

Efficacy of Proprioceptive Training and Conventional Training in Reducing Pain and Improving Functional Activity for people with Lateral Ligament Injury

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Abstract

Background : Most athletes who participate in sports experience lateral ligament injury. Lateral ligament damage is one of the most frequent ankle ailments. The study was developed to determine the efficacy of proprioceptive training and conventional training in reducing pain and improving functional activity with lateral ligament injury.

Purpose: To compare the efficacy of proprioceptive training and conventional training in reducing pain and improving functional activity with lateral ligament injury.

Methods : This study is an experimental study. A total of 40 subjects participated in the study based on inclusion and exclusion criteria were taken from prism health care. The subjects willing to participate were divided into two separate groups as Group A (20 subjects) received proprioceptive training and Group B (20 subject) received conventional training. All were assessed with Numerical pain rating scale and Foot and ankle ability measures. This exercise was given for 2 weeks, a period lasting for 45 to 60 minutes 10 reps, 3sets. Pre and post test values are calculated and tabulated. The entire process was conducted from November 2022 to March 2023.

Result : According to statistical analysis Proprioceptive training is effective in reducing pain with patients with lateral ligaments injury with p value of <0.0001.

Conclusion : This study finally concluded that proprioceptive training has a high impact in reducing pain with patients with lateral ligaments injury.

Keywords : Lateral ligaments injury, proprioceptive training, conventional training, Numerical pain rating scale, Foot and ankle ability measure.

Introduction

Ankle ligaments injuries are common sports injuries. The ankle's lateral ligaments were injured in more than 90% of cases. The functional interaction of bone and ligamentous components as well as how they work as a protective shield against one

another is perfectly illustrated by the ankle. The actual ankle motion consists of a combination of plantar and dorsiflexion, as well as a small amount of internal and external rotation and anterior/posterior translation of The talus on the tibia. 20° dorsiflexion to 50° plantarflexion is the typical

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range.¹ Additionally, the lower leg can externally rotate relative to the ankle joint on Occasion. Because the ligament is tight in this posture, inversion injuries to the plantar-flexed Foot result in an injury to the ATFL. Reduced proprioceptive function and mechanical stability are to be blamed for this. Balance Board training significantly reduces the risk of recurring injuries to already wounded ankles. The completion of a monitored rehabilitation program of balance training activities should Therefore it can be recommended to athletes². Among the most frequent orthopaedic ailments are ligament damage to the ankle joint. Sports-related ankle injuries range from 13 to 56% of all injuries, particularly those to the Lateral ligaments. Athletes who have “rolled over” on the outside of their ankle are the ones Who appear with lateral ankle ligament sprains most frequently³. The definition of proprioception is “the reception of stimuli produced within the organism,”

Whereas the definition of balance is “physical equilibrium” numerous balance exercises will Train proprioceptive pathways, thus it is crucial to comprehend the differences. Proprioception is a neurological process, whereas balance is the capacity to maintain Equilibrium. To develop an awareness of one’s environment, this mechanism integrates the Central nervous system with peripheral nervous system receptors.⁸ In order to fully engage the body’s proprioceptive sense and proprioceptors for Body position evaluation, motor process perception, and motor unit activation, proprioceptive training is a phrase used to describe the comprehensive neuromuscular control of employing various training methods. Proprioceptive training is not a particular technique for training. As a component of the multisystem process of Balance and postural regulation, proprioception is the capacity to perceive joint position and movements. The nervous system receives information from sensory signals and Proprioceptors about body location, muscular activity, visual feedback, and other inputs. Essential for improved movement control and balance maintenance during regular activities and athletic performance.¹² Most ankle injuries, or 80% of them, are lateral ankle sprains, which are among the most Frequent musculoskeletal injuries. Conventional treatment is the initial preferred course of action for the majority of patients, consisting of early ankle

mobilization and weight-bearing, unsupervised exercises, and occasionally the use of external support (a bandage, brace, or Tape)⁹.

Aim

To compare the efficacy of proprioceptive training and conventional training in reducing pain and improving the functional activity with lateral ligament injury.

Material and Method

It was an experimental study conducted on 40 subjects with lateral ligament injury among athletes. Convenient sampling techniques are used.

Study period: From November 2022 to March 2023.

Inclusion criteria

- Age 20 - 35
- Both male and female are included.
- Subject with lateral ligament injury

Exclusion criteria

- Subject participating in other interventional studies.
- Subject with recent ankle fracture.
- Patients who refuse to sign consent forms or a lack of ability to adhere to study instructions.

Outcome Measures

Assessments were done at baseline (before the start of treatment) and two weeks into the study.

