



A Study to Find the Effectiveness of Proprioceptive Training and Strengthening Exercises of Osteoarthritis of Knee

Authors

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Abstract

Background: Osteoarthritis is the most common joint disorder among adults 45 to 74 years of age or older, symptomatic disease occurs in approximately 12.1% population. Before 50 years of age the prevalence of OA in most joints is higher in men than in woman .In patients with no joint pain who have radiographic changes of OA, quadriceps weakness predicts radiograph progression and pain.

Methods: A total number of 30 subjects were divided into 2 groups as group A and group B, in which each group consists of 15 subjects. The group A subjects will be subjected to proprioceptive training with taping for a period of three times a week for 3 weeks. The group B subjects will be subjected to strengthening exercises for a period of three times a week for 3weeks.

Results: The Pre and Post ULTRASOUND with quadriceps exercises technique on OA knee shows significant difference ($p < 0.0001$) by using Un Paired `t` test in relieving non specific knee pain. The Pre and Post ultrasound with strengthening exercises (closed kinematic chain) on OA KNEE shows significant difference ($p < 0.0001$) using UN Paired `t` test in relieving non specific knee pain. This study shows that there is significant difference at 95% of Confidence Intervals ($p = 0.41$ i.e. > 0.05) by using unpaired `t` test in the effectiveness of ultrasound with quadriceps exercises versus ultrasound with strengthening exercises on OA knee patients with specific knee pain

Conclusion: This study between two groups comparing UST with proprioceptive training and UST with strengthening exercises. UST with strengthening exercises brings best result to subjects of knee osteoarthritis in reducing pain and functional disability .

Keywords: Taping, Semi-rigid brace, Ultrasound therapy, Ankle sprain.

Introduction

Osteoarthritis is the most common joint disorder among adults 45 to 74 years of age or older, symptomatic disease occurs in approximately 12.1% population. Before 50 years of age the prevalence of OA in most joints is higher in men

than in woman .In patients with no joint pain who have radiographic changes of OA ,quadriceps weakness predicts radiograph progression and pain.(Astha Maggo et al,2011)

The strengthening exercises are beneficial for OA knee by several pathways improving strength,

improving psychological wellbeing.(Fischer N.M et al,1993)

Few investigations have investigated the relationship between impaired proprioception and performance is other measures of functional status in OA. The quadriceps sensory dysfunction that is decreased proprioceptive activity. (Slemenda C et al, 1998)

Restoration of these sensory motor deficits with strengthening may retard progression of knee OA and reduce disability. (David T et al, 2009)

Although it is generally accepted that a rehabilitation program improves the functional capacity, pain and sensory motor function of patients .The efficacy of proprioceptive and strengthening exercises in OA knee to reduce pain, functional disability and improve joint position sense.(Da-Hon Lin et al,2009)

The economic impact of osteoarthritis has also been estimated to be as high as 3% of the gross domestic product because of work-days missed due to joint pain. The pathogenesis of osteoarthritis is likely multi factorial, and an interplay of systemic risk factors such as obesity or older age and local risk factors such as mechanical load both contribute to creating disease in any one joint.(Gupta Abishek Rajendra et al,2007)

Osteoarthritis of the knee impair quadriceps5 function which in turn impairs the patient balance and gait reducing their mobility and function the intent of proprioceptive exercises in to expose people to activities that challenge the stability of the knee and balance in a controlled manner during rehabilitation.(Ufuk Sekir et al,2005)

The therapeutic values of exercise come into effect at this stage of rehabilitation during injury to muscle, tendon or ligament (Scott M et al, 2000)

The rehabilitation programme should9 essentially include proprioceptive training. Proprioception is the body's ability to transmit a sense of position, analyze that information and react (consciously or unconsciously) to the stimulation with the proper movement (*Houglum, 2001*).

Proprioception includes balance, coordination and agility because the body's proprioceptors control all these factors. It describes the body's ability to react appropriately to external forces. The loss of position sense puts the joint at further risk of injury because of the loss of stability, postural control and functional capacity (ufuk sekir et al, 2005)

Proprioceptive feedback reaches the central nervous system from receptors located in muscles and joints, vestibular apparatus in the inner ear, and the eyes. Muscle and joint receptors are stimulated by movements of the musculoskeletal system. The vestibular apparatus provides information on whole body position and stimulated when upright body posture changes. (Scott M et al,2000)

Proprioceptive exercises provides training to brain, nerves and muscles to communicate better to correctly identify where the body is and how it is moving.(Ufuk Sekir et al,2005)

The incidence of osteoarthritis is expected to increase as the population ages to include a larger number of the elderly and with growing incidence of obesity throughout the world. (Robert Topp et al,2002)

The economic impact of osteoarthritis has also been estimated to be as high as 3% of the gross domestic product because of work-days missed due to joint pain. (Fitzgerald GK et al, 2002)

Although it is generally accepted that a rehabilitation program improves the functional capacity pain and sensorimotor function of patient there is lack of agreement about what such a rehabilitation program should include (Roddy et al 2005)

Though the above mentioned studies give us some insight to the role of some proprioceptive exercises in knee OA but none of the studies have studied the combined effect of strengthening exercises in knee OA .thus in this study it is intended to check the efficacy of proprioceptive and strengthening exercises in knee OA to reduce pain functional disability and improve joint position sense.

