Original Research Article

A CONTROLLED TRIAL TO EVALUATE THE EFFECT OF ULTRASOUND & EXERCISES V/S MOBILIZATION & EXERCISES IN ANKLE INJURY

[1]Dr. Megha Dinkar Gawali (PT), [2]Dr. Renuka Pal (PT), [3]Dr. Jafar Khan (PT) & [4]Dr. Shreya Anil Padave (PT)

[1]MPTh Scholar, Pacific College of Physiotherapy, Pacific Medical University Udaipur, Rajasthan, India
[2]Associate Professor, Pacific College of Physiotherapy, Pacific Medical University, Udaipur Rajasthan India
[3]Dean & HOD Pacific College of Physiotherapy, Pacific Medical University, Udaipur, Rajasthan India
[4]MPTh Scholar, Pacific College of Physiotherapy, Pacific Medical University Udaipur, Rajasthan, India

Corresponding Author: Dr. Megha Dinkar Gawali
Email: megha27april.mg@gmail.com

Abstract:
Introduction: The ankle joint and foot both are complex areas that consist of multiple joints. It gives flexibility which helps in movement. Flexibility in the ankle joint is necessary because it provides a connection point between the ground and the body. There are many joints in the foot and they are playing a role in multiple functions during activity
Methodology: This is a comparative study of effectiveness of ultrasound and exercises vs mobilization and exercises in ankle injury. The sample size is 30 Group B aged 18-50 years, and the outcome measures include VAS & Goniometry.
Results: The results showed a significant improvement in pain and activities of daily living from day 0 to 30th day and 30th day to 67th day (end of 9th week) in both Group A and Group B.
Discussion & Conclusion: Both treatment protocols significantly improved patients, with a greater improvement observed in Group B.

Keywords: Ankle Injury, Ultrasound, Mobilization, Exercises

1. INTRODUCTION

The ankle joint is a hinged synovial joint created by the talus, tibia, and fibula bones articulating. The ankle mortise is formed by the three boundaries (mentioned below).
1. The lateral malleolus articular facet (bony projection on the lower fibula) establishes the lateral border of the ankle joint.
2. The medial border of the joint is formed by the articular facet of the medial malleolus (a bony protrusion on the lower tibia).
3. The inferior articular surface of the tibia and the superior border of the talus create the superior section of the ankle joint.
Ultrasound therapy is an electrotherapy that has long been employed in physiotherapy practices. It is mostly used for its non-thermal action, in which high-frequency sound waves generate cellular fluid oscillations and movement.
Mobilisation is a type of manual therapy that encourages movement in stiffened tissues and immobilised joints. Mobilization with movement (MWM) is a concurrent application of sustained accessory mobilization applied by a therapist and an active physiological movement to end range

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applied by patient. Passive end of the range overpressure or stretching is then delivered without any pain as a barrier

Aim of study

The aim of study is to compare the efficacy of ultrasound & exercises V/s mobilization & exercises in ankle injury.

Objectives of the study

1. Determine the level of discomfort in patients with ankle sprains in groups A and B.
2. To assess the effectiveness of ultrasound and exercises on pain and range of motion in patients with ankle sprain in group A.
3. The goal of this study was to evaluate how mobilization and exercises affected pain and range of motion in group B individuals who had ankle sprains.
4. To assess the efficacy of ultrasound and exercise to mobilization and exercise in ankle injuries.

2. METHODOLOGY

The Group B with Ankle injury in the current study will be divided into two groups: The experimental Group A and the control Group B. Group A will receive therapeutic ultrasound with exercises, whereas Group B will receive exercises & mobilization. Because of this, the current investigation is a randomized controlled experiment.

Obtaining consent and ethical issues

The intended study requested ethical approval to be carried out at the Pacific College of Physiotherapy in Udaipur.

Study Population

All adults with Ankle Sprain, aged 18 to 50 were included in the study.

