COMPARISON BETWEEN MAITLAND MOBILIZATION WITH CONVENTIONAL PHYSIOTHERAPY AND MULLIGAN MOBILIZATION WITH CONVENTIONAL PHYSIOTHERAPY FOR THE TREATMENT OF KNEE OSTEOARTHRITIS PATIENT AT CRP.

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We the undersigned certify that we have carefully read and recommended to the Faculty of Medicine, University of Dhaka, for the acceptance of this dissertation entitled

"Comparison between Maitland mobilization with conventional physiotherapy and Mulligan mobilization with conventional physiotherapy for the treatment of knee osteoarthritis patient at CRP."

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DECLERATION

I declare that the work presented here is my own. All sources used have been cited appropriately. Any mistakes or inaccuracies are my own. I also decline that for any publication, presentation or dissemination of information of the study. I would bound to take written consent from the department of Bangladesh health professions institute (BHPI).

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ANNEXURE

Acknowledgement

Acronyms

BHPI	Bangladesh Health Professions Institute
BMRC	Bangladesh Medical Research Council
CRP	Centre for the Rehabilitation of the Paralysed
DF	Degree of Freedom
MS	Musculo-skeletal
ICF	International Classification of Functioning, Disability and Health
IRB	Institutional Review Board
MWM	Movement with Mobilization
NSAID	Non-Steroidal Anti-inflammatory Drugs
PT	Physiotherapy
RCT	Randomized Clinical trail
NPRS	Numeric Pain Rating Scale
SPSS	Statistical Package of the Social Sciences
WOMAC	Western Ontario and McMaster Universities Osteoarthritis Index
WHO	World Health Organization

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Abstract

Purpose: The study was conducted to identify and investigate the therapeutic effectiveness of Maitland mobilization along with conventional physiotherapy and Mulligan mobilization along with conventional physiotherapy for the treatment of knee osteoarthritis. This study has made the comparison, in order to discover the most effective treatment protocol to alleviate the symptoms of the condition. *Objectives:* To assess the effect on pain after introducing of Maitland mobilization along with conventional physiotherapy Mulligan mobilization along with conventional physiotherapy for knee osteoarthritis patient, to measure the severity of pain by using Numeric pain rated scale (NPRS) to identify the severity of pain, to assess functional disability by western Ontario and McMaster Universities Index (WOMAC).*Methodology:* A randomized clinical trial was conducted. 14 samples were randomly selected into 2 groups from Musculoskeletal Unit, Physiotherapy Department, Centre for the Rehabilitation of the Paralysed (CRP), Savar. Initially all the subjects were assessed by Peripheral Assessment Form at the clinical settings and then data were collected by questionnaires, Numeric pain rated scale (NPRS) was used to assess pain intensity and using Western Ontario and McMaster Universities Index (WOMAC) for functional disability of the patients. Experimental GroupA receivedof Maitland mobilization along with conventional physiotherapy while experimental Group Breceived Mulligan mobilization along with conventional physiotherapy. *Results:* The study has used statistical analysis by paired t test and unrelated *t* test to compare the Experimental group A and Experimental Group B and analyses by interpreting the probability level of significance of *t* value. The results were found to be significant for *t* value. *Conclusion:* The study concludes that the Mulligan mobilization with conventional physiotherapy technique is significantly capable of producing beneficial effects on pain reduction.

Keywords: *Maitland mobilization, Mulligan mobilization, Osteoarthritis.*

1.1Background

One of the most common arthritis & musculoskeletal problem is Osteoarthritis (OA), which is worldwide, & approximately 10% of the world's population have symptomatic OA who are 60 years or older (Sambandam et al., 2011). A chronic degenerative disorder with multifactorial etiology characterized by loss of articular cartilage, hypertrophy of bone at the margins, subchondral sclerosis and range of biochemical and morphological alteration of the synovial membrane and joint capsule known as Osteoarthritis (OA) (Harris et al., 2014).

The degenerative disorder, which is not a single disease but also represents the various disorders of joints such as joint failure (Sambandam et al., 2011). Generally degenerative disorder occurs in the elder people, but in Bangladesh, it is very common in both males (53.3%) and females (60.9%) and the young individuals may be affected (Al-Arfaj et al., 2002).

The Osteoarthritis (OA) affects 2,693 of every 100,000 women and 1770 of every 100,000 men (Murphy et al., 2008). Before 50 years of age, the prevalence of OA in most joints is higher in men than in women. After about 50 years of age women are more affecting with the hand, feet, spine, & weight-bearing joint such as hip & knee than men and greater severity of OA (Srikanth et al., 2005).

Knee osteoarthritis is a musculoskeletal problem and is associated with most common symptoms of pain, inflammation, instability, decreased range of motion & lowering the quality of life (Rinkle et al., 2010).

Knee osteoarthritis is the most common cause of joint disorder & its prevalence increasing with age. The point of prevalence of knee OA in Australian population is 5-10% & India population is 22% to 39% (Malgaonkar et al., 2014).

The prevalence of knee osteoarthritis in the Netherlands in 2007 was 14.3 per 1000 for men and 23.8 per 1000 for women (Jansen et al., 2011). It affects more than 21 million people in the US with 36% of elderly aged 70 or older having some degree of radiographic knee OA (Ambrosia, et al,. 2005).

In Bangladesh, there is no real statistics that how many patients are affected by osteoarthritis. However, one statistics give a general indication to the prevalence of osteoarthritis and that is 10,392,681 people are affected by osteoarthritis in 2004 (Paul et al., 2003).

Knee OA is the strongest predictor of disability among 10 diseases for several activities such as stair climbing, walking, housekeeping etc. & the risk factors of knee OA including with age, gender, obesity, varus/vulgusmalalignment, previous knee injury, occupation, heredity and others (Brouwer et al., 2007).

The main complains of a OA patient is joint pain, morning stiffness, muscle weakness, loss of range of motion, instability and loss of functional ability such as walking, squatting, sit to stand, climbing stairs (Anita et al., 2006). Nevertheless, the progression of the disease is usually slow leading to joint failure with pain and disability (Litwic et al., 2013). Knee OA is a main source of chronic disability (Colbert et al., 2013). It causes mark limitation in daily living activity (ADLs) of the patients (Marmon et al., 2013).

In OA both drug & non drug treatment are used , pain reduction and symptom improvement may be achieved by drug treatments but the drug treatment have side effects & drug overdose (NAM et al., 2013). Non-drug treatments include physical therapies such as electrotherapy, hyperthermia, phototherapy, exercise therapy and manual therapy (NAM et al., 2013).

The aim of physical therapy for knee OA is to reduce pain, preserve joint physiology and maintain or recover normal activity of the joint (Mishel et al., 2013).

Physiotherapy is concerned with maximizing mobility and improving quality of life by applying the appropriate intervention. Physiotherapy is directed towards the attainment of proper posture, improve muscle strength, which are achieved by using various approaches including manual therapy in the form of mobilization, strengthening exercises and stretching of soft tissues(NAM et al., 2013).

Maitland and Mulligan's mobilization with movement is a manual therapy treatment technique that used in the spine, upper & lower extremity for management of various musculoskeletal conditions (NAM et al., 2013). Maitland mobilization is applied to be effective in reducing pain and improving ROM in knee osteoarthritis (Rangey et al., 2015). The mobilization based on V grade. According to Maitland's classification, Grade I and Grade II joint mobilizations are performed primarily to decrease joint pain and Grade III and Grade IV joint mobilizations are performed to increase joint ROM (Paul et al., 2003).

Mulligan's movement with mobilization is a manual therapy technique in which the therapist applied pain free accessory joint gliding force at right angle or parallel to a joint while a concurrent movement of the joint actively performed by the patient (Malgaonkar et al., 2014). Manual therapy techniques such as Mulligan mobilization improve joint proprioception (Lalit et al., 2012). It is found that Mulligan's mobilization technique is more effective in reducing pain, joint stiffness and improving range of motion, walking distance & finally the quality of life in patients with knee Osteoarthritis (Malgaonkar et al., 2014).

Mulligan's concept of mobilization with movement (MWM) is a contemporary form of joint mobilization, consisting of a therapist-applied pain-free accessory gliding force combined with active movement (Mulligan, 2004). It is related to correct minor positional faults that occur secondary to injury and that lead to maltracking of the joint, resulting in symptoms such as pain, stiffness, or weakness. 11 Maitland concept is a process of examination, assessment and treatment of musculoskeletal disorder by

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manipulative physiotherapy where a chain of oscillatory joint mobilization grades based on the pathological limit of tissue are used (Colbert et al., 2013).

Hence, this study aims to investigate the effectiveness of Mulligan mobilization and Maitland mobilisation along with Supervised exercise program in with Knee Osteoarthritis in aspect of relieving pain intensity, reducing functional disability, improving muscle strength (Paul et al., 2003).

1.2 Rational

From many studies, it is found that many people are suffering from knee OA in Bangladesh. It is a matter of regret that most of them are deprived from proper physiotherapy treatment. They are just getting electrotherapy modalities. However, outdoor department of CRP is trying to provide appropriate management of knee Osteoarthritis based on evidence. The manual therapy that are most frequently employed to deal with this clinical condition including Maitland mobilization and Mulligan's mobilization. Maitland mobilization and Mulligan's mobilization reduce knee pain better than other physical therapy & electrotherapy modalities and to reduce joint stiffness, increase ROM & functional activities in patients with knee OA.

The aim of the study is to find out the effectiveness of Maitland mobilization and Mulligan's mobilization technique for the subject with knee OA. The subjects with knee OA exhibit significant deficits in knee kinematics including walking, squatting, sit to stand, housekeeping & climbing stairs. For reducing pain & increasing ROM and functional activity, it is suggested that patellar mobilization, isometric contraction, strengthening exercise & electrotherapy modalities IRR (Infra-red radiation) was the most effective interventions. In the field of research in physiotherapy, has not encoded any research on effectiveness of Maitland mobilization and Mulligan mobilization exercise in subjects with knee OA. There are some achievements in overall Physiotherapy intervention in knee OA but experts suggest that Mulligan's mobilization is one of the important interventions for knee OA.

The purpose of this study is to compare the effectiveness of Maitland mobilization and Mulligan mobilization with conventional physiotherapy alone for the patient with knee OA. There were some research articles published about physiotherapy intervention for patient with knee OA, but the comparison between Maitland and of Mulligan technique for the patients with knee OA. Therefore, in this study "Comparison between Maitland mobilization with conventional physiotherapy and Mulligan mobilization with conventional physiotherapy for the treatment of knee osteoarthritis patient in Bangladesh" will give the evidence of knee OA. However, research helps to improve the

knowledge of health professionals, as well as develops the profession. The results of the study may help the physiotherapists to give evidence-based treatment in patients with knee OA, which will be beneficial for both the patient with knee OA and for developing the field of physiotherapy profession.

1.3 Aim

The aims of the study to investigate the effectiveness of Maitland mobilization with conventional physiotherapy and Mulligan mobilization with conventional physiotherapy for the treatment of knee osteoarthritis patient in aspect of relieving pain intensity, reducing functional disability.

1.4 Objectives

1.5.1 General objective

To comparison between Maitland mobilization with conventional physiotherapy and Mulligan mobilization with conventional physiotherapy for the treatment of knee osteoarthritis patient.

1.5.2 Specific objectives

- To identify pain intensity.
- To identify reducing functional disability.
- To identify effectiveness of mainland mobilization and Mulligan mobilization.
- To explore the sociodemographic

1.5 Hypothesis

Null hypothesis

H_a : μ_1 - μ_2 =0 or μ_1 =μ_2, where the experimental group A and experimental group B and final mean difference is same.

