EFFICACY OF CLASS-BASED HOME EXERCISE ALONG WITH CONVENTIONAL PHYSIOTHERAPY ON FUNCTIONAL DISABILITY FOR THE PATIENT WITH KNEE OSTEOARTHRITIS

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

Efficacy of Class-Based Home Exercise along with Conventional Physiotherapy on Functional Disability for the Patient with Knee Osteoarthritis

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DECLARATION

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 declare that for any publication, presentation or dissemination of information of the study, I would be bound to take written consent from the department of physiotherapy of Bangladesh Health Professions Institute (BHPI)

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Acronyms

BHPI	Bangladesh Health Professions Institute
BMRC	Bangladesh Medical Research Council
CRP	Centre for the Rehabilitation of the Paralysed
IRB	Institutional Review Board
MS	Musculoskeletal
NPRS	Numeric Pain Measurement Scale
NSAID's	Non-Steroidal Anti-inflammatory Drugs
OA	Osteoarthritis
PT	Physiotherapy
RCT	Randomized Control trail
ROM	Range of Movement
SR	Systematic Review
WHO	World Health Organization
WOMAC	Western Ontario & McMaster Universities Osteoarthritis Index

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Abstract

Purpose: The purpose of the study was to compare the efficacy of home exercise with class-based exercise and home exercise alone on functional disability for the patient with knee osteoarthritis. *Objectives:* To determine the socio-demography of Knee Osteoarthritis pain and to analyze the efficacy of home exercise with class-based exercise on reducing pain, stiffness and improving function by reducing disability. *Methodology:* This study is an experimental design sixteen patients with Knee Osteoarthritis were conveniently selected from musculo-skeletal outpatient unit, CRP and then 8 patients were randomly assigned to Home exercise with class-based exercise group and 8 patients to the only Home exercise group. Numeric Pain Rating Scale (NPRS) was used to measure pain and Western Ontario & McMaster Universities Osteoarthritis Index (WOMAC) was used to measure pain, stiffness and disability. Statistical analysis was done by using Mann- Whitney *U* test. *Results:* The researcher found the male female ratio between 16 the patients, and 12% (n=2) were Male and 88% (n=14) were Female. Among them, In Control Group 6% (n=1) were Male and 44% (n=7) were Female and in Experimental Group 6% (n=1) were Male and 44% (n=7) were Female, mean age of experimental group was 53 years and the mean age of control group is 51 years, almost 88% (n=14) were house wife, about 6 % (n=1) were business, about 6% (n=1) were retired of the occupation, almost 69% (n=11) were urban area, about 31 % (n=5) were rural area. Mean difference of pain between pre-test and post-test of experimental group and control group were 5.4% and 5.8% and mean difference of WOMAC score between pre-test and post-test of experimental group and control group were 48.06% and 43.44%. Following application of treatment the study found that the experimental group showed a significant improvement ($p<.05$) in case of knee osteoarthritis. *Conclusion:* This experimental study shows that Home exercise with class-based exercise is more effective than Home exercise alone on functional disability for the patients with Knee osteoarthritis.

Keywords: Home exercise, class-based exercise, functional disability, knee osteoarthritis.

CHAPTER: I INTRODUCTION

1.1Background

In worldwide osteoarthritis (OA) is one of the most common musculoskeletal conditions, affecting the functional abilities of millions of people (kruger-jakins et al., 2016). Osteoarthritis is the most common condition affecting synovial joints (Andre et al., 2008). Osteoarthritis (OA) is a chronic disease. It is located in the joints, affecting one third of adults and presenting a tendency to increase with age (Imoto et al., 2012).Osteoarthritis (OA), the most common rheumatic disease, primarily affects the articular cartilage and subchondral bone of a synovial joint and results in joint failure. The most typical radiographic features are the formation of osteophytes at the joint margins, joint space narrowing, subchondral sclerosis, subchondral cyst formation and chondrocalcinosis. It has been estimated that about 40% to 80% of people with radiographic changes will have symptomatic disease. The Framingham Osteoarthritis Study found that 10% of people aged 63 years and over had symptomatic knee OA in the presence of radiographic changes (Fransen et al., 2015).

Knee osteoarthritis (OA) is the most common type of lower limb OA. Osteoarthritis incidence studies indicate that women, older adults, and those who are obese or who have a history of a knee injury have a moderate to strongly increased risk of knee symptoms, and radiographic and symptomatic OA (Murphy et al., 2015). Knee Osteoarthritis (OA) can be associated with symptoms of pain, instability, reduction of range of motion (ROM) and consequently, decline in quality of life and function. This functional limitation results in an increase of the risk of morbidity and mortality (Imoto et al., 2012).

Knee osteoarthritis (OA) is a major public health issue and causes chronic pain and disability among elderly in most of the developed countries. It is characterised by several pathological features, including joint space narrowing and osteophytosis (Muraki et al., 2013).Symptomatic knee osteoarthritis (OA) affects -6% of the adult population and occurs in almost 10% of those over age 65. It accounts for the majority of total knee replacements in the United States, and recent evidence suggests that it accounts for as much lower extremity physical disability in the elderly as any other disease (Shakoor et

al., 2009). Despite the urgent need of strategies for the prevention and treatment of this condition, demographics on the overall disease prevalence and the affected subgroups are not adequately characterised yet. The reported prevalence of radiographic knee OA differs considerably among previous population-based epidemiologic studies.In addition, apart from age, sex, obesity and occupational activities, there are only a few other established risk factors for knee OA (Muraki et al., 2013).

The etiology of knee OA is not entirely clear, but its incidence increases with age and in women. Obesity is a risk factor for the development and progression of knee OA and the need for total joint replacement (Deyle et al., 2006). According to Muraki et al (2013), Obesity is a strong risk factor for incident knee OA, possibly because of the accumulation of mechanical stress on the knee joint. Previous studies have found that female genderis also a strong risk factor for incident KL $\geq$ 2 knee OA, possibly implicating the involvement of muscle strength to compensate for mechanical stress. As men generally have more muscle strength than women, muscle strength involvement may compensate for the mechanical stresson the joint, which reduces the risk of occurrence of the disease in men.In Bangladesh, knee osteoarthritis is one of the familiar disabling diseases affecting both elderly male and female (Connor, 2007).

Osteoarthritis affects 12% of the population aged 25 to 74 years. Over the 70 years, radiographic osteoarthritis in the small joint of the hand is present in more than 80% of the population. An estimated 34% of United Kingdom populations over 45 years of age have radiographic osteoarthritis of the knees and 19% of those over 55 years have radiographic osteoarthritis of the hips. Up to two-third of those with knee osteoarthritis and one-third of those with hip osteoarthritis have symptoms related to their disease (Baar et al., 2008).

Approximately 60 million Americans have knee OA and this number will increase by 50% over the next decade. Knee pain during movement due to OA is a strong predictor of an increased need for functional assistance, and is the second leading cause of disability in the US. Approximately 10–30% of people diagnosed with OA have pain severe enough to limit function and cause disability, and this percentage is increasing. Loss of leg muscular strength is associated with increased pain and disability, as well as a more rapid progression of knee OA (Vincent et al., 2012).

Knee osteoarthritis (OA) is common and contributes greatly to morbidity in the community. Treatment is generally aimed at reducing pain and maintaining function. There is increasing interest in the role of various forms of exercise therapy in OA. Many of the studies to date are limited by small numbers and lack of controls. In addition they have generally used sophisticated and expensive apparatus, which limits their application to a community setting. As hospital based, such studies have focused on subjects with moderate or severe structural change, in whom there may be limited scope for improvement (Reilly et al., 2016).Currently, there is no known cure for OA. However, disease-related factors, such as impaired muscle function and reduced fitness, are potentially amenable to exercise. International guidelines advocate various non-pharmacological treatments, including exercise, as the first line of management for people with knee OA (Fransen et al., 2015).

Patella mobilizations may be beneficial for individuals with a variety of conditions, including post-operative rehab and knee osteoarthritis (OA) (Michael et al., 2010). Several studies have used knee mobilizations for treatment of knee pathology. Patella mobilization is critical to prevent patellar tendon adhesion and increase patellofemoral joint reaction (Hurst et al., 2010)

Physiotherapeutic treatment, and particularly exercise, has been part of the management of knee osteoarthritis for nearly a century and is the second most frequently prescribed treatment after oral medication. What is specifically unknown is whether such exercise should be performed by patients individually, at home, or be undertaken in a class-based setting as evidence exists to support both methods of provision (McCarthy et al., 2004).

1.2 Justification of the study

Osteoarthritis (OA) represents a clinical classification of pathological conditions involving a progressive degeneration of articular cartilage, a remodelling of sub-chondral bone and a synovitis which is usually limited. The condition is variously described as a part of a process of age-related change or a disease. It is twice as prevalent in women than men and increases in incidence with age, there being a major rise after 60 years (Haq et al., 2010). People with symptomatic OA of the knee complain of deep, aching pain. In early disease, pain is intermittent and mostly associated with joint use. For many people, symptomatic disease progresses and the pain becomes more chronic and may also be present at rest and during the night. The joint feels 'stiff', resulting in typical pain and difficulty when initiating movement after a period of rest. With advanced disease, patients may experience crepitus or deep 'creaking' sounds on movement and the range of joint motion often becomes limited. People with progressive symptomatic knee OA experience increasing difficulty with daily functional activities. In fact, knee OA is responsible for more disability in walking, stair climbing and housekeeping in non-institutionalised people aged 50 years and over than any other disease. Ultimately, chronic OA involving the lower limb joints leads to reduced physical fitness with resultant increased risk of cardiovascular co-morbidity (Fransen et al., 2015).Osteoarthritis (OA) is a serious joint disease that leads to a reduced quality of life. In 2003, OA was the sixth leading cause of disability worldwide, and has been estimated to rise to the fourth leading cause by 2020. A 2004 study carried out in a general population estimated that the prevalence of symptomatic OA in those aged 60 and above was 9.6% in men and 18% in women. Approximately 25% of adults aged over 55 report at least one episode of knee pain each year, which is likely to reflect underlying OA. OA is commonly presented in general practice, over 7 years an estimated 13% of older adults receive a diagnosis of OA (Silverwood et al., 2015).Osteoarthritis has a significant impact on our society because it is the most prevalent musculoskeletal disorder. The knee joint is most frequently affected by osteoarthritis and the number of patients with disabling osteoarthritis of the knee is rapidly increasing day by day. Most of the available literature shows that there is no effective treatment for osteoarthritis, and individuals with this disease have little benefit from prescribed medications (Holman &Lorig, 2006).