Group B were drawn from Udaipur and its neighboring cities' hospitals, rehabilitation facilities, and neighborhoods.

Sample Size

The sample size constitutes 30 patients, from pacific medical college and hospital

Sample size – 30

15 – Treatment with Ultrasound & Exercises.

15 - Treatment with Mobilization & Exercises.

Sampling Technique

The samples of the study will be selected by using randomized sampling technique.

Inclusion Criteria

- Mean age of 18 to 50 years.
- Patients having acute ankle sprain
- The study includes both male and female.
- Willingness to participate in the study

Exclusion Criteria

- Malignancy
- Patients with cardiac problems were not included.
- Any open wounds on the ankle joint
- Patients with knee dorsiflexion deformity are also excluded.
- Patients with a psychological problem and non-co-operative patients are excluded.

Procedure:

Exercises: 10 repetitions of each exercise, thrice daily.

Towel Curls

Standing Calf Stretch

Knee motions

Towel stretch

ULTRASOUND:

Frequency : 1 MHz
Intensity : 1.2 watt/cm2
Mode : Continuous
Treatment time : 10 minutes
Duration : 9 weeks (4 times / week)

Mobilization

The patient will be laying supine, with the leg supported on the table and the heel over the edge. The leg is in external rotation, and the ankle joint is stabilized in dorsiflexion by applying pressure to the plantar surface of the patient's foot from the thigh.
The calcaneus is grabbed, and the talus is secured to the table.

Data Analysis

The study's goal was to see how an intervention affected ankle pain severity, and impairment. The study included two outcome measures: Goniometry, and Visual Analog Scale (VAS)

3. RESULT

This chapter discusses the patient study, clinical considerations, data processing and interpretation, and the comparison study on the effectiveness of ultrasound and exercises vs mobilization and exercises in ankle injury.

Table 1. Data on Demographic characteristics & Dorsiflexion ROM of patients with ankle injuries in Group A.

Sr No.	Age	Gender	Dorsiflexion Pre	Dorsiflexion Post	Difference
1	45	F	5	7	2
2	40	F	5	8	3
3	40	F	7	9	2
4	30	M	9	11	2
5	46	F	5	10	5
6	18	F	7	17	10
7	32	M	10	14	4
8	42	F	8	13	5
9	25	M	8	12	4
10	28	F	10	14	4
11	35	M	9	18	9
12	46	F	7	16	9
13	48	F	8	13	5
14	47	F	10	14	4
15	38	M	8	13	5

Goniometry Score (dorsiflexion) PRE	Group A	
	Frequency	Percentage (%)
0-5degree	3	20%
5-15 degree	12	80%
15 and above	0	0%

Table 2. Frequency and percentage distribution of goniometry score Pre-Treatment (dorsiflexion)

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Goniometry Score (dorsiflexion) POST	Group A	
	Frequency	Percentage (%)
0-5degree	0	0%
5-15 degree	12	80%
15 and above	3	20%

Table 3. Frequency and percentage distribution of goniometry score Post-Treatment (dorsiflexion)

ANKLE PLANTARFLEXION RANGE

Table 4. Data on Demographic characteristics & Plantarflexion ROM of patients with ankle injuries in Group A.

Sr No.	Age	Gender	Plantar Pre	Plantar Post	Difference
1	45	F	18	24	6
2	40	F	18	26	8
3	40	F	15	22	7
4	30	M	22	30	8
5	46	F	26	35	9
6	18	F	24	32	6
7	32	M	28	36	8
8	42	F	14	25	11
9	25	M	16	28	10
10	28	F	28	34	6
11	35	M	32	40	8
12	46	F	24	32	6
13	48	F	30	40	10
14	47	F	25	32	7
15	38	M	18	27	9

Goniometry Score (Plantar flexion) PRE	Group A	
	Frequency	Percentage (%)
0-10 degree	0	0%
10-20 degree	6	40%
20-30 degree	7	46.7%
30-40 degree	2	13.3%
40 degree and above	0	0%

