

## ORIGINAL ARTICLE

### TO COMPARE THE EFFECTIVENESS OF CRYOTHERAPY WITH EXERCISES VERSUS TAPING WITH EXERCISES IN TREATING ACUTE LATERAL ANKLE SPRAIN

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**ABSTRACT: BACKGROUND:** Ankle sprain is a common form of sport injuries and it is a leading cause of pain and disability in common man and sportsman worldwide. Rate of this injury is 1 per 10, 000 persons in common man whereas lateral ligament injuries account for 15 to 25% of all sports injuries. Lateral ankle sprains are one of the most common injuries sustained in sports and exercise activities. It is one of the most common soft tissue injury encountered in clinical practice. Complications such as prolonged ankle pain, a high recurrence rate, and chronic laxity underline the importance of careful diagnosis and treatment of ankle sprain. Physical therapy such as cryotherapy and taping technique are frequently used and have been cited that use of cryotherapy and taping technique have shown significant improvement in relieving pain and improving functional ability. **OBJECTIVES:** This study is intended to find and compare the effectiveness of Cryotherapy and exercises versus taping and exercises in acute lateral ankle sprain. **DESIGN:** A comparative study. **SETTING:** Kempegowda department of Orthopaedics and Rehabilitation unit-Kempegowda institute of physiotherapy. **SUBJECTS:** 40 patients (20 in each group). **INTERVENTION:** Forty males and female patients with lateral ankle sprain belonging to an age group of 15-35 years were selected for the study who fulfilled the inclusion and exclusion criteria and were divided into two groups. Group A was treated with Cryotherapy and exercises and group B was treated with taping and exercises with a frequency of 7 sittings for one week. Treatment outcomes were assessed using VAS, ROM, and LEFS for pain and functional ability. **OUTCOME MEASURES:** VAS to measure pain intensity, ROM for stiffness and Lower extremity functional scale for functional ability. **RESULT:** In comparison with VAS, ROM and LEFS, Group B shows significant improvement of all the parameters than Group A. **INTERPRETATION & CONCLUSION:** Study findings concluded that group B-Taping with exercises gave better response and is more effective than Cryotherapy with exercises in reducing pain and enhancing functional performance in patients with lateral ankle sprain.

**KEYWORDS:** VAS, ROM, LEFS.

**INTRODUCTION:** Ankle injuries represent one of the most commonly occurring musculoskeletal injuries encountered today. These injuries occur frequently. The vast majority of such injuries occur as a result of inversion trauma with the foot in some degree of plantar flexion and involve damage to the lateral structures of the ankle joint mainly the lateral ligaments (Anterior talofibular, posterior talofibular and calcaneofibular).<sup>1</sup>

Lateral ankle sprains are one of the most common injuries sustained in sports and exercise activities. It is one of the most common soft tissue injury encountered in clinical practice and its complications such as prolonged ankle pain, a high recurrence rate, and chronic laxity underline the importance of careful diagnosis and treatment of ankle sprain.<sup>2</sup>

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Most ankle sprains are probably self-treated and are never reported to a health care provider; therefore many ankle sprains are not documented. Rate of this injury is 1 per 10, 000 persons in common man whereas lateral ligament injuries account for 15% to 25% of all sports injuries.<sup>6</sup>

Depending on the severity of the injury, ankle sprain is classified as:

**Grade I:** The ankle is painful, but there is little ligament damage (Stretch) and little loss of function (no tear).

**Grade II:** There is moderate ligament damage and the ankle joint is somewhat loose (Partial tear).

**Grade III:** One or more ligaments are torn and the ankle joint is very loose or unstable (Complete tear).<sup>3</sup>

There are a variety of treatments available in physiotherapy for treating acute ankle sprain. In this study we have compared the effectiveness of Cryotherapy with exercises and taping with exercises in treating acute ankle sprain injury. These two treatments were considered as the best treatment by so many researchers in the world.

**Angela Forster, Nigel Palastanga (2002):** States the type of application of ice packs for reducing pain and swelling is by placing it on top of the part to be treated. Hence it is applied over the lateral side of ankle joint for lateral ankle sprain.<sup>4</sup>

**Angela Forster, Nigel Palastanga (2002):** Suggested dosage for using ice pack application is between 10-20min for treating acute injuries.<sup>4</sup>

**Kenzo kase, Jim Wallis, Tsuyoshi kase (2003):** Kinesiotape is an adhesive cotton athletic tape with an elasticity that allows it to stretch up to 120% - 140% of its original length without any tension. This enhances skin breathing, through circulation waves to remove sweat and water. It has an excellent durability of 3-7 days.<sup>5</sup>

**METHODOLOGY:** 40 subjects with acute ankle sprain were selected through random sampling by using chit method. Subjects were allocated in two groups through random sampling method with 20 patients in each group.