Alternative hypothesis

H_a : μ_1 - μ_2 ≠0 or μ_1 ≠μ_2, where the experimental group A and experimental group B and final mean difference is not same.

1.6 Operational definition

Osteoarthritis (OA)

Osteoarthritis is a chronic degenerative joint disorder with multifactorial etiology characterized by loss of articular cartilage & hypertrophy of bone at the margins. Knee OA is one of the most common joint diseases in the elderly & is associated with disability.

Conventional physiotherapy

Physiotherapeutic interventions that are widely accepted and commonly practiced by medical community. The researcher formulated a list of evidence based physiotherapy interventions of knee OA and provided those to the physiotherapist to mark the interventions commonly used as conventional physiotherapy for knee OA. After finishing the pilot study, researcher became able to find out the conventional physiotherapy interventions used for knee OA and their frequency of use, with the consent of eight clinical physiotherapists & an educational booklet. Patellar mobilization, knee joint mobilization, isometric contraction of quadriceps muscle, stretching exercise, gapping exercise, strengthening exercise of quadriceps, hamstring, hip abductor & adductor group of muscle, squeezing, soft tissue mobilization, loose body manipulation & Infra-red radiation was the most commonly used interventions, Oral NSAIDs were the second most commonly used intervention and corticosteroid injection were the partially used interventions.

Maitland mobilization

Maitland concept is a process of examination, assessment and treatment of musculoskeletal disorder by manipulative physiotherapy where a chain of oscillatory joint mobilization grades based on the pathological limit of tissue are used. The Maitland Concept of Manipulative Physiotherapy emphasizes a specific way of thinking,

continuous evaluation and assessment and the art of manipulative physiotherapy and a total commitment to the patient. The application of the Maitland concept can be on the peripheral joints like knee joint both require technical explanation and differ in technical terms and effects; however, the main theoretical approach is similar to both. Maitland mobilization has been found to be effective in reducing pain and improving ROM in knee osteoarthritis subjects. The intensity of mobilization is commonly categorized based on a 5-grade classification system defined by Maitland. According to Maitland's classification, Grade I and Grade II joint mobilizations are performed primarily to decrease joint pain and Grade III and Grade IV joint mobilizations are performed to increase joint ROM. Knee mobilizations may be beneficial for individuals with a variety of conditions, including post-operative rehab and knee osteoarthritis (OA).

Mulligan mobilization

Mulligan's mobilization with movement (MWM) is a manual therapy treatment technique, used in the management of various musculoskeletal conditions given by Brain mulligan in 1980. It is the combination of two components, joint mobilization, and active movement. It helps in reducing pain and movement restriction. The treatment technique's principle is to overcome joint tracking problems or positional faults by making biomechanical changes. Mulligan's concept of mobilization with movement is a contemporary form of joint mobilization, consisting of a therapist-applied pain-free accessory gliding force combined with active movement. Mobilization with Movement (MWM) for peripheral joints is a widely used to restore functional movements in joints even after many years of restriction. Mobilization with Movement is the concurrent application of pain-free accessory mobilization with active and/or passive physiologic movement. Passive end-range over pressure may be applied without pain as a barrier.

Osteoarthritis can be defined as a condition characterized by loss of cartilage of focal areas within the synovial joints, associated with hypertrophy of bone (osteophytes, subchondral bone sclerosis) and thickening of the capsule (Zhang et al., 2008). Moreover, involvement of other structures, including the ligament, meniscus, capsule, synovial membrane and per articular muscles (Cooper et al., 2013). Worldwide, OA is one of the leading causes of disability, particularly in the elderly population and is most prevalent at the hip and knee (NAM et al., 2013). It also has an effect on the individual's function, quality of life, occupation, mood, relationships, and leisure activities (Marmon et al., 2013). The prevalence of OA varies from country to country widely in all over the world (Pas et al., 2013).

Worldwide estimates indicate that symptomatic knee OA occurs in 9.6% of men and 18% of women aged > 60 years or older (Malgaonkar et al., 2014). In the Framingham study the prevalence of radiographic knee OA in adults age ≥45 was 19.2% and 27.8% in the Johnston County Osteoarthritis project (Zhang & Jordan, 2008).

Osteoarthritis commonly affects the hands, feet, spine and large weight bearing joints such as the hip and knees &those who were only overweight had more than twice the chance of developing knee OA compared with their normal weight counterparts (Blagojevic et al., 2010).

Lower limb is the most common site for OA & patient with knee osteoarthritis complain pain and difficulty with everyday activities such as prolonged sitting, ascending and descending stairs, squatting, kneeling, rising from a chair and getting in and out of a car (Anita et al., 2006).

The complaint rate increase with age, up to 53.4% in the age group > 65 years & the major disability was inability to squatting (3.1%). Indian women had the highest rate of pain (28.4%), while Chinese men & women pain rate ratio was 9.9% & 23.8% (Veerapen et al, 2007).

The exact causes of Primary knee osteoarthritis are not known. The following factors such as age, obesity, genetics, occupation, prolonged standing, sports, and metabolic disorders are suspected to cause of primary knee OA (Gosset et al., 2012). Another study shows the following factors such as crystals in joint fluid or cartilage, high bone mineral density, injury to the joint, peripheral neuropathy, joint hyper mobility are responsible for primary knee OA(Hinton et al, 2002).

The exact causes of secondary knee osteoarthritis are as valgus and varus deformities of the knee-rheumatoid arthritis, infection, TB, hyperparathyroidism, over use of intra articular steroid therapy (Ebenezer, 2003). Repeated minor trauma may lead to micro fractures and subsequent osteoarthritis & occupational factor is to be important in the development of secondary OA. Hemophilia, acromegaly and hyperthyroidism all predispose joints to secondary OA (Porter, 2003).

Risk factors of osteoarthritis including Age, Obesity, Trauma, Genetics, Sex hormones, Muscle weakness, Mal-alignment, Infection, Crystal deposition, Acromegaly, Previous rheumatoid arthritis & Repetitive joint use or excessive load (McWilliams et al., 2011).

According to American college of Rheumatology, knee OA are clinically diagnosed. These are crepitus on active joint motion, morning stiffness < 30 mines, bony enlargement of knee on examination, no palpable warmth, age > 40 years. Above-mentioned criteria any of 3 should be present along with knee pain (Peat et al., 2006).

To treat the condition of degenerative osteoarthritis both drug-based & a variety of non-drug treatment are used, pain reduction and symptom improvement may be achieved by drug treatments but the drug treatment have side effect & drug overdose (NAM et al., 2013). Non-drug treatments including physiotherapy are effective to reduce pain in knee OA. Electrotherapy, hyperthermia, phototherapy, exercise therapy and manual therapy these are included in physiotherapy (NAM et al., 2013). For the management of knee OA

two recent systematic reviews demonstrated the usefulness of manual therapy and exercise program (French et al., 2011).

Mulligan technique is a kind of manual therapy technique for spinal or upper and lower extremity pain. Mulligan concept of movement with mobilization (MWM) is a contemporary form of joint mobilization, in which the therapist applied pain- free accessory gliding force combined with active movement performed by patient (Jansen et al., 2011). By providing mulligan mobilization immediate relief pain & improved function of patients in several musculoskeletal disorders (Teys et al., 2008).

The aim of the Mulligan mobilization technique is to restore a painful and limited movement to a painless and full range functional movement immediately (Mishel et al., 2013). Mulligan mobilization can be applied in either no-weight-bearing or weight-bearing position & with or without a belt. A study indicated that both the non-weight-bearing and weight-bearing Mulligan mobilization treatment techniques significantly improved range of motion (Vicenzino, 2006). Several clinical studies investigated the efficacy of Mulligan mobilization treatment techniques especially for spine & lower extremities (NAM et al., 2013).

An experimental design was conducted to compare between the Maitland mobilization and mulligan mobilization. 45 subjects with knee osteoarthritis were included and randomly assigned into 3 groups. Group-A (n=15) received Mulligan mobilization along with supervised exercise program, Group-B (n=15) received Maitland mobilization along with supervised exercise program and Group-C (n=15) received supervised exercise program alone thrice weekly for 4 weeks.Pain intensity was assessed by using the visual analog scale (VAS). WOMAC is used to evaluate pain, functional capacity and stiffness. Mulligans mobilization are effective in relieving knee pain and functional disability (Angie et al., 2016).

A study was done about a relationship between the Mulligan mobilization& the maitland mobilization in patients with knee OA. 40 subjects with knee osteoarthritis were

randomized 20 subjects each into Maitland mobilization and mulligan mobilization group. Group A was treated with Mulligan mobilization & Group B was treated with Maitland mobilization thrice a week for 2 weeks. At first Mulligan mobilization technique was performed in lying or non-weight-bearing position then the weight-bearing position. 3 set of 10 repetitions with one minute rest in between each set for six sessions with two days interval. Then Maitland mobilization was applied for same intervention. Pain intensity was assessed by using the visual analogue scale, range of motion was measured by goniometer & WOMAC is used to evaluate functional capacity. Both group received treatment 3 times per week for 2 weeks. After 6 sessions of therapy the study conclude that both Mulligan mobilization &maitland mobilization techniques are effective but Mulligan mobilization are more effective than Maitland mobilization technique (Malgaonkar et al., 2014).

| CHAPTER –III | METHODOLOGY |

This research was a quantitative evaluation of the comparison between Maitland Mobilization with conventional physiotherapy and mulligan mobilization with conventional physiotherapy management for the treatment of knee osteoarthritis in Bangladesh. NPRS was used as measurement tools for measuring the pain intensity in several functional positions & WOMAC was used for measuring the functional disability.

3.1 Study design

The study was conduct by using Randomized Clinical Trail (RCT). From the outdoor patients with adhesive capsulitis, 14 patients were selected by simple random sampling from musculoskeletal department, physiotherapy unit CRP;Savar. The researcher used computerized random sampling procedure for this research. 14 subjects were randomly selected in to 2 groups where 7 subjects were in Maitland mobilization with conventional physiotherapy group (Group-A) and 7 patients to the Mulligan mobilization with conventional physiotherapy group (Group-B).A pre-test (before intervention) and post-test (after intervention) was administered with each subject of both groups to compare the pain effects and functioning before and after the treatment.

3.2 Study area

Musculoskeletal Unit, Department of Physiotherapy, CRP, Savar, Dhaka- 1343.

3.3 Study Population

A population refers to the entire group of people or items that meet the criteria set by the researcher. The populations of this study will be the knee Osteoarthritis Patients.

3.4 Sample Size

14 sample was taken by the researcher. Obviously, this is a small sample but still we belief they will be provided a representative picture of the study. Due to time limitation the researcher has to choose 14 participants to conduct this study.

3.5 Sample Scheme

The study group subjects where studied in such way that this patients coming to CRP at Savar with a particular time period. As these patients attained at CRP randomly without the choice of CRP authority or the researchers choice, so they may be consideard as a random sample.

3.6 Inclusion criteria

- Willing to participate.
- Both sexes are included: Knee OA is degenerative joint disease which can occur both sexes that are found on research.
- Unilateral or bilateral knee OA: Can affect one or both limb.
- Crepitus on active joint motion.
- Knee pain: This is the most common symptom that occur after having knee OA.
- Stiffness.
- Reduce ROM of knee joint.

