LGJDX
ISSN No: 1008-0562
Journal Of Liaoning Technical University
Natural Science Edition

ANALYSIS OF THERAPEUTIC EFFECTS OF PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION STRETCHING WITH AND WITHOUT ULTRASOUND ON PAIN, STIFFNESS AND DISABILITY IN KNEE OSTEOARTHRITIS

RANDOMIZED CONTROLLED TRIALS

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ABSTRACT

Background: Knee osteoarthritis (OA), also known as degenerative joint disease of the knee, is typically the result of wear and tear and progressive loss of articular cartilage. Knee osteoarthritis can be divided into two types, primary and secondary.

Objective: The objective of this study was analysis of Therapeutic effects of PNF stretching with and without Ultrasound on pain, stiffness and disability in knee Osteoarthritis

Methods: Participants were allocated as per the Radiographic evidence of grade 2 or 3 of Kellgren

ISSN No: 1008-0562 Journal Of Liaoning Technical University Natural Science Edition

and Lawrence criteria for knee and further will be confirmed by the X-Ray findings. Participants will be measured in terms of pain ,stiffnesss and disability by WOMAC. Group A & Group B randomized by lottery method. The study was single blinded. Participants have receive treatment according to the allocated groups. All study participants havel receive a total of 18 treatments sessions over a six-week period, which consists of 03 treatment sessions per week. Both groups have receive heating pads at the baseline for 10 min.Both groups have receive 30 min/ treatment session for 3 days/week for 6 weeks.Data was collected at baseline and 6th week.Group A have receive PNF (Hold –relax) stretch for 20 min. Group B have receive PNF (Hold-Relax) and Ultrasound for 15 min and 5 min respectively.

Results: Results showed that both PNF with ultrasound and without ultrasound play an important role in improving pain, stiffness and disability. Both groups from baseline to post session (6th week) showed reduction in WOMAC score ($p \leq 0.05$). In contrast to group A (PNF) there was a statistically significant reduction in WOMAC score in group B (PNF+ US). It showed that PNF with US was more effective in reducing pain stiffness and disability in knee osteoarthritis patients as compared to PNF alone.

Conclusion: Both Proprioceptive Neuromuscular facilitation and Proprioceptive Neuromuscular facilitation and Ultrasound were effective in reducing pain, stiffness and Functional Limitations . However, PNF+US were statistically significant reduction in pain ,stiffness and disability.

Keywords : knee osteoarthritis; pnf techniques ; pain, stiffness and disability exercises.

INTRODUCTION

Osteoarthritis (OA) is a common musculoskeletal ailment that affects around 1770 out of every 100,000 men and 2693 out of every 100,000 women globally. The overall incidence of knee OA in India was found to be 28.7%, or between 22% and 39% (1). Knee osteoarthritis (OA), also known as degenerative joint disease of the knee, is typically the result of wear and tear and progressive loss of articular cartilage (2). It is most common in the elderly. Knee osteoarthritis can be divided into two types, primary and secondary. Primary osteoarthritis is articular degeneration without any apparent underlying reason. Secondary osteoarthritis is the consequence of either an abnormal concentration of force across the joint as with post-traumatic causes or abnormal articular cartilage, such as rheumatoid arthritis(RA) (3). Proprioceptive neuromuscular facilitation is a stretching

