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COMPARISION OF EFFECTS OF MAITLAND VERSUS MULLIGAN MOBILIZATION TECHNIQUES ON PAIN,DORSIFLEXION RANGE OF MOTION AND FUNCTIONAL DISABILITY IN ATHLETES WITH SUBACUTE LATERAL ANKLE SPRAINS

Physiotherapy

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ABSTRACT

The lateral ankle sprain is known as the commonest injury found in athletes concerned with running and jumping activities. It leads to decrease in the ankle dorsiflexion range of motion which affects the functional ability of the athletes. Physical therapists use different types of manual therapy techniques as an intervention. Thirty athletes were assessed as per the assessment Performa and included as per inclusion criteria and were divided into three groups, Group 1 (Mulligan mobilization), Group 2 (Maitland mobilization) and Group 3 (control group). Each participant underwent a treatment protocol of 2 weeks with 6 sessions per week. The outcome measures, VAS, DF ROM and FADI and FADI- sport module were assessed on the base line, post treatment and at 2 weeks follow up. Mulligan MWM significantly increased DF ROM and decreased functional disability in athlete immediately after treatment and showed constant improvement after 2 weeks of follow up. Maitland mobilization may not have immediate effect on DF ROM and on functional disability, however, there was improvement in pain perception in athletes with lateral ankle sprain.Both the techniques, Maitland and Mulligan mobilization are effective in decreasing pain and functional disability and increasing the dorsiflexion ROM in athletes with subacute lateral ankle sprain.

KEYWORDS

Lateral Ankle Sprain, Maitland Mobilization, Mulligan Mobilization.

1. INTRODUCTION

Lateral ankle sprain is a condition with complete or incomplete tear of lateral ankle ligaments leading to mild to severe laxity and instability and reduced function of ankle joint. Ankle sprain is known to be the commonest injury seen among people with active lifestyle and the ankle is common joint to be injured in most athletes seen in clinical practice.[1,5] It accounts for 10 to 30 % of sports related injuries. It's particularly common in volley ball, soccer, basketball players and other athletes concerned with running or jumping activities or lower extremity related sporting activities. Inversion sprains are more common than eversion sprains due to relative instability of lateral joint and weakness of ligaments of lateral complex compared to medial complex. [2]

Decrease in active range of motion of dorsiflexion is a commonly seen impairment following the lateral ankle sprain , which impacts both the walking pattern and running gait patterns.[4,1] With extreme dorsiflexion or plantarflexion the anterior tibiofibular ligament and calcaneofibular ligament which are weak due to shorter medial aspect of ankle mortice are comparatively more prone for different grades of sprain often by minimal quantity of force.[6,3] Due to the immediate inflammatory process, production of acute anteriolateral pain and oedema which leads to avoidance of movement and weight bearing is normally observed. Short term and long term loss of joint range of motion specifically dorsiflexion range of motion and reduced muscular strength due to disuse atrophy leads to functional and sports specific limitation.[1,6] The usual physiotherapy treatment consists of conservative treatment and exercise with manual mobilizations. There are many studies being done on the use of mobilization in all three stages of ankle sprain, acute, sub-acute and chronic stages.

Most commonly used mobilization techniques for lateral ankle sprains are Maitland and Mulligan mobilization techniques. Brian Mulligan described this technique of Mulligan mobilization as the mobilization with movements (MWM). This technique is applied in a pain free direction.[9] It combines both accessory joint movements with active physiological movements.[7]A postero-anterior directing glide of tibia upon talus with active dorsiflexion with movements in a weight bearing position increases the range of ankle dorsi flexion ROM.[6] Geoffrey Douglas Maitland introduced the Maitland techniques, the treatment procedure uses different speed or amplitude and different grades of mobilization.[10].

Landrum et al focused on the effects of application of single maitland grade III anterior-posterior mobilization and stated that there was significant improvement in dorsiflexion range, there was decrease in joint stiffness and even pain was remarkably reduced.[11] In study by Hoch et al, they focused on AP grade III Maitland talocrural joint mobilization as a two week protocol and the outcomes were self-reported functions, ankle dorsiflexion range of motion, and dynamic balance. In this study the results indicated that the mobilization that was targeted as posterior talar glide was able to produce significant improvement in functions with ankle sprain for atleast one week(1-week follow up after treatment).[12]

Vicenzino et al study showed that both with weight bearing as well as with non-weight bearing ankle MWM technique due produce major improvement in dorsiflexion ROM whereas Yeo et al concluded that passive accessory mobilization technique do produces an hypoalgesic effect initially and an increase in range of motion of ankle dorsiflexion. [8]

Previous literatures have shown a significant effect of Maitland as well as Mulligan mobilization on lateral ankle sprain individually or combined with other treatment but there is limited studies available comparing the benefits of these two techniques in isolation in management of ankle sprain of lateral aspect of ankle. The purpose of this study is to compare, Maitland and Mulligan mobilization, which technique has more effectiveness in management of lateral ankle sprain and increase range of motion of dorsiflexion, decrease pain and functional disability in athletes with ankle sprain of lateral aspect.