Materials and Methods

Subjects were selected through simple Random Sampling. The purpose of this study was explained to all the subjects. An informed consent was taken, followed by demographic data from each subjects. The study included a sample of 30 subjects from Outpatient Physiotherapy department of Narayana Medical Institutions, Nellore.

Selection Criteria**Inclusion Criteria**

- Both sex
- Age group between 30-50 years
- Diagnosed cases of osteoarthritis grade2 and 3
- Bilateral osteoarthritis
- Patient should able to demonstrate sufficient English skills.

Exclusion Criteria

- Neurologic disorders
- Steroid injections in past 2 months
- Inflammatory arthritis
- Metal implants in lower limbs
- Osteoporosis
- knee ligament/meniscal injuries

Outcome Measures

- Pain
- VAS scale.

Measurement Tool

- VAS SCALE
- WOMAC SCALE

Materials Used

- goniometer
- inch tape
- Ultrasound

Duration of Study

- 3 weeks.

Intervention to be Conducted**Intervention**

1. Before starting the exercises patients were given treatment for pain reduction by UST .the patients were positioned supine and comfortably on the treatment plinth.

2. Strengthening exercises(Gail D,2005)12 Static quadriceps in knee extension patient is positioned fully supine .patient contracts the quadriceps femoris muscle and pushes knee down while maintaining the foot in full dorsiflexion.

Closed chain exercises one of the two exercises is performed 3 times per week.

- A .seated leg press
- B .partial squats
- C. proprioceptive exercises (chita et al 2007)
 - A .one leg balance
 - B .blind advanced one leg balance
 - C .toe walking
 - d. heel walking
 - e .cross leg body swing

Methodology

A total number of 30 subjects diagnosed with knee osteoarthritis based on inclusion and exclusion criteria. After the informed consents obtained, they will be divided into 2 groups as group A and group B, in which each group consists of 15 subjects.

Prior to the treatment pre test will be conducted for the group A and group B to check the knee range of motion with WOMAC scale and the results will be recorded.

After a brief demonstration about ultrasound with quadriceps exercises , the group A subjects will be subjected to ultrasound with quadriceps exercises for a period of thrice a week for 3 weeks.

A brief demonstration about ultrasound with strengthening exercises is given to the group B subjects and the group B subjects will be subjected to ultrasound with strengthening exercises for a period of thrice a week for three weeks.

The post test will be conducted for group A and group B on WOMAC scale and the results will be recorded and analysed to compare the pre test and post test results.

Procedure

Assessment of Pain

The Visual Analogue Scale (VAS) is designed to present to the respondent a rating scale with minimum constraints. Respondents mark the location on the 10-centimeter line corresponding to the amount of pain they experienced. This gives them the greatest freedom to choose their pains exact intensity. It also gives the maximum opportunity for each respondent to express a personal response style. VAS data of this type is recorded as the number of millimeters from the left of the line with the range of 0-100.

Data Analysis

The data were analysed by repeated measures Unpaired 't' test at 0.41 level of significance and using soss version.

The dependent variable was Pain and the independent variable was VAS scale.

Independent Sample T-Test

Group Statistics

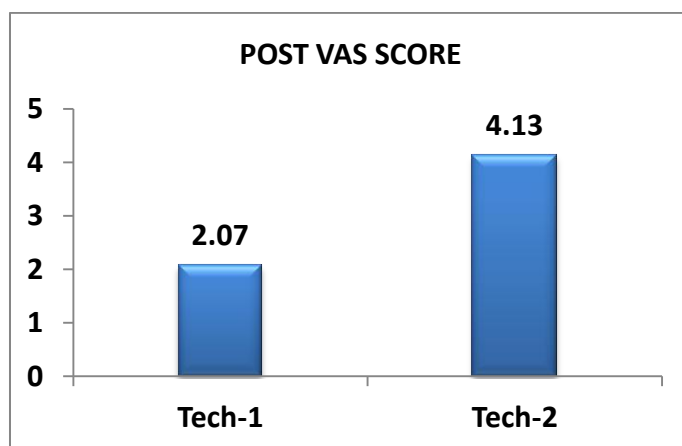
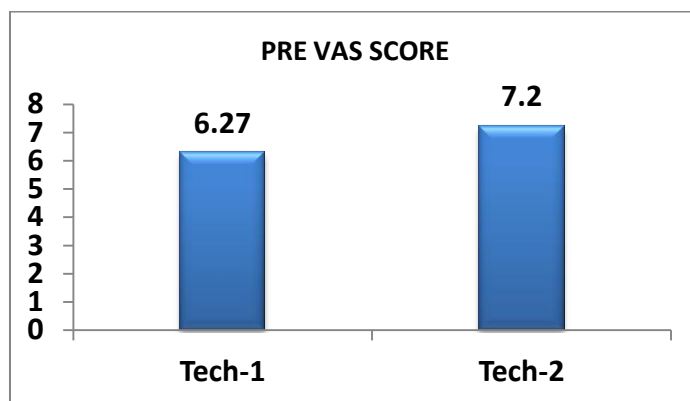
	Tech	N	Mean	Std. Deviation	P-VALUE
Age	1.00	15	40.8667	4.91160	0.748
	2.00	15	41.5333	6.27770	
PRE VAS	1.00	15	6.2667	.79881	0.003
	2.00	15	7.2000	.77460	
POSTVAS	1.00	15	2.0667	.70373	< 0.0001
	2.00	15	4.1333	.99043	
PREWOMAC	1.00	15	74.5333	2.85023	0.001
	2.00	15	79.4667	4.24040	
POSTWOMAC	1.00	15	23.4000	1.99284	<0.0001
	2.00	15	29.6667	1.98806	