method used to improve flexibility and range of motion. Proprioceptive neuromuscular facilitation improves neuromuscular efficiency and muscle length, which both increase range of motion After the stretching is finished, the effects may linger for up to 90 minutes (4). In order to maintain human balance and motor control during daily tasks, proprioception is essential. Any deficiencies in proprioceptive function could lead to imbalance issues and a higher chance of falling. Numerous physiological systems, such as those related to the muscles, senses, brain, and emotions, have been demonstrated to alter with age. Therefore, aging in humans is linked to a loss of proprioceptive function (5). In addition, proprioception is compromised in knee Osteoarthritis patients compared to the general population. According to certain research, pain is linked to poor proprioception, and knee discomfort significantly predicts a decline in balance. Furthermore, the research revealed that pain affected proprioception in addition to muscular strength (6). Reduced muscle strength and proprioception are known to be impacted by edema in addition to pain in people with knee Osteoarthritis . Proprioceptive neuromuscular facilitation (PNF) practices promote multiple-plane joint movements, which relieve pain and increase joint range of motion (7). It is generally known that swelling cause thequadricep motor neuronspinal inhibitory mechanism to fire. It also lowers muscle activity which lowers proprioception. Diverse views exist, meanwhile,. regarding the impact of knee pain alone on quadriceps muscle weakness, specifically reduced proprioception and balance stability in individuals with knee Osteoarthritis who do not have edema (8). Many studies have been conducted on the effects of therapeutic ultrasound in knee Osteoarthritis. There have also been reports of using physical modalities in combination, including TENS, therapeutic ultrasound, and high-intensity laser treatmen (9). Veena Kirthika et al.2018 conducted a study to access the effect of Efficacy of Combined Proprioceptive Exercises and Conventional Physiotherapy in Patients with Knee Osteoarthritis. : The aim of this study is to analyze the effect of combined proprioceptive exercises and conventional physiotherapy in PKOA. A total of 40 female PKOA were recruited for the study and were divided into two groups as follows: Group A(conventional group) and Group B (experimental group). Group B in addition to the conventional treatment received proprioceptive exercises. Both the groups were instructed to perform exercises for 5 days in a week for 3 months. Visual analog scale (VAS) for pain and the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) score were noted pre- and post-intervention. On comparing the mean values of Group A and Group B on VAS and

WOMAC scores, both the groups showed a significant decrease ($P < 0.001$) in the posttest mean, but Group B (experimental group) was more effective than GroupA(conventional group). The present study concluded that 3 months duration of combining proprioceptive exercises with conventional physiotherapy is more effective than conventional physiotherapy alone in PKOA (10).

METHODS

Study Design

The study design was a randomized controlled trials.

Study Settings

The study was conducted in Layyah City Hospital.

Study Duration

The study was completed in 6 months after approval of synopsis.

Sample Size

Total sample size was 10

Sampling Technique

Non-probability Purposive Sampling technique has been used for this study.

Sample Selection

Inclusion Criteria

- Age 40– 65 years.
- Both genders.
- Patient diagnosed as a case of primary knee OA
- Radiographic evidence of grade 2 or 3 of Kellgren and Lawrence criteria for knee OA.

- Patient who are able to perform exercise.
- Patient who are willing to participate in the study .

Exclusion Criteria

- Subjects with secondary OA.
- Knee pain attributable to a cause other than primary OA.
- Pain or any other pathology in lower back ,hips or ankle.
- Any contraindication for exercise.
- Un-cooperative patients.
- History of knee replacement.
- Exclusion criteria included having presence of severe knee OA (KL greater than grade III).

Data Collection Tool

WOMAC (Western Ontario and McMaster Universities Arthritis Index)

In 1988, Bellamy and coworkers first published the WOMAC, a 24-item, condition-specific questionnaire to be used for knee osteoarthritis. Womac is most widely used in the evaluation of Knee Osteoarthritis .

Data Collection Procedure

The data was collected after the approval of the ethical committee of GCUF Layyah Campus. The researcher had complete consent form, demographics and demonstrate the procedure to participants who was willing to participate in study and enrolled . Participants was allocated as per the Radiographic evidence of grade 2 or 3 of Kellgren and Lawrence criteria for knee and further will be confirmed by the X-Ray findings. Participants will be measured in terms of pain ,stiffnesss and disability by WOMAC. Group A & Group B randomized by lottery method. The study was single blinded. Participants have receive treatment according to the allocated groups. All study participants havel receive a total of 18 treatments sessions over a six-week period, which consists of 03 treatment sessions per week. Both groups have receive heating pads at the baseline for 10 min.Both groups have receive 30 min/ treatment session for 3 days/week for 6 weeks.Data was collected at baseline and 6th week.Group A have receive PNF (Hold –relax) stretch for 20 min.