2. METHODOLOGY

The 30 participants was divided into three groups, two receiving the interventions, Mulligan mobilization (MWM) and Maitland anterior posterior talocural mobilization and the last one control group receiving standard treatment followed by which the data was obtained by using the Visual Analog Score [VAS] for pain, Dorsi flexion range [DF ROM] and Functional Ankle Disability Index [FADI and FADI – sport].

The group with Maitland mobilization was given a 30 second bout of the grade III anteroposterior (AP) ankle joint mobilization in supine lying position.[4]

The group for mulligan mobilization, the participant in a standing position as the forward tibial glide of posteroanterior direction with belt was given by therapist keeping the talus and the forefoot fixed with the web-space of stabilizing hand and the mobilizing hand will be positioned in the anterior aspect over the proximal part of lower leg so as to maintain the proper alignment of the distal leg and treating foot. The athlete was then asked to do weight bearing dorsiflexion or to do forward tibial translation on the talus. A ten repetitions each of three sets was applied with one minute rest between sets [6,7].

After the treatment by mobilization, the athletes were given hot pack application for 10 minutes. The control group was given standard treatment hot pack for 10 minutes and 10 minutes rest before going out to play.

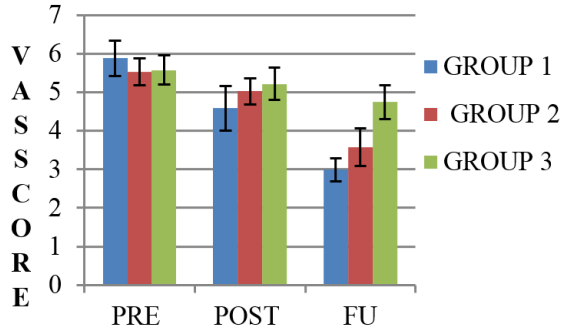
3. DATA ANALYSIS

Data analysis was done by SPSS (version 22.0), ANOVA was used to find out the difference between the groups (Maitland mobilization, Mulligan mobilization and control group) and paired T test was used to quantify the data within the groups for each of the variables, VAS, DF ROM, FADI and FADIS .And p value of ≤0.05 was considered.

4. RESULTS

Table 4.1. VAS Compared Between And Within The Groups

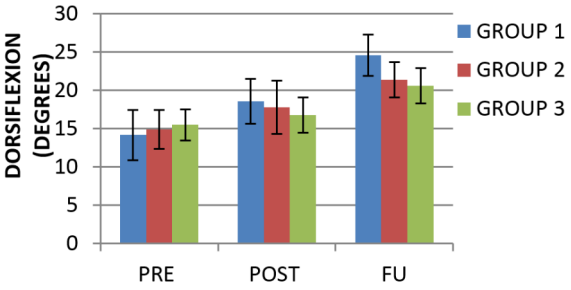
	PREVAS (mean±SD)	POSTVAS (mean±SD)	FUVAS2 (mean±SD)	T VALUE	P VALUE
GROUP 1	5.88±0.46	4.58±0.58	2.99±0.30	22.468	0.000*
GROUP 2	5.53±0.35	5.02±0.34	3.58±0.49	12.132	0.000*
GROUP 3	5.57±0.38	5.21±0.42	4.74±0.44	16.750	0.000*
F VALUE	43.969 ; P VALUE= 0.000				



Graph 4.1.Comparison of VAS between all three groups.

Table 4.2.DF Compared Between And Within The Groups

	PRE DF (mean ±SD)	POST DF (mean±SD)	FUDF2 (mean±SD)	T VALUE	P VALUE
GROUP 1	14.2±3.29	18.6±2.95	24.6±2.68	-13.630	0.000*
GROUP 2	14.9±2.55	17.8±3.46	21.4±2.32	-8.204	0.000*
GROUP 3	15.5±2.01	16.8±2.30	20.6±2.32	-18.419	0.000*
F VALUE	7.504; P VALUE= 0.003				