3.7 Exclusion criteria

- Subject who has history of taking physiotherapy intervention, oral NSAID or corticosteroid injection previously.
- The participants who has deformity of the knee.
- Subjects who were mentally unstable.
- Neuromuscular disease.
- Symptoms due to other cause.
- Pregnancy.
- History of metastatic cancer.
- Unstable angina.
- Prior surgery.
- Arthritis of knee joint.

Flowchart of the phases of randomized controlled trial:

Assessed for eligibility Outdoor knee osteoarthritis patients

↓

Randomly selected 14 patients of osteoarthritis

↓

Randomized to A & B Group (n=14)

Experimental Group A (n1=7)	Experimental Group B (n2=7)
↓	↓
Received Maitland mobilization with conventional physiotherapy	Received mulligan mobilization with conventional physiotherapy
↓	↓
Follow Up (after 6 sessions)	Follow up (after 6 sessions)
↓	↓
Outcome analyzed	Outcome analyzed

A flowchart for a randomized controlled trial of a treatment program including conventional physiotherapy with Maitland Mobilization and Mulligan Mobilization for patient with knee Osteoarthritis patient.

3.8 Sample technique

Subjects, who will meet the inclusion criteria, will be taken as sample in this study. Fourteen patients with knee osteoarthritis was selected from outdoor musculoskeletal physiotherapy department of CRP (Savar) and then 7 patients with knee osteoarthritis will be randomly assigned to Maitland mobilization with conventional physiotherapy group (Group-A) and 7 patients to the Mulligan Mobilization with conventional physiotherapy group (Group-B) for this randomized control trial study. The study was a single blinded study. When the samples was collected, the researcher randomly assigned the participants into two experimental groups, because it improves internal validity of experimental research. The samples was given numerical number A1, A2, A3 etc for the group A and B1, B2, B3 etc for the group B. Total 14 samples was included in this study, among them 7 patients was selected for the group A (received Maitland mobilization with conventional physiotherapy) and rest 7 patients will select for group B (received mulligan with conventional physiotherapy)

3.9 Method of data collection

3.9.1 Measurement

To conduct the study questionnaire was developed under the advice and permission of the supervisor following certain guidelines. The researcher has used Pain and Disability questionnaire. By using Numeric Pain Rating Scale (NPRS) for pain measurement in different working position and also activities and WOMAC scale for disability.

3.9.1a Western Ontario McMaster University Osteoarthritis Index (WOMAC)

In the field of osteoarthritis research The Western Ontario McMaster University Osteoarthritis Index (WOMAC) was developed as an osteoarthritis specific measures of disability. It comprises three components: pain, stiffness, physical function, which can be reported separately or as an overall index. It is recommended that, the use of WOMAC as a primary measure of efficacy in osteoarthritis trials.

3.9.1b Numeric Pain Rating Scale (NPRS)

In this study researcher was used numeric pain rating scale for measuring the intensity of pain. The NPRS is a simple and accurate way of subjectively assessing pain along a continuous visual spectrum. NPRS consists of a straight line on which the individual being assessed marks the level of pain. The ends of the straight line are the extreme limits of pain with 0 representing no pain and 10 representing the worst pain ever experienced. The Numeric pain rating scale (NPRS) is a tool widely used to measure pain and a change in the numeric pain rating scale score represents a relative change in the magnitude of pain sensation.

3.9.2 Measurement Tool

The organized material was questionnaire, consent form, pen, paper, pencil was used as data collection tools in this study. All questionnaire designed to conduct the interviews.

3.9.3 Data collection procedure

The study procedure was conducted through assessing the patient, initial recording, treatment and final recording. After screening the patient at department, the patients was assessed by qualified physiotherapist. Six sessions of treatment was provided for every subject.

Fourteen subjects were chosen for data collection according to the inclusion criteria. The researcher divided all participants into two groups and coded A1-A7 for group A and B1-B7 for group B. Group A was received maitland mobilization glide with conventional physiotherapy and group B was received for mulligan mobilization with conventional physiotherapy.

Data was gathered through a pre-test, intervention and post-test and the data was collected by using a written questionnaire form which was formatted by the researcher. Pretest was performed before beginning the treatment and the intensity of pain, disability & ROM of movements was noted with NPRS score. The same procedure was performed

to take post-test at the end of six session of treatment. Researcher gave the assessment form to each subject before starting treatment and after six session of treatment and instructed to put mark on the line of NPRS according to their intensity of pain. The researcher collected the data both in group A and group B in front of the qualified physiotherapist in order to reduce the biasness. At the endof the study, specific test was performed for statistical analysis.

3.10 Intervention

A common intervention program was executed for both groups as conventional physiotherapy, it includes- . Quadriceps stretching, hamstring stretching, calf stretching, soft tissue mobilization, accessory movements, Infra-red radiation and Ultrasound, which are the most frequently, used interventions. In this study, the group A was treated with Maitland mobilization in addition with conventional physiotherapy. Clinical physiotherapist applied the Maitland mobilization exercise with the conventional physiotherapies and mulligan mobilization with conventional physiotherapies. Each group got 6 sessions of treatment. There is no evidence of exact repetition for exercise, but in practice expert opinion suggests that 6 sessions is minimal enough for patients with knee osteoarthritis to get more effectiveness.

3.11 Data Analysis

Data was analyzed by SPSS version 20 to compute the descriptive statistics using pie chart, bar chart, linear line diagram and also percentage and parametric test were conducted using paired t test and unrelated t test
The researcher has calculated the variables mean, mean difference, standard deviation, standard error, degree of freedom and significant level to show that experimental group and control group mean difference in within group was significantly different than the standard table values. In the between group than the standard table values. In the between group, the data shows that the mean difference was greater than the control group. The

researcher had tested mean variables stating problem test using t statistic, which is paired t test and also unrelated t test and was predicted as normally distributed if $Df \geq 30$

Estimated predictor

Hypothesis test of mean difference between the experimental group A and experimental group B, within groups and also between groups, assuming normal distribution of the parent population, two different and or independent variables, variables were quantitative by estimated predictor of paired t test or unrelated t test.

Hypothesis test

Paired t test

Paired t test was used to compare difference between means of paired varibles. Selection of test of hypothesis is mean difference under t distribution.

Assumption

Paired variables

Variables were quantitative

Parent population of sample observation follows normal distribution

Formula: Test statistic t is follows

$$t = \frac{\overline{d}}{SE(\overline{d})} = \frac{\overline{d}}{\frac{SD}{\sqrt{n}}}$$

Level of significant

The researcher has used 5% level of significant to test the hypothesis. Calculated t value and compared with standard t value is with appropriate degrees of freedom, the null hypothesis will be rejected when observed t value is large than the standard t value and alternative hypothesis is accepted. On the other hand, reversed decision has taken when the calculated value of t is smaller than the standard t value. All this decision are taken with a prefixed level of significance (for this case is 5%).

Table 3.1: WOMAC Questionnaire (Initial and Final assessment paired t test)

		Experimental group A			Experimental group B	
Serial no	Variable	t	Sig (2-tailed)	df	t	Sig (2-tailed)
Pair 1	pain in walking	1.000	.356	6	3.240	.018
Pair 2	pain in stair climbing	2.121	.078	6	8.000	.000
Pair 3	pain in night	1.459	.172	6	4.804	.003
Pair 4	pain in rest	3.873	.008	6	2.500	.047
Pair 5	pain in weight bearing	4.583	.004	6	3.240	.018
Pair 6	Morning stiffness	1.922	.103	6	3.873	.008
Pair 7	Stiffness occurring later in the day	1.549	.172	6	2.828	.030
Pair 8	Descending stairs	2.121	.078	6	6.971	.000
Pair 9	Ascending stairs	2.121	.078	6	7.071	.000
Pair 10	Rising from sitting	3.873	.008	6	4.583	.004
Pair 11	Standing	6.000	.001	6	7.120	.000
Pair 12	Bending to floor	2.121	.078	6	4.382	.005
Pair 13	Walking on flat surface	1.549	.172	6	4.768	.003
Pair 14	Getting in / out of car	2.121	.078	6	3.873	.008
Pair 15	Going shopping	1.549	.172	6	3.667	.010
Pair 16	Putting on socks	3.286	.017	6	2.828	.030
Pair 17	Lying in bed	1.000	.356	6	2.521	.045
Pair 18	Taking off socks	2.828	.030	6	3.576	.012
Pair 19	Rising from bed	.548	.604	6	3.240	.018
Pair 20	Getting in/out of bath	2.121	.078	6	6.971	.000
Pair 21	Sitting	2.500	.047	6	2.500	.047
Pair 22	Getting on/off toilet	1.922	.103	6	3.240	.018
Pair 23	Heavy domestic duties	1.549	.172	6	6.971	.000
Pair 24	Light domestic duties	3.873	.008	6	8.000	.000

Unrelated t test

Unrelated t test was used to compare difference between two means of independent variables. Selection of test of hypothesis was two independent mean differences under indipendant t distribution.

Assumption

Different and independent variables

Variables were quantitative

Normal distribution of the variables

Formula: test statistic t is follows:

$$t = \frac{\overline{x_1} - \overline{x_2}}{s\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

Where,

$\overline{x_1}$ = Mean of experimental group

$\overline{x_2}$ = Mean of control group

n_1 = Number of participants in the experimental group A

n_2 = Number of participants in the experimental group B

S = Combined standard deviation of both group

Table 3:2 WOMAC questionnaire unpaired t test

Variable	T	Df	Sig (2-tailed)
pain in walking	2.412	12	.033
pain in stair climbing	2.828	12	.015
pain in night	2.178	12	.050
pain in rest	1.987	12	.070
pain in weight bearing	1.342	12	.205
Morning stiffness	1.000	12	.337
Descending stairs	1.139	12	.277
Ascending stairs	1.188	12	.258
Rising from sitting	.000	12	1.000
Standing	.949	12	.361
Bending to floor	.000	12	1.000
Walking on flat surface	2.646	12	.021
Getting in / out of car	.816	12	.430
Going shopping	1.441	12	.175
Putting on socks	.408	12	.690
Lying in bed	.816	12	.430
Taking off socks	.408	12	.690
Rising from bed	.000	12	1.000
Getting in/out of bath	.000	12	1.000
Sitting	1.083	12	.300
Getting on/off toilet	1.083	12	.300
Heavy domestic duties	4.472	12	.001
Light domestic duties	1.390	12	.078

3.12 Ethical consideration

The research proposal was submitted to the Institutional Review Board (IRB) of Bangladesh Health Professions Institute (BHPI) and approval was taken from the board. The whole process of this research project was done by following the Bangladesh Medical Research Council (BMRC) guidelines and World Health Organization (WHO) Research guidelines. Again before starting data collection, researcher obtained permission from the head of physiotherapy department to access patient data based management and allow full involvement of physiotherapist who have been working in musculoskeletal physiotherapy department, CRP, Savar. The researcher strictly maintained the confidentiality regarding participant's condition and treatments. The researcher obtained consent from each participant to take part in this study. A signed informed consent form was received from each participant. The participants they decline answering any question during the study and were free to withdraw their consent and terminate participation at any time. Withdrawal of participation from the study did not affect their treatment in the physiotherapy department and they still had the chance to receive same facilities. Every subject had the opportunity to discuss their problems with the senior authority or administration of CRP and had any questioned answer to their satisfaction.

