

Effects of Ultrasound Therapy, Interferential Therapy and Combination of Ultrasound Therapy with Interferential Therapy on Bursitis of Knee in Sports

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Abstract- In modern age athletes are trained scientifically to improve their physical fitness, technical and tactical ability to attain better performance. People participated in sports are more likely than others have injuries. In this research the researcher is interested to find out effects of ultrasound therapy, interferential therapy and combination of ultrasound therapy with interferential therapy in treatment of bursitis of knee. Though there are different knee injuries, the investigator selected only bursitis of knee. To test the effect of these different treatments, namely, ultrasound therapy, interferential therapy and combination of ultrasound therapy with interferential therapy on the players who were suffering from bursitis of knee. The researcher selected perceived pain, swelling and range of motion as dependent variables. 30 players suffering from bursitis of knee were selected as subjects for this study. The subjects were in the age group of 16 to 25 years. The differences between means of initial and final scores on selected criterion variables were subjected to statistical treatment using analysis of covariance (ANCOVA). The results of the study proved that ultrasound therapy, interferential therapy and combination of ultrasound therapy with interferential therapy were significantly contributed for the treatment of bursitis of knee as measured through swelling, pain and range of motion. Among the treatment groups, combination of ultrasound therapy with interferential therapy was significantly better than the other two treatment groups, namely, ultrasound therapy group and interferential therapy group in reducing pain, swelling and improving range of motion for bursitis of knee in the players.

Index Terms: Ultrasound Therapy, Interferential Therapy, Bursitis, Pain, Swelling, Range of motion.

1. INTRODUCTION

In modern age athletes are trained scientifically to improve their physical fitness, technical and tactical ability to attain better performance. People who participate in sports are more likely than others have injuries. This certainly doesn't mean you should avoid sports. Physiotherapy plays an integral part in the multi-disciplinary approach to the management of sports injuries. The aim of physiotherapy is to treat and fully rehabilitate the athlete post-injury, post-operatively, to prevent further injury and to return the athlete to sport in the shortest possible time. Effectiveness of therapeutic ultrasound for pain, musculoskeletal injuries, and soft tissue lesions remains questionable. Study has proven that ultrasound helps in enhancing the metabolic activities of cells. Thus, ultrasound treatment helps in tissue repair, especially in soft tissue injuries (**Kerry G Baker, et al., 2001**). The literature regarding interferential therapy (IFT) treatment has proven that pain and inflammation will be reduced from the acute

phase, and even aims to increase range of motion, especially in short-term changes. IFT along with ultrasound can be applied to ease pain and swelling symptoms as well. This well applied together to the nerve tract of irritated or inflamed tissue can shorten the inflamed region and reduce pain (**Heidt RS, et al., 1996 and McConnell J, 2002**). In this research the researcher is interested to find out effects of ultrasound therapy, interferential therapy and combination of ultrasound therapy with interferential therapy in treatment of bursitis of knee. Even though there are different knee injuries, the investigator selected only bursitis of knee for this study. To test the effect of these different treatments, namely, ultrasound therapy, interferential therapy and combination of ultrasound therapy with interferential therapy on the players who were suffering from bursitis of knee. The researcher selected perceived pain, swelling and range of motion as dependent variables.

Sports Injuries

Sports injuries are injuries that occur in athletic activities or while exercising. Sports injuries may be classified as hard tissue injuries, soft tissue injuries, capsular injuries, and cutaneous injuries. Out of which, soft tissue injuries and hard tissue injuries are most commonly occurring injuries in present sports, and both may be mild to severe.

involve more than one structure in the knee. Pain, swelling and reduced range of motion are the most common signs of knee injury.

Bursitis

Bursitis is the inflammation or irritation of the bursa. The bursa is a sac filled with lubricating fluid, located between tissues such as bone, muscle, tendons, and skin, that decreases rubbing, friction, and irritation. Bursitis is most often caused by repetitive, minor impact on the area, or from a sudden, more serious injury. Age also plays a role. As tendons age they are able to tolerate stress less, are less elastic, and are easier to tear. Overuse or injury to the joint at work or play can also increase a person's risk of bursitis. Examples of high-risk activities include gardening, raking, carpentry, shoveling, painting, scrubbing, tennis, golf, skiing, throwing, and pitching. Incorrect posture at work or home and poor stretching or conditioning before exercise can also lead to bursitis.

Bursitis of Knee

The most common form of knee bursitis involves inflammation of a bursa at the front of the knee. Localized inflammation and swelling can produce a lime or even grapefruit sized lump under the skin. It has been called housemaid's knee because it is often caused by repeated kneeling. A trauma to the knee or a medical condition, such as gout or rheumatoid arthritis, can also cause knee bursitis.

Ultrasound Therapy

The first large scale application of ultrasound was around World War II. Sonar systems were being built and used to navigate submarines. It was realized that the high intensity ultrasound waves that were using were heating and killing fish. This led to research in tissue heating and healing effects. Since the 1940's ultrasound has been used by physical therapists for therapeutics effects in an effective manner. Therapeutic ultrasound refers generally to any type of ultrasonic procedure that uses ultrasound for therapeutic benefit. Ultrasound is a method of stimulating the tissue beneath the skin's surface using very high frequency sound waves, between 800,000 Hz and 2,000,000 Hz, which cannot be heard by humans.

