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A Study to Compare the Effectiveness of Proprioceptive Exercise Versus Joint Mobilization on Pain and Function in Patient with Knee Osteoarthritis

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Abstract: ***Knee osteoarthritis (OA), also known as degenerative joint disease, is typically the result of wear and tear and progressive loss of articular cartilage. The demographic data was obtained and a detailed assessment of 30 participants was done on the basis of name, age, gender, height, weight, BMI, present chief complaints, past history and medical history and divided into two groups namely Group A (Proprioceptive Exercise) and Group B (Joint Mobilization). Primary outcome measure of the treatment relative parameter such as Pain will be assessed by using numerical pain rating scale (NPRS) and WOMAC is used to assess pain, stiffness, and function in patients with OA knee. On comparison between the two group of A and B, the P value was found to be statistically significant for treatment Group A than treatment Group B in terms of NPRS & WOMAC. There is significant difference between two treatments [A (2.6) and B (3.1)] in terms of average improvement in Mobilization (t = 1.74) Where the P value is (p=0.04 < 0.05) In addition, the mean improvement in the value of NPRS by Treatment B is greater than that of Treatment A. There is significant difference between two treatments [A (32.7) and B (10.8)] in terms of average improvement in Mobilization (t=12.75) Where the P value is (p=1.75 > 0.05) In addition, the mean improvement in the value of NPRS by Treatment A is greater than that of Treatment B. Hence, we conclude that Treatment B is effective than Treatment A in the term of mean decrease in NPRS & Treatment A is effective than Treatment B in the term of mean decrease in WOMAC.***

Keywords: Mobilization, Proprioception, Pain

1. Introduction

Knee osteoarthritis (OA), also known as degenerative joint disease, is typically the result of wear and tear and progressive loss of articular cartilage. It is most common in elderly people and can be divided into two types, primary and secondary. Almost 10 to 40% of the world population is affected with Osteoarthritis. In India knee Osteoarthritis is more commonly among rural population of about 32.6% and 60.3% in urban population. The prevalence of OA increases with age and generally affects women more frequently than men. The knee is the weight - bearing joint most commonly affected by OA. Due to demographic changes, the incidence of OA is rapidly increasing. It also leads to social, psychological, and economical burden on the affected population throughout the world. Clinically, OA knee is characterized by pain, tenderness, and limitation of knee movement, crepitus, occasional effusion, and variable degrees of local inflammation. Individuals with knee OA often exhibit poor neuromuscular control, slower walking speed, decreased functional ability and increased susceptibility to fall. There are many treatment options available for osteoarthritis of Knee. Proprioception Exercises and Mobilization Technique is compared in this study.

Proprioception is the sense of body movement and position. This sense comes from stimulation of proproceptors in the muscle, tendons and joints in the skeletal/muscular system. Joint mobilizations are large - amplitude movements that carry halfway into the joint range of motion, occupying any part of the range and yet not reaching the end range. This technique can be used to treat joint stiffness by increasing range of motion and joint pain by stimulating mechanoreceptors.

2. Methodology

Study Setting: The study was s conducted in Jaya collage of physiotherapy outpatient department and clinics in and around Chennai.

Source of Data: Primary data will be collected from the samples and 30 samples will be included for the study on the basis of purposeful randomized sampling method. Subjects are taken from Jaya collage of physiotherapy outpatient department and clinics in and around Chennai.

Sampling Size: A total of 30 subjects fulfilled the selection criteria are included in the study. They are assigned Group A (n=15) proprioceptive exercise and Group B (n=15) joint mobilization.

Inclusion Criteria: Both male and female subjects fulfilling the clinical criteria of American college of rheumatology for OA knee, Pain in the knee for most days or prior month, Morning stiffness less than 30minutes in duration, Bony enlargement of the knee on examination, Painful restricted movement of knee, Radiological investigations suggestive of OA, Age 40 to 65, Clinically diagnosed of OA knee joint by an orthopedician, Sub acute stage of OA knee with unilateral.

Exclusion Criteria: History of total knee arthroplasty or major knee trauma injury, Presence of R. A, Polyarthritis or Systemic inflammatory arthropathies, History of neurological and psychological disorder and unresolved balance disorder, High risk health status. E. g. uncontrolled hypertension, diabetes, heart disease, angina type pain, nocturnal dyspnea, shortness of breath, tachycardia etc. Musculoskeletal problem like fractures, tendonitis or bursitis or any Significant symptoms affecting the whole lower limb or back that would severe enough to interfere with the exercise program, Corticosteroid injection to the quadriceps or patellar tendon in the last month, Excluded if patient have acute inflammation and contractures, Any surgical procedure done on the lower extremity (ligaments, meniscus tear), Post traumatic stiffness, Deformity over knee joint.

3. Methodology

The demographic data was obtained and a detailed assessment of 30 participants was done on the basis of name, age, gender, height, weight, BMI, present chief complaints, past history and medical history. Participants allocated in a group according to the selection criteria.

