



A COMPARATIVE STUDY TO FIND OUT THE EFFECTIVENESS OF MULLIGAN TECHNIQUE VERSUS CONVENTIONAL THERAPY WITH COMMON USE OF ULTRASOUND THERAPY (U.S.T) IN TIBIOFEMORAL OSTEOARTHRITIS.

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Objective: The aim of this study is to find out the effectiveness of Mulligan technique over conventional therapy with common use of ultrasound in tibiofemoral osteoarthritis.

Methods: Thirty tibiofemoral osteoarthritis patients were randomly allotted to Group – A and Group – B. Both the groups received UST (1 MHz frequency, in continuous mode with 1 watt/cm² intensity for 5 minutes for 10 sessions) and general information about osteoarthritis and advices for self care. Group – A patients received 12 clinical sessions of Mulligan mobilization technique (MWM) Mobilization with movement over 4 week period. Group – B patients received Isometric knee exercise & Home exercise programme. Measured outcomes were VAS for pain, Goniometric measurement of knee flexion ROM and WOMAC score for functional ability.

Result: Measured outcomes were taken at 1st day (pre-treatment), at end of 10th day and end of 4th week. Paired ‘t’ test was done to compare within the group and independent ‘t’ test was done to compare between the groups. Both the groups show clinically and statistically significant improvement. However, at the end of the 4th weeks improvements were more significant in Group – A then Group – B in WOMAC scores {Group – A mean value (11.2) & Group – B (22.93)} & ROM, { Group – A mean value (127.26) & Group – B (114.66)} & in VAS scores {Group – A mean value (1.38) & Group – B (2.22)}.

Conclusions: Although both the groups showed significant improvement but group – A showed more improvement then Group – B. It is notated from the study that mobilization along with UST & clinically guided simple quadriceps isometric exercises is very beneficial to alleviate the pain & improve the ROM & functional ability.

Keywords: *Tibiofemoral osteoarthritis; Mobilization; Home exercise Program; functional ability.*

INTRODUCTION

Human & human diseases go side by side from the very beginning of the human life, osteoarthritis (OA) one of them it is a most common form of arthritis usually degenerative in nature mainly affects articular cartilage. Cartilage is the slippery tissue that covers the ends of bones in a joint. Healthy cartilage allows bones to glide over each other. It also helps absorb the shock of movement. In OA, the top layer of cartilage breaks down & wears away. This allows bones under the cartilage to rub together. The rubbing causes pain, swelling, & loss of motion of the joint. Over time, the joint may lose its normal shape. Also, bone spurs may grow on the edges of the joint. Bits of bone or cartilage can break off & float inside the joint space, which causes more pain & damage. OA is the 4th leading causes of years lived with disability at the global level. In global population OA affected prevalence is 22% to 39%¹¹⁵. In India its prevalence is 2.78%¹¹⁶ & in West Bengal prevalence is 19.7%¹¹⁷. OA knee big challenge for poor socioeconomic group population. Knee joint has 3 components – lateral tibiofemoral, medial tibiofemoral & patella-femoral joints. Medial tibiofemoral joint is more prone to develop prone to develop OA due to the transmission of high medial compartment force during weight bearing.

History of OA is not found fully. Sir William Heberden first discovered about OA in 18th century. Population with obesity more prone to develop OA knee. From population sassed survey found that people who engage more with

prolong standing, squatting more prone to develop OA knee. OA has slowly progressive erosion of cartilage which is however is changes in the properties of proteoglycans & loss glycosaminoglycans.

There are various conservative therapeutic treatment protocols available to treat OA knee patients. Physical agents like SWD, TENS, LASER, superficial heating agents (wax bath, moist heat), cold, EMS, & UST. Many studies invest Several studies shown that ultrasound is a good for tibiofemoral OA. The ultrasound is deep heating modalities as the ultrasound can penetrate 3-8 cm & it increases tissue temperature 4-5 C. Studies have investigated the effectiveness of manual therapy in OA patients Mulligan's technique mobilization with movement (MWM) is a manual therapy treatment technique that is used in the management of various musculoskeletal conditions. Mulligan proposed that a minor positional fault of the joint result in movement restriction & pain.

NEED FOR THE STUDY

Knee osteoarthritis affects the large portion of the population in India. Epidemiological study already had been shown that tibiofemoral osteoarthritis is commonest among the knee osteoarthritis. The tibiofemoral osteoarthritis will cause substantial pain & decrease knee range of motion hence it will also produce locomotors disability & dependency in large population.

AIM OF THE STUDY

The aim of this study is to find out the effectiveness of Mulligan technique over conventional therapy with common use of ultrasound in tibiofemoral osteoarthritis.

To compare the Mobilization with movement (MWM) versus Isometric knee exercise & Home exercise programme with common use of ultrasound in decreasing the pain & improving the range of motion & functional ability of tibiofemoral osteoarthritis patients.