The purpose of the study is to evaluate the effectiveness of class-based home exercise along with conventional physiotherapy on functional disability for the patient with knee osteoarthritis. There were some research articles published about physiotherapy intervention for patient with knee osteoarthritis, but class-based exercise program for knee osteoarthritis is not so focused among them and only a very few research articles published regarding class-based exercise program for knee osteoarthritis. So, in this study "Efficacy of class-based home exercise along with conventional physiotherapy on functional disability for the patient with knee OA" will give the evidence for effectiveness of class-based exercise program for 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 to guide physiotherapists to give best treatment in patient 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 aim of the study is to compare the effectiveness of combined exercise including class-based homeexercise along with conventional physiotherapy versus only home exercise along with conventional physiotherapy on functional disability for the patient with knee osteoarthritis.

1.4 Objective

1.4.1 General objective

- To fine out the effectiveness of class-based home exercise along with conventional physiotherapy in the treatment of knee osteoarthritis.

1.4.2 Specific objective

- To compare the effectiveness of home exercise with or without class-based exercise along with conventional physiotherapy in the treatment of knee osteoarthritis.
- To measure pain level before and after home exercise with or without class-based exercise.
- To measure joint stiffness before and after home exercise with or without class-based exercise.
- To measure functional disability before and after home exercise with or without class-based exercise.

1.5 Hypothesis

Class-based home exercise along with conventional physiotherapy is more effective than only home exercise along with conventional physiotherapy on functional disability for the patient with knee osteoarthritis.

1.6 Null hypothesis

Class-based home exercise along with conventional physiotherapy is no more effective than only home exercise along with conventional physiotherapyon functional disability for the patient with knee osteoarthritis.

1.7 Theoretical framework

Dependent variable: Knee osteoarthritis

Independent variables:

Home exercise

↓

With conventional physiotherapy

↓

It helps to improvement of patient's condition to decrease pain, joint stiffness, and to increase functional ability to perform daily living activities

↓

Home exercises are effective for the patient with knee osteoarthritis

Class-based home exercise

↓

With conventional physiotherapy

↓

It encourages and motivates patient to do exercise and patient feel safe in class to see another patient by suffering same condition, it also helps to increase patient's awareness about their condition

↓

Class-based home exercise helps to improve patient's practical knowledge so that patient can perform exercise regularly and appropriately at home

↓

Regular and appropriate exercise helps to better improvement of patient's condition to decrease more pain, more joint stiffness and to more increase in functional ability to perform daily living activities

↓

Class-based home exercise is more effective for the patient with knee osteoarthritis

1.8 Operational definition

Knee Osteoarthritis: KneeOsteoarthritis is a degenerative joint disease characterized by progressive destruction of joint cartilage and associated structures such as bone, synovial and fibrous joint capsule and the periarticular musculature.

Functional disability: Functional disability or diversity is a politically and socially correct term for special needs, disability, impairment and handicap, which began to be used in Spain in scientific writing, at the initiative of those directly affected, in 2005. A functional disability limits a person's ability to perform physical activities, have a significant sensory impairment, need long-term care, use assistive devices, technology or exercises.

Home exercise: A home exercise program is one that's done at home. It is an exercise program in which the person engages in at their residence.

Class-based exercise: exercises which are giving through a class where a group is set of a people which are considered together because they have suffering in a common condition.

CHAPTER: II LITERATURE REVIEW

Knee osteoarthritis (OA) is the leading cause of pain and disability in older people (Wylde et al., 2016). In knee osteoarthritis loses cartilage, the bone grows to try and repair the damage. Instead of making things better, however, the bone grows abnormally and makes things worse. For exemple, the bone can become misshapen and make the joint painful and ustable. (Fransen& McConnell, 2008).

The Framingham Osteoarthritis Study found that 10% of people aged 63 years and over had symptomatic knee osteoarthritis in the presence of radiographic changes (Fransen& McConnell, 2008). Osteoarthritis incidence studies indicate that women, older adults, and those who are obese or have a history of a knee injury have a moderate to strongly increased risk of knee symptoms, and radiographic and symptomatic osteoarthritis (Murphy et al., 2015).

Though exact cause is not known (Mounach et al., 2008) the following factors are suspected to , causation of primary OA are age, obesity , genetics, occupation involving prolonged standing, sports, multiple metabolic disorders (Conaghan et al., 2008). Another study shows the factors that are responsible for primary osteoarthritis are crystals in joint fluid or cartilage, high bone mineral density, injury to the joint, peripheral neuropathy, joint hyper mobility (Mounach et al., 2008).

The causes of secondary osteoarthritis of the knee are as valgus and varus deformities of the knee, Rheumatoid arthritis, infection, TB, hyperparathyroidism, over use of intra articular steroid therapy (Conaghan et al., 2008). Repeated minor trauma may lead to micro fractures and subsequent OA. Occupational factors are thought to be important in the development of secondary OA. Hemophillia, acromegaly and hyperthyroidism all predispose joints to secondary OA (Veerapan et al., 2007).

Overweight is a risk factor for knee osteoarthritis. Weight reduction reduces not only the symptoms and progression of osteoarthritis, but also the risk of acquiring osteoarthritis. The Osteoarthritis Research Society International Group strongly recommends that patients with osteoarthritis lose weight and maintain weight at a lower level in overweight patients. Maintaining the body mass index at 25 kg/m_2 or below would reduce osteoarthritis in the population by 27–53%. As mentioned, knee injuries such as knee ligament tears, meniscal injuries and fractures involving the articular surfaces is a strong risk factor for knee osteoarthritis (Dillon et al., 2006).

OA principally involves with the patelo-femoral and medial tibiofemoral compartments of the knee (Robert &Petrella, 2010). There are several inter related features common to osteoarthritic joints (Chapple et al., 2011). Predominant symptoms to osteoarthritis are pain (Conaghan et al., 2008). Most knee OA pain is well localized to the anterior or medial aspects of the knee and upper tibia (Robert &Petrella, 2010). It is aggravated by prolongation of work or exertion and relieved by taking rest. Pain occurs due fibrosis of capsule, stretching the shrunken capsule , muscular fatigue, bone pressure due to vascular congestion and intraosseoushypertention (Lawrence et al., 2008). Patelo-femoral pain is usually worse going up and down stairs. In late stage pain as being worse at night and after rest, due to raised pressure insubchondral bone (Robert &Petrella, 2010).

Swelling may be intermittent (suggesting an effusion) or continues (with capsular thickening or large osteophytes) (Lawrence et al., 2008). Stiffness is present after rest and a little time to wear off with movement (Veerapan et al., 2007). There is a reduction in compliance of soft tissue as a result of degenerative change and secondary inflammatory process. In addition as the subchondral micro fractures heal and formation of callus that causes a loss of joint mobility and stiffness follows. The combination of joint pain, stiffness and possible effusion will often cause patients to limit their activities and consequent loss of end of range movement (Chapple et al., 2011). Minimal tenderness and coarse crepitus can be elicited (Conaghan et al., 2008).

Crepitus can be increased from mild cracking to loud sounds in advanced disease. Loss of proprioception, loss of ligamentous control and loss of negative pressure within the joint as a result of effusions all contribute to joint instability in OA (Veerapan et al., 2007).
Chronic muscle inhibition is often linked to chronic pain and will lead to atrophy and ensuing muscle weakness (Chapple et al., 2011). Especially weakness and wasting of the quardriceps muscle which is responsible for the knee extension (Robert &Petrella, 2010).
Chronic oedema of synovial membrane and capsule makes the joint appear large. Muscle atrophy may also make the joint look bigger (Veerapan et al., 2007).
Pain is the major stimulus for people with knee osteoarthritis (OA) to seek medical attention but the causes of pain are complex and radiographs which are the standard for clinical imaging in OA are often discordant with symptoms. In recent years there has been increasing interest in the role of the synovium in painful OA. Although nowhere as florid or extensive as the inflammation observed in rheumatoid arthritis, clinical effusions and capsular thickening can be clinically evident in some joints with knee OA, and are more frequently observed using sensitive measures such as ultrasound (US) and MRI3e10. Synovial changes in OA are regarded by many as a secondary response to the degradation of cartilage11 though there are others who advocate them as a primary driver for OA which may be partly responsible for pain and disease progression (Hall et al., 2014).

The pain of OA is usually related to activity. For OA of the knee, activities such as climbing stairs, getting out of a chair, and walking long distances bring on pain. Morning stiffness usually lasts less than 30 minutes (Zhang & Jordan, 2010).In fact, knee OA is more responsible than any other disease for disability in walking, stair climbing and housekeeping among non-institutionalized people 50 years of age and older (Lane et al., 2011).

The menisci perform many important roles within the knee joint complex, such as improving congruity and stability of the femoro-tibial contact, mechanical shock absorption and loadsharing, facilitating limited rotation via meniscotibial translation, and generating proprioceptive feedback via internal mechanoreceptors. Menisci consist of approximately 75% collagen by dry weight, with collagen fibrils predominantly oriented in a circumferential fashion to resist tensile hoop stresses during loading. A complex of meniscotibial, meniscofemoral, and peripheral capsular attachments restrain meniscal movement, particularly outward 'extrusion' under loading (Cake et al., 2013)

Diagnosis of osteoarthritis focuses on two major goals. When diagnosing OA, the doctor must first differentiate osteoarthritis from other types of arthritis. It is also important to determine whether a patient has primary osteoarthritis or a secondary form of osteoarthritis associated with another disease or condition. Early, accurate diagnosis of osteoarthritis is necessary so that appropriate treatment options can be considered. To diagnose osteoarthritis, doctor will make assessments using: Medical history will include information about past medical conditions, allergies, treatments, and surgical procedures as well as current medical issues (Vincent et al., 2012)

During the physical examination, doctor will observe for any signs and symptoms which commonly are associated with osteoarthritis. The doctor will look for: Joint swelling, Joint tenderness, Decreased range of motion in joints, Visible joint damage (i.e., bony growths). In imaging studies X-rays are typically used to confirm the diagnosis of osteoarthritis. X-rays can reveal osteophytes at the joint margins, joint space narrowing, and subchondral bone sclerosis. Subchondral bone is the layer of bone which is just below the cartilage. While MRI (magnetic resonance imaging) is a more sensitive imaging (Silverwood et al., 2015).