Study Duration - 6 weeks.

Treatment Duration - 30 minutes.

Parameters of the Study: Primary outcome measure of the treatment relative parameter such as Pain will be assessed by using numerical pain rating scale (NPRS) and WOMAC is used to assess pain, stiffness, and function in patients with OA knee.

Procedure:

Group - A Proprioceptive Exercise:
Treatment session: 3days /week

Proprioceptive Exercise:

1) **Knee flexion and extension using Swiss ball**
   Patient position: supine lying. **Procedure:** Ask the patient to put both feet on the Swiss ball and slowly roll the Swiss ball towards you by bending you knees, slowly roll it back out. **Duration:** 5minutes. **Repetitions:** 5 repetitions per session.
2) **Step up and down in a footstool:**
   Patient position: standing upright. **Procedure:** Step up with the right foot in a footstool, pressing through the heel to straighten your right leg. Bring the left foot to meet your right foot on top of the footstool. Bend your right knee and step back down with the left foot.
   Bring the right foot down to meet the left foot on the ground. **Duration:** 5minutes. **Repetitions:** 5 repetitions per session.
3) **Sliding lunge:**
   Patient position: stand straight with feet hip - width apart. **Procedure:** place the slider under the ball of your foot. Slowly and with control, ease your foot out to the side with a straight leg. Bring the leg back to your standing position. **Duration:** 5minutes. **Repetitions:** 5 repetitions per session.
4) **Single leg squat:**
   Patient position: stand straight with feet hip - width: apart. **Procedure:** stand on one leg raise the other leg straight out with toes pointed up standing leg into a squat and slowly come back to a standing position. **Duration:** 5minutes. **Repetitions:** 5 repetitions per session.
5) **Walking on heel to toe:**
   Patient position: Standing. **Procedure:** Patient put heel just in front of the toe of other foot (3 meter line marked). **Duration:** 5minutes. **Repetitions:** 5 repetitions per session.
6) **Raising from standard chair without arm support:**
   Patient position: Sitting. **Procedure:** Ask the patient to sit and stand from standard chair without arm support. **Duration:** 5minutes. **Repetitions:** 5 repetitions per session.

Group - B Joint Mobilization:

Tibiofemural Glide:

1) **Anterior glide**
   Patient position: supine lying with knee flexed 20 to 30 degree. **Procedure:** Therapist stabilizes lower part of leg then place hands posterior to tibia and perform anterior glide in rhythmic oscillatory movement. **Duration:** 5minutes. **Repetitions:** 5 repetitions per session.
2) **Posterior glide**
   Patient position: supine lying with knee flexed 20 to 30 degree. **Procedure:** Therapist stabilizes lower part of leg and place web space of his hands on patella tendon insertion point perform posterior glide in rhythmic oscillatory movement. **Duration:** 5minutes. **Repetitions:** 5 repetitions per session.

Patellar Glide:

3) **Superior - inferior and Inferior - superior mobility**
   Patient position: supine lying. **Procedure:** Therapist place web space of his left hand on base of patella right hand over the apex and therapist perform gentle and gradual motion of superior - inferior and inferior - superior glide. **Duration:** 5minutes. **Repetitions:** 5 repetitions per session.
4) **Medial - lateral and Lateral - medial mobility**
   Patient position: supine lying, **Procedure: Medial - lateral:** Therapist stand contra lateral, both the thumbs are placed medial border of patella force applied lateral to medial direction. **Lateral - medial:** The pulp of both thumbs placed on lateral border of patella force applied lateral to medial direction**. Duration:** 5minutes. **Repetitions:** 5 repetitions per session.

Oblique Glide:

5) **Superior medial - Inferior lateral**
   Patient position: Supine lying. **Procedure:** Therapist place web space of right hand on the superior medial border of patella and web space of left hand on the inferior lateral border of patella then glide delivered from superior inferior to inferior lateral direction. **Duration:** 5minutes. **Repetitions:** 5 repetitions per session.

6) Superior lateral - Inferior medial

Patient position: supine lying. **Procedure:** Therapist place web space of right hand on the superior lateral border of patella and web space of left hand on the inferior medial border of patella then glide delivered from superior inferior to inferior lateral direction. **Duration:** 5minutes. **Repetitions:** 5 repetitions per session.

