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Evaluation of Proprioceptive Training to Restore the Joint's Sense in Ankle Sprains

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Abstract: ***Background of the Study: Ankle Sprain is a common musculoskeletal injury in which the ligaments of the Ankle partially or completely tear due to sudden twisted in Sports, and house hold and Professional activities. By Stepping off an Uneven Surface, most Ankle Sprains are Inversion injuries, with acute tears of the lateral ligaments of Ankle. The main aim of the study is to evaluate the Proprioceptive training and Traditional Physiotherapy in Ankle Sprains. An experimental study was conducted on 30 subjects with ankle sprain using convenient sampling technique based on inclusion and exclusion criteria subjects are divided into two groups group-A and group-B. Group-A Traditional Physiotherapy group was treated with traditional methods of RICE, stretching's and strengthening exercises where as Group-B Proprioceptive Training group was treated with traditional physiotherapy and proprioceptive training using exercise mats or floor, tilting table, oval board, trampoline foam roller for a period of 6weeks. Statistical Analysis of the study showed that both the Groups (Traditional physiotherapy Group-A) and (Traditional Physiotherapy and Proprioceptive Training in Group-B) had Significant Reduction in Pain and improvement in Joint Sense in Ankle Sprain but Group-B Subjects improved better When compared to Group-A. This study shows that there was significant improvement in reducing pain and improving functional ability in both Group-A and Group-B. However the (group B) showed more significant improvement than (group A) in improving the function and Join ROM and Joint Proprioception.***

Keywords: Ankle, Pain, Proprioception, Physiotherapy, Ankle Sprain, Traditional Physiotherapy

1.Introduction

Ankle Sprain is a common musculoskeletal injury in which the ligaments of the ankle partially or completely tear due to sudden twisted in a Sports activity or by stepping off an uneven surface and in house hold or professional activities. Most ankle sprains are inversion injuries, with acute tears of the lateral ligaments of the ankle. Individuals who had ankle sprains will complain of pain on the outside of their ankle and various degrees of swelling and bleeding under the skin. Depending on the severity of the Sprain a person may or may not be able to put weight on the foot (1). Sprain to the lateral ligaments of ankle in inversion mechanism consists more than 85% of Ankle Sprain among the lateral ligament of the anterior talofibular ligaments (ATFL) is the weakest one among them involving in all cases of lateral ligament Sprain, Calcaneo fibular ligaments (CFL) involves in more than one third cases, and Posterior talk fibular ligament (PFL) involves in less than 10% of cases. Meta analysis found ankle sprain constitutes 13: 6 of prevalence in females athlete and 6.94 in males athlete per 100 exposure and Football, Cricket, Rugby, Basketball, Tennis, Wrestling, Skiing, Ice hockey, Parachuting, Rock Climbing and Tracking are the premier sports to incident ankle sprain (2). It is mainly seen in the Countries like U. K Approximately 5000 ankle sprains occur each day. In Sweden up to 300000 each year. The incidence has been estimated an ankle sprain per 10000 people per day. The injury is painful and incapacitating in the acute phase, the weight bearing is difficult to tolerate for all but the most miner injuries (3). Ankle Sprain injuries account for approximately 10% of all injuries treated in the casually department. The Ankle ligament Sprains in the athletic population ranges from 11% to 20%. The two million ankle sprains occur every year in the United States, Which results in USD 2 Billion in health care costs. An estimated 32% to 74% of patients with lateral ankle sprains develop instability (4). In the American and British about 23000 and 5000 ankle injuries occurred per day. The 70% of patients with initial ankle sprain may be recurrence and become chronic ankle instability if given inappropriate treatment. In India the people who are participate in sports and Walking Barefoot is very common and hence incidence and Prevalence of the injuries are also high compared to western population Ankle Sprains Prevalence rate between 2-7 in this 13.6 Female and 6.90 in Male's for every 1000 People. Need of the study is to evaluate the Proprioceptive training and Traditional Physiotherapy to reduce pain and to restore the joint's sense in Ankle Sprain. Hence this study is undertaken with an intention to evaluate the Proprioceptive training and traditional physiotherapy in ankle sprains.