The majority of patients with osteoarthritis are managed in primary care, and the prevalence of knee osteoarthritis is such that simple interventions which are effective in a community setting are necessary (Andre et al., 2008). Treatment is generally aimed at reducing pain and maintaining function. There is increasing interest in the role of various forms of exercise therapy in osteoarthritis (O'Reilly et al., 2016). Currently, there is no known cure for osteoarthritis. However, disease-related factors, such as impaired muscle function and reduced fitness, are potentially amenable to exercise . International guidelines advocate various non-pharmacological treatments, including exercise, as the first line of management for people with osteoarthritis (Fransen& McConnell, 2008).

Recommendations and guidelines for the management of osteoarthritis have been published by several different scientific organizations However, most of them are produced by national organizations, or are restricted to the use of specific interventions, such as physical therapy in many instances, or selected drug classes many OA management recommendations across organizations, controversies remain and are related to the use of some non pharmacological interventions (e.g. acupuncture, knee braces, heel wedges) and, within pharmacological treatments, to the pharmacological class of symptomatic slow-acting drugs in osteoarthritis (SYSADOAs), mainly rep- resented by glucosamine sulfate and chondroitin sulfate, and to some extent by intra-articular hyaluronic acid (Reginster et al., 2015).

Clinical trials in OA suffer from a large placebo effect and most pharmacological treatments are shown to have, at best, a mild-to-moderate effect oral NSAIDs had an effect size in the mild-to moderate range over oral placebo, intra-articular hyaluronic acid emerged asthe most effective treatment for knee OA pain (Rieger, 2008).

The knee joint is commonly affected in osteoarthritis and it is estimated that 10% of people aged over 60 years experience knee osteoarthritis symptoms, resulting in substantial pain and physical dysfunction. Current evidence demonstrates beneficial effects of exercise therapy on pain and physical function in knee osteoarthritis, without the common and sometimes serious side effects associated with pharmacological and surgical interventions. Consequentially, exercise is considered the cornerstone of conservative management and is recommended in all clinical guidelines internationally (Chang et al., 2015).

Physiotherapeutic treatment, and particularly exercise, has been part of the management of knee osteoarthritis for nearly a century and is the second most frequently prescribed treatment after oral medication . What is specifically unknown is whether such exercise should be performed by patients individually, at home, or be undertaken in a class-based setting as evidence exists to support both methods of provision (McCarthy et al., 2004).

A reduction in pain and improve functional ability has been shown with a home exercise programme, which is consistent for all measures of pain(O'Reilly et al., 2016).The supplementation of a home exercise programme with a class-based exercise programme did result in an improvement in locomotor function(McCarthy et al., 2004).High-quality evidence indicates that land-based therapeutic exercise provides short-term benefit that is sustained for at least two to six months after cessation of formal treatment in terms of reduced knee pain, and moderate-quality evidence shows improvement in physical function among people with knee osteoarthritis.Poor physical fitness is another impairment reported among people with knee OA. Physiological reserve for aerobic capacity is enhanced primarily by increasing muscle oxidative capacity. Aerobic exercise (e.g. walking, cycling) of sufficient intensity increases muscle oxidative enzymes and muscle capillarisation, hence increasing peak oxygen uptake. Higher oxygen uptake is inversely related to morbidity and mortality and renders every submaximal daily task easier (in terms of effort). Thus, improved fitness may enhance quality of life by allowing a greater range of available daily tasks, thereby improving physical function (Fransen et al., 2015).

There is a good evidence to support the use of a number of physiotherapy interventions in the management of knee joint osteoarthritis (Arshad et al., 2015). The management of OA depends on the joint involvement, the stage of the disorder, the severity of the symptoms, age of the patient and his or her functional needs (Lawrence et al., 2008).

The major goal of physiotherapy are educate the patient , caregivers and relatives, Relieve symptoms such as pain and stiffness, Preserve joint motion and function by limiting disease progression (Reijman et al., 2007), Strengthen weak muscles related to the arthritis joint, Encourage correct function, Minimize disability (Kornaat et al., 2006).

Physical activity is defined as body movement that is produced by the contraction of the skeletal muscles and that increases energy expenditure, whereas exercise is planned, structured and repetitive movement to improve or maintain one or more components of physical fitness. Exercise has proven benefits in the various components of health-related physical fitness—defined by the American College of Sports Medicine (ACSM) to consist of cardiorespiratory fitness, body composition, muscular strength, muscular endurance and flexibility.Exerciseprogrammes are complex interventions that vary with exercise type, frequency, intensity and duration, as well as the mode of delivery (individual-group, supervised-unsupervised or facility-home-based). There is a common tendency to pool clinical trial data on exercise as an indistinct entity when formulating conclusions on exercise effects. Such results can be misleading because the effects of exercise can be moderated by the nature of the exercise programmes itself and by both patient and disease characteristics (Hinman&Crossley, 2007).

Most exercise interventions for OA conventionally fall into one of the following physical performance categories: strengthening, aerobic, flexibility and skills/balance. In theory, the health benefits accrued are specific to the type of exercise. For example, aerobic activity to improve cardiorespiratory fitness can improve sleep and well-being and reduce all-cause mortality, whereas strengthening primarily improves local muscle function and proprioception to improve joint stability and local biomechanical functioning. However, there is evidence that both forms of exercise can reduce pain and improve function so both are recommended in most recent guidelines.Other than strengthening or aerobic exercises, range of motion (ROM) exercise is also believed to be beneficial in improving

symptoms and function. This is especially useful when functional and structural properties of periarticular soft tissue have been compromised following acute knee swelling or prolonged joint immobilisation. Other types of exercise that incorporates 'mind and body' components such as Tai Chi and Yoga are also gaining interest for its role in improving symptoms and function. It is possible that these may have additional benefits such as modulation of the inflammatory response and reduction of central sensitisation in people with OA (Goh et al., 2016).

As the number of people who have osteoarthritic disease is increasing, the prevention of osteoarthritis is important and necessary. Osteoarthritis has three strong risk factors (excessive musculoskeletal loading, high body mass index and previous knee injury) in which prevention may work. According to Hochberg, avoiding squatting and kneeling and carrying heavy loads during work have been associated with a reduction of 15–30% in the prevalence of osteoarthritis in men. Another study showed a significant exposure–response relationship between symptomatic knee osteoarthritis and squatting and kneeling (Dillon et al., 2006).

Prevention programs for sports injury, especially ACL injury, have recently shown encouraging results. Norwegian studies showed that the prevention of ACL injuries was possible with the use of neuromuscular training programs. Prevention of joint injuries would give an additional 14–25% reduction in the prevalence of osteoarthritis (Takeda et al., 2011).

CHAPTER: III METHODOLOGY

This research was a quantitative evaluation of the comparison between the exercise programs combined with only home exercise and class-based home exercise along with conventional physiotherapyfor management of pain, stiffness and functional activities of the patients with knee osteoarthritis. To identify the effectiveness of this treatment approach Numeric Pain Rating Scale (NPRS) and Western Ontario & McMaster Universities Osteoarthritis Index was used as measurement tools for measuring the level of pain, stiffness and functional activities in several functional positions.

3.1 Study design

The study was conducted by using a quantitative randomized control trail design with two different subject groups. Randomized control trail design is a method of testing hypothesis by which cause and effect can be established.

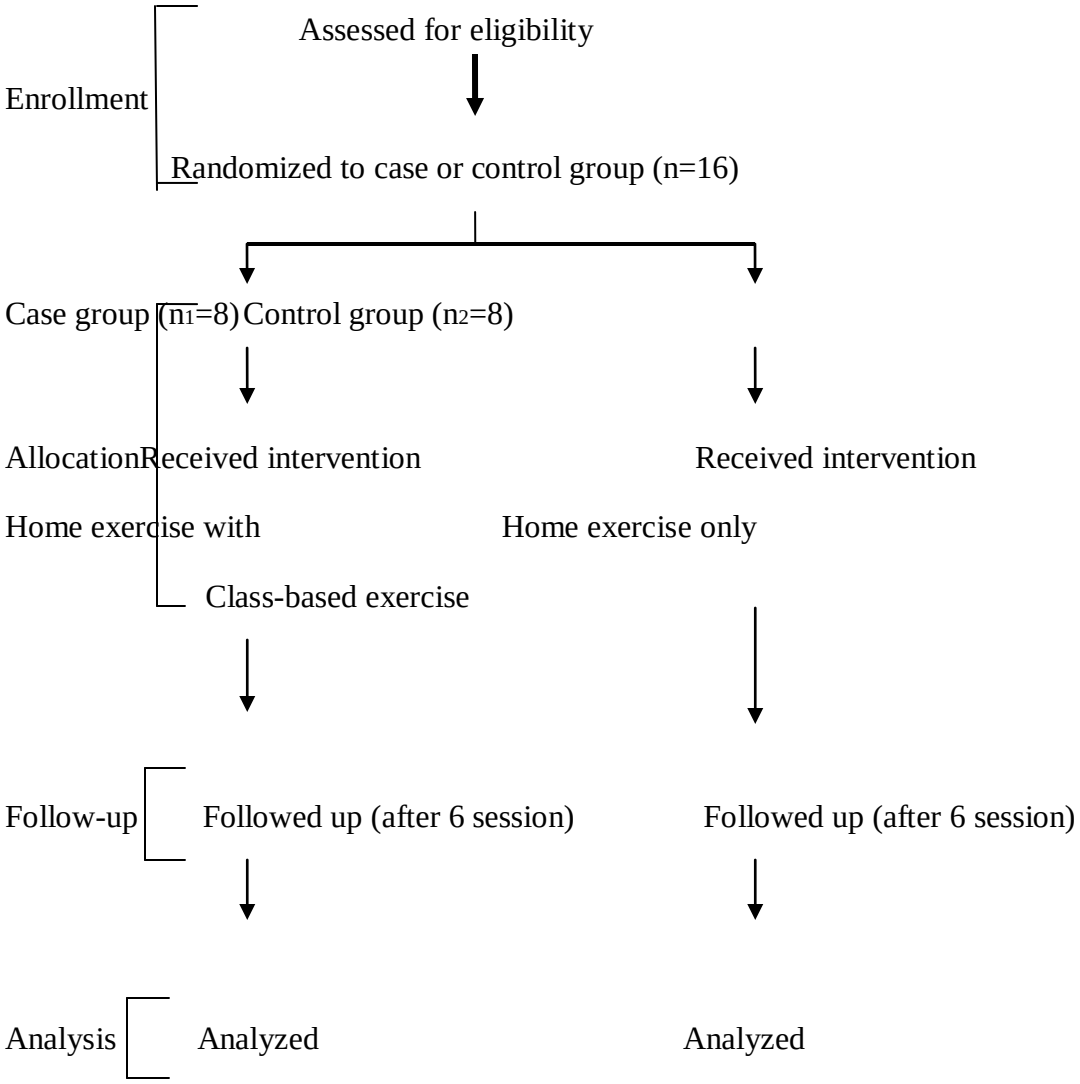
The study was true experimental between different subject designs. Both groups received a common treatment regimen. Only the experimental group received the home exercise with class-based exercise program while in control group only home exercise program was given.