OBJECTIVES OF THE STUDY

1. To evaluate the effect of mobilization (MWM) with UST for decreasing the pain & improving the range of motion & functional ability of tibiofemoral osteoarthritis patients at 10th day & end of 4th weeks of treatment.
2. To evaluate the effect of UST, Isometric knee exercise & Home exercise programme for decreasing the pain & improving the range of motion & functional ability of tibiofemoral osteoarthritis patients at 10th day & end of 4th weeks of treatment.
3. To compare the effectiveness of mobilization (MWM) versus Isometric knee exercise & Home exercise programme with common use of UST in decreasing the pain & improving the range of motion & functional ability of tibiofemoral osteoarthritis patients at 10th day & end of 4th weeks of treatment.

HYPOTHESIS

Null Hypothesis:

There is no significant difference between Mulligan knee mobilizations (MWM) with UST over Home exercise programme with UST & Isometric knee exercise to improve the functional ability of tibiofemoral osteoarthritis patients.

Alternate Hypothesis:

There is significant difference between Mulligan knee mobilizations (MWM) with UST over Home exercise programme with UST & Isometric knee exercise to improve the functional ability of tibiofemoral osteoarthritis patients.

REVIEWS

1. **M. V. Hurley et al (2012):** did a study on home based exercise programme for knee pain & knee OA. Aim of the study is to find out that the Long-term outcomes and costs of an integrated rehabilitation program for chronic knee pain. Total 418 people with chronic knee pain taken for this study. For outcome measures they used WOMAC scale. After 30 months study they concluded that the long-term rehabilitation program for chronic knee pain very much beneficial.
2. **Sheila C O'Reilly et al (2012):** did a study on home based exercise programme for knee pain & knee OA. Aim of the study is to find out that the Effectiveness of home exercise on pain and disability from osteoarthritis of the knee: It is a randomised controlled trial. Total 191 men and women with knee pain aged (40–80) taken for this study. For outcome measures they used WOMAC & VAS scale. After 6 months study they concluded that the programme of home quadriceps exercises can significantly improve self reported knee pain and function.
3. **Amaia Bilbao et al (2011):** did a study on validity & reliability of WOMAC Validation of a proposed WOMAC short form for patients with hip osteoarthritis. Total 788 & 445 patients with hip OA taken for this study. For outcome measures they used WOMAC scale. Finally they concluded that the WOMAC is valid & reliable & responsive for patients with THR (Total hip replacement).

METHODOLOGY

The study was conducted by using pre-test & post-test experimental design at Physical-therapy Rehabilitation Centre, Burdwan Institute of Medical & Life Sciences, Burdwan & Out Patient Department of Orthopaedics, Burdwan Medical College & Hospital, Burdwan. Total 30 subjects who were randomly divided into two equal groups Ethical clearance was obtained from the institutions ethical committee before commencement of the study.

- **STUDY AREA:**

Physiotherapy Rehabilitation Centre, Burdwan Institute of Medical & Life Sciences, Burdwan
Out Patient Department of Orthopedics, Burdwan Medical College & Hospital, Burdwan

• **STUDY POPULATION:**

The subjects those who fulfilled the selection criteria was selected for the study.

They were as follows:

INCLUSION CRITERIA:

Clinically diagnosed as tibiofemoral osteoarthritis

Age: 45 – 60 years.

Gender: Male & Female.

Duration: Chronic cases (6 months)

EXCLUSION CRITERIA:

Recent history of trauma or surgery in lower extremity

Severe osteoporosis

Un co-operative patients.

Any other musculoskeletal or neurological condition

Avoid patellofemoral osteoarthritis.

STUDY PERIOD: 6 months.

SAMPLE SIZE: 30 Subjects between age group of 45 - 60 years ,with tibiofemoral osteoarthritis and willing to participate in the study were included and they were assessed and randomly divided into two equal groups Group A and Group B each of 15 patients.

SAMPLE DESIGN: Randomized control trial.

STUDY DESIGN: A comparative study.

STUDY TOOLS:

Instrumental Tools

Goniometer

Therapeutic Ultrasound unit

Physical Tools

Treatment couch

Sufficient pillows & bed sheets

Paper & pencil

Aquestic gel

Kidney tray

Cotton swab

Towel

Stopwatch

Mulligan Mobilization Belt

Statistical Tools

Computer

Calculator

Data collection chart

ASSESSMENT TOOLS:

Assessment Proforma: (Attached at annexure-)

Visual analogue scale(VAS): (Attached at annexure-)

VAS has been said that best 'Pencil & paper' method of assessing the intensity of clinical pain. VAS consists of 10 cm scale with one end having no pain other end worst imaginable pain. The patient is requested to put a mark on the scale at the point, which approximates to the relative intensity of his or her pain experienced. Subjects were not permitted to see the previous scores. Scores were established by measuring from the zero point to the distance of the mark in cm. Three responses were taken, pre-treatment, at the 10th day & 4th weeks.

Goniometer: (figure no.)