3.13 Informed Consent

The researcher was obtained consent to participate from every subject. A signed informed consent form was received from each participant. The participants was informed that they have the right to meet with outdoor doctor if they think that the treatment was not enough to control the condition or if the condition become worsen. The participants was also informed that they were completely free to decline answering any question during the study and were free to withdraw their consent and terminate participation at any time. Withdrawal of participation from the study was not affect their treatment in the physiotherapy department and they would still get the same facilities. Every subject had the opportunity to discuss their problem with the senior authority or administration of CRP and have any questioned answer to their satisfaction.

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3.14 Elimination of confounding variables

Confounding variable has an effect on the study variables, which can affect the result of the study. There were some confounding variables in this study such as patient's age, history of taking recent physiotherapy intervention, oral NSAID, steroid injection or other treatment, which can influence the result of the study. To control the confounding variables, researcher set the inclusion criteria as to include only those subjects who have no history of taking recent physiotherapy intervention, oral NSAID, steroid injection or other treatment.

Social and global

4.1.1 Age of the participants

Compares the baseline characteristics of age of the participants between Experimental Group A and Experimental Group B. In addition, two groups did not show significant differences. In Experimental Group A, the mean age ($\pm$ SD) of the participants was 3.29 ($\pm$ 1.380) years and in experimental group B 3.71($\pm$0.951) years.

Variables	Group (Mean$\pm$ SD)				
	Experimental Group A	**N**	**Experimental Group B**	**N**	
Age of the participants	**47.57 $\pm$ 15.098**	**7**	**54.00 $\pm$ 11.180**	**7**	

Table 4.1.1: Age of the participants

4.1.2 Gender of the participants

14 Patients with knee OA were included as sample of the study, among them 34% were Female and 64% were Male.
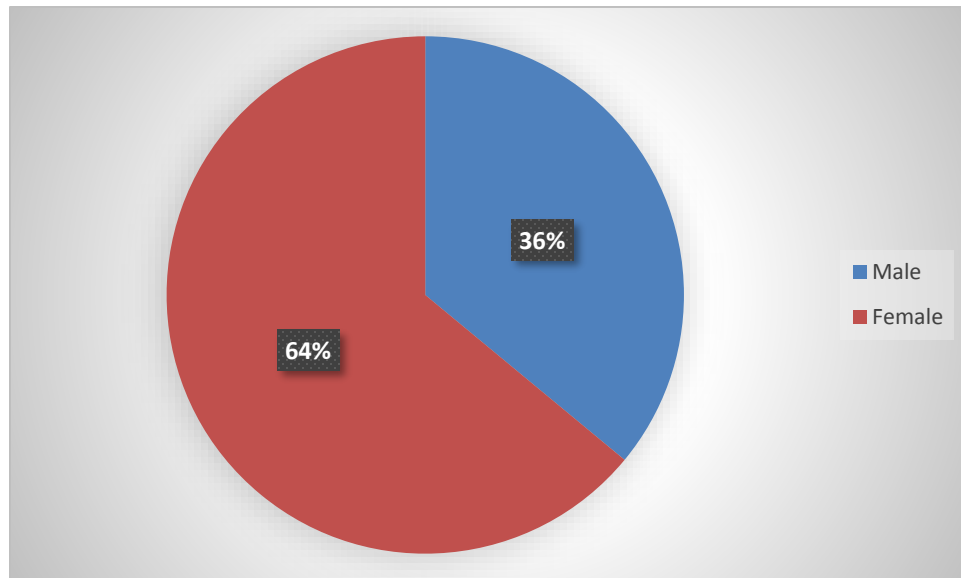
Figure: Gender of the participants

4.1.3 Occupation of the participants

14 Patients with knee OA were included as sample of the study, among them almost 50% housewife, about 21% were businessman, about 29% were service holder, about 6% others.
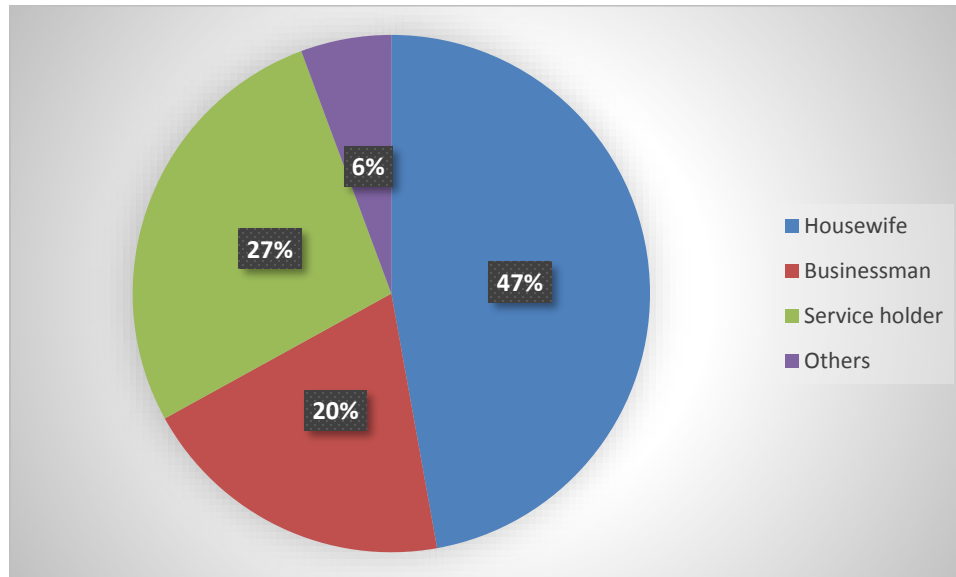
Figure:Occupation of the participants

4.2 Pain in NPRS

The study found that in the pain at rest observed t value was 7.778 in experimental group A at two tailed paired t test while this same variable for experimental group B observed value was 12.728 in within group. 5% level of significant at 6(six) degree of freedom standard t value was 2.44 and observed t value in pain at rest in both group which was greater than standard t value that mean null hypothesis was rejected and alternative hypothesis was accepted in the within group. Both groups in aspect of pain at rest were significant at 0.001% level. But the mean difference of experimental group B was greater than the experimental group A mean that means mulligan mobilization with conventional physiotherapy treatment for knee OA patient was more effective than Maitland mobilization with conventional physiotherapy in case of pain in NPRS.

The unrelated or independent t test in between group at 5% level of significant and 12 degree of freedom standard table value was 2.10 and at the same significant level and same degree of freedom observed t value was 1.391. The observed t value was less than the table value that mean null hypothesis was accepted and alternative hypothesis was rejected which meant there was no difference between mulligan mobilization with conventional physiotherapy treatment group and Maitland mobilization glide with conventional physiotherapy group.

4.3 WOMAC scale

4.3.1 Pain in walking

The study found that in the pain in walking observed t value was 1.000 in experimental group A at two tailed paired t test while this same variable for experimental group B observed value was 3.240 in within group. 5% level of significant at 6(six) degree of freedom standard t value was 2.44 and observed t value in pain in walking in experimental group B which was greater than standard t value that mean null hypothesis was rejected and alternative hypothesis was accepted in the group. Experimental group B in aspect of pain in walking were significant at 0.018% level. But the mean difference of experimental group B was greater than the experimental group A mean that means mulligan mobilization with conventional physiotherapy treatment for knee OA patient

was more effective than Maitland mobilization with conventional physiotherapy in case of pain in walking.

The unrelated or independent t test in between group at 5% level of significant and 12 degree of freedom standard table value was 2.10 and at the same significant level and same degree of freedom observed t value was 2.412. The observed t value was more than the table value that mean alternative hypothesis was accepted and null hypothesis was rejected which meant there was mulligan mobilization with conventional physiotherapy treatment group is more effective than Maitland mobilization with conventional physiotherapy group.

4.3.2 Pain in stair climbing

The study found that in the pain in stair climbing observed t value was 2.121 in experimental group A at two tailed paired t test while this same variable for experimental group B observed value was 8.000 in within group. 5% level of significant at 6(six) degree of freedom standard t value was 2.44 and observed t value in pain in stair climbing in experimental group B which was greater than standard t value that mean null hypothesis was rejected and alternative hypothesis was accepted in the group. Experimental group B in aspect of pain in stair climbing were significant at 0.001% level. But the mean difference of experimental group B was greater than the experimental group A mean that means mulligan mobilization with conventional physiotherapy treatment for knee OA patient was more effective than Maitland mobilization with conventional physiotherapy in case of pain in stair climbing.

The unrelated or independent t test in between group at 5% level of significant and 12 degree of freedom standard table value was 2.10 and at the same significant level and same degree of freedom observed t value was 2.828. The observed t value was more than the table value that mean alternative hypothesis was accepted and null hypothesis was rejected which meant there was muligan mobilization with conventional physiotherapy treatment group is more effective than Maitland mobilization with conventional physiotherapy group.

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4.3.3 Pain in night

The study found that in the pain in night observed t value was 1.459 in experimental group A at two tailed paired t test while this same variable for experimental group B observed value was 4.804 in within group. 5% level of significant at 6(six) degree of freedom standard t value was 2.44 and observed t value in pain in night in experimental group B which was greater than standard t value that mean null hypothesis was rejected and alternative hypothesis was accepted in the group. Experimental group B in aspect of pain in night were significant at 0.018% level. But the mean difference of experimental group B was greater than the experimental group A mean that means mulligan mobilization with conventional physiotherapy treatment for knee OA patient was more effective than maitland mobilization with conventional physiotherapy in case of pain in night.

The unrelated or independent t test in between group at 5% level of significant and 12 degree of freedom standard table value was 2.10 and at the same significant level and same degree of freedom observed t value was 2.178. The observed t value was more than the table value that mean alternative hypothesis was accepted and null hypothesis was rejected which meant there was muligan mobilization with conventional physiotherapy treatment group is more effective than Maitland mobilization with conventional physiotherapy group.

4.3.4 Pain in rest

The study found that in the pain in rest observed t value was 3.873 in experimental group A at two tailed paired t test while this same variable for experimental group B observed value was 2.500 in within group. 5% level of significant at 6(six) degree of freedom standard t value was 2.44 and observed t value in pain in rest in both group which was greater than standard t value that mean null hypothesis was rejected and alternative hypothesis was accepted in the group. Experimental group A in aspect of pain in rest were 0.004% and Experimental group B in aspect of pain in rest were significant at 0.047% level. But the mean difference of experimental group A was greater than the experimental group B mean that means maitland mobilization with conventional

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physiotherapy treatment for knee OA patient was more effective than mulligan mobilization with conventional physiotherapy in case of pain in rest.

The unrelated or independent t test in between group at 5% level of significant and 12 degree of freedom standard table value was 2.10 and at the same significant level and same degree of freedom observed t value was 1.987. The observed t value was less than the table value that mean null hypothesis was accepted and alternative hypothesis was rejected which meant there was Maitland mobilization with conventional physiotherapy treatment group is more effective than Mulligan mobilization with conventional physiotherapy group.

4.3.5 Pain in weight bearing

The study found that in the pain in weight bearing observed t value was 4.583 in experimental group A at two tailed paired t test while this same variable for experimental group B observed value was 3.240 in within group. 5% level of significant at 6(six) degree of freedom standard t value was 2.44 and observed t value in pain in rest in both group which was greater than standard t value that mean null hypothesis was rejected and alternative hypothesis was accepted in the group. Experimental group A in aspect of pain in rest were 0.004% and Experimental group B in aspect of pain in rest were significant at 0.018% level. But the mean difference of experimental group A was greater than the experimental group B mean that means Maitland mobilization with conventional physiotherapy treatment for knee OA patient was more effective than mulligan mobilization with conventional physiotherapy in case of pain in weight bearing.