Interferential Therapy (IFT)

Knee Injuries

Knee is made up of many important structures, any of which can be injured. The most common knee injuries include fractures around the knee, dislocation, sprains and tears of soft tissues, . In many cases, injuries

Interferential therapy was developed by Dr. Hans Nemeč in 1950. Interferential therapy is an effective therapy option used by many physiotherapists to relieve pain and accelerate the self-healing process, getting your body back to a healthy, pain free state. The high frequency signals of an IFT penetrate through the skin into deeper lying muscle tissues. Electrodes are placed on patient's skin around the injured body part. The interferential current device then transmits electrical impulses in minute quantities through the skin. Underlying tissues and nerves are stimulated which begins the healing properties. These impulses are not painful in the least. Frequencies produced by the IFT have been proven to stimulate endorphins, the body's natural pain killers. This can help to create a self-healing process without the need to for medications.

Statement of the Problem

The purpose of this study was to trace out the effects of ultrasound therapy, interferential therapy and combination of ultrasound therapy with interferential therapy in the treatment for bursitis of knee in sports.

Hypotheses

In the light of the theoretical foundations laid so far on the treatment effects, the investigator hypothesized the following for the purpose of this study.

It was hypothesized that the three treatments, namely, ultrasound therapy, interferential therapy and combination of ultrasound therapy with interferential therapy would significantly reduce pain and swelling, and improve range of motion for the anterior cruciate ligament (ACL) injury among injured players of knee.

2. METHODOLOGY

The subjects for this study were the students studying Master of Physical Education (M.P.Ed.), Bachelor of Physical Education (B.P.Ed) and Diploma in Physical Education (D.P.Ed.) in Rayalaseema College of Physical Education, Proddatur and also the students of other nearby Degree and P.G. Colleges in Proddatur, YSR Kadapa District, Andhra Pradesh, who got bursitis of knee and approached Physiotherapy Department at Rayalaseema College of

Physical Education for treatment during the academic years 2014-15 to 2017-18. The players who reported pain, swelling and reduced motion were selected as subjects, by administering a brief questionnaire. 30 players suffering from bursitis of knee were selected as subjects for this study. The subjects were in the age group of 16 to 25 years. Further the subjects were randomly sub divided into three groups consisting of 10 in each. Group I underwent ultrasound therapy, Group II underwent interferential therapy and Group III underwent combination of ultrasound with interferential therapy.

The selected **Dependent Variables** for the study were as follows:

1. **Pain** - at and around the knee joint.
2. **Swelling** - may be of any degree near the
3. knee joint
4. **Range of Motion (ROM)** - due to bursitis of knee.

The selected **Independent Variables** for the study were as follows:

1. Ultrasound Therapy
2. Interferential Therapy
3. Combination of Ultrasound Therapy with Interferential Therapy

Prior to the experimental treatments, all the subjects were measured pain, swelling and range of motion at knee joint. The experimental treatments were given to the subjects as per description and supervision of the

experienced physiotherapist for fifteen days. All the subjects were tested prior to treatment and after completion of fifteen days of treatment on selected dependent variables, namely, pain, swelling and range of motion. The difference between initial and final means of pain, swelling and range of motion were considered as the effect of selected treatment on selected injury. The differences between means of initial and final scores on selected criterion variables were subjected to statistical treatment using analysis of covariance (ANCOVA).

3. ANALYSIS OF THE DATA AND RESULTS OF THE STUDY

The data on each criterion variable of bursitis of knee were analyzed separately and the results are presented below.

Results on Swelling of Bursitis of knee

The descriptive statistics on obtained data on swelling of bursitis of knee due to ultrasound therapy (UST), interferential therapy (IFT) and combination of ultrasound therapy with interferential therapy (USIFT) are presented in Table 1.

Table 1: Analysis of Covariance for the Pre Test, Post Test and Adjusted Post Test data on Swelling of Bursitis of Knee of Ultrasound Therapy (UST), Interferential Therapy (IFT) and Combination of Ultrasound Therapy With Interferential Therapy (USIFT) Groups

Tests / Groups		UST Group	IFT Group	USIFT Group	SOV	Sum of Squares	df	Mean Squares	F ratio
Pre Test	\bar{X}	41.25	42.00	42.10	B	4.31	2	2.16	0.18
	σ	3.83	3.07	3.50	W	327.53	27	12.13	
Post Test	\bar{X}	37.10	39.60	34.81	B	114.79	2	57.40	7.29*
	σ	2.20	3.58	2.44	W	212.53	27	7.87	
Adjusted Post Test	\bar{X}	37.23	39.55	34.74	B	115.89	2	57.94	7.76*
					W	194.05	26	7.46	

*Significant at 0.05 level of confidence.

