrast, another perhaps more plausible explanation is that taping the ankle simply increased proprioceptive awareness, which may be the explanation for ankle injury prevention.¹⁹ the tape places considerable tension on the skin, which may accentuate proprioceptive sensory feedback of ankle joint position. This may alert the participant to impending tissue injury and thereby create reflex activation of protective muscles to prevent excessive joint range. Additionally, anecdotal evidence suggests that the FRT restricts range of plantar flexion/inversion motion;

One of the main objective of this study was to determine whether the training program was equally effective in reducing the rate of ankle sprains in subjects with and without a history of an ankle sprain. None of the prior studies has been

able to document that a proprioceptive training program will significantly reduce the incidence of ankle sprains in athletes without a prior sprain.^{19,20} Our results suggest that this training program will reduce the rate of ankle sprains in athletes who have not had a prior ankle sprain, also significantly reducing the rate of recurrent ankle sprains with players with history of ankle injury.

Our study observed a rate of 6 ankle injuries per 1000 exposure sessions in intervention group and 19 ankle injuries per 1000 exposure sessions under the control group. Only participants with prior history of ankle injury had sustained injury but not all the participants with history has sustained injury in intervention group. The results substantiate that our intervention program was effective in significantly reducing the rate of recurrent ankle sprains also in those young football players who had prior ankle sprains. But in control group both with history and no history of ankle injury sustained injuries but number of non history participants were significantly lesser. Statistical analysis were done with Fisher exact test. From these findings, our intervention protocol appears to be effective in preventing ankle injuries.

LIMITATIONS

- Only Male participants are taken.
- Subjects with 18-23 years of age were considered for study thus results cannot be generalized to all age group.
- Limited sample size.

FURTHER RECOMMENDATIONS

- Study can be done on Female Participants.
- Further studies can be done with larger sample size.
- Further studies can be done with different type of sports
- Further studies can be done with different age group

CONCLUSION

In conclusion, the present study shows that the combined effect of balance training programme with fibular repositioning tape reduce the rate of ankle sprains in athletes who have not had a prior ankle sprain, also significantly reducing the rate of recurrent ankle sprains with players with history of ankle sprains in young football players.

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