A pre-test (before exercise) and post-test (after exercise) was administered with each subject of both groups to compare the pain effects, stiffness and functional ability before and after the treatment. The design could be shown by-

r o x o (experimental group)

r o o (control group)

Flowchart of the phases of randomized controlled trial



A flowchart for a randomized controlled trial of a treatment program includingclass-based home exercise with conventional physiotherapy for the patient with knee osteoarthritis

3.2 Study area

Physiotherapy musculoskeletal department of Centre for Rehabilitation of the Paralysed (CRP), Savar, Dhaka.

3.3 Study population

The study population was the patients diagnosed as knee osteoarthritis in the Musculoskeletal Unit of Physiotherapy Department at CRP, Savar, Dhaka.

3.4 Sample size

In this study, 16 participants were selected according to inclusion and exclusion criteria. 8 participants were in experimental group and 8 participants in control group.

3.5 Sampling

Subjects, who met the inclusion criteria, were taken as sample in this study. Sixteen patients with knee osteoarthritis were selected from musculoskeletal physiotherapy department of CRP (Savar). Among them 8 patients were selected for the experimental group (received class-based home exercise with conventional physiotherapy) and rest 8 patients were selected for control group (received only home exercise with conventional physiotherapy) by computer generated random number using Microsoft Office Excel 2010 because it improves internal validity of experimental research. The samples were given numerical number C1, C2, C3 etc. for the control group and E1, E2, E3 etc for experimental group. The study was a single blinded technique.

3.6 Inclusion criteria

- Age more than 45 years are included.
- Male and female both are included.
- Radiologically confirmed knee osteoarthritis (McCarthy et al., 2004).
- Patients who are willing to participate.
- Patient who have no pshychological problem.

3.7 Exclusion criteria

- Patient who had received NSAIDs.
- Patient with severe psychological problem.
- Patient with knee OA secondary to inflammatory arthritis (McCarthy et al., 2004).
- Patient who had received an intra-articular steroid injection in the knee (McCarthy et al., 2004).
- Patient who are pregnant.

3.8 Method of data collection

3.8.1 Data collection tools

In this particular study, a written questionnaire, pen, paper, pencil, a written book (Bengali version) of home exercise.

3.8.2 Questionnaire

The questionnaire was developed under the advice and permission of the supervisor following certain guidelines. There were one close ended questions with Numeric Pain Rating Scale (NPRS) and twenty four close ended question with Western Ontario McMaster University (WOMAC) osteoarthritis index each question was formulated to identify the change of pain, stiffness, functional ability with each activity and all questions were related to pain and disability.

3.8.3 Measurement tool

McCaffery& Beebe (1993) suggested Numeric Pain Rating Scale. The Numeric Pain Rating Scale (NPRS) is a unidimensional measure of pain intensity in adults, including those with chronic pain due to rheumatic diseases. The 11-point numeric scale ranges from '0' representing one pain extreme (e.g. “no pain”) to '10' representing the other pain extreme (e.g. “pain as bad as you can imagine” or “worst pain imaginable”).

The Western Ontario & McMaster Universities Osteoarthritis Index is a disease-specific, tri-dimensional self-administered questionnaire, for assessing health status and health outcomes in osteoarthritis of the knee. According to Nicholas (1982), The questionnaire contains 24 questions, targeting areas of pain, stiffness and physical function to assess pain, stiffness and physical function in patients with knee osteoarthritis.

3.8.4 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 were assessed by qualified physiotherapist. six sessions of treatment was provided for every subject.Sixteen subjects were chosen for data collection according to the inclusion criteria. The researcher divide all participants into two groups and coded C1 (8) for control group and E1 (8) for experimental group. Experimental group received home exercise with class-based exercise and control group received only home exercise.

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. Pre-test was performed before beginning the treatment and the level of pain, stiffness and functional ability was noted with NPRS score and WOMAC score on questionnaire form. The same procedure was performed to take post-test at the end of six session of treatment. The researcher collected the data both in experimental and control group in front of the qualified physiotherapist in order to reduce the biasness.

At the end of the study, specific test was performed for statistical analysis.

3.8.5 Intervention

A common intervention program was executed for both groups as conventional physiotherapy, it includes- Soft tissue release technique, Patellar mobilization., Movement with mobilization, Rotation mobilization, Pendulum exercise, Gapping, Strengthening exercise, Stretching exercise, IRR (Infra-Red Radiation), UST (Ultrasound).

In this study, treatment time was equal in both groups. The exercise programme was simple and provided a good indication of repetitions, intensity and duration for patients with osteoarthritis of the knee. Both groups received the same facilities and the duration of treatment sessions that were same as other outdoor patients in the physiotherapy department.

3.8.6 Class-based home exercise

Anatomy of knee:

Knee joint is one of the biggest and complex joint in the human body. The knee joint is composed of femur, tibia, fibula combination of these bones. There are some of the muscles who have tendon that connects the bones, which helps to knee to move (flexion/extension).

There are also some of the ligaments that connect the bones of the knee joint, as well as to provide stability. There are two “C” shaped cartilage, which are called menisci.

Figure- 1: Normal knee joint

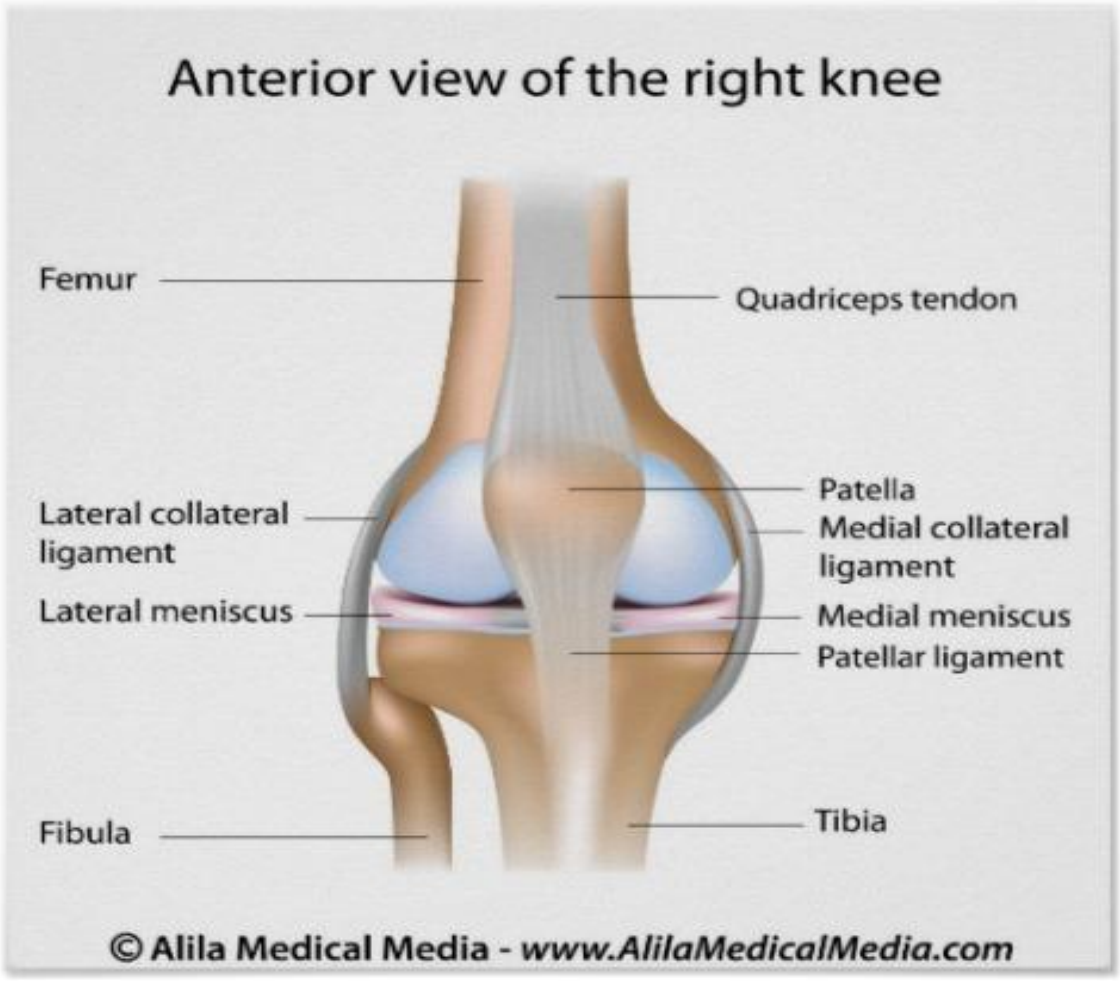
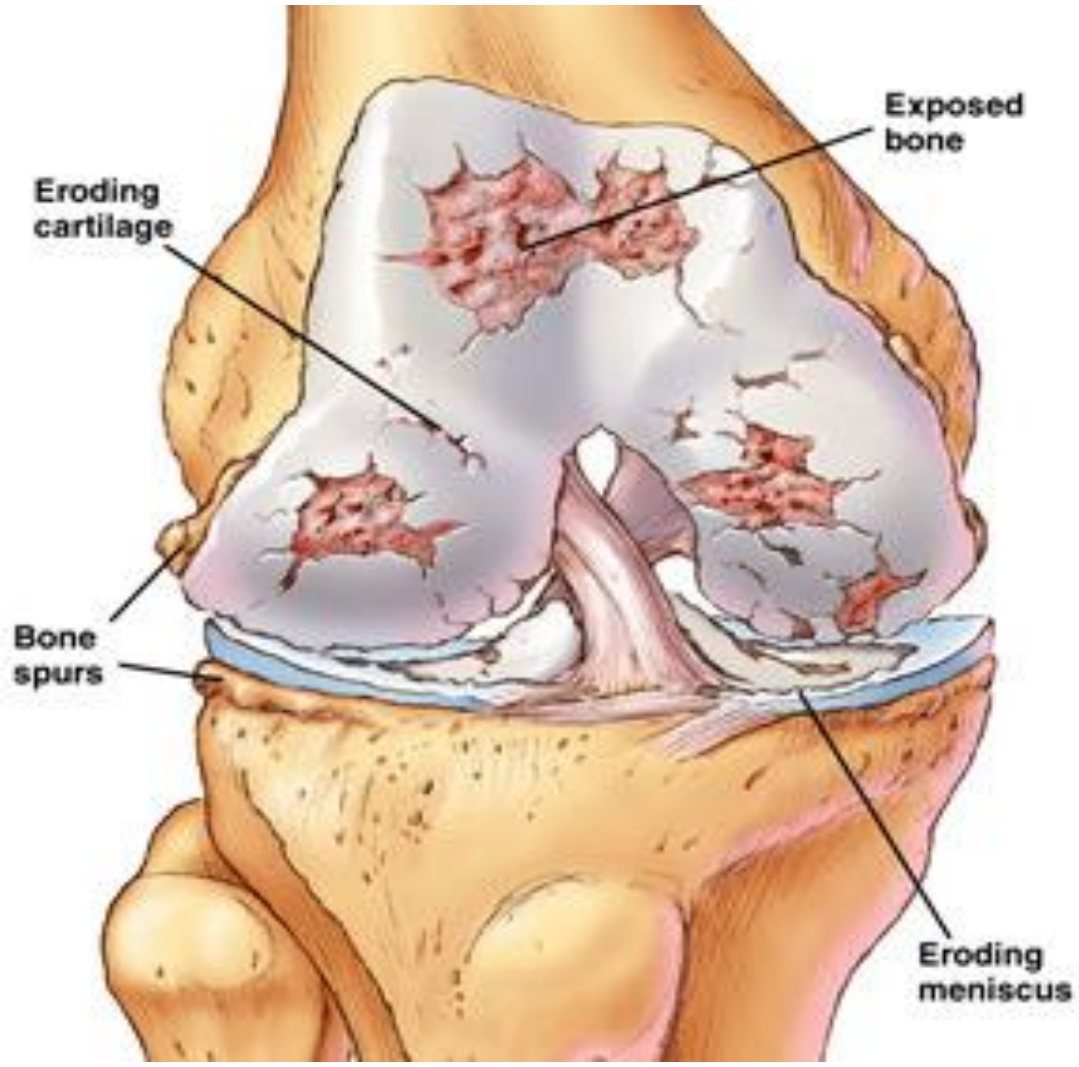