Numerical pain rating scale : This scale has been determined to be one of the most accurate pain outcome measures available. Patients were instructed to mark along a straight line on the evaluation sheet with a 0 at the beginning and a 10 at the end, with ‘0 denoting no pain and ‘10 denoting severe pain, depending on their perception of discomfort.⁸

Foot and ankle ability measure scale:

The Foot and Ankle Ability Measure (FAAM) was created in order to assess physical function in patients with foot and ankle-related disorders. This self-report outcome tool is also accessible in versions in Persian, English, German, and French. The Foot and Ankle Ability Measure, Sports Subscale and the

Foot and Ankle Ability Measure, Activities of Daily Living Subscale, are two subscales of the overall 29-item questionnaire. The more challenging tasks required for participating in sports are measured by the Sports subscale. It was made for athletes and is population-specific.⁹

Procedure

Taking into account the inclusion and exclusion criteria, participants were included. Participants were given a brief explanation of the process before being asked to sign the consent form. All of the invited subjects were evaluated in accordance with the assessment form. Participants were randomized into two groups, A and B, at random. Assessments were done at the start of the trial and two weeks later.

Group A: Proprioceptive training :

Proprioception is the neurological process that the body uses to receive sensory input from its environment and combine it with other information to produce a motor response. Examples of proprioceptive exercises for the ankle joint include standing on one leg while doing an activity like catching or throwing a ball, balancing on a wobble board or ankle disk, and standing on one leg Side Steps, Ankle Circle, Towel crunches, lateral crunches while doing these exercises. These workouts can improve the sensorimotor system's capacity to adjust to a changing environment, which will subsequently protect the body from harm⁶. Side step Procedure: The subject was instructed to stand with feet together with knees slightly bent and asked to take side step with the left foot followed by small steps and repeat the same to the other foot. No of sets: 3, No of repetition 10, hold for 10 sec and relax for 10 sec. Ankle circles : Procedure: The subject was instructed to sit in a long sitting and keep their arms inside and instructed to do little circles with the ankle and rotate left foot. No of sets : 3, No repetition 10 , hold for 10 sec and relax for 10 sec. Towel scrunches. Procedure: The subject was instructed to stand with flat foot placing on a towel and instructed to move the towel on their direction. No of sets :3, No repetition 10, hold for 10 sec and relax for 10 sec. Lateral lunges : Procedure: The subject was instructed to stand with feet hip width apart and take a broad side step with knee bent straight. No of sets :3, No repetition 10 , hold for 10 sec and relax for 10 sec.

Group B: Conventional training:

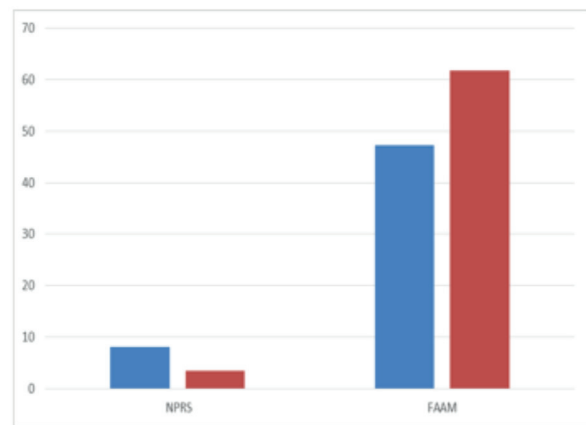
The main goals of conventional ankle joint treatment are to protect the wounded area to some extent and lessen the negative repercussions that the injury may have. After an ankle injury, muscular strength training has two purposes: to treat muscle dysfunction, such as atrophic muscle atrophy brought on by breaking and restricted mobility, and to treat articular muscle weakness. It is thought that one of the most effective ways to improve joint stability and reduce the risk of reinjury is to strengthen the associated muscle groups around the ankle through strength training.¹³

Bilateral heel raise Procedure: The subject was instructed to stand apart with maintaining straight knees then lift the heels from the ground and hold it for 10 secs. No of set 3 and no of repetitions 10 relax for 10 sec.

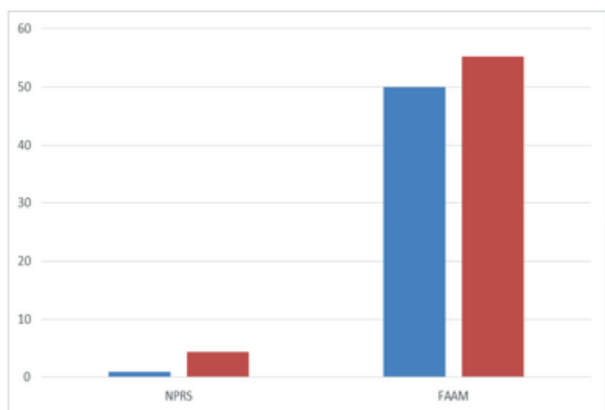
Forward lunges Procedure: The subject was instructed to stand with feet hip width apart and arms at their sides and bend any one of the knee forward with both legs bent 90 degree angle with weight bearing in front leg and repeat the same by switching legs. No of sets: 3, No of repetitions 10, hold for 10 sec and relax for 10 sec.

Full squats Procedure: The subject was instructed to stand apart as they squat down with maintaining the chest up and shoulder back with parallel 90 degree knees. No of sets: 3, No repetition 10, hold for 10 sec and relax for 10 sec.