Table 5. Frequency and percentage distribution of goniometry score Pre-Treatment (Plantar flexion)

Goniometry Score (Plantar flexion) POST	Group A	
	Frequency	Percentage (%)
0-10 degree	0	0%
10-20 degree	0	0%
20-30 degree	7	46.6%

30-40 degree	8	53.4%
40 degree and above	0	0%

Table 6. Frequency and percentage distribution of goniometry score Post-Treatment (Plantar flexion)

Evaluation of patients pain levels with (VAS)VISUAL ANALOGUE SCALE in ankle injury patients

VISUAL ANALOGUE SCALE

VAS Score PRE Treatment	**Group A**	
	Frequency	**Percentage (%)**
Mild pain (0-3)	0	0 %
Moderate pain (4-6)	2	13.3 %
Severe pain (7-10)	13	86.7%

Table 7. Frequency and percentage distribution of Pain score Pre-treatment in Group A

VAS Score POST Treatment	**Group A**	
	Frequency	**Percentage (%)**
Mild pain (0-3)	2	13.3 %
Moderate pain (4-6)	13	86.7%
Severe pain (7-10)	0	00.0 %

Table 8. Frequency and percentage distribution of Pain score Post-Treatment in Group B

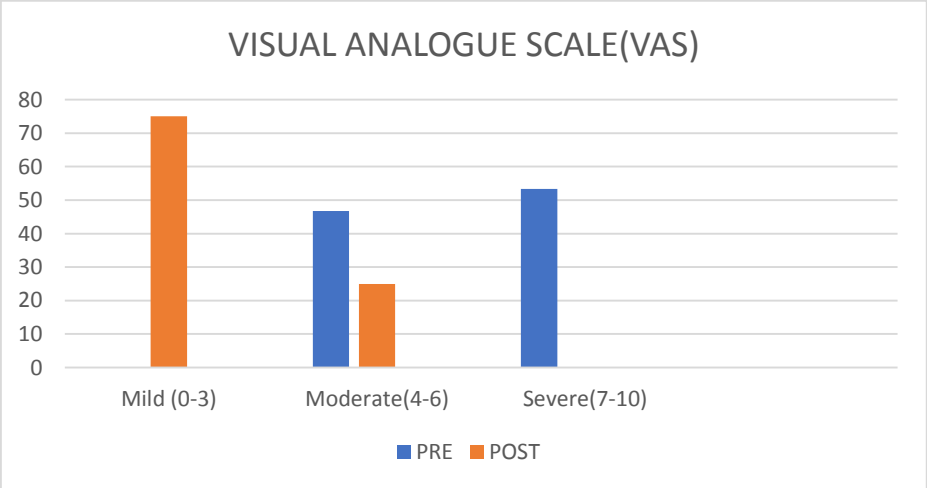

Figure 1. Represents comparison between Pre & Post pain score

Evaluation of patients pain levels with goniometry in ankle injury patients.

ANKLE DORSIFLEXION RANGE

Goniometry Score (dorsiflexion) PRE	**Group B**	
	Frequency	**Percentage (%)**
0-5degree	3	20.00%
5-15 degree	12	80.00%
15 and above	0	0%

Table 9. Frequency and percentage distribution of goniometry score Pre-Treatment (dorsiflexion)

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Goniometry Score (dorsiflexion) POST	Group B	
	Frequency	Percentage (%)
0-5degree	0	0%
5-15 degree	9	60.00%
15 and above	6	40.00%

Table 10. Frequency and percentage distribution of goniometry score Post-Treatment (dorsiflexion)