The unrelated or independent t test in between group at 5% level of significant and 12 degree of freedom standard table value was 2.10 and at the same significant level and same degree of freedom observed t value was 1.342. The observed t value was less than the table value that mean null hypothesis was accepted and alternative hypothesis was rejected which meant there was Maitland mobilization with conventional physiotherapy treatment group is more effective than Mulligan mobilization with conventional physiotherapy group.

4.3.6 Descending stairs

The study found that in the pain in Descending stairs observed t value was 2.121 in experimental group A at two tailed paired t test while this same variable for experimental group B observed value was 6.971 in within group. 5% level of significant at 6(six) degree of freedom standard t value was 2.44 and observed t value in pain in descending stair in experimental group B which was greater than standard t value that mean null hypothesis was rejected and alternative hypothesis was accepted in the group. Experimental group B in aspect of pain in stair climbing were significant at 0.001% level. But the mean difference of experimental group B was greater than the experimental group A mean that means mulligan mobilization with conventional physiotherapy treatment for knee OA patient was more effective than Maitland mobilization with conventional physiotherapy in case of pain in descending stairs.

The unrelated or independent t test in between group at 5% level of significant and 12 degree of freedom standard table value was 210 and at the same significant level and same degree of freedom observed t value was 1.139. The observed t value was less than the table value that mean null hypothesis was accepted and alternative hypothesis was rejected which meant there was Maitland mobilization with conventional physiotherapy treatment group is more effective than Mulligan mobilization with conventional physiotherapy group.

4.3.7 Ascending stairs

The study found that in the pain in Ascending stairs observed t value was 2.121 in experimental group A at two tailed paired t test while this same variable for experimental group B observed value was 7.071 in within group. 5% level of significant at 6(six) degree of freedom standard t value was 2.44 and observed t value in pain in ascending stair in experimental group B which was greater than standard t value that mean null hypothesis was rejected and alternative hypothesis was accepted in the group. Experimental group B in aspect of pain in stair climbing were significant at 0.001% level. But the mean difference of experimental group B was greater than the experimental group A mean that means mulligan mobilization with conventional physiotherapy

treatment for knee OA patient was more effective than Maitland mobilization with conventional physiotherapy in case of pain in ascending stairs.

The unrelated or independent t test in between group at 5% level of significant and 12 degree of freedom standard table value was 2.10 and at the same significant level and same degree of freedom observed t value was 1.188. The observed t value was less than the table value that mean null hypothesis was accepted and alternative hypothesis was rejected which meant there was Maitland mobilization with conventional physiotherapy treatment group is more effective than Mulligan mobilization with conventional physiotherapy group.

4.3.8 Rising from sitting

The study found that in the pain in rest observed t value was 3.873 in experimental group A at two tailed paired t test while this same variable for experimental group B observed value was 4.583 in within group. 5% level of significant at 6(six) degree of freedom standard t value was 2.44 and observed t value in pain in rest in both group which was greater than standard t value that mean null hypothesis was rejected and alternative hypothesis was accepted in the group. Experimental group A in aspect of pain in rest were 0.008% and Experimental group B in aspect of pain in rest were significant at 0.004% level. But the mean difference of experimental group B was greater than the experimental group A mean that means mulligan mobilization with conventional physiotherapy treatment for knee OA patient was more effective than Maitland mobilization with conventional physiotherapy in case of pain in Rising from sitting.

The unrelated or independent t test in between group at 5% level of significant and 12 degree of freedom standard table value was 210 and at the same significant level and same degree of freedom observed t value was 0.001. The observed t value was less than the table value that mean null hypothesis was accepted and alternative hypothesis was rejected which meant there was Maitland mobilization with conventional physiotherapy treatment group is more effective than Mulligan mobilization with conventional physiotherapy group.

4.3.9 Standing

The study found that in the pain in standing observed t value was 6.000 in experimental group A at two tailed paired t test while this same variable for experimental group B observed value was 7.120 in within group. 5% level of significant at 6(six) degree of freedom standard t value was 2.44 and observed t value in pain in rest in both group which was greater than standard t value that mean null hypothesis was rejected and alternative hypothesis was accepted in the group. Experimental group A in aspect of pain in rest were 0.001% and Experimental group B in aspect of pain in rest were significant at 0.001% level. But the mean difference of experimental group A was greater than the experimental group B mean that means maitland mobilization with conventional physiotherapy treatment for knee OA patient was more effective than mulligan mobilization with conventional physiotherapy in case of pain in standing.

The unrelated or independent t test in between group at 5% level of significant and 12 degree of freedom standard table value was 2.10 and at the same significant level and same degree of freedom observed t value was 0.949. The observed t value was less than the table value that mean null hypothesis was accepted and alternative hypothesis was rejected which meant there was Maitland mobilization with conventional physiotherapy treatment group is more effective than Mulligan mobilization with conventional physiotherapy group.

4.3.10 Bending to floor

The study found that in the pain in Descending stairs observed t value was 2.121 in experimental group A at two tailed paired t test while this same variable for experimental group B observed value was 4.382 in within group. 5% level of significant at 6(six) degree of freedom standard t value was 2.44 and observed t value in pain in descending stair in experimental group B which was greater than standard t value that mean null hypothesis was rejected and alternative hypothesis was accepted in the group. Experimental group B in aspect of pain in stair climbing were significant at 0.005% level. But the mean difference of experimental group B was greater than the experimental group A mean that means mulligan mobilization with conventional physiotherapy treatment for knee OA patient was more effective than Maitland mobilization with conventional physiotherapy in case of pain in Bending to floor.

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The unrelated or independent t test in between group at 5% level of significant and 12 degree of freedom standard table value was 2.10 and at the same significant level and same degree of freedom observed t value was 0.001. The observed t value was less than the table value that mean null hypothesis was accepted and alternative hypothesis was rejected which meant there was Maitland mobilization with conventional physiotherapy treatment group is more effective than Mulligan mobilization with conventional physiotherapy group.

4.3.11 Walking on flat surface

The study found that in the pain in walking observed t value was 1.549 in experimental group A at two tailed paired t test while this same variable for experimental group B observed value was 4.768 in within group. 5% level of significant at 6(six) degree of freedom standard t value was 2.44 and observed t value in pain in walking in experimental group B which was greater than standard t value that mean null hypothesis was rejected and alternative hypothesis was accepted in the group. Experimental group B in aspect of pain in walking were significant at 0.003% level. The mean difference of experimental group B was greater than the experimental group A mean that means mulligan mobilization with conventional physiotherapy treatment for knee OA patient was more effective than Maitland mobilization with conventional physiotherapy in case of pain in Walking on flat surface.

The unrelated or independent t test in between group at 5% level of significant and 12 degree of freedom standard table value was 2.10 and at the same significant level and same degree of freedom observed t value was 2.646. The observed t value was more than the table value that mean alternative hypothesis was accepted and null hypothesis was rejected which meant there was mulligan mobilization with conventional physiotherapy treatment group is more effective than Maitland mobilization with conventional physiotherapy group.

4.3.12 Getting in / out of car

The study found that in the pain in walking observed t value was 2.121 in experimental group A at two tailed paired t test while this same variable for experimental group B observed value was 3.873 in within group. 5% level of significant at 6(six) degree of freedom standard t value was 2.44 and observed t value in pain in walking in experimental group B which was greater than standard t value that mean null hypothesis was rejected and alternative hypothesis was accepted in the group. Experimental group B in aspect of pain in walking were significant at 0.008% level. The mean difference of experimental group B was greater than the experimental group A mean that means mulligan mobilization with conventional physiotherapy treatment for knee OA patient was more effective than Maitland mobilization with conventional physiotherapy in case of pain in Getting in / out of car.

The unrelated or independent t test in between group at 5% level of significant and 12 degree of freedom standard table value was 2.10 and at the same significant level and same degree of freedom observed t value was 0.816. The observed t value was less than the table value that mean null hypothesis was accepted and alternative hypothesis was rejected which meant there was Maitland mobilization with conventional physiotherapy treatment group is more effective than Mulligan mobilization with conventional physiotherapy group.

4.3.13 Going shopping

The study found that in the pain in walking observed t value was 1.549 in experimental group A at two tailed paired t test while this same variable for experimental group B observed value was 3.667 in within group. 5% level of significant at 6(six) degree of freedom standard t value was 2.44 and observed t value in pain in walking in experimental group B which was greater than standard t value that mean null hypothesis was rejected and alternative hypothesis was accepted in the group. Experimental group B in aspect of pain in walking were significant at 0.010% level. But the mean difference of experimental group B was greater than the experimental group A mean that means mulligan mobilization with conventional physiotherapy treatment for knee OA patient

was more effective than Maitland mobilization with conventional physiotherapy in case of pain in Going shopping.

The unrelated or independent t test in between group at 5% level of significant and 12 degree of freedom standard table value was 2.10 and at the same significant level and same degree of freedom observed t value was 1.441. The observed t value was less than the table value that mean null hypothesis was accepted and alternative hypothesis was rejected which meant there was Maitland mobilization with conventional physiotherapy treatment group is more effective than Mulligan mobilization with conventional physiotherapy group.

4.3.14 Putting on socks

The study found that in the pain in rest observed t value was 3.286 in experimental group A at two tailed paired t test while this same variable for experimental group B observed value was 2.828 in within group. 5% level of significant at 6(six) degree of freedom standard t value was 2.44 and observed t value in pain in rest in both group which was greater than standard t value that mean null hypothesis was rejected and alternative hypothesis was accepted in the group. Experimental group A in aspect of pain in rest were 0.017% and Experimental group B in aspect of pain in rest were significant at 0.030% level. But the mean difference of experimental group A was greater than the experimental group B mean that means maitland mobilization with conventional physiotherapy treatment for knee OA patient was more effective than mulligan mobilization with conventional physiotherapy in case of pain in Putting on socks.

The unrelated or independent t test in between group at 5% level of significant and 12 degree of freedom standard table value was 2.10 and at the same significant level and same degree of freedom observed t value was 0.408. The observed t value was less than the table value that mean null hypothesis was accepted and alternative hypothesis was rejected which meant there was Maitland mobilization with conventional physiotherapy treatment group is more effective than Mulligan mobilization with conventional physiotherapy group.

4.3.15 Lying in bed

The study found that in the pain in walking observed t value was 1.000 in experimental group A at two tailed paired t test while this same variable for experimental group B observed value was 2.521 in within group. 5% level of significant at 6(six) degree of freedom standard t value was 2.44 and observed t value in pain in walking in experimental group B which was greater than standard t value that mean null hypothesis was rejected and alternative hypothesis was accepted in the group. Experimental group B in aspect of pain in walking were significant at 0.045% level. But the mean difference of experimental group B was greater than the experimental group A mean that means mulligan mobilization with conventional physiotherapy treatment for knee OA patient was more effective than Maitland mobilization with conventional physiotherapy in case of pain in Lying on bed.

The unrelated or independent t test in between group at 5% level of significant and 12 degree of freedom standard table value was 2.10 and at the same significant level and same degree of freedom observed t value was 0.816. The observed t value was less than the table value that mean null hypothesis was accepted and alternative hypothesis was rejected which meant there was Maitland mobilization with conventional physiotherapy treatment group is more effective than Mulligan mobilization with conventional physiotherapy group.