**Source of Data:** Patient coming to Kempegowda institute of medical sciences and research centre department of orthopaedics and department of physiotherapy with acute lateral ankle sprain fulfilling the inclusion and exclusion criteria.

**Inclusion Criteria:** 1. Patients with a Grade 1 acute lateral ankle sprain; 2. 15-35 years; 3. Both sexes; 4. Occupation any kind; 5. Any side of the leg; 6. Injury less than 1 week.

**Exclusion Criteria:** 1. Grade 2 and 3 sprain; 2. Bony ankle injury; 3. Multiple injuries to the leg; 4. Ankle sprain more than 1 week since injury; 5. Any contraindication to cryotherapy; 6. Any old fractures in the leg and foot; 7. Psychological depressed patients; 8. General debility patients; 9. Any neurological impairment in lower limbs; 10. Any sensory loss; 11. Any open wounds; 12. Recurrent lateral ankle sprain.

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**PROCEDURE:** 40 patients with acute ankle sprain priorly between 15-35 yrs of age group were selected based on the inclusion and exclusion criteria. Patients were divided into two groups randomly. Each group was assigned with 20 patients. Group A received Cryotherapy with exercises and group B received taping and exercises. Before starting the treatment patient is positioned comfortably and assessed thoroughly about his or her condition. All the patients were clearly instructed about the purpose of the study and written consent was taken from the subjects. Both the groups were assessed for the pain intensity using VAS (visual analog scale), ROM (range of motion) using goniometry and LEFS (lower extremity functional scale) for ankle joint for functional ability.

**PROCEDURE FOR ICE PACK APPLICATION:** Group A patients were treated with ice pack application and static exercises. Ice pack was in the form of gel pack. Patient was assessed for thermal sensitivity to ascertain their suitability for heat or cold application.

The patients received ice pack application for 10 mins with the gel pack wrapped around the ankle joint in supine position. This will be followed by static exercises.

**PROCEDURE FOR KINESIOTAPE APPLICATION:**

**Skin Preparation for application of kinesiotape:** Skin should be free of oils and lotions and should be cleaned prior to tape application. For a limited number of patients, body hair may limit adhesion. If the degree of body hair limits adhesion then the patient needs to shave or clip the area to be treated.

**Technique for application of kinesiotape to ankle joint in acute ankle sprain:** Open Basket Weave Ankle Taping.

**Position:** The subject should be sitting on bench with the leg extended off the edge and foot dorsiflexed as much as possible within the limits of pain (90° angle to the leg):

1. Apply two anchor strips encircling the leg at the base of the gastrocnemius and one strip on the mid foot, leaving the anterior lower leg, ankle, and dorsal aspect of the foot open.
2. Apply an anchor to the foot, medial to lateral around the foot. Tape should pass directly over the styloid process of the 5<sup>th</sup> metatarsal, leaving the anterior lower leg, ankle, and dorsal aspect of the foot open.
3. Anchor the ends of the horseshoes and closures strips.
4. Apply compression over the taping. Finish by enclosing both the proximal and distal portions of the taping with anchor strips.

**Procedure for static Exercises:** Static exercises will be given to both the groups (group A and B). Frequency of treatment—thrice a day (exercises) for one week. Exercise intervention used for both groups: Static eversion/inversion/dorsiflexion/plantar flexion of ankle with 10second hold and five repetitions each. These exercises will require duration of 5minutes. Static calf stretch with 20 second hold and three repetitions in long sitting or supine position. These exercises will require duration of 2 mins. Active plantar flexion and dorsiflexion of ankle joint are given 20 repetitions for duration of 1min. Heel slides (with lower limb triple extension) in supine lying position 30 repetitions within 2 mins. Circumduction of ankle joint will be done in supine or high sitting positioning in clockwise and anticlockwise directions, 20 repetitions are given in 1min.

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Both the groups got treatment daily for a period of 7 days for 20 mins.



