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Pilates Exercise and Resisted Muscle Training To Hip And Knee Muscle Impairment In Improving Pain And Quality Of Life In Patients With Tibio Femoral Osteoarthritis

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ABSTRACT

Aim: The aim of the study is to compare the effect of pilates exercise and resisted muscle training of hip and knee joint muscles to improve pain and quality of life in tibio femoral osteoarthritis.

Method: 50 patients diagnosed with tibiofemoral osteoarthritis were included in the study. The patients were randomly assigned into 2 groups. Group A received pilates exercise on mat for hip and knee joint muscle for 4 weeks and Group B received resisted muscle training using theratube for hip and knee joint muscle for 4 weeks. Pre and post intervention measures for KOOS (Knee Osteoarthritis Outcome Score) scale were observed and documented.

Result & Conclusion: The results indicate that both group A and group B shows improvement in all components of KOOS. But when compared between both groups, group A shows more significant improvement in pain and symptom than group B.

Introduction:

Knee joint plays an essential role in movements related to carrying the body weight and provides flexible movements during running, walking, jumping.¹ Knee joint undergoes many stresses and strain to provide us the ability to perform our daily activities without any problem. Some external factors limit the knee joint from performing and result in pain, disability. The knee pain has become common in all the age groups, most of the time our body movements do not cause any problem but it developed from everyday wear and tear, overuse injury.²

David felson (2004) has described pathogenesis of osteoarthritis.³ This breakdown of cartilage causes the joint

to rub together which causes severe pain, stiffness and loss of joint mobility which reduces the quality of life. As a result, varus malalignment is a major contributing factor to OA progression in medial compartment. The study was done in 2008 does knee malalignment mediate the effects of quadriceps strengthening on knee adduction moment, pain, and function in medial knee osteoarthritis.^{4,5} Decreased hip abductor muscle activity lead to stress on lateral structures iliotibial band which increased load on medial compartment of the knee.⁶

Elizabeth A. Sled, et al (2010) has reported strengthening program for the hip abductor muscles resulted in increased hip muscle strength, reduced knee pain, and improved functional performance on a sit-to-stand task in with medial knee OA compared with a control group without knee OA.

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There was no change in the knee adduction moment with the exercise program.⁶

The core muscle described as a muscular box with the abdominals in front, the diaphragm as the roof and pelvic floor and hip girdle muscle as the bottom. The muscles helps to stabilize the spine, pelvis and kinetic chain during functional movement. Core stability is the ability of the lumbopelvic hip complex to prevent buckling and to return to equilibrium after perturbation.⁷ This study supports core muscles strengthening should be incorporated in physical rehabilitation program for knee OA.⁸

Pilates is an exercise approach developed in the early 1900s that is based on body mind spirit interaction combining with biomechanics, Motor learning, and core stability. The pilates exercise improves physical and mental conditioning through increasing strength, flexibility, balance and postural awareness by stretching and strengthening exercises. In literature, there have been few researches on general effects of pilates exercise but there is insufficient data regarding the effect of pilates mat exercise in Osteoarthritis.⁹

So the purpose of this study to determine the difference between pilates exercise and resisted muscle training of hip and knee joint muscles to improve quality of life in patients with tibiofemoral osteoarthritis.

Research Design and Methodology

Study Population:

50 patients diagnosed with tibiofemoral osteoarthritis were included in the study.

Inclusion and Exclusion Criteria:

The study focuses on individuals aged 40 to 70, including both males and females, who experience knee pain at rest rated between 3 and 8 on the Numerical Pain Rating Scale. All participants must have a medical diagnosis of osteoarthritis. Individuals will be excluded from the study if they have inflammatory conditions, any medical issues that restrict physical activity, received joint injections in the past three months, or have any bony abnormalities, such as fractures.

Procedure:

The purpose of these exercises is to strengthen the hip and knee muscles. Strengthening improves the pain and quality of life in patients with knee osteoarthritis, and decrease the osteoarthritis progression. The patients were explained about purpose and nature about the study. Informed consent was taken from the subjects after their inclusion in the study. The patient were selected age group between 40 to 70 years and pain at rest between 3 and 8 on NPRS. The patient is asked to patients level of pain over the previous 24 hours and indicate

the intensity of pain in between 0 to 10. Osteoarthritis will be diagnosed medically. Then patients were allotted to Group A and Group B. The exercise was given for 4 weeks. Group A includes pilates training on reformer, Group B include resisted muscle training using elastic tube. Outcome measures was collected at baseline included the Numerical Pain Rating Scale and knee osteoarthritis outcome score questionnaire. After completion of the 4 week of treatment procedure check for the pain and strength of the patient on Numerical pain rating scale, and knee osteoarthritis outcome score questionnaire.

Group A Received Pilates Exercise:

Pilates training consisting of 10 repetitions on reformer including 5 min of warm up on mat, 30 min of exercises on reformer.