4.3.16 Taking off socks

The study found that in the pain in rest observed t value was 2.828 in experimental group A at two tailed paired t test while this same variable for experimental group B observed value was 3.576 in within group. 5% level of significant at 6(six) degree of freedom standard t value was 2.44 and observed t value in pain in rest in both group which was greater than standard t value that mean null hypothesis was rejected and alternative hypothesis was accepted in the group. Experimental group A in aspect of pain in rest were 0.030% and Experimental group B in aspect of pain in rest were significant at 0.012% level. But the mean difference of experimental group B was greater than the experimental group A mean that means mulligan mobilization with conventional

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physiotherapy treatment for knee OA patient was more effective than maitland mobilization with conventional physiotherapy in case of Taking off socks.

The unrelated or independent t test in between group at 5% level of significant and 12 degree of freedom standard table value was 2.10 and at the same significant level and same degree of freedom observed t value was 0.408. The observed t value was less than the table value that mean null hypothesis was accepted and alternative hypothesis was rejected which meant there was Maitland mobilization with conventional physiotherapy treatment group is more effective than Mulligan mobilization with conventional physiotherapy group.

4.3.17 Rising from bed

The study found that in the pain in walking observed t value was 0.548 in experimental group A at two tailed paired t test while this same variable for experimental group B observed value was 3.240 in within group. 5% level of significant at 6(six) degree of freedom standard t value was 2.44 and observed t value in pain in walking in experimental group B which was greater than standard t value that mean null hypothesis was rejected and alternative hypothesis was accepted in the group. Experimental group B in aspect of pain in walking were significant at 0.018% level. But the mean difference of experimental group B was greater than the experimental group A mean that means mulligan mobilization with conventional physiotherapy treatment for knee OA patient was more effective than Maitland mobilization with conventional physiotherapy in case of Rising from bed.

The unrelated or independent t test in between group at 5% level of significant and 12 degree of freedom standard table value was 2.10 and at the same significant level and same degree of freedom observed t value was 0.001. The observed t value was less than the table value that mean null hypothesis was accepted and alternative hypothesis was rejected which meant there was Maitland mobilization with conventional physiotherapy treatment group is more effective than Mulligan mobilization with conventional physiotherapy group.

4.3.18 Getting in / out of bath

The study found that in the pain in walking observed t value was 2.121 in experimental group A at two tailed paired t test while this same variable for experimental group B observed value was 6.971 in within group. 5% level of significant at 6(six) degree of freedom standard t value was 2.44 and observed t value in pain in walking in experimental group B which was greater than standard t value that mean null hypothesis was rejected and alternative hypothesis was accepted in the group. Experimental group B in aspect of pain in walking were significant at 0.001% level. But the mean difference of experimental group B was greater than the experimental group A mean that means mulligan mobilization with conventional physiotherapy treatment for knee OA patient was more effective than Maitland mobilization with conventional physiotherapy in case of Getting in / out of bath.

The unrelated or independent t test in between group at 5% level of significant and 12 degree of freedom standard table value was 2.10 and at the same significant level and same degree of freedom observed t value was 0.001. The observed t value was less than the table value that mean null hypothesis was accepted and alternative hypothesis was rejected which meant there was Maitland mobilization with conventional physiotherapy treatment group is more effective than Mulligan mobilization with conventional physiotherapy group.

4.3.19 Getting on / off toilet

The study found that in the pain in walking observed t value was 1.922 in experimental group A at two tailed paired t test while this same variable for experimental group B observed value was 3.240 in within group. 5% level of significant at 6(six) degree of freedom standard t value was 2.44 and observed t value in pain in walking in experimental group B which was greater than standard t value that mean null hypothesis was rejected and alternative hypothesis was accepted in the group. Experimental group B in aspect of pain in walking were significant at 0.018% level. The mean difference of experimental group B was greater than the experimental group A mean that means mulligan mobilization with conventional physiotherapy treatment for knee OA patient

was more effective than Maitland mobilization with conventional physiotherapy in case of Getting on / off toilet.

The unrelated or independent t test in between group at 5% level of significant and 12 degree of freedom standard table value was 2.10 and at the same significant level and same degree of freedom observed t value was 1.083. The observed t value was less than the table value that mean null hypothesis was accepted and alternative hypothesis was rejected which meant there was Maitland mobilization with conventional physiotherapy treatment group is more effective than Mulligan mobilization with conventional physiotherapy group.

4.3.20 Heavy domestic duties

The study found that in the pain in walking observed t value was 1.549 in experimental group A at two tailed paired t test while this same variable for experimental group B observed value was 6.971 in within group. 5% level of significant at 6(six) degree of freedom standard t value was 2.44 and observed t value in pain in walking in experimental group B which was greater than standard t value that mean null hypothesis was rejected and alternative hypothesis was accepted in the group. Experimental group B in aspect of pain in walking were significant at 0.001% level. The mean difference of experimental group B was greater than the experimental group A mean that means mulligan mobilization with conventional physiotherapy treatment for knee OA patient was more effective than Maitland mobilization with conventional physiotherapy in case of pain heavy domestic duties.

The unrelated or independent t test in between group at 5% level of significant and 12 degree of freedom standard table value was 2.10 and at the same significant level and same degree of freedom observed t value was 4.472. The observed t value was more than the table value that mean alternative hypothesis was accepted and null hypothesis was rejected which meant there was mulligan mobilization with conventional physiotherapy treatment group is more effective than Maitland mobilization with conventional physiotherapy group.

4.3.21 Light domestic duties

The study found that in the pain in rest observed t value was 3.873 in experimental group A at two tailed paired t test while this same variable for experimental group B observed value was 8.000 in within group. 5% level of significant at 6(six) degree of freedom standard t value was 2.44 and observed t value in pain in rest in both group which was greater than standard t value that mean null hypothesis was rejected and alternative hypothesis was accepted in the group. Experimental group A in aspect of pain in rest were 0.008% and Experimental group B in aspect of pain in rest were significant at 0.001% level. But the mean difference of experimental group B was greater than the experimental group A mean that means mulligan mobilization with conventional physiotherapy treatment for knee OA patient was more effective than maitland mobilization with conventional physiotherapy in case of light domestic duties.

The unrelated or independent t test in between group at 5% level of significant and 12 degree of freedom standard table value was 2.10 and at the same significant level and same degree of freedom observed t value was 1.390. The observed t value was less than the table value that mean null hypothesis was accepted and alternative hypothesis was rejected which meant there was Maitland mobilization with conventional physiotherapy treatment group is more effective than Mulligan mobilization with conventional physiotherapy group.

The purpose of this study was to evaluate the effectiveness of Maitland mobilization with conventional physiotherapy compare to mulligan mobilization with conventional physiotherapy for knee osteoarthritis. In this experimental study, 14 patients with knee osteoarthritis were randomly assigned to the experimental group A and the experimental group B. Among them 14 patients, 7 patients were be included in the experimental group A who received Maitland mobilization with conventional physiotherapy and the rest of the 7 patients were included in the experimental group B, who received mulligan mobilization with conventional physiotherapy. Each group attended for 6 sessions of treatment within two weeks in the physiotherapy outdoor department of CRP Savar in order to demonstrate the improvement. The outcome was measured by using visual analogue scale for pain intensity in different functional position by using WOMAC scale.

Different measurement tools were used to examine the hypothesis and test the hypothesis whether the null hypothesis were accepted or not based on the smaller or large p. Self-oriented semi structured questionnaire was used to find out the socio demographic indicator. Significant improvement occurred in the most of the measures that were recorded before and after treatment.

14 Patients with knee osteoarthritis were included as sample of the study, among the age range was 20 to 70 years. On the other hand a study about effectiveness of maitland mobilization and mulligan mobilization in female knee OA the age range was 30 to 60 years (angie et al., 2016).

The present study among them 64% were Female and 34% were Male are affected with knee osteoarthritis. In this study female are more affected with knee osteoarthritis then male. On the other study there is also more affected population are female then male. The study in Bangladesh shows that males (53.3%) and females (60.9%) and the young individuals may be affected (Al-Arfaj et al., 2002).

The current study 14 Patients with knee osteoarthritis were included as sample of the study, among them almost 50% housewife, about 29% were service holder, about 21% were businessman and about 6% were other. On the other research, there is also different occupation included student, housewife, working women, teachers (Anita et al., 2006). In osteoarthritis there is no relation with any specific occupation.

In this study, Numeric pain rated scale (NPRS) was used to examine the pain. the another study revealed the pain intensity by visual analogue scale for pretest and posttest (angie et al., 2016). The study found that in the pain at rest observed t value was 7.778 in experimental group A at two tailed paired t test while this same variable for experimental group B observed value was 12.728 in within group. 5% level of significant at 6(six) degree of freedom standard t value was 2.44 and observed t value in pain at rest in both group which was greater than standard t value that mean null hypothesis was rejected and alternative hypothesis was accepted in the within group. Both groups in aspect of pain at rest were significant at 0.001% level. But the mean difference of experimental group B was greater than the experimental group A mean that means mulligan mobilization with conventional physiotherapy treatment for knee OA patient was more effective than Maitland mobilization with conventional physiotherapy in case of pain in NPRS.

In current study WOMAC scale (western Ontario and McMaster Universities Index) was used to explore the functional disability. Another study found semiler findings wher functional disability is found by WOMAC scale (angie et al., 2016). Both study the result is significant. In this study the experimental group A and the experimental group B both result is significant. The experimental group B is more significant than the experimental group A. So, Mulligan mobilization with conventional physiotherapy is more effective then Maitland mobilization with conventional physiotherapy.

Limitations

- The main limitation of this study is its short duration.
- The study was conduct with 14 patients of knee osteoarthritis, which is a very small number of samples in both groups and is not sufficient for the study to generalize the wider population of this condition.
- Researcher only explored the effect of Maitland mobilization and mulligan mobilization of after 6 weeks, so the long term effect of Maitland mobilization and mulligan mobilization was not explored in this study.
- The research was carried out in CRP Savar such a small environment, so it is difficult to keep confidential the aims of the study for blinding procedure. Therefore, single blind method is used in this study.
- There is no available research done in this area in Bangladesh. Therefore, relevant information about knee osteoarthritis patient with specific intervention for Bangladesh will be very limited in this study.

CHAPTER –VI   CONCLUSION AND RECOMMENDATION

6.1 Conclusion

The result of this experimental study have identified the effectiveness of Mulligan mobilization with conventional physiotherapy was better treatment than the Maitland mobilization with conventional physiotherapy alone for reducing pain and improve the functional ability of the knee osteoarthritis patient. Participants in the Mulligan mobilization with conventional physiotherapy showed a greater benefit than those in the Maitland mobilization with conventional physiotherapy group, which indicate that the conventional physiotherapy with Mulligan mobilization can be an effective therapeutic approach for patient with knee osteoarthritis. From this research, the researcher wished to explore the effectiveness of Mulligan mobilization along with conventional physiotherapy to reduce the features of patient with Knee Osteoarthritis, which will be helped to facilitate their rehabilitation and to enhance functional activities.

Knee osteoarthritis known as a global degenerative disease that just not affected a specific joint but the entire complex. The manifestations were not only pain but also restriction to activities of daily living. From this research, researcher also concluded the specific variables and comparison of their improvement rates. This heleped the professionals to decide the specific evidence based protocol for applying interventions in knee Osteoarthritis patient.

6.2 Recommendations

As a consequence of this researcher it is recommended to do further study including comparison of Maitland mobilization with conventional physiotherapy & mulligan mobilization with conventional physiotherapy alone to assess the effectiveness of these interventions with-

Double blinding procedure.

It is recommended to do further study with more number of subjects and with a longer time frame.

It is also recommended to include the range of motion assessment of patient and to identify the average number of sessions that are needed to be discharged from treatment to validate the treatment technique.