2.Methods

An experimental study was conducted on 30 subjects with ankle sprain using convenient sampling technique using odd even method of sampling based on inclusion and exclusion criteria. Men and women with ankle sprains between 18 to 50 years are included in the study. Recurrent ankle sprains, ankle sprains with foot drops and ankle sprains with fractures or any nerve injuries are excluded from the study. After receiving an informed consent from the subjects, subjects are divided into two groups group-A and group-B. Group-A Traditional Physiotherapy group was treated with traditional methods of RICE, stretchings and strengthening exercises where as Group-B Proprioceptive Training group was treated with traditional physiotherapy and proprioceptive training using exercise mats or floor, tilting table, oval board, trampoline and foam roller. In group-A that is traditional

physiotherapy group R. I. C. E Rest, Ice, Compression and Elevation. Rest was encouraged to prevent further tissue damage. Ice was applied at the injury site the patient position was supine lying. Compression was given by the crepe bandage in supine and it was given minimum 2 to 3 hours and during sleep at night. Elevation is given to the affected limb above the level of the heart by placing pillows, isometric exercises was started after 72 hours. Single leg balance exercise, was performed when the patient was pain free and ambulated on a leveled surface with out using an assistive device. Stretching exercises was performed for 15-30 sec using a towel for 10-20repetitions, Single leg stance balance exercises for 20-30 sec and repeated it for 10 repetitions both exercises was performed for 3-4 times per-day for a period of 6 weeks in group-B proprioceptive training group R. I. C. E Rest, Ice, Compression and Elevation. Rest was encouraged to prevent further tissue damage Ice was applied at the injury site the patient position was supine lying. Compression was given by the crepe bandage in supine and it was given minimum 2 to 3 hours and during sleep at night. Elevation was given to the affected limb above the level of the heart by placing pillows. Isometric exercises was started after 72 hours Single leg balance exercise, was performed when the patient was pain free and ambulated on a leveled surface without using an assistive device. Stretching exercises was performed for 15-30 sec using a towel for 10-20repetitions. Single leg stance balance exercises for 20-30 sec and repeated it for 10 repetitions. both exercises was performed for 3-4 times per-day and the proprioceptive exercises was performed as 6 weeks of balance training, 20-minute session, 5 times a week to improve ankle instability. one legged knee flexion on even surface with eyes open and close, and on standing position. one legged stance on even surface with eyes open and close, and on a balance board on standing position runners pose on even surface with eyes open and close, and on a balance board on standing position. Crossed leg sway with eye open hand supported, with eye open hand unsupported, with eye closed and hand unsupported and on a balance board. Toe walk on walking and jumping. Exercise mats or floor was performed by maintain single leg standing on floor and of several thick mattress from 1to 10 cm progress from 1 cm to 10 cm in three phases. Tilting table was used by maintain standing position in a double and single limb combined with ball throwing and catching. In first 2 weeks performed only double limb stance, then perform single limb stance up to 4 weeks and progress to throwing and catching in double and single limb stance. Oval board was maintained proper balance in a double and single leg stance, progressed to same work with convex surface on the floor and in weeks 4/6 standing position in a double and single limb stance with convex surface on the floor combined with throwing and catching was performed. Trampoline usage was started withstanding in a single limb stance in 2 weeks, progress to jumping with affected leg in 4 weeks and ball throwing and catching in 6 weeks. Foam roller was started in first 2 weeks by maintaining proper balance on a double limb stance with semicircular foam. Progress to single limb stance in 4 weeks and double and single limb stance on cylindrical foam in 6 weeks was performed. All the exercises were performed for a period of 6weeks.

3.Statistical Analysis

Database was statistically analyzed using descriptive and inferential statistics; mean and standard deviation was estimated using paired and independent t test. Paired t test was used to compare data sets within the groups and independent t test was used to compare the data sets between the groups.

Table 1: Comparison of pre-test and post-test values of FAAM and VAS in Group-A

GROUP A		MEAN	STANDARD DEVIATION	t VALUE	P VALUE
Foot and Ankle Ability Measure (FAAM)	PRE TEST	11.25	1.54	8.9678	<0.0001
	POST TEST	13.20	0.87		
VAS SCORE (VAS)	PRE TEST	8.27	1.98	9.8975	<0.0001
	POST TEST	3.79	0.67		

The data from above table shows pre-test and post-test values of FAAM and VAS of subjects in group A. The pre-test mean value of FAAM was 11.25 and post-test mean value was 13.20 This shows that FAAM scores were gradually Increasing significantly $p<0.0001$. The pre-test mean value of VAS was 8.27, and post-test mean value was 3.79, this shows that the VAS scores were gradually decreasing significantly $p<0.0001$.