Figure-2 : Mechanism of knee osteoarthritis



Changes that occur in the knee joint after knee osteoarthritis:

Bone are exposed due to erosion of cartilage or menisci. Abnormal growth is continue of the knee joint, for which decreases the space into the joint, as a result pain feel due to friction of the bones during knee flexion and extension.

Figure-3: Normal and knee osteoarthritis joint

Knee Osteoarthritis:

Osteoarthritis is one kind of joint disease which caused by the erosion of joint cartilage and bone. It is most commonly affected large weight bearing joint in the body, such as- spinal joint, hip joint, knee joint are most common. Osteoarthritis also occurs in ankle joint, finger joint, but most of them are osteoarthritis occur in knee joint.

Causes of knee osteoarthritis:

1. Most common cause of knee osteoarthritis is age,the ability of cartilage to heal decreases as a person gets older, as a result osteoarthritis in knee can occur very easily by producing wound.
2. Osteoarthritis can also occur because of high body weight, because of extra weight pressure increases on knee, which is enable to produce wound slowly.
3. Osteoarthritis can also occur due to heredity.
4. Osteoarthritis affect female more than male.
5. People with certain occupations that include a lot of activity that can stress the joint, such as kneeling, squatting, or lifting heavy weights, are more likely to develop osteoarthritis of the knee because of the constant pressure on the joint.
6. Manny time osteoarthritis can occur due to another disease.

Symptoms of knee osteoarthritis:

1. Swelling on the knee and pain increases on the knee, pain will be radiated to the above and below the knee joint.
2. Muscle spasm present and Muscle atrophy will be occurred slowly.
3. The ability of knee flexion and extension will be decreased.
4. If it can't maintain in a long period of time, deformity will be developed in the knee joint.

Home exercises to maintain knee osteoarthritis:

When osteoarthritis occur in the knee, it is very necessary to extend and increase power of muscles around the knee, so that stress decreases and movement of the knee remain normal around the knee joint.

The following therapy will help you to decrease your knee pain and also help you more strong and refresh. But remember that therapy will not be painful, if you feel more pain during therapy then therapy have to stop and have to advice your therapist.

Figure-4: Isometric quadriceps strengthening

1. Isometric quadriceps strengthening: (without movement of the knee)

Lie on your back with the leg you want to exercise straight. Place a small rolled towel underneath the knee. Slowly tighten the muscle on top of the thigh (quadriceps) and push the back of the knee down into the rolled towel. Hold contraction for 5 seconds and then slowly release, resting 5 seconds between each contraction. Perform 3 sets of 10 repetitions, 2 times daily.

Advantage of therapy*:*This exercise helps to strengthen the quadriceps muscle (the big muscle on the front of the thigh), an important stabilizer of the knee.

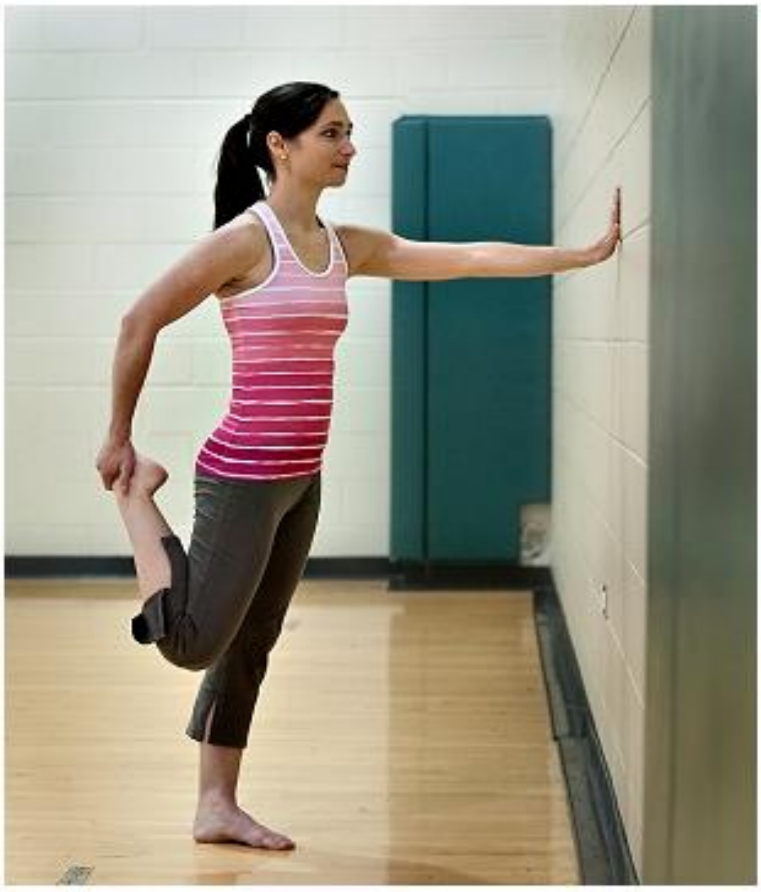
Figure-5: Isotonic quadriceps strengthening

2. Isotonic quadriceps strengthening: (with movement of the knee)

Sit on a chair with both legs bent at 90°. Slowly raise your right leg so that it's parallel to the floor, keeping your left foot on the ground. Hold for 30 seconds, then slowly bring the right foot back to the floor, and repeat on left leg. Do 10 repetition 2 times daily.

Advantage of therapy: It increases power of the muscles around the knee and decreases pain.

Figure-6: Quadriceps muscles stretching



3. Quadriceps muscles stretching: (Standing)

Stand with feet hip-distance apart. Bend your right knee and hold the top of your right foot with your right hand. Bring your right heel as close as possible to your glutes. You can use a wall for balance. Hold for 30 seconds, and repeat on the left leg. Do 3 repetition 2 times daily.

Advantage of therapy: It decreases the pressure on the knee joint.

Figure-7: Hamstring muscles stretching

4. Hamstring muscles stretching:

Lie on your back with the leg to be stretched straight with a strap around the bottom of your foot. Using the strap for support, elevate your leg until you feel a gentle stretch at the back of you knee and thigh. Hold for up to 30 seconds. Slowly lower. Perform 3 repetitions, 2 times daily.

Advantage of therapy: This therapy helps to stretch the hamstring muscles, improving the range of motion of your knee and helping you feel more flexible.

Figure-8: Calf muscles stretching

5. Calf muscles stretching:

Stand facing a wall with the leg to be stretched behind you and the other leg in front. Place your hands or forearms on the wall for support. Slowly bend the front knee, keeping the heel of the leg behind you down on the floor. Once you feel a stretch in you calf muscle at the back of your ankle, hold for 30 seconds. Slowly relax. Perform 3 repetitions, 2 times daily.

Advantage of therapy: This therapy will help your lower leg and ankle stay flexible, helping to improve your balance and the way you walk.

Figure-9: Home advice for knee osteoarthritis



Home advice to maintain knee osteoarthritis:

1. Always have to keep in control of body weight.
2. Have to eat a healthy diet at home.
3. To decrease knee sewelling and severe pain, a few pieces of ice wrape in a thin towel or cloth to keep the knees 3 times daily for 5 minuets at home.
4. In order to decrease knee pain and stiffness have to hot compression 3 times for 15 to 20 minutes at home, in this case hot water filled into a bottle and wrape the bottle with thin towel and keep it on the knee.
5. Have to avoid for a long time sitting on the floor with knees folded, Sitting on the floor, as knees folded as if in prayer or any other tasks where the knee is folded to sit on the floor with knees folded should be avoided. In this case you can make your task by sitting on a small tool or chair.
6. To keep in mind while working, the knees should not folded for a long time during household activities such as cutting vegetables, sweep in floor and lifting.
7. Always should be careful that no pain occur again in knee by falling or getting hurt.