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Annexure

1. IBR Permission Letter

2. Data Collection Permission Letter

3. Consent Form (Bengali Version)

4. Questionnaire (Bengali Version)

5. Consent Form (English Version)

6. Questionnaire (English Version)

IRB Permission Latter

বাংলাদেশ হেল্থ প্রফেশন্স ইনস্টিটিউট (বিএইচপিআই)
Bangladesh Health Professions Institute (BHPI)
(The Academic Institute of CRP)

Ref. CRP-BHPI/IRB/10/18/1260

Date: 27/10/2018

To
Md. Nazmul Huda
B.Sc. in Physiotherapy
Session: 2013-2014, Student ID:112130215
BHPI, CRP, Savar, Dhaka-1343, Bangladesh.

Subject: Approval of the thesis proposal **"Comparison between Maitland mobilization with conventional physiotherapy and Mulligan mobilization with conventional physiotherapy for the treatment of knee osteoarthritis patient at CRP"** by ethics committee.
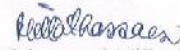
Dear Md. Nazmul Huda,
Congratulations.
The Institutional Review Board (IRB) of BHPI has reviewed and discussed your application to conduct the above mentioned dissertation, with yourself, as the Principal investigator. The Following documents have been reviewed and approved:

Sr. No.	Name of the Documents
1	Dissertation Proposal
2	Questionnaire (English version & Bangla version)
3	Information sheet & consent form.

The purpose of study is to determine the comparison between Maitland mobilization with conventional physiotherapy and Mulligan mobilization with conventional physiotherapy for the treatment of knee osteoarthritis patient. The study involves use of a self-structured Bengali version questioner that may takes 20 to 30 minutes to fill the questionnaire or participate in the test for collection of specimen and have no likelihood of any harm to the participants. The members of the Ethics committee have approved the study to be conducted in the presented form at the meeting held at 09:30 AM on January 24, 2018 at BHPI.

The institutional Ethics committee expects to be informed about the progress of the study, any changes occurring in the course of the study, any revision in the protocol and patient information or informed consent and ask to be provided a copy of the final report. This Ethics committee is working accordance to Nuremberg Code 1947, World Medical Association Declaration of Helsinki, 1964 - 2013 and other applicable regulation.

Best regards,

Muhammad Millat Hossain
Assistant Professor, Dept. of Rehabilitation Science
Member Secretary, Institutional Review Board (IRB)
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

সিআরপি-চাপাইন, সাভার, ঢাকা-১৩৪৩, বাংলাদেশ, ফোন ঃ ৭৭৪৫৪৬৪-৫, ৭৭৪১৪০৪ ফ্যাক্স ঃ ৭৭৪৫০৬৯
CRP-Chapain, Savar, Dhaka-1343, Tel : 7745464-5, 7741404, Fax : 7745069, E-mail : contact@crp-bangladesh.org, www.crp-bangladesh.org

Permission Latter

July 21, 2018

Head, Department of Physiotherapy,

Centre for the Rehabilitation of the Paralyzed (CRP)

Chapain, Savar, Dhaka -1343.

Through: Head, Department of Physiotherapy, BHPI.

Subject: Permission to collect data in order to conduct my research project.

Respected sir,

With due respect and humble submission to state that I am Md. Nazmul Huda, student of 4th professional B.Sc. in physiotherapy at Bangladesh Health Professions Institute(BHPI). According to the course curriculum, I have to conduct a research project for the partial fulfillment of the degree of B.Sc. in Physiotherapy. The title of my research project is **"Comparison between Maitland mobilization with conventional physiotherapy and Mulligan mobilization with conventional physiotherapy for the treatment of knee osteoarthritis patient in Bangladesh"**. My research project will be conducted under the supervision ofMohammad Anwar Hossain, Associate professor and Head of the Physiotherapy Department, CRP, Savar, Dhaka.I want to collect data for my research project from the patients of musculoskeletal unit, department of Physiotherapy, CRP- Savar. So, I need permission for data collection from the musculoskeletal unit of physiotherapy department of CRP-Savar. I would like to assure that anything of my study will not be harmful for the participants.

May I, therefore, pray and hope that you would be kind enough to grant my application and give me permission for data collection and oblige thereby.

Yours obediently,

Nazmul Huda

Md. Nazmul Huda

4th Professional B.Sc. in Physiotherapy

Roll-20, Session: 2013-2014

Bangladesh Health Professions Institute (BHPI)

CRP, Chapain, Savar, Dhaka-1343.

Approved

Mohammad Anwar Hossain
Associate Professor & Head
Physiotherapy Dept., CRP
CRP-Chapain, Savar, Dhaka-1343

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সম্মতিপত্র

আসসালামু আলাইকুম,

আমি মোঃ নাজমুল হুদা(আই.পি.এইচ.বি) বাংলাদেশ হেলথ প্রফেশন্স ইনস্টিটিউট ,, সিসি ইন ফিজিওথেরাপী .এস.পি এর বি.আর. ৪র্থ বর্ষের শিক্ষার্থী। আমার প্রাতিষ্ঠানিক কাজের অংশ হিসেবে আমাকে একটি গবেষণা করতে হবে। আমার গবেষণার বিষয় কোর্সের ,হলো“হাঁটুতে অস্টিও আর্থ্রাইটিস রোগীদের চিকিৎসার জন্য সি.আর.পি তে মেটল্যান্ড মোবিলাইজেশনের সাথে প্রচলিত ফিজিওথেরাপি চিকিৎসা এবং মুলিগান মোবিলাইজেশনের সাথে প্রচলিত ফিজিওথেরাপি চিকিৎসার তুলনাএ **পরীক্ষামূলক** ।” ,গবেষণার মাধ্যমে আমি একটি পরীক্ষা করবো যেহাঁটুতে অস্টিও আর্থ্রাইটিস রোগীদের চিকিৎসার জন্য প্রচলিত ফিজিওথেরাপী চিকিৎসা সহ মেটল্যান্ড মোবিলাইজেশন এবং মুলিগান মোবিলাইজেশন চিকিৎসার মধ্যে কোনটি বেশী কার্যকারী হবে ।

গবেষণাটি সম্পাদনের জন্যআপনি আমার গবেষণার একজন সম্মানিত ,আমার তথ্য সংগ্রহ করা প্রয়োজন হবে। এজন্য , অংশগ্রহনকারী হতে পারেন। আপনার নিয়মিত ফিজিওথেরাপীর সময় আমি আপনার সাথে কয়েকবার দেখা করব। আমি নিশ্চিত করছি যেচিকিৎসা পদ্ধতি প্রয়োগ করা হবে তা আপনার জন্য ব্যথামুক্ত ও নিরাপদ। ,

আমি আপনাকে অবগত করছি যেএটি একটি সম্পূর্ণ প্রাতিষ্ঠানিক গবেষণা এবং এটি অন্য কোনো উদ্দেশ্যে ব্যবহৃত হবে না। আমি , আপনাকে আরো নিশ্চিত করছি যেআপনার প্রদত্ত সকল তথ্য গোপন রাখা হবে। আপনার অংশগ্রহন হবে ইচ্ছাকৃত ,। এই গবেষণা থেকে আপনি যে কোনো মুহূর্তে সম্মতি প্রত্যাহার করতে পারবেন।

আপনার যদি এই গবেষণা সম্পর্কে এবং অংশগ্রহণকারী হিসেবে আপনার অধিকার সম্পর্কে কোনো জিজ্ঞাসা থাকে তবে আপনি আমার সাথে অথবা আমার পর্যবেক্ষক মোহাম্মদ আনোয়ার হোসেন, সহযোগী অধ্যাপক এবং ফিজিওথেরাপী বিভাগের প্রধান , সিআরপি, সাভার, ঢাকা এর সাথে যোগাযোগ করতে পারবেন।

উপাত্ত সংগ্রহের পূর্বে আপনার কি কোনো প্রশ্ন আছে?

আমি কি আপনার সাক্ষাৎকার গ্রহনের সম্মতি পেতে পারি?

☐হ্যাঁ   ☐না

অংশগ্রহণকারীর স্বাক্ষর.........................তারিখ.................................

তথ্যসংগ্রহকারীর স্বাক্ষর.........................তারিখ.................................

স্বাক্ষীর স্বাক্ষর.........................তারিখ.................................

প্রশ্নপত্র

হাঁটুতে অস্টিও আর্থ্রাইটিস রোগীদের চিকিৎসার জন্য প্রচলিত ফিজিওথেরাপি চিকিৎসা সহ মেটল্যান্ড মোবিলাইজেশন এবং মুলিগান মোবিলাইজেশন চিকিৎসার কার্যকরীতা প্রমাণ করতে এই প্রশ্নপত্রটি ধার্য করা হয়েছে। নিচের টেবিলে কিছু প্রশ্নের তালিকা দেওয়া আছে এবং প্রতিটি প্রশ্নের জন্য সম্ভাব্য উত্তর দেওয়া আছে। উত্তরগুলোর মধ্যে থেকে যে উত্তরটি সব থেকে বেশি কাছাকাছি এবং সঠিক মনে হয়েছে দয়া করে সেটিতে ($\sqrt{}$) চিহ্ন দিন।

পর্ব-১ (ব্যাক্তিগত তথ্যাবলী)

রোগীর নাম: তারিখ:

রোগীর কোড নাম্বার: মোবাইল নম্বর:

রেজি নং:   ঠিকানা:

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শিরনামঃ "হাঁটুতে অস্টিও আর্থ্রাইটিস রোগীদের চিকিৎসার জন্য সি.আর.পি তে মেটল্যান্ড মোবিলাইজেশনের সাথে প্রচলিত ফিজিওথেরাপি চিকিৎসা এবং মুলিগান মোবিলাইজেশনের সাথে প্রচলিত ফিজিওথেরাপি চিকিৎসার তুলনা" ।

পর্ব-২ (সামাজিক ও বৈষয়িক তথ্যাবলী)

প্রশ্ন	উত্তর
১. বয়স	··············(বছর)
২. লিঙ্গ	☐ পুরুষ ☐ মহিলা
৩. বৈবাহিক	☐ বিবাহিত ☐ অবিবাহিত
৪. বসবাসের এলাকা	☐ গ্রাম ☐ শহর
৫. পেশা	
৬. আয়	

পর্ব-৩ (স্বাস্থ্য বিষয়ক তথ্যাবলী)

প্রশ্ন	উত্তর
৭. কত সময় ধরে সমস্যা	········ বছর······মাস
৮. কোন পাশের সমস্যা	☐ ডান ☐ বাম
৯. ওজন(কেজি)	
১০. উচ্চতা (সে মি)	

পরীক্ষার আগের উপাত্ত:

পর্ব-৪ (ব্যাথা সম্পর্কিত তথ্য)

যে কোন একটি সংখ্যায় দাগ দিন

০ = নাই   ১০ = সর্বাধিক

১১. আজকে আপনার ব্যাথা কতটুকু ?