Range of active movement is measured clinically by Goniometer. The subject is placed in the prone position, with the hip in 0 of abduction, adduction, flexion, extension & rotation. The foot is over the edge of the supporting surface. The centre or the fulcrum of the Goniometer over the lateral condyle of the femur & the stationary arm is aligned with lateral midline of the femur, using greater trochanter for the reference, while movable arm is aligned with the lateral midline of fibula, using lateral malleolus for reference. Three responses were taken, pre-treatment, at the 10th day & 4th weeks.

WOMAC Scale: (figure no.)

The WOMAC is tridimensional disease specific, self – administered health status measures. The index consists of 24 questions (5pain, 2stiffness & 17 physical function domains) & available in Likert & VAS scaled format. In this study the Likert format is used. The 3domains in WOMAC can be analyzed separately or with a single score. Every question has 5 alternative answers, which means total 0-4 points. The maximum score in the Likert version is total 96(20 for pain, 8 for stiffness & 68 for physical function). Patients completed the forms by themselves without assistance from the investigator & were asked to relate their responses. Patients were not permitted to see previous responses. Three responses were taken, pre-treatment, at the 10th day & 4th weeks.

SL NO	VARIABLES	MEASURES
1	Pain intensity	Visual Analogue scale

2	Knee Range of Motion	Goniometer
3	Functional disability	WOMAC

DATA ANALYSIS

For this study 30 patients were selected & all 30 patients completed the study. The 30 patients were randomly assigned into 2 Group – A and Group – B. Group – A received ultrasound therapy and Mulligan mobilization technique (MWM) Mobilization with movement. Group – B received ultrasound therapy, isometric exercises for quadriceps and home exercises program. Both the groups got educational information about OA and general advice for self – care and methods of modifying risk factors.

The Western Ontario and McMaster Universities Osteoarthritis scale , (WOMAC), were used for functional ability, goniometric measurement for range of motion (ROM) of knee flexion and visual analogue score (VAS) were recorded to the subjects on the first day prior the treatment , at the end of 10th day and at the end of the 4th weeks.

Mean was calculated for the first day prior to the treatment, at the end of 10th day and at the end of the 4th week to see the average improvement in ROM, VAS and WOMAC scores in the two groups separately.

Standard deviations (SD) were taken to see the variation from their means.

Confidence interval (mean +- SD) were calculated to see the variation within the group from Day 1 - 10th day - 4th weeks and at the end of the 10th day and end of the 4th week between the group A and group B.

The observed differences were tested with the Paire't' test for within the group and Fisher's't' test (independent't' test) for between the group with 28 d.f. and the p – value were noted against each result.

DISCUSSION

From extensive review of literatures, it is noted that tibiofemoral osteoarthritis is commonest among the OA knee which leads to substantial amount of pain, restriction in range of motion, particularly knee flexion and decreases in muscle strength and this overall leads to the physical disability.

Based on the result of the present trial it may be stated that both groups improve in respect of pain, ROM, and WOMAC score at the 10th day and significantly improve at the end of 4 week of treatment. When compared between the group at 10th day VAS score shows that Group – B mean value (4.01) is greater than Group – A mean (3.26). So Group – A shows more decrease in pain than group – B although this difference is not significant ($p > 0.05$). Improvement of ROM is also evident at 10th day in Group – A [Group – A mean (120.27) and Group –B mean (117.47)] although this difference is not significant ($p > 0.05$). Group –A improve in WOMAC score than Group –B

[Group –A mean (34.53) & Group –B mean (39.20)] although difference is not significant ($p > 0.05$). So it will be assumed that application of mobilization(MWM) techniques along with UST and may have more beneficial effect than Home Exercise Program along with UST and isometrics exercises at 10th day.

CONCLUSION

It has been found that the both groups show clinically & statistically significant reduction in pain, improve in knee flexion ROM & functional ability at end of 4th week of treatment. However, the Group – A shows more improvement than Group – B in all respects. So, mobilization (MWM) along with UST is more effective treatment modality to improve the functional ability of tibiofemoral osteoarthritis patients.

LIMITATIONS

After selection of careful & planned methodology each study will have certain unavoidable limitations. During the course of the study following limitation was found

1. Same study can be done with larger sample size.
2. Duration of the study can be increased to gain maximum benefit.
3. A strict follow up can be done in order to observe the long term outcome of treatment protocol.

RECOMMENDATIONS

The following recommendations are made to carry more fruitful study in the future –

1. More constructive home exercise protocol can be developed to gain maximum benefit from the home exercise program.
2. Home exercise compliance book can be maintained by the patient & that will help to assess how much the patient continues his / her home exercise program.
3. Isometric exercise can be given with isokinetic device or an angle specific Isometric exercise can be incorporated & this all may be more fruitful to the patients.
4. Same study can be for patellofemoral osteoarthritis patients to see the effectiveness of the treatment protocol.
5. The effectiveness of the same treatment protocol that is used for this study can be incorporated in separate female or male sexes to observe the particular effectiveness of the treatment in particular gender.

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