3.9 Ethical Consideration

The proposal of the dissertation including methodology was approved by Institutional Review Board (IRB) and obtained permission from the concerned authority of ethical committee of Bangladesh Health Professions Institute (BHPI). 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 the beginning of the data collection, the researcher obtained the permissionensuring the safety of the participants from the concerned authorities of the clinical setting and was allotted with a witness from the authority for the verification of the collected data. The researcher strictly maintained the confidentiality regarding participant‟s condition and treatments.

The researcher obtained consent to participate from every subject. A signed informed consent form was received from each participant. The participants 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 would 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.

3.10 Data analysis

In order to ensure that the research have some values, the meaning of collected data has to be presented in ways that other research workers can understand. In other words the researcher has to make sense of the results. As the result came from an experiment in this research, data analysis was done by using the software named Statistical Package for Social Science (SPSS) version 20 and scientific calculator.

For the significance of the study, a statistical test was carried out. Statistical analysis refers to the well-defined organization and interpretations of the data by systemic and mathematical procure and rules (Depoy&Gitlin, 2013). The U test was done for the analysis of the balance after six session treatment of both control and tail groups. Mann-Whitney U test is a non-parametric test that is simply compares the result obtained from the each group to see if they differ significantly. This test can only be used withordinal or interval/ ratio data.

The formula of Mann-Whitney U test:

$$U = n_1\, n_2 + \frac{n_x(n_x + 1)}{2} - T_x$$

n_1 = the number of the subjects in trail group

n_2= the number of the subjects in control group.

n_x= the number of the subjects of the group with larger rank total.

T_x= the larger rank total.

3.11 Significant level

In order to find out the significance of the study, the researcher calculated the "p" value. The p values refer the probability of the results for experimental study. The word probability refers to the accuracy of the findings. A p value is called level of significance for an experiment and a p value of <0.05 was accepted as significant result for health service research. If the p value is equal or smaller than the significant levels, the results are said to be significant.

Calculating the degree of freedom for the Mann–Whitney U test from the formula:

Degrees of freedom (*df*) = $(n_1-1) + (n_2-1) = (8-1) + (8-1) = 14$

Table-1: Level of significance for one tailed hypothesis

Df	.1	.05	.025	.01	.005	.0005
14	25.99	28.87	31.53	34.81	37.16	44.435

3.12 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 could influence the result of the study. Researcher found no significant difference between the mean age of two groups and the mean age of control group was 45years and mean age of trial group was 48 years, so there was no effect of age which can influence the result. 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.

CHAPTER: IV RESULTS

For this study 16 patients with knee osteoarthritis were taken as sample from Musculo-skeletal outpatient unit of Center for Rehabilitation of Paralyzed (CRP), Savar to compare the efficacy of home exercise with class-based exercise and home exercise alone on functional disability for the patient with knee osteoarthritis.

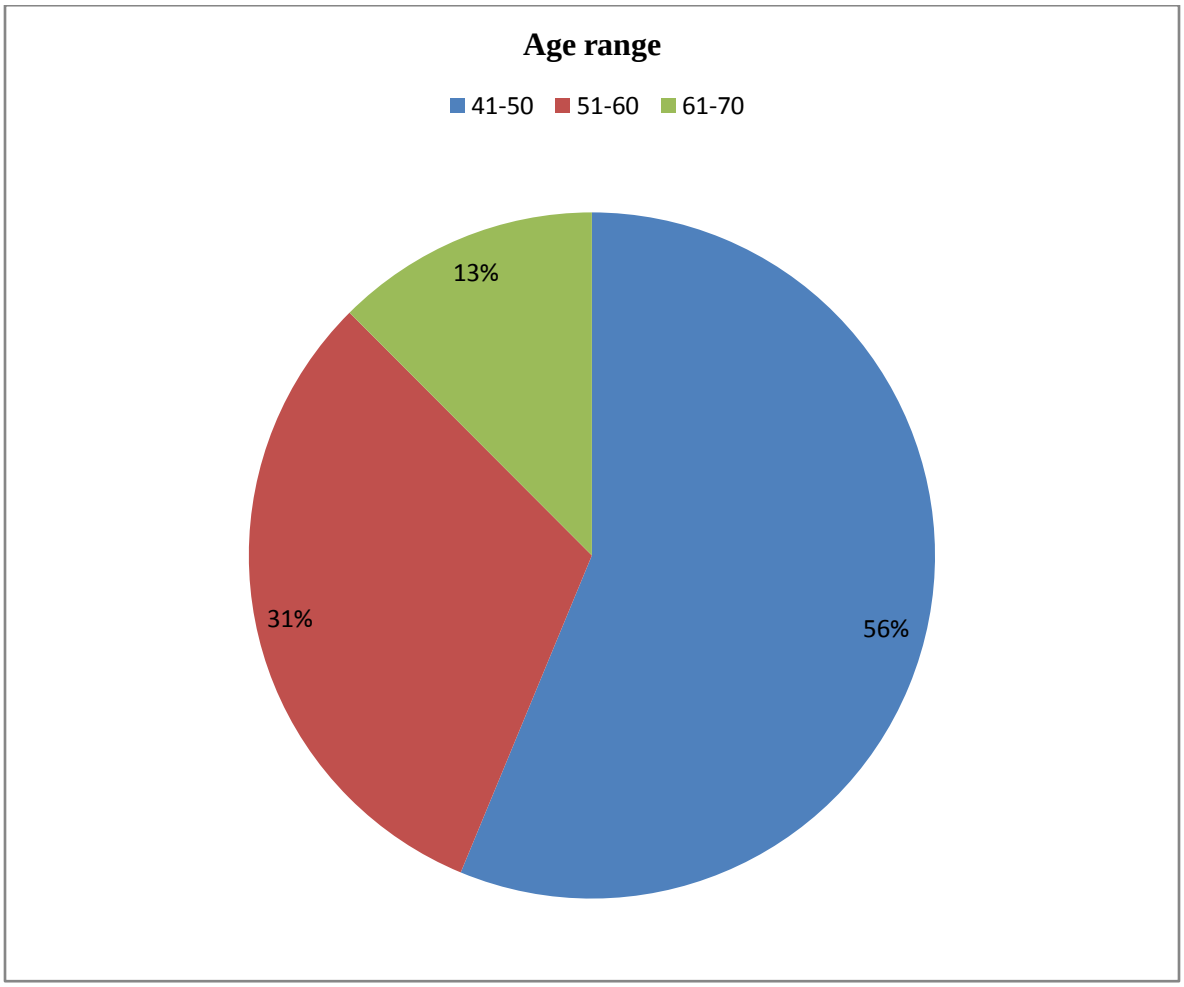
In this study the results which were found have been shown in different bar diagrams, pie charts and tables.

Table-2: Mean age of the participants

Experimental Group		**Control Group**	
Subjects	**Age (Years)**	**Subjects**	**Age (Years)**
E1	50	C1	57
E2	48	C2	62
E3	50	C3	45
E4	50	C4	45
E5	51	C5	45
E6	50	C6	52
E7	65	C7	55
E8	60	C8	48
Mean Age	**53 years**	**Mean Age**	**51 years**

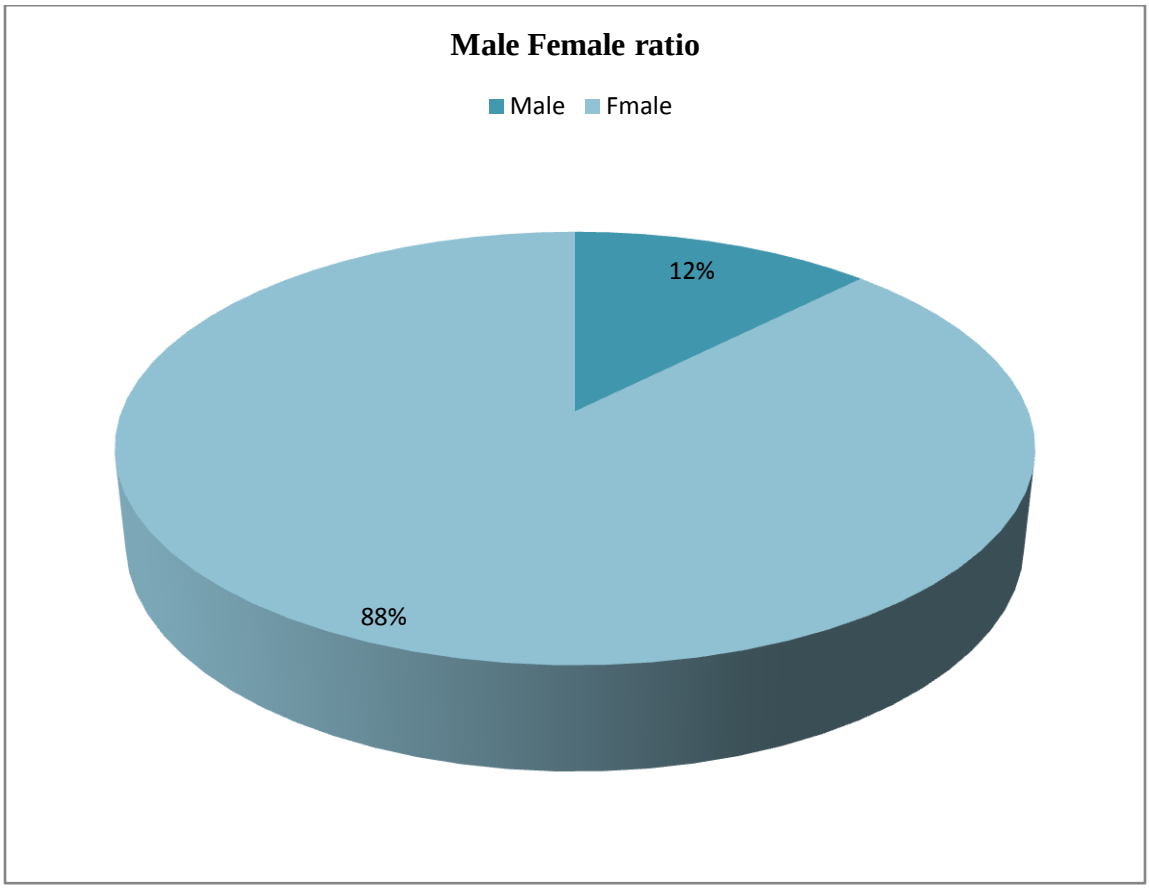
16 Patients with knee osteoarthritis were included as sample of the study, among them Experimental group mean age 53 years and control group mean age 51 years.