_____

০   ১   ২   ৩   ৪   ৫   ৬   ৭   ৮   ৯   ১০

পর্ব-৫ (শারীরিক অক্ষমতা)

ওয়েস্টার্ন আন্টারিও ও ম্যাকমাস্টর বিশ্ববিদ্যালয় অস্টিও আর্থ্রাইটিস সূচিপত্র

১২. **নির্দেশ** :অনুগ্রহ করে প্রতিটি বিভাগের কার্যক্রম নিম্নলিখিত অনুযায়ী নির্ধারন করি।

০ = নাই
১= কিছুটা
২= মাঝামাঝি
৩= ওনেক
৪= অত্যাধিক

প্রতিটি কার্যক্রমের জন্য একটি সংখ্যা বৃত্ত করি :

১২.১ ব্যাথা

১. যখন হাঁটেন	০ ১ ২ ৩ ৪
২ যখন সিঁড়িতে উঠেন	০ ১ ২ ৩ ৪
৩. রাতের বেলা	০ ১ ২ ৩ ৪
৪. বিশ্রাম অবস্থা	০ ১ ২ ৩ ৪
৫. যখন ওজন বহন করেন	০ ১ ২ ৩ ৪

১২.২ শক্ত হয়ে যায়

১. সকালে শক্ত হয়	o	১	২	৩	8
২. দিনের অন্য সময় শক্ত হয়	o	১	২	৩	8

১২.৩ শারীরিক কাজ

১. সিঁড়ি দিয়ে উঠতে	o	১	২	৩	8
২. সিঁড়ি দিয়ে নামতে	o	১	২	৩	8
৩. বসা থেকে উঠা	o	১	২	৩	8
৪. দাঁড়িয়ে থাকার সময়	o	১	২	৩	8
৫. মেঝের দিকে ঝোকার সময়	o	১	২	৩	8
৬. সমতলে হাটার সময়	o	১	২	৩	8
৭. গাড়িতে ওঠা/নামার সময়	o	১	২	৩	8
৮. কেনাকাটার সময়	o	১	২	৩	8
৯. মোজা পড়ার সময়	o	১	২	৩	8
১০. বিছানায় শুতে	o	১	২	৩	8
১১.মোজা খুলতে	o	১	২	৩	8
১২. শোয়া থেকে উঠার সময়	o	১	২	৩	8
১৩. গসলে যাওয়ার সময়	o	১	২	৩	8
১৪. বসে থাকা অবস্থায়	o	১	২	৩	8
১৫. টয়লেটে যওয়ার সময়	o	১	২	৩	8
১৬. বাসায় ভারী কাজগুলো করতে	o	১	২	৩	8
১৭. বাসায় হালকা কাজগুলো করতে	o	১	২	৩	8

প্রতিটি প্রশ্নের মান ৪। মোট প্রশ্ন ২৪ টা। মোট নাম্বার ৯৬।

রোগীর চিকিৎসা পূর্ববপ্রতী নাম্বার _____ / ৯৬

পরীক্ষার পরের উপাত্ত:

পর্ব-৪ (ব্যাথা সম্পর্কিত তথ্য)

যে কোন একটি সংখ্যায় দাগ দিন

০ = নাই   ১০ = সর্বাধিক

১১. আজকে আপনার ব্যাথা কতটুকু ?

_____

০   ১   ২   ৩   ৪   ৫   ৬   ৭   ৮   ৯   ১০

পর্ব-৫ (শারীরিক অক্ষমতা)

ওয়েস্টার্ন আন্টারিও ও ম্যাকমাস্টর বিশ্ববিদ্যালয় অস্টিও আর্থ্রাইটিস সূচিপত্র

১২. **নির্দেশ** :অনুগ্রহ করে প্রতিটি বিভাগের কার্যক্রম নিম্নলিখিত অনুযায়ী নির্ধারন করি।

০ = নাই
১= কিছুটা
২= মাঝামাঝি
৩= ওনেক
৪= অত্যাধিক

প্রতিটি কার্যক্রমের জন্য একটি সংখ্যা বৃত্ত করি :

১২.১ ব্যাথা

১. যখন হাঁটেন	০ ১ ২ ৩ ৪
২ যখন সিঁড়িতে উঠেন	০ ১ ২ ৩ ৪
৩. রাতের বেলা	০ ১ ২ ৩ ৪
৪. বিশ্রাম অবস্থা	০ ১ ২ ৩ ৪
৫. যখন ওজন বহন করেন	০ ১ ২ ৩ ৪

১২.২ শক্ত হয়ে যায়

১. সকালে শক্ত হয়	o	১	২	৩	৪
২. দিনের অন্য সময় শক্ত হয়	o	১	২	৩	৪

১২.৩ শারীরিক কাজ

১. সিঁড়ি দিয়ে উঠতে	o	১	২	৩	৪
২. সিঁড়ি দিয়ে নামতে	o	১	২	৩	৪
৩. বসা থেকে উঠা	o	১	২	৩	৪
৪. দাঁড়িয়ে থাকার সময়	o	১	২	৩	৪
৫. মেঝের দিকে ঝোকার সময়	o	১	২	৩	৪
৬. সমতলে হাটার সময়	o	১	২	৩	৪
৭. গাড়িতে ওঠা/নামার সময়	o	১	২	৩	৪
৮. কেনাকাটার সময়	o	১	২	৩	৪
৯ মোজা পড়ার সময়	o	১	২	৩	৪
১০. বিছানায় শুতে	o	১	২	৩	৪
১১.মোজা খুলতে	o	১	২	৩	৪
১২. শোয়া থেকে উঠার সময়	o	১	২	৩	৪
১৩. গসলে যাওয়ার সময়	o	১	২	৩	৪
১৪. বসে থাকা অবস্থায়	o	১	২	৩	৪
১৫. টয়লেটে যওয়ার সময়	o	১	২	৩	৪
১৬. বাসায় ভারী কাজগুলো করতে	o	১	২	৩	৪
১৭. বাসায় হালকা কাজগুলো করতে	o	১	২	৩	৪

প্রতিটি প্রশ্নের মান ৪। মোট প্রশ্ন ২৪ টা। মোট নাম্বার ৯৬।

রোগীর চিকিৎসা পূর্ববপ্ররতী নাম্বার _____ / ৯৬

Consent Form

Assalamualaikum,

I am Md. Nazmul Huda, student of 4th year B.Sc. in physiotherapy at Bangladesh Health Professions Institute (BHP). To obtain my Bachelor degree, I shall have to conduct a research and it is a part of my study. The participants are requested to participate in the study after reading the following.

My research title is "Comparison between Maitland mobilization with conventional physiotherapy and Mulligan mobilization with conventional physiotherapy for the treatment of knee osteoarthritis patient in Bangladesh". I would like to ask you some personal and other knee pain related questions will apply some physical treatment.

I would like to inform you that this is a purely academic study and will not be used for any other purpose. All information provided by you will be kept confidential and in the event of any report or publication it will be ensured that the source of information remains anonymous. Your participation in this study is voluntary and you may withdraw yourself at any time during this study without any negative consequences. You also have the right not to answer a particular question that you don't like or do not want to answer during interview.

If you have any query about the study, you may contact with Md. Nazmul Huda and/ or Mohammad Anwar Hossain, Associate professor and Head of the Physiotherapy Department, CRP, Savar, Dhaka-1343.

So, May I start now?

- Yes
- No

Signature of the Patient: ……………………………………………………

Date:

Signature of the Data Collector: ………………………………………

Date:

Signature of the Researcher: ……………………………………………

Date:

Questionnaire English

This questionnaire was developed to identify the effectiveness of Maitland mobilization and Mulligan mobilization along with conventional Physiotherapy.There are few question listed in the below table and few possible answers were selected as per each question. Its seems that you may feel comfortable in multiple answers of a single question but please give tick (√) mark on single answer seems that you may feel comfortable in multiple which seems most closely linked to you.

Part-I (Personal information)

Patient Name: Date:

Patient code no: Mobile No:

Reg No: Address:

Title: "Comparison between Maitland mobilization with conventional physiotherapy and mulligan mobilization with conventional physiotherapy for the treatment of knee osteoarthritis patient in Bangladesh".

Part-II (Social and global information)

Question	Response
1. Age of the participant	……………(years)
2. Gender	☐Male ☐Female
3. Marital Status	☐ Married ☐ Unmarried
4. Living area	☐ Rural ☐Urban
5. Occupation	
6. Income	

Part – III (Health related information)

Question	Response
7. Duration of problem	……… year……month
8. Side involvement	☐Right ☐Left
9. Weight (Kg)	
10. Height (cm)	

Pre-test questions:

Part –IV (Pain related information)

Circle one number.

 0 = None   10 = Extreme

11. How much pain you feel today?

_____
0   1   2 345   6   7   8   9   10

Part – V (Disability related information)

Western Ontario and McMaster Universities Osteoarthritis Index

12. **Instructions:** Please rate the activities in each category according to the following scale of difficulty:

0 = None
1= Slight
2= Moderate
3= Very
4= Extremely

Circle one number for each activity:

12.1 Pain

1. Walking	0 1 2 3 4
2. Stair Climbing	0 1 2 3 4
3. Nocturnal	0 1 2 3 4
4. Rest	0 1 2 3 4
5. Weight bearing	0 1 2 3 4

12.2 Stiffness

1. Morning stiffness	0 1 2 3 4
2. Stiffness occurring later in the day	0 1 2 3 4

12.3 Physical Function

1. Descending stairs	0 1 2 3 4
2. Ascending stairs	0 1 2 3 4
3. Rising from sitting	0 1 2 3 4
4. Standing	0 1 2 3 4
5. Bending to floor	0 1 2 3 4
6. Walking on flat surface	0 1 2 3 4
7. Getting in / out of car	0 1 2 3 4
8. Going shopping	0 1 2 3 4
9. Putting on socks	0 1 2 3 4
10. Lying in bed	0 1 2 3 4
11.Taking off socks	0 1 2 3 4
12. Rising from bed	0 1 2 3 4
13. Getting in/out of bath	0 1 2 3 4
14. Sitting	0 1 2 3 4
15. Getting on/off toilet	0 1 2 3 4
16. Heavy domestic duties	0 1 2 3 4
17. Light domestic duties	0 1 2 3 4

Each question has 4 score. Total questions are 24. Total number is 96.

Pre - test score of the patient is _____ / 96.

Post-test questions:

Part –IV (Pain related information)

Circle one number.

 0 = None   10 = Extreme

11. How much pain you feel today?

0   1   2 345   6   7   8   9   10

Part – V (Disability related information)

Western Ontario and McMaster Universities Osteoarthritis Index

12. **Instructions:** Please rate the activities in each category according to the following scale of difficulty:

0 = None
1= Slight
2= Moderate
3= Very
4= Extremely

Circle one number for each activity:

12.1 Pain

1. Walking	0 1 2 3 4
2. Stair Climbing	0 1 2 3 4
3. Nocturnal	0 1 2 3 4
4. Rest	0 1 2 3 4
5. Weight bearing	0 1 2 3 4

12.2 Stiffness

1. Morning stiffness	0 1 2 3 4
2. Stiffness occurring later in the day	0 1 2 3 4

12.3 Physical Function

1. Descending stairs	0 1 2 3 4
2. Ascending stairs	0 1 2 3 4
3. Rising from sitting	0 1 2 3 4
4. Standing	0 1 2 3 4
5. Bending to floor	0 1 2 3 4
6. Walking on flat surface	0 1 2 3 4
7. Getting in / out of car	0 1 2 3 4
8. Going shopping	0 1 2 3 4
9. Putting on socks	0 1 2 3 4
10. Lying in bed	0 1 2 3 4
11.Taking off socks	0 1 2 3 4
12. Rising from bed	0 1 2 3 4
13. Getting in/out of bath	0 1 2 3 4
14. Sitting	0 1 2 3 4
15. Getting on/off toilet	0 1 2 3 4
16. Heavy domestic duties	0 1 2 3 4
17. Light domestic duties	0 1 2 3 4

Each question has 4 score. Total questions are 24. Total number is 96.

Pre - test score of the patient is _____ / 96.