ORIGINAL RESEARCH PAPER
Volume - 15 | Issue - 05 | May - 2026 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

EFFECTIVENESS OF MULLIGAN'S MOBILIZATION VERSUS NEUROMUSCULAR EXERCISES ON GRADE-2 ANKLE SPRAIN AMONG FAST BOWLERS.

Sports Science

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ABSTRACT

Background: Grade 2 ankle sprain, the most prevalent cause of ankle sprains is inversion of the ankle joint on the affected side and loss of plantar flexion in overhead throwing sports, such as cricket players. GIRD is the primary cause of decreased ankle joint mobility and pain, affecting 30% of athletes. Physiotherapists today use rest, stretch, and strengthening techniques to treat ankle sprains. In cricket, fast bowlers are crucial and are more likely to sustain injuries than batsmen and fielders. 3,4 The subject usually presents with pain over the ankle region and on examination, tenderness over the ankle is present. Numerous studies indicate that the Mulligan mobilization approach and neuromuscular exercises are useful in enhancing ankle mobility in cricketers and athletes. **Objective:** The objective of this study is to find the effectiveness of Mulligan mobilization versus neuromuscular exercises on pain and range of motion in grade-2 ankle sprain among fast bowlers. **Study design & method:** A total number of 60 subjects who are clinically diagnosed with Grade-2 Ankle sprain were taken and randomly assigned into two groups. In Group A (n=30) the subjects were treated with Mulligan's mobilization, where in Group B (n=30) were treated with Neuromuscular exercises. Interventions are given for 4 weeks, 5days per week 40 min duration. Subjects were assessed for pain using VAS and Range of Motion using Goniometer pre intervention and post intervention. **Result:** The result of the study revealed that there is statistically significant difference between the groups Mulligan's Mobilization and Neuromuscular exercises when compared on their mean scores of VAS and range of motion scores. **Conclusions:** The present study concluded that both Mulligan's Mobilization, Neuromuscular exercises are effective but when compared between groups Mulligan's Mobilization is found to be more effective than Neuromuscular exercises in reducing pain and increasing range of motion in fast bowler subjects with grade II ankle sprain.

KEYWORDS

Mulligan's Mobilization with Movement, Neuromuscular Exercises, Range of motion, visual analogue scale, grade 2 ankle sprain.

INTRODUCTION:

Cricket is a global sport played in over 100 countries, in watched by billions worldwide. In cricket fast bowlers are attracting increasing interest because their performance plays crucial role in team success[1.] Being a successful fast bowler was influenced by a number of elements, including excellent technique, physical attributes like limb length, range of motion, and core stability, as well as anthropometric measurements and isokinetic influences[1].

Grade-2 Ankle sprain is most common condition in overhead throwing athletes like cricket players leads to loss of plantar flexion and inversion of ankle joint on the affected side. GIRD affects 30 % of sports population and it is the main cause for reduced ankle joint range and pain, currently physical therapist using rest stretch and strengthening for the management of ankle sprain. In cricket fast bowlers require more movements in lower limb and speed because the ball needs to travels at higher speeds.[2] The components of the fast-bowling technique are: 1) The run up: The bowler starts the run up by walking or jogging over his marker, progressively picking up speed as he approaches the wicket. It concludes when he jumps into the air at the beginning of the pre-delivery stride, preparing for the back foot to hit the ground, which signals the start of the delivery stride. 2) Pre-delivery stride: This stride, which separates the delivery stride from the run-up, starts with a left foot leap for a right-handed bowler and ends when the bowler lands on either the right or back foot. 3) Delivery stride: The delivery begins with the batsman's body learning away from the foot as the weight shifts.

4) Back foot strike: The bowler leans away from the batsman at the beginning of the delivery strike, placing their weight on their previously planted back foot. This trunk leaning back is comparable to that seen in some javelin throwing techniques and could be used to increase the tool's acceleration. 5) Front foot strike: The front (left) foot strikes the ground while the delivery stride continues due to ground contact forces. This phenomenon is usually known as front foot contact, or more accurately, front foot impact, front foot, or bearing is large ground reaction forces encountered[8].

Stage 2 injuries were the most common in fast Bowler, these injuries may have been caused by weak core muscles, poor neuromuscular control, and slick footing. Ankle sprains are common in bowlers who were unable to properly plant their foot upon landing due to a lack of neuromuscular control. Poor ground conditions could also be the culprit, as they can cause the foot to slip when landing. It happens at the second stage, which is a single-leg stance phase, where the foot bears the entire body weight. The momentum generated during the run-up makes this stride a bit more challenging. Therefore, a great degree of neuromuscular control is required for the foot to land correctly. The main causes of Stage 2 injuries include slick surfaces and incorrect foot positioning. A recent meta-analysis study also indicated that the main causes of non-contact injuries in fast bowlers are neuromuscular inadequacies and inadequate core strength. [11.]