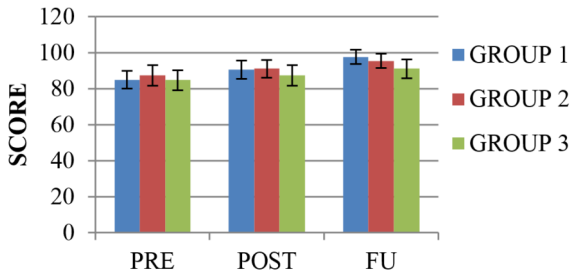
Graph 4.2.Comparison of DF between all three groups

Table 4.3. FADI Compared Between And Within Groups

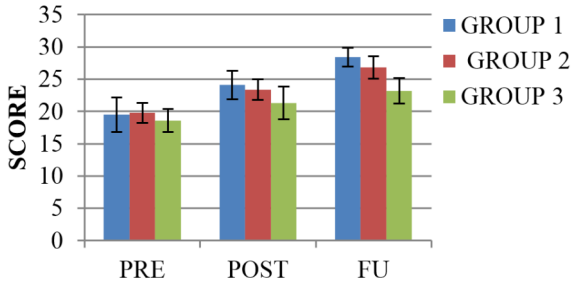
	PREFADI (mean±SD)	POSTFADI (mean±SD)	FUFADI2 (mean±SD)	T VALUE	P VALUE
GROUP 1	84.9±4.91	90.4±5.15	97.6±3.89	-17. 372	0.000*
GROUP 2	87.3±5.79	91±4.94	95.4±4.09	-12. 016	0.004
GROUP 3	84.7±5.50	87.3±5.77	91± 5.27	-12. 175	0.052
F VALUE	5.680 ; P VALUE= 0.009				

TABLE 4.4. FADIS Compared Between And Within Groups

	PRE FADIS (mean±SD)	POST FADIS (mean±SD)	FU FADIS2 (mean±SD)	T VALUE	P VALUE
GROUP 1	19.5±2.68	24.1±2.23	28.4±1.43	-13. 899	0.000*
GROUP 2	19.8±1.54	23.4±1.58	26.8±1.75	-13. 024	0.000*
GROUP 3	18.6±1.78	21.3±2.54	23.2±1.99	-13. 532	0.000*
F VALUE	23.471 ; P VALUE = 0.000				



Graph 4.3.Comparison of FADI between all three groups



Graph 4.4. Comparison of FADIS between all three groups

DISCUSSION

There was a significant improvement in Mulligan mobilization on dorsiflexion range of motion and disability index as compared to Maitland mobilization and it can be attributed to correction of positional faults. It is said that ATFL pulling at the distal portion of fibula can lead to anterior positional fault of fibula and caudal subluxation or if oedema present in the joint can lead to positional faults. The talus which lacks muscle attachment can also be pulled in to the anterior subluxation. Any of the above cause or combination of these causes can lead to positional faults. It has been seen that MWM repositions this fibular subluxation which corrects the positional faults attributing to the improvements shown by the therapy.

Both of the experimental groups, Maitland mobilization and Mulligan mobilization group have shown improvement in pain post treatment and also in 2 week follow up. The possible mechanism of the reduction of the pain intensity by manual therapy includes the direct effect on articular and periarticular structures and neurophysiological mechanisms. The direct effects includes the removal of the mechanical dysfunction of the talocrural joint, stimulation of the receptor in the synovial lining of the capsule of the joint, leading to pain gating; and increase in synovial fluid exchange in the capsule.

Mulligan mobilization treatment technique has shown significant improvement in the range of ankle dorsiflexion comparing Maitland mobilization technique. In case of plantar or inversion sprain, it is believed that an excessive anterior displacement of talus happens and there can be laxity of the ATFL, so correction of the limited posterior glide with repetitive DF of ankle with a sustained AP glide of talus can restore normal kinematics of the joint after finishing of the glide. The increase in dorsiflexion seems to be mechanical rather than related to the change in the pain system. In case of Mulligan technique correction of the restricted posterior glide due to sustained talar mobilization in antero-posterior direction with repetitive dorsiflexion restores normal kinematics of the ankle joint leading to increase in the ROM.

Maitland grade III mobilization is considered as stretching phenomenon, where due to the plastic deformation, the resting length is changed so an increased the ROM after the 2 week follow up is seen.This result co relates with the study by Green t et al. where in their study they said that due to physiological modulation of the pain and mechanical alteration of the tissue, there was an increase in range of motion of ankle DF. Mobilization performed at the end range like done in this study, showed improvement as in the plastic deformation of the tissues, it responds to the force applied to it to effect the mechanical alteration in the tissues.

According to Basmajian et al, selection of the AP talocrural joint mobilization is based on the concave- convex rule, which states that when the convex surface moves on the concave surface, sliding is in the opposite to the direction of the angular movement of the bone,

where as if the concave surface moves on the convex surface then , sliding is in the same direction as the angular movement of the bone. Therefore the mobilization is given in an posterior direction (that is AP) helps in restoration of DF ROM.

