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Original Article

Comparison of Thrust Manipulation versus Non-Thrust Mobilization on Functional Deficit in Athletes with Chronic Ankle Sprain; A Randomized Clinical Trial

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ABSTRACT

Background: Chronic ankle sprain is a widespread musculoskeletal injury affecting functional performance with long-term health cost effects on the quality of an athlete's life. Manual therapy techniques performed on the ankle joint are an effective intervention that should be part of a complete treatment plan for athletes with an ankle sprain**. Objective:** To compare the effects of thrust manipulation with non-thrust mobilization on pain in chronic ankle sprain among athletes. **Methods:** It was a randomized controlled trial conducted at Pakistan Sports Board and Model Town Football Club, Lahore. A purposive sampling technique was used to collect the data as per the inclusion criteria of the participants aged between 16 to 40 years' males. Participants were randomized into two groups; Group A received the thrust manipulation group and group B of non-thrust mobilization was given to the rear foot. Each group was given a baseline exercise protocol. The patient completed the foot & ankle ability measure scale being used as the primary outcome measure and 15 points of the Global Rating of Change scale. Using SPSS version 24, baseline characteristics were presented as mean and standard deviation.

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Between-group comparison using independent samples t-test was done, with a p-value≤0.05 considered significant. **Results:** The results regarding sociodemographic patients' characteristics showed that the mean and standard deviation for age and body mass index were found to be 22.50±2.00 and 22.65±1.14 in the thrust manipulation group while 23.37±2.66 and 23.03±1.97 in the non-thrust mobilization group respectively with the statistical difference of p>0.005. The results regarding between-group comparison using an independent sample t-test showed a significant difference at the post-interventional level for both scales in favor of thrust manipulation (p<0.001). **Conclusion:** This study found that both muscle thrust manipulation and non-thrust mobilization were effective, but the method of thrust manipulation was clinically and statistically more effective in improving functional capacity in athletes with chronic ankle sprain.

INTRODUCTION

An ankle sprain is a common musculoskeletal injury in athletics that accounts for 10 to 30% of all sports-related injuries. One-third of those who sustain ankle injury does not heal fully within a year. These injuries can have a major impact on activities of daily living (ADLs) as well as sports activities.[1-3] Chronic ankle instability (CAI) causes long-lasting pain, instability, ongoing functional impairments and injury recurrence in 50%-70% of those who have a lateral ankle sprain (LAS) surging up the financial cost due to potential further health issues which arise because of limited physical activity, enhanced ankle osteoarthritis-post-traumatic and absence from the competition and a decreased quality of life-related to health.[4-6]

American physical treatment association endorses therapeutic activities, exercises, manual therapy and sports training-related activities during the rehabilitation phase of an ankle sprain. Many manual therapy techniques are recommended including graded passive joint mobilization, joint manipulation and non-weight bearing & weight-bearing mobilization with movement (MWM).[7,8] Several trials examined the effects of the clinical use of MWM for rehabilitation in the case of ankle sprains but no study has thoroughly studied the therapeutic advantages.[9,10]

Ho Jin Shin et al found that following an ankle sprain, the talus and distal part of the fibula was anteriorly displaced, the proximal part of the fibula was posteriorly displaced and the dorsiflexion range of motion (DFROM) was diminished in athletes with CAI, manual therapy at the joint of ankle, including mobilization and thrust-manipulation techniques has been proven to enhance pain relief, DFROM and dynamic balance whereas the specific manual therapy mechanism is difficult & unknown.[11]

Shi X Han (2019) discovered that six sessions of manual therapy, rather than one improve the ankle functional performance in patients with CAI.[12] Erik A suggested that about half of the individuals with CAI treated with ankle-joint mobilization have significant improvement in function which was self-reported and the rest did not show improvement which aimed to predict manual therapy treatment success with CAI.[13]

Loitzun in 2021 stated that when combined with regular physical treatment, the MWM of the distal fibula is most effective in achieving ADLs & sports function in the long term.[14,15] The foot & ankle ability measure scale (FAAM) was used as the primary outcome of the measure. The FAAM supports subscales, 45 of the Lower Extremity Functional Scale (LEFS).[16] Individuals completed 15 points of the Global Rating of Change (GRC) scale which was defined by Jaeschke et al, to score their experience of increased ankle function.[17]

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There is a lack of evidence showing a comparison of both techniques and proving which technique is more effective for reducing recurrent ankle sprains and improving athletes' functional performance. ankle sprain in athletes. Therefore, this trial was designed to compare the effects of manual thrust manipulation with non-thrust mobilization on functional ability in athletes with chronic ankle sprains.

METHODS

This single-blinded, randomized clinical trial conducted in Pakistan Sports Board Complex and Model Town Football Club had been completed in nine months and recruited a sample size of 16 subjects with the help of Epitool. Using purposive sampling.[18] The age of participants ranged from 16 to 40 years according to the inclusion criteria.

Patients with a chronic ankle sprain that last for more than six months and patients with a history of fracture, tumor, osteoporosis, rheumatoid arthritis or steroid use were excluded from the study. Each participant was randomly assigned to one of two groups using the sealed envelope technique. The proximal and distal tibiofibular as well as the talocrural joints were manipulated at high velocity in group A, whereas the talocrural joint was treated with a distraction thrust. The talo-cuneiform joint was manually treated with low-velocity anteroposterior movement in Group B, whereas the hindfoot was manually treated with non-thrust lateral glide and eversion. The patient completed the FAAM and GRC as a kind of subjective assessment.