Figure- 10:Age Range

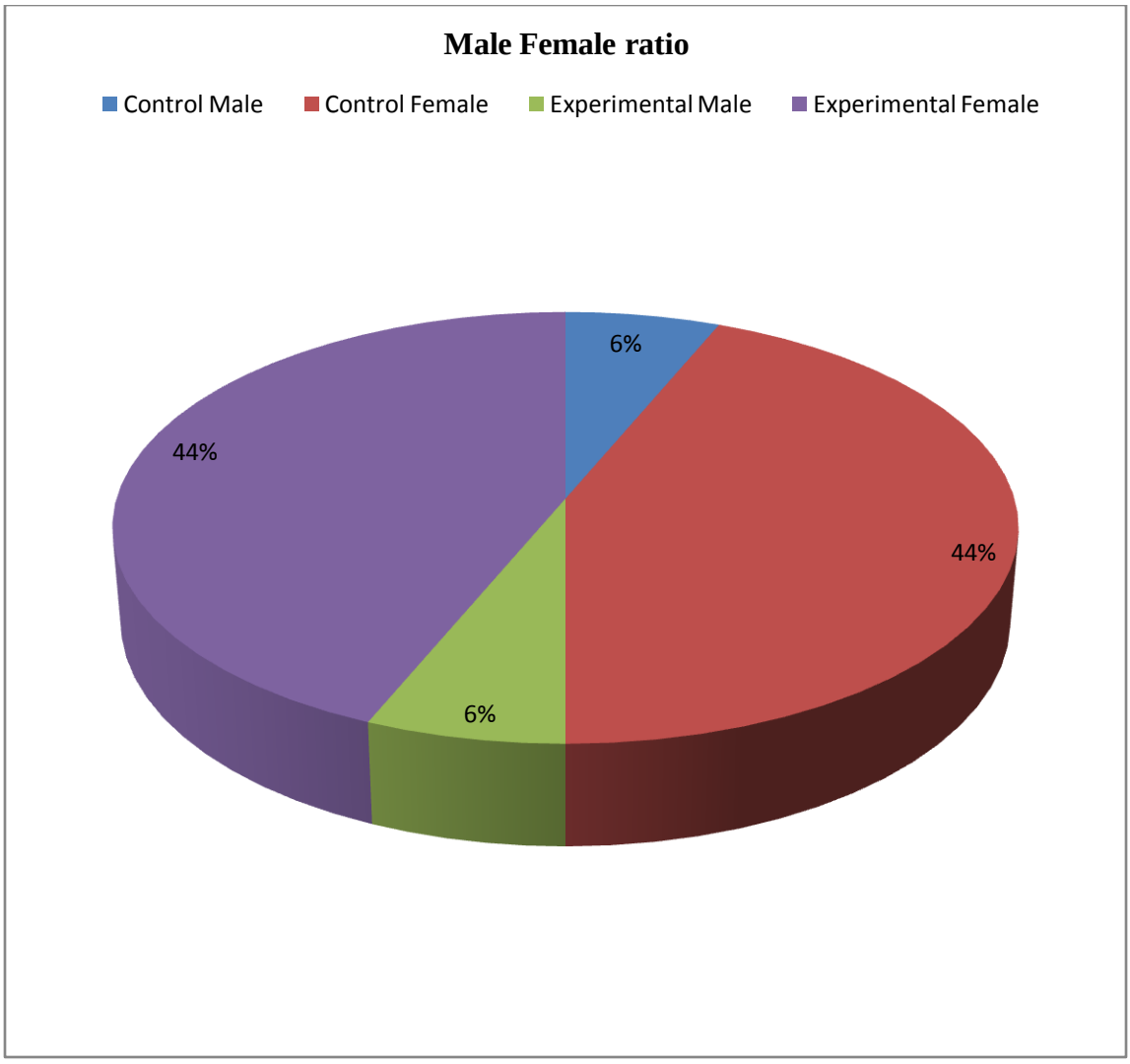


In this particular study the majority of the participants 56% (n=9) were in "41-50" years of age followed by 31% (n=5) were in "51-60" years, 13% (n=2) were in "61-70" years of age range group.

Figure-11: Gender Distribution

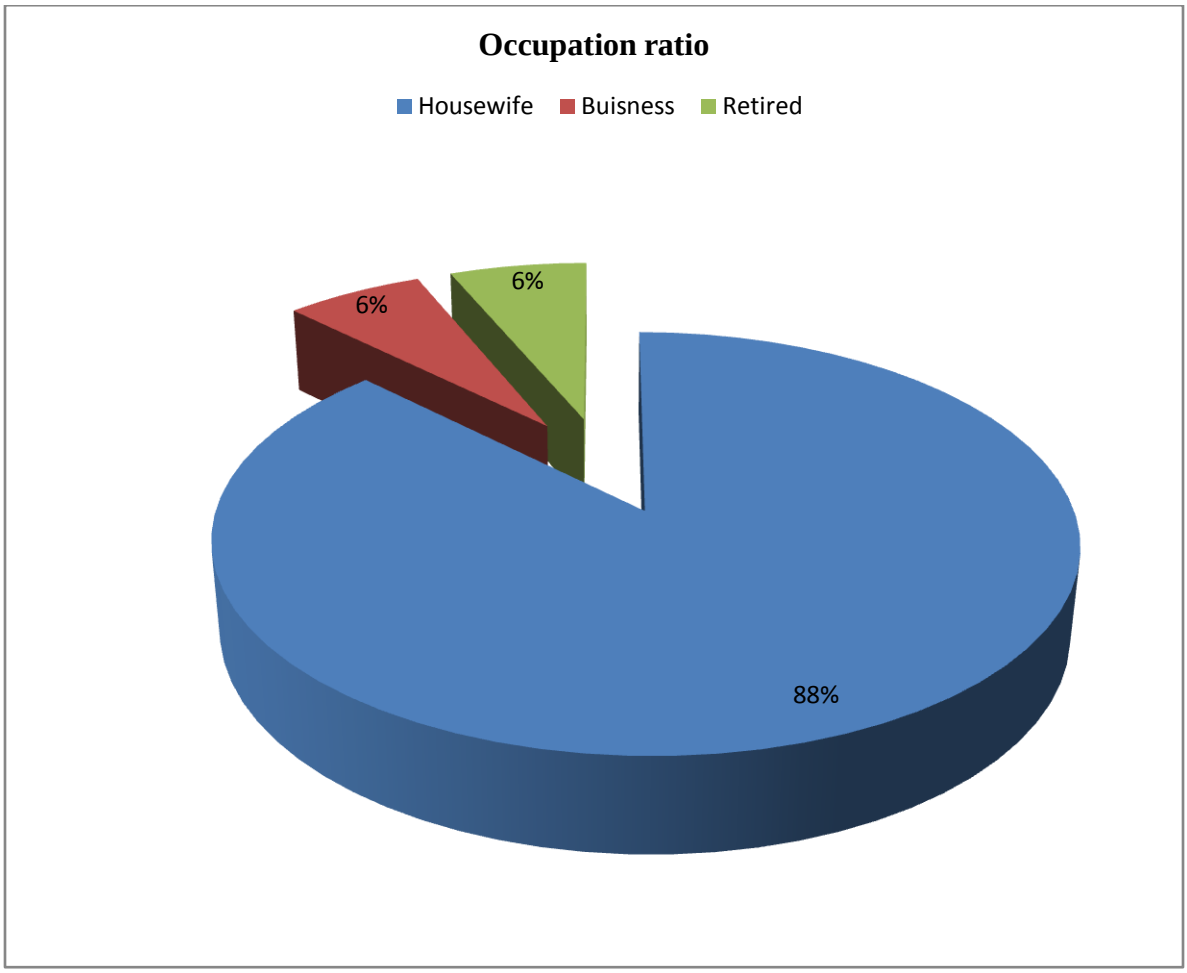


16 Patients with knee osteoarthritis were included as sample of the study, among them almost 12% (n=2) were male and about 88% (n=14) were female.