- a. **Warmup:** It includes pelvic curl, chestlift, and chest lift with rotation on mat.
- b. **Foot work:** Parallel heels, parallel toes, V position toes, open V heels, open V toes calf raises and prances on reformer.
- c. **Abdominal:** Hundred prep feet on foot bar on reformer.
- d. **Hip Work:** Frog, down and up circles, openings on reformer.
- e. **Spinal Articulation:** Bottom lift on reformer.
- f. **Legs:** Side left lift, forward and lift, forward with drops, adductor squeeze.
- g. **Lateral:** Side lifts.
- h. **Back:** Back extension on mat.

Group B Resisted Muscle Training:

The strengthening programme consist of 3 sets of 10 repetitions using elastic tube for strengthening hip and knee muscles. Perform these exercises both affected and unaffected leg 4 session per week for 4 weeks. After completion of 4 week programme, checkup session was there.

Method of measurement of outcome of interest:

Numerical Pain rating Scale, Knee Osteoarthritis Outcome Score Questionnaire

Statistical Analysis:

The data were compiled in MS excel sheet 2007. For analysis of this data SPSS version 20th software was applied qualitative data will be represented in the form of frequencies and percentiles. The quantitative data were represented form of mean, standard deviation, etc. Both these qualitative and

quantitative data were represented on visual impression like bar diagram, pie diagram etc. For intercomparison between 2 groups Unpaired t test were applied. P value was checked at 5% level of significance.

Discussion:

The aim of the study was to compare the effect of pilates exercise and resisted muscle training of hip and knee joint muscles to improve pain and quality of life in tibio femoral osteoarthritis. The subjects were divided into two groups- group A includes Pilates exercise on mat & group B includes resisted muscle training of hip and knee joint muscles using thera tube. While analyzing the outcome measures of this study, group A showed significant improvement in pain and symptoms of KOOS when compared with group B. Result of the study also showed that significant decrease in pain, stiffness, and improvement in QOL, ADL, Sports and recreational activities within group A and group B when compared with pre and post intervention.

Pilates exercises:

According to Katina Weaver Walker (2013) that pilates exercise for a better quality of life with knee osteoarthritis and after knee arthroplasty. Due to low impact form of pilates exercise joints can be exercised very gently and surrounding tissue is strengthened even when range of motion is diminished. Pilates is perfect conditioning program in osteoarthritis. The core muscles helps to stabilize the spine, pelvis and kinetic chain during functional movement. Poor core muscle endurance found in this study indicates a weak core muscle that contributes to supporting body weight. Core muscle endurance deficient lead to an increase in loading of the knee as well as in knee joint contact force during dynamic movement.¹⁰

Core muscles comprised of plantar flexor evertor, soleus, gluteus maximus, gluteus medius, transversus abdominis, multifidus, rectus abdominis and oblique abdominals were found consistently activated before any limb movements. Hence poor core stability is one of the contributing factors that will lead to knee OA development as well as its progression. Besides the core muscles, lower limb muscles and hip muscles also play an important role in knee OA pathogenesis. The previous researches by Mayer (2012)¹¹, Chidozie E. Mbada, (2008)¹², whereby the higher body mass index increase loading on the core muscles. This study suggests core muscles weakness may precede knee OA onset and development. This is due to weak core muscles that will cause the usage of the affected limb to be minimized or compensated by another limb. This study supports core muscles strengthening should be incorporated in physical rehabilitation program for knee OA. Mikesky et al., (2000)¹³

found that knee OA patients had poor flexibility. Since rectus femoris muscles is involved in flexion at the hip joint and extension at the knee joint, tight rectus femoris muscles will pull the hip and knee joint closer.

As the core strength decreases, functional activity level also decreases. Pain and deformity limit the functional activity level of the patient suffering from knee OA. This reduced activity level may cause disuse atrophy of the spinal muscles which would further lead to weakness of the core.

Resisted Muscle Training:

In patients with knee OA showed that strengthening of the quadriceps musculature with either isometric or isotonic-resistive exercise was associated with significant improvement in quadriceps strength, reduction of knee pain, and improved function. According to Victor, Quadriceps strength is related to the rate of lower extremity loading. Higher loading rates may initiate knee OA or cause progression of existing disease. Quadriceps femoris muscle is significantly impaired in knee OA. Hip Abductor muscles plays important role in the disease progression and pain.

Pilates exercise includes efficient movement, core stability and enhanced performance. Core muscle such as transverse abdominis is active during the movement of lower limb following contralateral weight shifting. Due to weak core muscles it leads to usage of affected limb to be minimized or compensated by another limb. core muscle and hip and knee joint muscle strengthening exercise reduces the load on knee joint as well as improves the knee joint space and it slow down the onset and progression of the OA.

The limitation of this included strength of the muscle was not measured. Future studies can be done with pilates exercises in reformer and its effects on OA.

Conclusion:

Pilates exercises and resisted muscle training shows significant improvement in all components of KOOS. But when compared between the groups pilates exercise shows significant improvement in pain and symptoms in patient with knee osteoarthritis than the resisted muscle training.

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