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Results

The Pre and Post ULTRASOUND with quadriceps exercises technique on QA knee shows significant difference ($p < 0.0001$) by using Un Paired 't' test in relieving non specific knee pain.

The Pre and Post ultrasound with strengthening exercises(closed kinematic chain) on OA KNEE shows significant difference ($p < 0.0001$) using Un Paired 't' test in relieving non specific knee pain. This study shows that there is significant difference at 95% of Confidence Intervals ($p = 0.41$ i.e. > 0.05) by using unpaired 't' test in the effectiveness of ultrasound with quadriceps exercises versus ultrasound with strengthening exercises on OA knee patients with specific knee pain

Discussion

The purpose of this study was to find out the effect of proprioceptive and strengthening exercises in knee osteoarthritis.

30 subjects were selected who fulfilled the predetermined inclusive and exclusive criteria. The subjects were divided into two groups, 15 in each group. Group A underwent ultrasound with quadriceps exercises and Group B ultrasound therapy with strengthening exercises.

The results indicated that the effectiveness proprioceptive and strengthening exercises has shown significant difference at 95% of CI ($P > 0.05$) in relieving of knee osteoarthritis.

In both groups group B shows significant improvement in pain and functional outcome score with womac score.

Whereas group A and B with in group A itself compare to with pre and post improvement shown

,group B itself comparative with pre and post improvement shown ,where as comparison between group A and group B, group B shown significant difference.

Functional treatment is a widely used and generally accepted treatment for OA KNEE .A number of studies assessing the effectiveness of different conservative treatments of acute osteoarthritis have been performed, but until now, little was known about patient satisfaction in relation to the functional outcome .The results of these randomized comparing proprioceptive and strengthening exercises treatment demonstrated improved patient satisfaction with less local complications in patients treated with ultrasound therapy and strengthening exercises ,but overall showed no improved functional outcome. the purpose of .is study was to determine the effectiveness of proprioceptive exercises along with strengthening exercises in improving pain and disability in patients with knee osteoarthritis

In two groups pain and disability were taken as dependent variables to assess the improvement between the groups .findings of the present study suggest that these addition of UST and strengthening.

In this study VAS was used to measure pain .A statistically significant differences was found between two groups. Maximum reduction of pain was in group B .This is in favour of our research hypothesis.

Pain relief in this group is in accordance with a case report of 70 year old lady with osteoarthritis of knee who found moderate pain relief pain by proprioceptive exercises as done by CHILDS et al(2002)

But there is minimal information on its long term impact .it is theorized that because elevated plasma a endorphin. a neurotransmitter inhibitory to pain signal ,has been observed in response to prolong rhythmic exercises(Thoren et al.1990).leading to increased a endorphin production might decrease pain experienced by persons with osteoarthritis.

In the present study WOMAC score was used to assess overall knee functions since its validity and reliability is already established¹⁶.

A study by Felson et al,(2009) states that proprioceptive acuity as assessed by the accuracy of reproduction of knee flexion has modest effects on pain and physical function limitation in knee osteoarthritis.

Hurley et al (2004) have reported that proprioceptive is closely related to functional performance and walking speed.

This study showed that patient affected with OA knee .when performed proprioceptive exercises along with strengthening exercises showed a significant reduction in pain and functional disability and improvement in proprioception as compared to patients performing strengthening exercises alone .Thus proprioceptive exercises in patients of knee osteoarthritis.

Conclusion

Management of osteoarthritis, which deteriorates with imbalance between the stress applied to the articular cartilage of the joint and its ability to withstand it, requires being more extensive than mere analgesics .this study between two groups comparing UST with quadriceps exercises and UST with strengthening exercises.UST with strengthening exercises brings best result to subjects of knee osteoarthritis in reducing pain and functional disability .these results partly accepted and partly reject the experimental hypothesis suggesting that using proprioceptive exercises and strengthening exercises together will produce statistically significant difference in pain ,disability and but joint position sense may take longer duration to show significant differences.

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