A pre-session assessment was completed in addition to the examination following the 8th week of therapy. Participants attended a total of 24 counseling sessions (three per week). The SPSS software version 25 was used to analyze the data. Baseline characteristics were presented as mean and standard deviation. Between-group comparison using independent samples t-test was done, with a p-value≤0.05 considered significant.

RESULTS

Table I: Comparative Sociodemographic Characteristics of Patients

	Thrust Manipulation mean ± SD	Non-Thrust Mobilization mean ±S D	p-value
Age	22.50 ±2.00	23.37±2.66	0.128
Weight	72.00± 5.34	75.62±5.42	0.098
Height	70.12±1.88	69.87±1.45	0.872
BMI	22.65±1.14	23.03±1.97	0.348

The results regarding the sociodemographic characteristics of patients showed that the mean and standard deviation for age and body mass index were found to be 22.50±2.00 and 22.65±1.14 in the thrust manipulation group while 23.37±2.66 and 23.03±1.97 in the non-thrust mobilization group respectively with the statistical difference of p>0.005 (Table I).

Table II: Between-Group Comparison of Foot and Ankle Ability Measure, and Global Rating of Change

	Thrust Manipulation mean ± SD	Non-Thrust Mobilization mean ± SD	p-value
GRC (Pre-treatment)	-5.50±1.41	-4.89±1.40	0.879
GRC (Post-treatment)	4.62±1.59	2.25±1.98	0.019
FAAM (Pre-treatment)	34.12±15.16	39.62±7.22	0.371
FAAM (Post-treatment)	78.37±3.06	69.62±1.68	0.001

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The results regarding between-group comparison using independent samples t-test showed a significant difference at post interventional level from GRC and FAAM in favor of thrust manipulation ($p<0.05$), descriptive statistics given in Table .

DISCUSSION

This study examined the effects of thrust manipulation and non-thrust mobilization on functional impairment in athletes with chronic ankle injury using the foot and ankle ability test and the GRC. The current study's findings revealed that thrust manipulation considerably enhances function and GRC when compared to non-thrust manipulation. Both groups showed a statistically significant difference in their self-reported questionnaire and function. When the efficacy of manual therapy and exercise (MTEX) was compared to that of a home exercise program (HEP), similar results were seen.

The MTEX strategy is preferred to the HEP technique for treating ankle inversion sprains.[18] Truyols-Dominguez indicated in one of the most recent assessments that it is often difficult to compare manual therapy treatments utilized on patients. Because of the unique nature of these treatments, the outcomes of manual therapy should be examined with care. The current data is diverse due to the vast range of methodologies investigated with a limited number of samples. It is difficult to compare the findings due to the variations in the tests and parameters employed in each research.

This is because there is no agreement on the issue, making comparison impossible. Furthermore, various research has looked at the physiological consequences of ankle joint mobilization and manipulation.[19,20] A recent study on the short-term response to thrust and non-thrust manipulation and exercise emphasizes that CPR allows you to identify patients with an ankle inversion sprain who are likely to have rapid and dramatic short-term success with a treatment approach that includes manual therapy and general mobility exercises.[21] The results of this investigation revealed statistically significant differences in post-intervention function between the two groups (FAAM). This finding of the current study contradicts previous study findings. However, manual therapy in the form of joint manipulation and mobilization is much more useful in the treatment of chronic ankle sprain.[22] According to the findings of the current study, athletes who received thrust manipulation increased their functional performance more than those who did not. It is quite likely that the statistically significant improvement also had some therapeutic value. A substantial difference in FAAM was found between thrust manipulation and non-thrust mobilization groups.

The findings of this most recent study provided additional support for the findings of Brantingham JW's systematic review, which concluded that MTEX is extremely effective in bringing about functional improvement in athletes who have suffered an inversion ankle sprain in a relatively short period.[23] Manual physical therapy is effective in restoring ranges of motion at these joints, resulting in improvements in foot and ankle mechanics and function. Linens et al used the minimum score to compare the lowest and highest results on the side hop test.[24]

This is because the operational definition of a repeat for the side hop test differs from what was previously thought. Given that the therapeutic exercise regimen was the same for both groups and they improved as well as previous research indicating that the therapeutic exercise regimen is associated with improvement in self-reported function and functional performance, the changes in self-reported function and functional

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performance observed in this study could be attributed to the therapeutic exercise regimen.[25] The findings from this current study differ from those studies conducted by Bassett & Prapavessis[26], who made a comparison between the mean of 7.6 sessions of supervised clinic exercise with the physical therapist to 4.6 sessions of supervised HEP progression. Contrary to our results where a total of 16 athletes were included in two groups showing significant improvement after the interventions. Results showed that the thrust manipulation technique has better effects as compared to the non-thrust mobilization technique in improving function in athletes with a chronic sprain of the ankle.

Long-term follow-up was not conducted and results could not be generalized to the whole population. This study did not include a pure control group. The previously documented association of chronic ankle sprain with adverse outcomes makes the current findings likely of interest to clinicians and researchers.

CONCLUSION

This study found that the thrust manipulation technique is more effective with a statistically significant difference as compared to non-thrust mobilization in improving the functional deficit in athletes with a chronic ankle sprain. Although both treatment techniques showed improvement within-group analysis,but the thrust manipulation showed more significant results.

DECLARATIONS

Consent to participate: Written consent had been taken from patients. All methods were performed following the relevant guidelines and regulations.
Availability of data and materials: Data will be available on request. The corresponding author will submit all dataset files.
Competing interests: None
Funding: No funding source is involved.
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CONSORT Guidelines: All methods were performed following the relevant guidelines and regulations.

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