Graph-1:

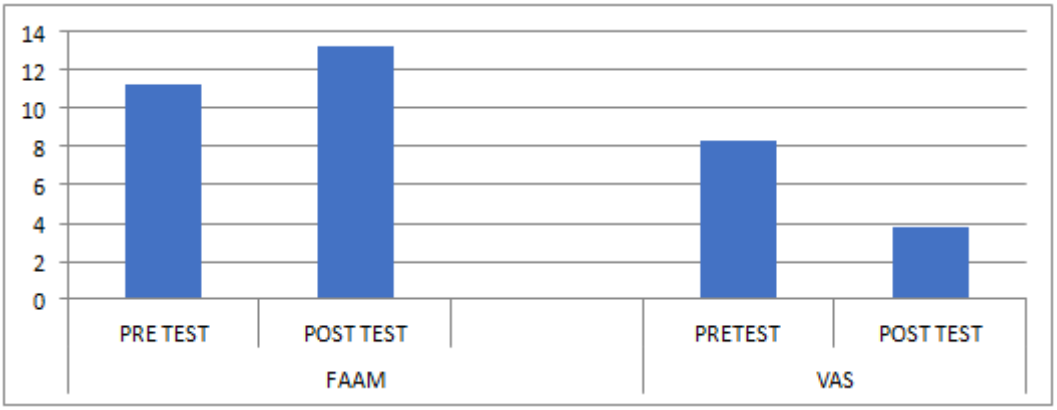


Table 2: Comparison of pre-test and post-test values of FAAM and VAS in group B

(GROUP B)		MEAN	STANDARD DEVIATION	t VALUE	P VALUE
Foot and Ankle Ability Measure (FAAM)	PRE TEST	11.72	1.67	7.9864	<0.0001
	POST TEST	17.76	0.93		
VAS SCORE (VAS)	PRE TEST	8.98	1.88	8.8753	<0.0001
	POST TEST	1.58	0.75		

The data from above table shows pre-test and post-test values of FAAM and VAS of subjects in group B. The pre-test mean value of FAAM was 11.72 and post-test mean value was 17.76. This shows that the FAAM scores were gradually increasing significantly $p<0.0001$. The pre-test mean value of VAS was 8.98 and post-test mean value was 1.58. This shows that the VAS scores were gradually decreasing significantly $p<0.0001$.

Graph 2:

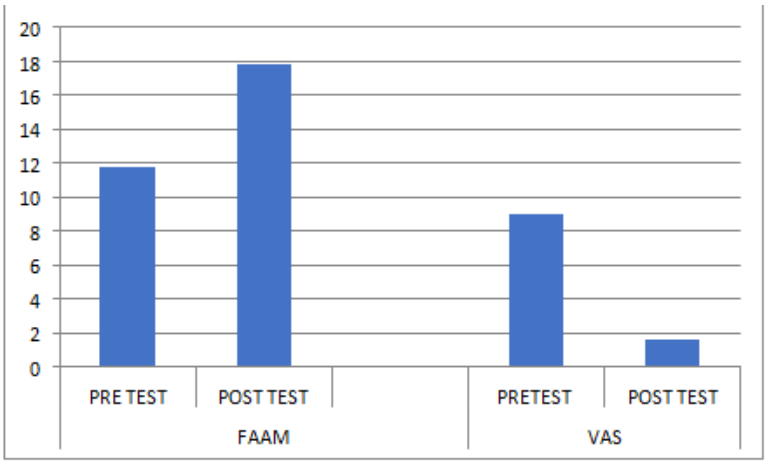
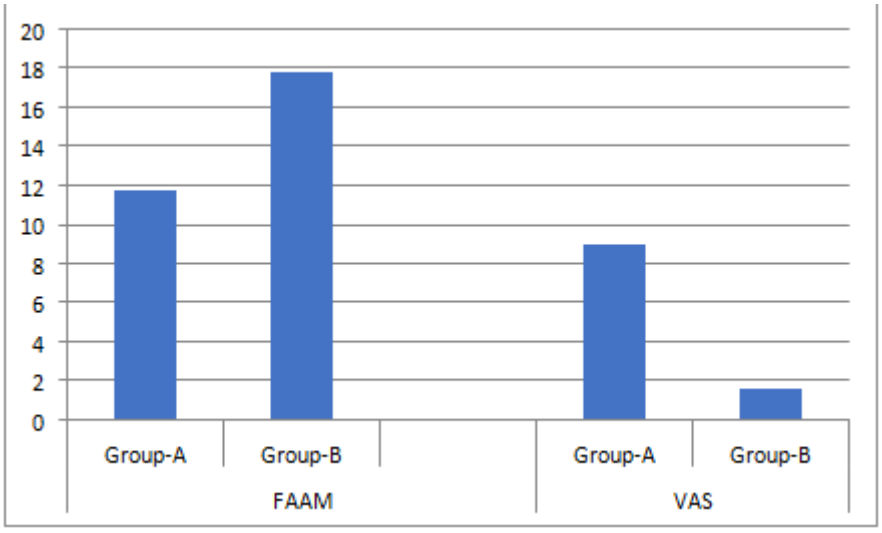