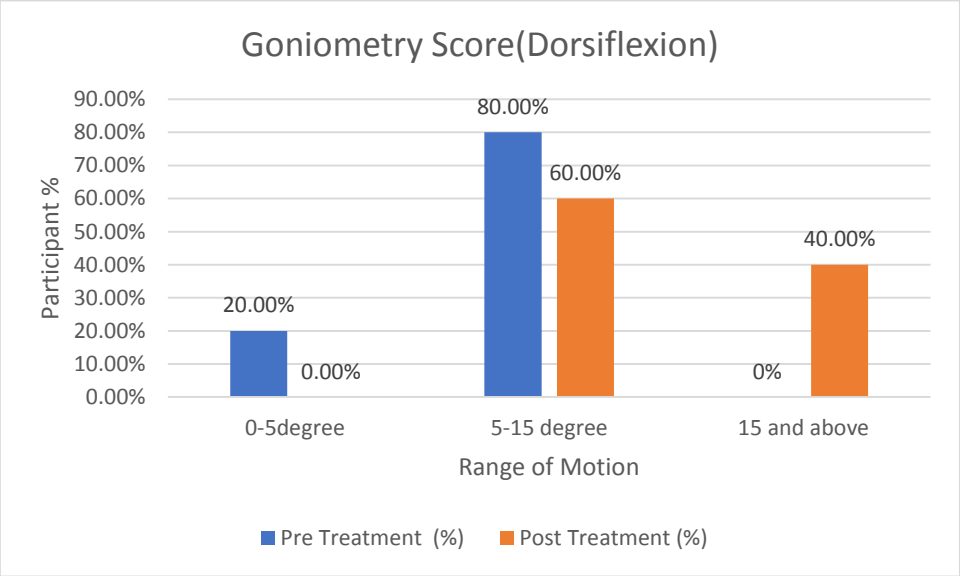

Figure 2. Represents comparison between Pre & Post Dorsiflexion range

ANKLE PLANTARFLEXION RANGE

Goniometry Score (Plantar flexion) PRE	Group B	
	Frequency	Percentage (%)
0-10 degree	0	0%
11-20 degree	5	33.3%
21-30 degree	9	60.00%
31-40 degree	1	6.6%
41 degree and above	0	0%

Table 11. Frequency and percentage distribution of goniometry score Pre-Treatment (Plantar flexion)

Goniometry Score (Plantar flexion) POST	Group B	
	Frequency	Percentage (%)
0-10 degree	0	0%
11-20 degree	0	0%
21-30 degree	2	13.3%
31-40 degree	6	40.0%

41 degree and above	7	46.7%

Table 12. Frequency and percentage distribution of goniometry score Post-Treatment (Plantar flexion)

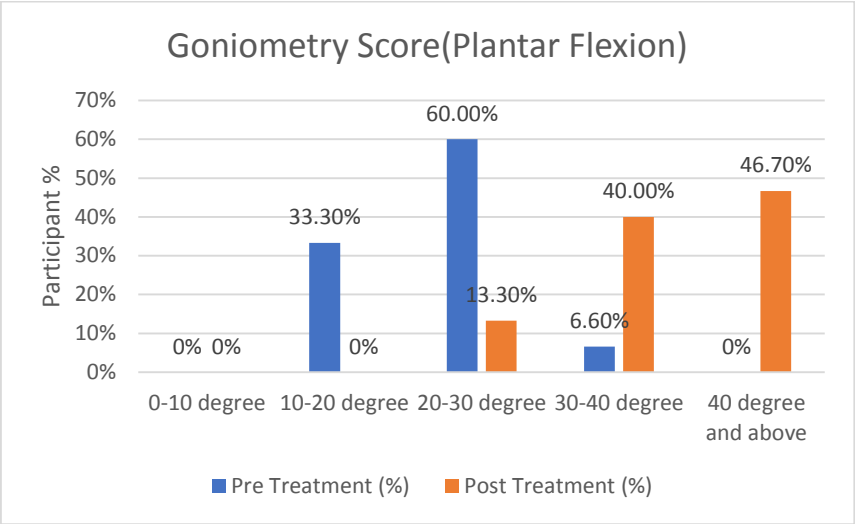

Figure 3. Represents comparison between Pre & Post Plantar flexion range

Table-8 unpaired 't' test for group A and group B level of pain among patients with ankle injury.