SOV: Source of Variance; B: Between, W: within

The Table value for significance at 0.05 level with df 2 and 27 and 2 and 26 are 3.35 and 3.37 respectively.

The table 1 shows that the pre test means on swelling of bursitis of UST, IFT and USIFT groups are 41.25, 42.00 and 42.10 respectively. The obtained F ratio of 0.18 for pre test means is less than the table value of 3.35 for df 2 and 27 required for significance at 0.05 level. This shows that there was no significant difference in means of the groups at initial stage.

The post test means on swelling of bursitis of UST, IFT and USIFT groups are 37.10, 39.60 and 34.81 respectively. The obtained F ratio of 7.29 for post test means is greater than the table value of 3.35 for df 2 and 27 required for significance at 0.05 level. This shows that there was significant difference in means of the groups at the end of treatment.

The adjusted post test means on swelling of bursitis of UST, IFT and USIFT groups are 37.23, 39.55 and 34.74 respectively. The obtained F ratio of 7.76 for adjusted post test means is greater than the table value of 3.37 for df 2 and 26 required for significance at 0.05 level.

The result of the study indicates that there is a significant difference among adjusted post test means

of UST, IFT and USIFT on swelling of bursitis of knee. To determine the significance difference among the three paired means, the Scheffe's test was applied as post hoc test and the results are presented in Table 2.

Table 2: Scheffe's Post hoc Analysis for the difference between the Adjusted Post Test Paired Means on Swelling of Bursitis Knee of Selected groups

Adjusted Post Test Means			Mean Differences	Confidence Interval
UST Group	IFT Group	UST & IFT Group		
37.23	39.55	--	2.32	3.89
37.23	--	34.74	2.49	3.89
--	39.55	34.74	4.81*	3.89

*Significant at 0.05 level of confidence.

Table 2 shows that the adjusted post test mean difference on swelling of bursitis of knee between IFT group and USIFT group is 4.81 which is greater than the confidence interval value 3.89. It may be concluded from the result that there is a significant difference between UST group and IFT group on swelling of bursitis of knee.

Further the table II shows that the adjusted post test mean difference on swelling of bursitis of knee between UST group and IFT group, and between

UST group and USIFT groups are 2.32 and 2.49 respectively, which are lesser than the confidence interval value 3.89. It may be concluded from the result that there is no significant difference between UST group and IFT group and between UST group and USIFT groups on swelling of bursitis of knee.

The adjusted post test mean values on swelling of bursitis of knee of UST, IFT and combination of USIFT groups are graphically depicted in Figure 1.

Figure 1: Bar Diagram Showing Pre Test, Post Test and Adjusted Post Test means on Swelling of Bursitis of Knee of UST, IFT and USIFT Groups.

4. RESULTS OF THE STUDY AND DISCUSSION ON HYPOTHESES

The results presented in tables I and II show the descriptive statistics, ANCOVA results and post analysis respectively on swelling of bursitis of knee due to ultrasound therapy (UST), interferential therapy

(IFT) and combination of ultrasound therapy with interferential therapy (USIFT). The results proved that all the three treatment groups were able to reduce swelling of bursitis of knee significantly. The formulated hypothesis No. 1 that ultrasound therapy, interferential therapy and combination of ultrasound

therapy and interferential therapy would significantly reduce swelling of bursitis of knee was accepted at 0.05 level.

Further the results proved that the combination of ultrasound therapy with interferential therapy (USIFT) was found to be significantly better than the other two treatments i.e., ultrasound therapy (UST) and interferential therapy (IFT) in reducing the swelling of bursitis of knee. The formulated hypotheses No. 4 that the combination of ultrasound therapy with interferential therapy (USIFT) would significantly reduce swelling of bursitis of knee, when compared to the other two treatments i.e., ultrasound therapy (UST) and interferential therapy (IFT) was accepted at 0.05 level.

5. CONCLUSIONS

From the analysis of the data, the following conclusions were drawn:

1. It was concluded that the three treatments, namely, ultrasound therapy, interferential therapy and combination of ultrasound therapy with interferential therapy have significantly reduced swelling of bursitis of knee. It was further concluded that the combination of ultrasound with interferential therapy

was significantly better when compared with the two other treatments, namely, ultrasound therapy and interferential therapy in reducing swelling of bursitis of knee.

2. It was concluded that the three treatments, namely, ultrasound therapy, interferential therapy and combination of ultrasound therapy with interferential therapy have significantly reduced pain of bursitis of knee. It was further concluded that combination of ultrasound therapy with interferential therapy was significantly better when compared with the two other treatments, namely, ultrasound therapy and interferential therapy in reducing pain of bursitis of knee.
3. It was concluded that the three treatments, namely, ultrasound therapy, interferential therapy and combination of ultrasound therapy with interferential therapy have significantly improved range of motion of bursitis of knee. It was further concluded that combination of ultrasound therapy with interferential therapy was significantly better when compared with the two other treatments, namely, ultrasound therapy and interferential therapy in improving range of motion of bursitis of knee.

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