Methodology

t - Test: Two - Sample Assuming Equal Variances		
	A - NPRS - DIFF	*B - NPRS – DIFF*
Mean	2.666666667	3.133333333
Variance	0.380952381	0.695238095
Observations	15	15
Pooled Variance	0.538095238	
Hypothesized Mean Difference	0	
Df	28	
t Stat	- 1.74223943	
P (T<=t) one - tail	0.046221279	
t Critical one - tail	1.701130908	
P (T<=t) two - tail	0.092442558	
t Critical two - tail	2.048407115	

Table 1

t - Test: Two - Sample Assuming Equal Variances		
	A - WOMAC - DIFF	***B - WOMAC – DIFF***
Mean	32.73333333	10.8
Variance	25.35238095	19.02857143
Observations	15	15
Pooled Variance	22.19047619	
Hypothesized Mean Difference	0	
Df	28	
t Stat	12.75122648	
P (T<=t) one - tail	1.75463E - 13	
t Critical one - tail	1.701130908	
P (T<=t) two - tail	3.50927E - 13	
t Critical two - tail	2.048407115	

4. Discussion

In this study a total number of 30 subjects were referred to Physiotherapy department with knee Osteoarthritis according to inclusion criteria participate in this study.30 subjects were included and they are already clinically diagnosed as pain Osteoarthritis of knee. Those 30 Subjects were randomly allotted into 2 groups, 15 each, Group A received proprioceptive exercise and Group B received joint mobilization treatment. This study was conducted to evaluate the effect of proprioceptive exercises and joint mobilization on pain and function in patient with OA knee. The outcome measures were then recorded using NPRS and WOMAC.

Group A – To Find Out the Effect of Proprioceptive Exercise

The baseline mean difference of NPRS for proprioceptive exercise (Table 1) was 6.6 After the end of six weeks the mean value of NPRS has decreased from 6.6 to 4 The paired t test done in comparison of pre and post - test means scored showed that: t=16.73, P= 1.18 > 0.05. The baseline mean difference of WOMAC for proprioception (Table 2) was 71.6. After the end of the six weeks the mean value of WOMAC has decreased from 71.6 to 38.8. The paired t test done in comparison of pre and post - test means scored showed that: t=25.18, P=2.32 > 0.05 **Noel Macwan** conducted a study measurement of proprioception in OA knee and concluded that there was reduced proprioception in subjects with OA knee the study identify and understand the proprioceptive impairment in oa knee patients by studying joint position sense in normal and then in oa knee patient. **HEE SEONG JEONG ET AL. J ATHL TRAIN.** Proprioceptive training effectively promoted pain relief and completion of functional daily activity among patients with knee OA and should be included in rehabilitation programs. Stiffness and other mobility measures were unchanged after proprioceptive training. Modified proprioceptive training programs are needed to target stiffness and improve additional physical function domains.

Group B – To Find Out the Effect of Joint Mobilization

The baseline mean difference of NPRS for joint mobilization (Table 3) was 6.2. After the end of six weeks the mean value of NPRS has decreased from 6.2 to 3. The paired t test done in comparison of pre and post - test means scored showed that: t = 14.55, p = 3.79 >0.05. The baseline mean difference of WOMAC for proprioceptive (Table 4) was 72 After the end of three weeks the mean value of WOMAC has decreased from 72 to 61.2 The paired t test done in comparison of pre and post - test means scored showed that: t=9.59, p=1.57 >0.05. **DEYLE, et al** Study found the mobilization is improving balance, increases knee flexion ROM, and increases knee flexor and extensor strength and improves physical function. and decreasing pain in osteoarthritis knee. mobilization for knee provide pain reliefs decrease pain during night reduce morning stiffness improve function of knee joint by increasing muscle power and techniques of mobilization. **Nor AM. Lyn KS**. Effects of passive joint mobilization on patients with knee osteoarthritis. Sains Malays 2011 gliding technique improve flexion and extension of knee and decrease pain.

Comparing the Values of Group A and Group B

On comparison between the two group of A and B based on influence from table 5 and 6, the P value was found to be statistically significant for treatment Group A than treatment Group B in terms of NPRS & WOMAC. There is significant difference between two treatments [A (2.6) and B (3.1)] in terms of average improvement in Mobilization (t = 1.74) Where the P value is (p=0.04 < 0.05) In addition, the mean improvement in the value of NPRS by Treatment B is greater than that of Treatment A. There is significant difference between two treatments [A (32.7) and B (10.8)] in terms of average improvement in Mobilization (t=12.75) Where the P value is (p=1.75 > 0.05) In addition, the mean improvement (table 8) in the value of NPRS by Treatment A is greater than that of Treatment B.

5. Conclusion

The study suggests that both the treatments are individually effective in reducing NPRS, WOMAC Score from pretest to post test. By comparing the efficacy of the two treatments in terms of two measures NPRS, WOMAC Score we found that both the Treatment is equally effective in terms of the

reduction in NPRS, WOMAC Score. The inter - group analysis showed that there is difference between Treatment A and Treatment B in terms of mean reduction in the values of measures, namely NPRS & decrease in the mean value of WOMAC. Hence, we conclude that Treatment B is effective than Treatment A in the term of mean decrease in NPRS & Treatment A is effective than Treatment B in the term of mean decrease in WOMAC

6. Limitations and Recommendation

Limitations

- Sample size is small
- Short duration of the study and no long term follow up of patients

Recommendations

- A large sample size can be taken
- Along with the study add conventional therapy for better results
- Study can be done additionally with modalities for better results

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