Studies conducted on Grade 2 ankle sprains in fast bowlers found that neuromuscular exercise helps to improve the ankle joint's plantar flexion and inversion movements[3]. Neuromuscular exercise targets the structures like ligaments and muscles in and around the ankle joint.[7] Neuromuscular exercises also help to release adhesions and relax muscle and promote the body's own healing mechanism. Another effective treatment for reducing ankle sprains is Mulligan's mobilization technique, which enhances ankle range of motion[10]. Numerous studies have been done on the improvement of ankle range of motion in cricket players using both the neuromuscular and mulligan mobilization techniques. However, to the best of our knowledge, this is the first study to compare the efficacy of both techniques in fast bowlers.[11]So, the purpose of this study is to assess the effectiveness of mulligan mobilization versus neuromuscular exercises on improving ankle joint range of motion in fast bowler's. The outcome measures of this study are evaluated using visual analogue scale (VAS) to assess pain and goniometer to measure the ankle joint range of motion.[22]

MATERIALS AND METHODS:

Subjects diagnosed with Grade 2 ankle sprain and treated at our institute between September 2023 to December 2024 and those who were followed up in Out Subject Department up to September 2024 were retrospectively studied. 60 subjects diagnosed with chronic Grade 2 ankle sprain randomly divided into two groups. Group A (mulligan mobilization) N=30 and Group B (Neuromuscular exercises) N=30.

Inclusion criteria

- Fast bowlers who have the symptoms of 2nd degree ankle sprain whose diagnosed confirm by orthopedic surgeon.
- Age between 19 to 26 years.
- 10 degrees dominant and non-dominant difference in ankle range of motion are taken.
- Sub-acute ankle pain.
- Only Males were included.
- Fast Bowlers in Cricket players.
- Players who had not included in any study in last 6 months

Exclusion criteria

- Subjects with previous history of Grade 2 ankle sprain.
- History of lower limb surgeries.
- Subjects with Other orthopedic conditions involving lower limb were excluded.

The study was approved by the Institutional Ethics committee and written informed consent was obtained from all subjects. We could trace records of 60 subjects who fulfilled our inclusion, exclusion and follow up criteria. Of these subjects we studied, 30 subjects were treated with mulligan mobilization, 30 subjects were treated with neuromuscular exercises

PROCEDURE:

Group A: Mulligan's movements with mobilization (M.W.M):
The Mulligan concept of mobilization with movement (MWM) is a manual treatment method in which the subject performs an active movement while the therapist applies a manual glide force. Mulligan suggested that MWM might be useful for LAS recovery. In order to find possible MWM therapy responders, the protocol is intended to apply MWM to the cuboid, talus, and fibula, respectively, after LAS. The same technique will be applied for ankle to improve range of motion in ankle joint.

M.W.M for Grade-2 ankle sprain:
Mulligan mobilization with movement (MWM). A passive posterior, lateral, and superior glide was applied while the participant undertook weight- bearing active dorsiflexion, with three to five repetitions. This technique was applied with minimal body weight through the treated ankle that was maintained, while the participant performed this active dorsiflexion. Immediately after the MWM application, the dorsiflexion ROM, pain, and YBT were reassessed. The MWM consists of a passive posterior glide of the talus relative to the tibia, during the same active weight- bearing dorsiflexion movement. A mobilization belt that was looped around the physiotherapist and the posterior part of the subject's leg was used to assist the anterior glide force of the tibia relative to the talus. Similar to the MWM, the MWM was administered to the treated leg initially with little subject body weight and continued for three to five repetitions on the weight-bearing active dorsiflexion activity. If the subject did not fit the responder requirements, a third and final MWM was then applied in accordance with the MWM procedure for LAS. A 20 mm wide non-stretch sports tape was used to administer the cub metatarsal MWM under tension in a counter-force direction because it was impossible for a therapist to apply manual MWM in a weight-bearing position. This was done in an attempt to mobilize the cub metatarsal joint. In order to prevent weight bearing, two thicknesses of tape were applied. The below MWM technique are given for 5 days per week 40 min duration

Group B: Neuromuscular exercises:
Neuromuscular exercises are training that improves unconscious motor responses by activating central processes that control dynamic joints as well as afferent inputs. Programs of neuromuscular exercises are intended to lower the risk of injury and incorporate interventions that emphasize better control over the centre of mass. The lower extremities are more susceptible to biomechanical aberrations as the centre of mass shifts away from the base of support. The risk of damage may be reduced if this movement can be better controlled, which could lessen excessive forces on the lower extremities. The use of therapies like neuromuscular exercise regimens to assess the frequency of lower extremity injuries is supported by a number of research.

The best nonsurgical treatment for acute lateral ligament injuries of the ankle is peroneal strengthening and neuromuscular training. In an athlete with persistent ankle instability, the 6-week dynamic neuromuscular workout program improved ankle joint sensorimotor control characteristics. The below NME technique is given for 5 days per week 40 min duration.

RESULTS:
The aim of the study was to find the effectiveness of Mulligan mobilization versus neuromuscular exercise on Grade-2 ankle sprain among fast bowlers.