(n=30)

Level of pain	Group A		Group B		Mean difference	't` value
	Mean	SD	Mean	SD		
Group A & Group B	0.60	0.507	0.80	0.676	0.200	0.917

(*** P<0.001 highly significant)

Table 8 reveals that the obtained overall 't' value for thirst level between Groups A and B was 0.917, which was highly significant at p0.001. The mean of group A was 0.60, whereas the mean of group B was 0.80, with a mean difference of 0.200, indicating that group A improved more than other metrics. It was concluded that movement with mobilization and exercise was more beneficial than ultrasonography and exercise in relieving pain in ankle injury patients. As a result, the research hypothesis is accepted.

4. DISCUSSION & CONCLUSION

The current investigation revealed that ultrasound combined with exercises and mobilisation combined with exercises can be useful in treating ankle discomfort. On the ninth week of treatment, there were significant differences in pain intensity within each group and between the two groups. Although both Groups A and B had pain reduction, Group B experienced a significant drop in pain severity.

Studies testing the effectiveness of ultrasound, exercise, and mobilization exercises in alleviating ankle discomfort have revealed considerable improvements.

In terms of range of motion (ROM), both treatment groups showed statistically significant improvements at the end of the treatment in active ankle range of motion.

5. REFERENCES

1. Kisner, C., & Colby, L. A. (1996). Therapeutic exercise: Foundations and techniques. Philadelphia: F.A. Davis.
2. O'Sullivan, S.B., Schmitz, T.J. and Fulk, G.D. (2014). Physical Rehabilitation 6th Edition,

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FA Davis Company, Philadelphia,
3. Essential Orthopaedics Maheshwari.
4. Vicenzino B, Prangley I, Martin D. The initial effect of two Mulligan mobilization with movement treatment techniques on ankle dorsidorsiflexion. Proceedings of the Australian Conference of Science and Medicine in Sport, Perth, WA, June 2001. Brisbane, Q: Sports Medicine Australia; 2001.
5. Denegar CR, Hertel J, Fonseca J. The effect of lateral ankle sprain on dorsidorsiflexion range of motion, posterior talar glide, and joint laxity. J Orthop Sports Phys Ther. 2002.
6. Neptune RR, Kautz SA, Zajac FE: Contributions of the individual ankle plantar flexors to support, forward progression and swing initiation during walking. J Biomech, 2001.
7. Perry J, Burnfield J: Gait Analysis: Normal and pathological function, 2nd ed. California: Slack, 2010.
8. Williams P. Gray's Anatomy. 36th ed. London, UK: Churchill Livingstone; 1980.
9. Fujita T, Iwata M, Fukuda M, et al.: Relationship between lower extremity muscle mass, leg plantar dorsiflexion strength and muscle power of hemiplegic stroke patients. J Phys Ther Sci, 2011.
10. Collins N, Teys P, Vicenzino B. The initial effects of a Mulligan's mobilization with movement technique on dorsidorsiflexion and pain in subacute ankle sprains. Man Ther. 2004.
11. Handoll HHG, Rowe BH, Quinn KM, de Bie R. Interventions for preventing ankle ligament injuries. Cochrane Database of Systematic Reviews 2002.
12. Van der Windt DAWM, Van der Heijden GJMG, Van den Berg SGM, Ter Riet G, De Winter AF, Bouter LM. Ultrasound therapy for acute ankle sprains. Cochrane Database of Systematic Reviews 2002.
13. Zammit E, Herrington L. Ultrasound therapy in the management of acute lateral ligament sprains of the ankle joint. Physical Therapy in Sport 2005.
14. Moher D, Schulz KF, Altman DG. The CONSORT statement: revised recommendations for improving the quality of reports of parallel-group randomised trials. Lancet 2001.