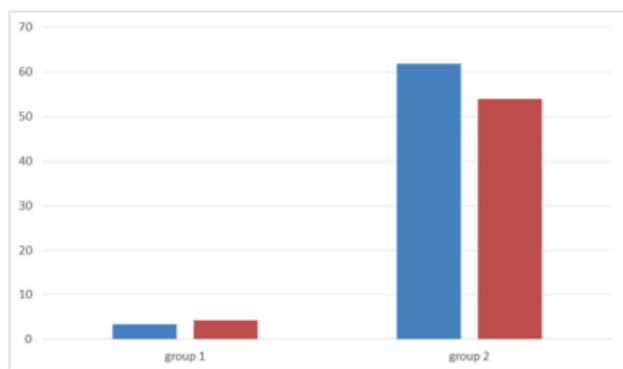
Data analysis



Graph-1: Pre and post test value of proprioceptive training.



Graph-2: Pre and post test value of conventional training



Graph-3: Post test value of Proprioceptive training and conventional training.

Result

The statistical analysis of Group A with proprioceptive training using numerical pain ratings scale, pre test and post test mean value 8.10 ± 3.40 ; and standard deviation value of 0.72 ± 0.50 ; with SEM value of 0.16 ± 0.11 ; T value of 23.9730 and P value less than 0.0001 is considered to be extremely statistical significant. And with Foot and ankle ability measure scale, pre test and post test mean value 47.45 ± 61.75 ; and standard deviation value of 7.77 ± 6.54 ; with SEM value of 1.74 ± 1.46 ; T value of 6.2954 with P value less than 0.0001 is considered to be extremely statistical significant. The statistical analysis of Group B with conventional training using numerical pain ratings scale pre test and post test value of 8.05 ± 4.30 and standard deviation value of 0.69 ± 0.66 ; with SEM value of 0.15 ± 0.12 ; SEM value of 0.15 ± 0.15 ; and T value of 17.6519 and P value less than 0.0001 which is considered as extremely statistical significant. And

with foot and ankle ability measure scale, pre test and post test value of 50.00 ± 55.26 ; and standard deviation value of 3.97 ± 3.14 ; SEM value of 0.89 ± 0.70 and T value of 4.5924 and P value less than 0.0001 which is considered to be extremely statistical significant. The difference between the two groups A and B by using Number pain ratings scale post test mean value of 3.40 ± 4.30 ; and standard deviation 0.50 ± 0.66 ; SEM value of 0.11 ± 0.15 ; with T value of 4.8659 with P less than 0.0001 which is considered to be extremely statistical significant. And foot and ankle ability measure scale posttest mean value of 61.75 ± 53.95 ; and standard deviation value of 6.54 ± 4.10 ; SEM value of 1.46 ± 0.92 with P value less than 0.0001 which is considered as extremely statistically significant.

Statistical analysis of numerical pain ratings scale and foot and ankle ability measure post test revealed that both groups show similar results but proprioceptive training exceeds the conventional training.

Discussion

The goal of the present study was to compare the efficacy of proprioceptive training and conventional training in reducing pain and improving functional activity for people with lateral ligament injury. Athletes who have rolled their ankles outward on the outside most frequently show with lateral ankle ligament sprain. This frequently happens when an athlete missteps, lands on an opponent’s foot, or lands on uneven terrain. Usually, these circumstances result in the foot being in plantar flexion at the time of the injury. Immediately following the injury, the patient typically feels a sharp, localized pain on the lateral side of the ankle. According to the statistical analysis, the difference between the pre-test and post-test score for both group A and B is significant. 40 Individuals pre and post-test values are identified independently, and their respective mean values for both groups are determined. Using descriptive and inferential statistics, the collected data is tabulated and evaluated. The mean and standard deviation are applied to all parameters. Significant differences between pre and post treatments data were analyzed using a paired t-test. For both group A and B, the unpaired t-test was employed to examine significant

differences in post-test values between the two groups.

As per the findings of a study by Vivek kumar Arora in 2016 proprioceptive and technical training can be a successful treatment to stop ankle sprains from happening again in people who have previously experienced grade I or grade II ankle sprains. According to Ana Maria de Castro 2022, A proprioceptive training programme for athletes that lasts longer than three weeks with weekly protocols made up of dynamic exercises for people with ankle problems. According to Carlo Mamo in 2016, proprioceptive control enhancements in single stance may be a critical element in the effective prevention of ankle, knee, and low back discomfort. According to Tina Winter, when done five times a week for 15 minutes, proprioceptive training enhances functional ankle stability in speed skaters after 12 weeks but not after six. Elements of Proprioception are affected in several ways. The technical demands of speed skating only caused kinaesthesia to improve in the right feet for plantarflexion. While there was no improvement in the static one-legged stance, the intervention group significantly outperformed all test scores for dynamic balance. For speed skaters to improve their functional ankle stability, regular proprioceptive training is advised⁷

Conclusion

According to the findings of this study Group A with proprioceptive training was found to be more beneficial than Group B with conventional training in reducing pain and improving functional activity for people with lateral ligament injury. As a result it is suggested that this procedure be used in clinical practice to improve functional activity and reduce pain with patients with lateral ligament injury.

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Conflict of Interest: Nil

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