The results of the study are analysed using outcome parameter, universal goniometer, Visual Analogue scale. To compare pre-test and post-test values between group A and B using paired T test is used to compare results between group p value is < 0.00-0. Statistical analysis is done using SSPS 20.0 software version.

Table-1: Analysis of Post test scores of PF between Group A and Group B

GROUPS	GONIOMETER (PF)	N	Mean	Std. Deviation	Std. Error mean	P value
Group A	PRE-TEST	29	27.241	2.5447	0.4725	**0.000**
	POST-TEST	29	41.276	1.6234	0.3015	
Group B	PRE-TEST	28	27.571	2.0263	0.3829	**0.000**
	POST-TEST	28	39.563	2.8737	0.5431	

RESULTS: The above table and graph shows that mean score of PF changes pre-test and post-test values within group-A & B were found to be statically significant **P <0.00.**

Table-2: Analysis of Post test scores of DF between Group A and Group B

GROUPS	GONIOMETER (DF)	N	Mean	Std. Deviation	Std. Error mean	P value
Group A	PRE-TEST	29	6.759	1.5733	0.2922	**0.000**
	POST-TEST	29	11.966	1.7825	0.331	
Group B	PRE-TEST	28	7	2.3254	0.4395	**0.000**
	POST-TEST	28	13.071	2.1418	0.4048	

RESULTS: The above table and graph shows that mean score of DF changes pre-test and post-test values within group-A & B were found to be statically significant **P <0.000**

Table-3: Analysis of Post test scores of INV between Group A and Group B

GROUPS	GONIOMETER (INV)	N	Mean	Std. Deviation	Std. Error mean	P value
Group A	PRE-TEST	29	16.483	2.2139	0.411	**0.000**
	POST-TEST	29	27.276	1.8496	0.3435	
Group B	PRE-TEST	28	16.357	2.407	0.4549	**0.000**
	POST-TEST	28	25.857	2.8378	0.5363	

RESULTS: The above table and graph shows that mean score of INV changes pre-test and post-test values within group-A & B were found to be statically significant **P <0.000**

Table-4: Analysis of Post test scores of EVE between Group A and Group B

GROUPS	GONIOMETER(EVE)	N	Mean	Std. Deviation	Std. Error mean	P value
Group A	PRE-TEST	29	7.207	1.4238	0.2644	**0.000**
	POST-TEST	29	16.966	1.9545	0.3629	
Group B	PRE-TEST	28	7.179	1.3623	0.2575	**0.000**
	POST-TEST	28	15.714	2.2748	0.4299	

RESULTS: The above table and graph shows that mean score of INV changes pre-test and post-test values within group-A & B were found to be statically significant **P <0.000**

Table – 5: Analysis of Post test scores of VAS between Group A and Group B

GROUPS	(VAS)	N	Mean	Std. Deviation	Std. Error mean	P value
Group A	PRE-TEST	29	5.828	0.8048	0.1494	**0.000**
	POST-TEST	29	2.552	0.6317	0.1173	
Group B	PRE-TEST	28	5.714	0.81	0.1531	**0.000**
	POST-TEST	28	3.071	0.7664	0.1448	

RESULTS: The above table and graph shows that mean score of VAS changes pre-test and post-test values within group-A & B were found to be statically significant **P <0.000**

DISCUSSION:
According to the study's findings, the Mulligan's mobilization group showed stronger trends of improvement in pain and range of motion

than the neuromuscular exercise group. Compared to the group mean and P value, both Mulligan's mobilization and neuromuscular exercise demonstrated significant improvements in range of motion and pain. The results of the study were analyzed pre intervention and post intervention after 4 weeks of therapy.

The improvement in pain and range of motion in the Mulligan mobilization group may be due to sensory input that activates the pain inhibitory system. As a means of retraining the spinal cord circuit, tactful and compressive stimuli may influence the neurons' inhibitory nociperception and the motor neuron pool in the spinal cord. Mulligan mobilization can successfully reduce discomfort and increase range of motion while also improving ankle joint function. Decreased use of painkillers and improved quality of life are two other advantages of the Mulligan mobilization approach.[21]

The study's findings demonstrated a statistically significant improvement in pain and range of motion in both before and post-test values for the neuromuscular exercises given to subjects receiving four weeks of therapy. When comparing pre- and post-test results, the current study's research revealed that four weeks of Mulligan mobilization techniques and neuromuscular exercises were statistically significant. However, when comparing the groups, Mulligan mobilization demonstrated a statistically significant improvement in fast bowlers' grade-II ankle sprain pain and range of motion.[22]

CONCLUSION:

This study concludes that both Mulligan's mobilization technique and neuromuscular exercises are effective in reducing pain and improving range of motion among fast bowlers with grade-2 ankle sprain when compare between pre-test and post-test values within the groups.

However, when post-test values were compared in-between groups, mulligans mobilization showed significant improvement over neuromuscular exercises. Hence, this study concludes mulligans mobilization is more effective in reducing pain, increasing range of motion among fast bowlers with grade 2 ankle sprain.

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