Group B have receive PNF (Hold-Relax) and Ultrasound for 15 min and 5 min respectively.

RESULTS

A total of 10 subjects were enrolled in this study. During the final week of treatment, 14 patients were assessed at the end of the sixth treatment week, both groups had a statistically significant decrease in Proprioceptive Neuromuscular facilitation with Ultrasound(PNF+US).

The improvement from the pretreatment Womac score and post treatment womac at the end of sixth week in each group was statistically important. All participants completed 18-sessions under supervision of physiotherapist and verbally confirmed that they complied with home exercise program.

Baseline of demographic character and clinical character (WOMAC) of both control and experimental groups are presented in Table 4.2. The results show that mean of age of group A and group B were51.2±4.65 and 52.2±3.27 respectively, mean of gender of group and group B were 1.6±0.54 and 1.8±0.44.

For group A pre-treatment mean of WOMAC score was 81.6±6.10 and post-treatment mean score was 75.8±5.35 with a mean change of 5.80±0.66 and p-value of 0.001 which is highly significant. In group B pre-treatment mean of WOMAC score was 74.8±4.65 and post-treatment mean score was 46.6±3.2 with a mean change of 28.2±3.05 and p-value of 0.001 which is highly significant.

Results showed that both PNF with ultrasound and without ultrasound play an important role in improving pain, stiffness and disability. Both groups from baseline to post session (6th week) showed reduction in WOMAC score ($p \leq 0.05$). In contrast to group A (PNF) there was a statistically significant reduction in WOMAC score in group B (PNF+ US). It showed that PNF with US was more effective in reducing pain stiffness and disability in knee osteoarthritis patients as compared to PNF alone.

DISCUSSION

This study was performed on 10 subjects with age ranging from 40 to 65 years, both genders were included in this study. Subjects were divided into two case and experimental groups, Group A (Proprioceptive Neuromuscular Facilitation Group) and Group B (Proprioceptive Neuromuscular

Facilitation +Ultrasound). This study compared the effects of Analysis of Therapeutic effects of PNF with and without Ultrasound on Pain stiffness and functional limitations In knee OA . Both groups were assessed at baseline and after 6 weeks of intervention. The outcome measure of the study was measured and it was perceived that both the groups showed improvement after 6 weeks of intervention, but greater difference was observed in pain ,stiffness and disability of group 2 participants (PNF+US Group).

Ali Karakas et al. 2019 conducted a study to access the effect of pulsed ultrasound treatment on pain, functionality, synovial fluid and cartilage thickness in knee OA.The results of WOMAC questionnaire scores, were improved statistically significant in both groups ($P<0.05$), but group effect could not be demonstrated ($P>0.05$) There were no statistically significant results in terms of both synovial fluid and femoral cartilage thickness measurements ($P>0.05$). In current study,The stretching prioprioceptive neuromuscular facilitation were performed and there was reduction in WOMAC score($p=0.001$) in Group A and prioprioceptive neuromuscular facilitation stretching and Therapeutic Ultrasound were applied and there was reduction in WOMAC score ($p=0.001$) in Group (11).

Qipeng Song peixin et al.2020 conducted a study to access the effect of proprioceptive neuromuscular facilitation improves pain and descending mechanics among elderly with knee osteoarthritis. The results of WOMAC questionnaire scores, were improved statistically significant in both groups ($P<0.05$), Compared to the control group, the PNF group showed a decreased pain score; increased passive hip, knee, and ankle ROM; a decreased minimum knee flexion angle, and increased HAM during stair descent. In current study,The stretching prioprioceptive neuromuscular facilitation were performed and there was reduction in WOMAC score($p=0.001$) in Group A and prioprioceptive neuromuscular facilitation stretching and Therapeutic Ultrasound were applied and there was reduction in WOMAC score ($p=0.001$) in Group 2 (12).

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