Theoretically, when stretching of the connective tissue occurs, it is basically the deformation that is happening at the toe region of the stress-strain curve where by the crimping of the fibers is been removed. The plastic deformation does not occur until the within the connective tissue reaches to a higher level. Hence, with increase in connective tissue length, there is increase in joint mobility. The mobility of the joint might also have improved due to increase in the interstitial fluid content of the connective tissue structures to normal levels.

Due to the residual symptoms of the ankle sprain, there is disorder with the mobility of the joint which effects the static and dynamic function of the body. Due to decrease in the talar translation or its mobility, it reduces the ability of adaptation of the foot on the surface while walking or running. Normal dorsiflexion required for walking is at least 10 degree whereas; 20 – 30 degrees are required for running activities. The mobilization increases the talar mobility specifically the posterior and anterior talar translation which indeed improves the dorsiflexion of the talocrural joint. With these improvements, the person is more functionally able due to which there is improvement in functional disability index over the duration of two weeks.

The technique used in this study for the Mulligan mobilization that is MWM used weight bearing technique which resembles the functional position of the ankle joint where as the technique used in the Maitland mobilization, it uses a non weight bearing position. Hence the improvements shown in Mulligan techniques can be attributed to this fact.

In a study by Cosby N et al, they said that talocrural mobilization of single bout does not correct the positional faults which may not be enough to show any improvement in the dorsiflexion range of motion immediately. They suggested that multiple bouts of the same grade that is grade III AP mobilizations can increase the dorsiflexion range and the subject returns to the activity faster than the control group. If a single bout of 30 second grade III mobilization is to be given to increase the dorsiflexion range of motion, then the treatment should be of longer duration to observe any mechanical differences between the control and experimental group. Hence the improvement in the dorsiflexion in 2 week follow up is seen in this study.

Manual therapy techniques cause a significant improvement in DF ROM, pain and disability index after ankle sprain. However, Mulligan mobilization technique proved to be more effective than Maitland mobilization in subacute lateral ankle sprain.

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REFERENCES

1. London JK, Reiman MD,Sylvain Jonathan. The efficacy of manual joint mobilization /manipulation in treatment of lateral ankle sprain: a systemic review. *Br. J sports Med 2013;0:1-6.*
2. Lopez-Rodriguez S, Fernandez de-Las-Penas C, Alburquerque-Sendin F, et al. Immediate effects of manipulation of the talocrural joint on stabilometry and baropodometry in patients with ankle sprain. *J Manipulative Physiol Ther 2007;30:186–92.*
3. Todd E Davenport et al. Ankle manual therapy for individuals with post acute ankle sprains: description of a randomized, placebo-controlled clinical trial. *BMC Complementary and Alternative Medicine 2010, 10:59.*
4. Brotzman SB, Wilk KE. Foot and ankle injuries. In Brotzman SB wilk KE editors. Clinical orthopedic rehabilitation . Mosby, Inc 2003, p.371-392.
5. Brukner P, Khan k. Acute ankle injuries. In Brukner P, khan K.editors. clinical sports medicine Sydney: Mc Graw Hill Companies. Inc: 2007, p.612-31.
6. Cosby NL, Koroch M, Grindstaff TL, et al. Immediate effects of anterior to posterior talocrural joint mobilizations following acute lateral ankle sprain. *J Man Manip Ther 2011;19:76–83.*
7. Pellow JE, Brantingham JW. The efficacy of adjusting the ankle in the treatment of subacute and chronic grade I and grade II ankle inversion sprains. *J Manip Physiol Ther 2001;24:17–24.*
8. Reid A, Birmingham TB, Alcock G. Efficacy of mobilization with movement for patients with limited dorsiflexion after ankle sprain: a crossover trial. *Physio Can 2007;59:166–72.*
9. Hubbard T J, Hicks-kittle C A. Ankle ligament healing after an acute ankle sprain: evidence based approach. *Journal of athletic training 2008; 43(5):523-529.*
10. Kisner C, Colby L A. Therapeutic exercise foundations and techniques.
11. Bleakley et al. some conservative strategies are effective when added to controlled mobilization with external support after acute ankle sprain: systemic review. *Australian journal of physiotherapy. 2008; 55: 7-20*
12. Elizebeth l landrum et al. Immediate Effects of Anterior-to-Posterior Talocrural Joint Mobilization after Prolonged Ankle Immobilization: A Preliminary Study. The journal of manual & manipulative therapy.16(2):100-105.