Open basket weave technique



Ice packet technique



Static exercises of taping

### DATA ANALYSIS:

**Statistical Methods:** Descriptive statistical analysis has been carried out in the present study. VAS, ROM and LEFS before and after intervention is presented on Mean SD (Min-Max). Significance is assessed at 5 % level of significance.

**Statistical Tests:** Chi square test is used to analyse the characteristics of the samples. Student t test (two tailed, independent) was used to test the significance of study parameters between the two groups of subjects. Student t test (paired) has been used to find the significance of study parameters between pre and post intervention in each group:

1. Student t test.
2. t-test for two populations means (method of paired comparisons).

**OBJECTIVE:** To investigate the significance of the difference between two population means. No assumption is made about the population variances.

**Statistical Software:** The Statistical software namely SPSS 15.0, Stata 8.0, Med Calc 9.0.1 and Systat 11.0 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc.

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**RESULTS:** In group A 19 males and 1 females participated and in group B 16 males and 4 females participated.

Group B showed statistically significant difference in VAS compared to Group A.

Analysis of mean difference of both the groups were compared using independent, t<sup>o</sup> test showed that there was statistically significant change in ROM Group B than Group A when compared to pre and post- intervention.

There was increase in mean values of LEFS post intervention in both the groups. In Group A the pre and post interventions mean values 52.69 and 77.94 respectively. In Group B the pre and post intervention mean value are 53.56 and 82.25 respectively. This shows there was significant increase in functional outcome in group B.

**DISCUSSION:** Ankle injuries represent one of the most commonly occurring musculoskeletal injuries encountered today. These injuries occur frequently. The vast majority of such injuries occurs as a result of inversion trauma with the foot in some degree of plantar flexion and involve damage to the lateral structures of the ankle joint mainly the lateral ligaments.

This study was conducted to determine the effectiveness of Cryotherapy and exercises versus taping and exercises in acute lateral ankle sprain using VAS, ROM and LEFS as outcome measures.

After analysis of the result, in group A 19 males (95%) and 1 female (5%) had participated and in group B 16 males (80%) and 4 females (20%) had participated in this study. In total 35 males and 5 females had participated. Hence the mean of the age in group A and in group B patient age group lies between 15-35 years in this study.

Analysis of pain using VAS, ROM of ankle joint and subtalar joint using goniometer and functional ability using LEFS between the Group A and B showed that there was statistically significant improvement in both the groups when compared pre-intervention to post intervention.

Comparison of VAS in both groups showed that there was a significant reduction of pain in both groups. When the means values were taken for improvement from pre-intervention to post intervention were compared with VAS, Group A showed mean values 6.65 on day 1 and at the end of one week 2.55 and in Group B 6.65 on day 1 and 2.00 at the end of one week. This implies that the subjects with taping and exercises (group b) had improved in pain reduction than compared to subjects with cryotherapy and exercises.

Comparison of ROM in both groups showed that there was a significant increase in ROM in both groups. When the means values were taken for improvement from pre-intervention to post intervention were compared with ROM, Group A showed mean values on day 1 as 21.25 and 27.75 at the end of the week and in Group B on day 1 was 16.00 and 29.90 at the end of the week. This implies the subjects with taping and exercises were improved in ROM than compared to subjects with cryotherapy and exercises.

Comparison of LEFS in both groups showed that there was a significant improvement in functional ability in both groups. When the means of improvement from pre-intervention to post intervention were compared, Group A showed mean values 52.69 on day 1 and 77.94 at the end of week and in Group B 53.56 on day 1 and 82.25 at the end of week. This implies that the subjects with taping and exercises had an improved functional ability than compared to subjects with cryotherapy and exercises.

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The outcome measures were compared between both the groups and the mean values that is the difference of pre and post intervention of VAS, ROM and LEFS were taken. There as significant improvements in Group B compared to Group A.

**CONCLUSION:** In this study visual analog scale, range of motion and lower extremity functional scale were used to measure the prognosis of the pain intensity and functional ability in treating acute lateral ankle sprain were determined.

Taking into consideration the parameters of pain using the mean score of visual analog scale, range of motion and lower extremity functional scale in case of Cryotherapy with exercises was compared with taping with exercises

The study can be concluded stating that Taping and exercise gave better improvement than Cryotherapy and exercise in treatment of acute ankle sprain taking mean scores into account.

### LIMITATIONS:

1. The study was done only in the age group of 15-35 years; other age groups were not included in the study.
2. The duration of ankle sprain was not equal for all the subjects.

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