Table 3: Comparison of post-test values of FAAM and VAS in group A and B

POST TEST		MEAN	STANDARD DEVIATION	t VALUE	P VALUE
Foot and Ankle Ability Measure (FAAM)	Group A	13.20	0.87	18764	<0.0001
	Group B	17.76	0.93		
VAS SCORE	Group A	3.79	0.67	1.6532	<0.0001
	Group B	1.58	0.75		

The data from above table shows post-test values of FAAM and VAS of subjects in group A and group B. The post-test mean value of FAAM in group A was 13.20 and post-test mean value of FAAM in group B was 17.76. This shows group B has greater improvement in restoring the joint sense in Ankle sprains than group A with the p value (0.0001). The post-test mean value of VAS in group A was 3.79 and post-test mean value of VAS of group B was 1.58. This shows group B had greater improvement in reduction of pain than group A with the p value (0.0001).



Graph 3

4.Result

From statistical analysis made with the quantitative data revealed statistically significant difference between the group A and group B and also within the groups. the post-test mean value of FAAM in group A was 13.20 and post-test mean value of FAAM in group B was 17.76. this shows that FAAM scores in group B were comparatively higher than group A, $p<0.0001$. the post-test mean value of vas in group A was 3.79 and post-test mean value of vas in group A was 1.58. this shows vas scores in group A were comparatively lesser than group A, $p<0.0001$. statistical analysis of post test for pain and restoring joint sense in ankle sprains revealed that subjects who received traditional physiotherapy and proprioceptive training in group B showed marked improvement compared to subjects who received only traditional physiotherapy in group A.

5.Discussion

Ankle sprain is a common during sports, and house hold and professional activities. This study was focused on ankle sprains for normal individuals to provide proper strength and balance and to helps in preventing ankle sprains in future. Physiotherapy (11) treatment s are rice rest, ice, compression, and elevation. ice was used to reduce muscle spasm, ice has also been shown to reduce blood flow, the inflammatory response, edema production, hemorrhage and pain sensitivity. According to the Dutch Quality Institute for Healthcare CBO consensus guidelines RICE therapy is the treatment preferred for the first 4 to 5 days for ankle joints (5). Using Cold therapy in treating ankle sprains helps in reducing edema. (6) compression is purported to increase the hydrostatic pressure of the interstitial fluid, (7) counteracting some of the force that causes fluid to move out of the tissue following damage. Elevation of the affected limb utilizes the influence of gravity and results in an increase in venous and lymphatic drainage reduction in edema and reduction of local bleeding (8, 9). Isometric and isotonic strength training exercises, active range of motion exercises, strengthen exercises, stretching's, ultrasound, interferential therapy, taping, soft tissue manipulation therapy (10), proprioceptive training (11), neuromuscular training, balance training exercises. Alghadir, Zahewn A Iqbal, Amir Iqbal, Hashim Ahmed explained that we can prevent ankle sprain by correcting mechanical insuffiencies and improving functional performances (11). Pánics et al. discussed about effective treatments for ankle joints in which prorioceptive treatment plays major role (12, 13, 14). Hupperets MD, Verhagen EA, Van Mechelen W concluded that The Proprioceptive Training reduces the risk of recurrent Ankle Sprains and improve the joint sense and ability of locomotion. (14) Daniel TP Fong, Yue-Yan Chan, Kam-Ming Mok, Patrick discussed about proprioceptive trainings which decreases the risk of the Recurrent Ankle Sprains and Gives Good Strength and improve the joint sense. (15) along with proprioceptive treatment balance training will help the ankle sprain individual to get better improvement than routine treatment (16) where as balance training will also reduces the risk of ankle sprains also (17) Ahmad H. et., al. explained that improving Range of Motion providing Proprioception and Balance helps the chronic ankle sprain subjects to get effective recovery (18) Ryan P McGovern, Rob Roy L Martin concluded that the support to join ligaments further risk of recurrent ankle sprains by more functional treatment and the proprioceptive training. (19) Young-Jun Shin, provided a literature that supporting the ankle joint are prevent the risk of recurrent injury to the ankle joint. (20). In this study we have provided only traditional training for group-A and traditional training along with proprioceptive training for the subjects with ankle sprain and this study resulted proprioception training and traditional physiotherapy to restore the joints

sense and to reduce pain in ankle sprains for group-B was higher compared with group-A and the result obtained was that the traditional training along with proprioceptive training will help in reducing ankle sprain with good muscular support.

6.Conclusion

In this study by evaluating the proprioception training and traditional physiotherapy to restore the joints sense and to reduce pain in ankle sprains showed that there was a significant difference between the pre test intervention. the study concluded that both the groups resulted in positive outcomes but group-B with traditional physiotherapy and proprioceptive training showed higher level of positive outcome in terms of decreasing pain and improving joint's sense. when compared to group-A with traditional physiotherapy in ankle sprains.

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