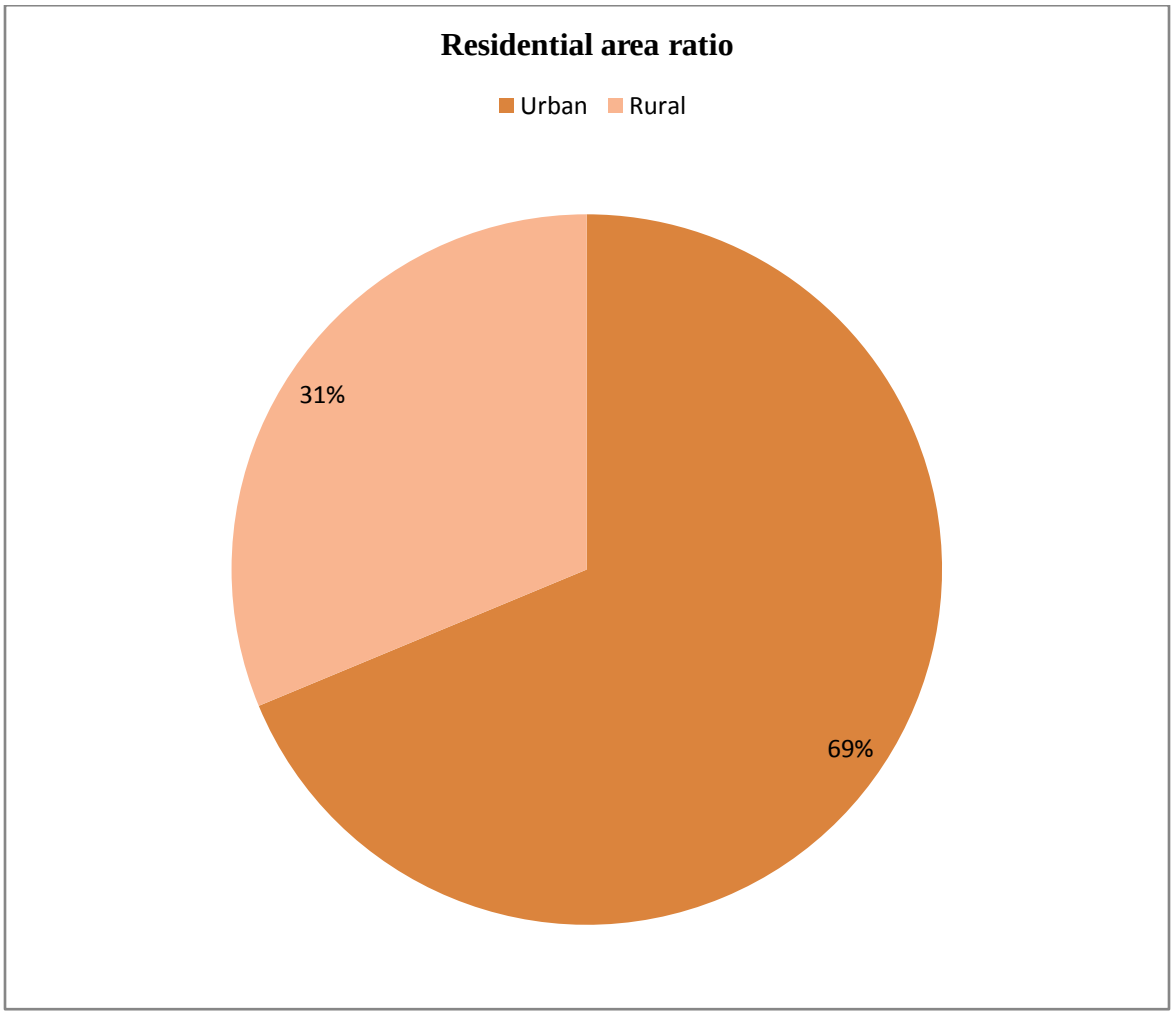
On the other hand, In Control Group 6% (n=1) were Male and 44% (n=7) were Female and in Experimental Group 6% (n=1) were Male and 44% (n=7) were Female.

Figure- 12:Occupation Distribution

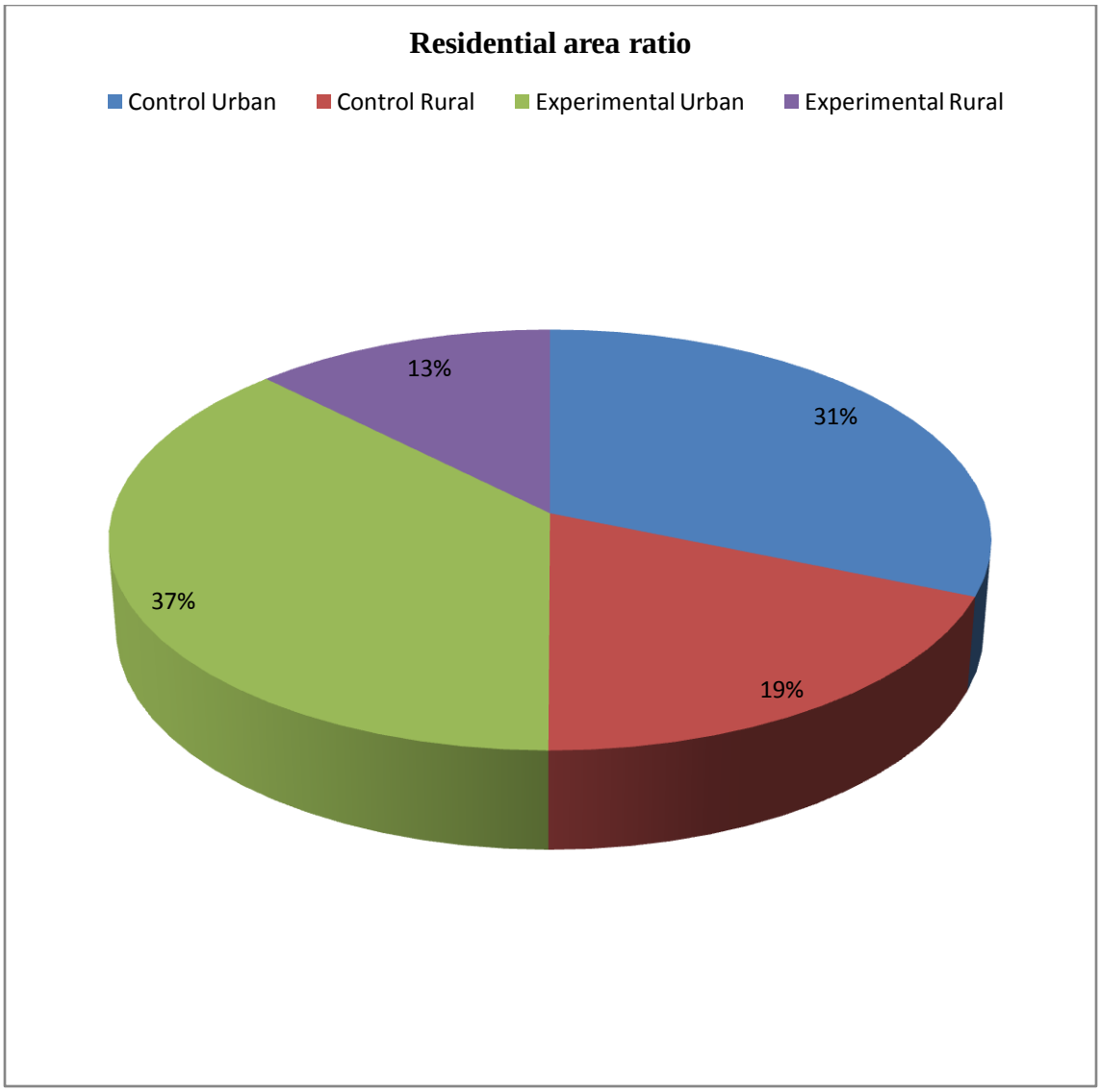


16 Patients with knee osteoarthritis were included as sample of the study, among them almost 88% (n=14) were house wife, about 6 % (n=1) were business, about 6% (n=1) were retired of the occupation.

Figure- 13: Residential area Distribution

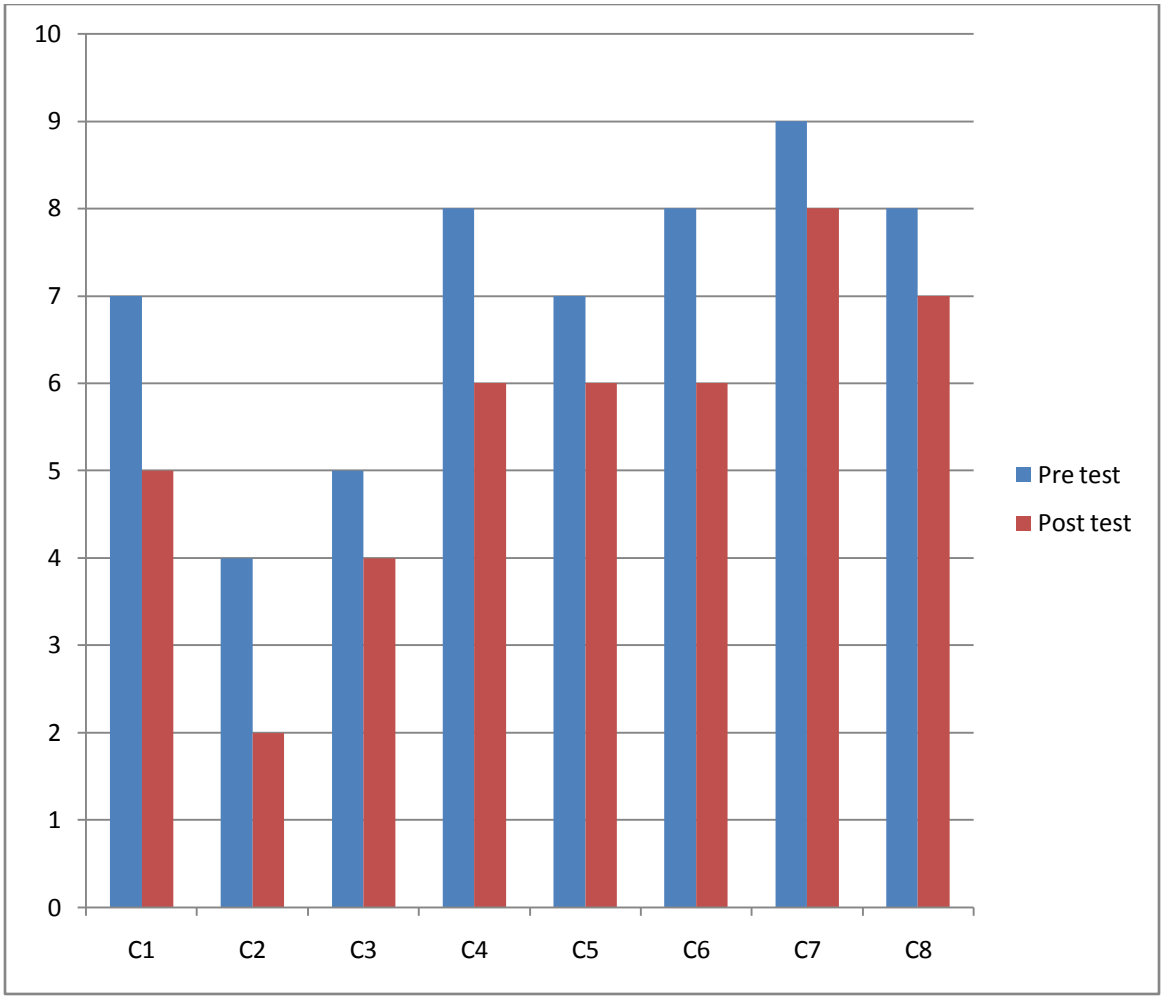


16 Patients with knee osteoarthritis were included as sample of the study, among them almost 69% (n=11) were urban area, about 31 % (n=5) were rural area.



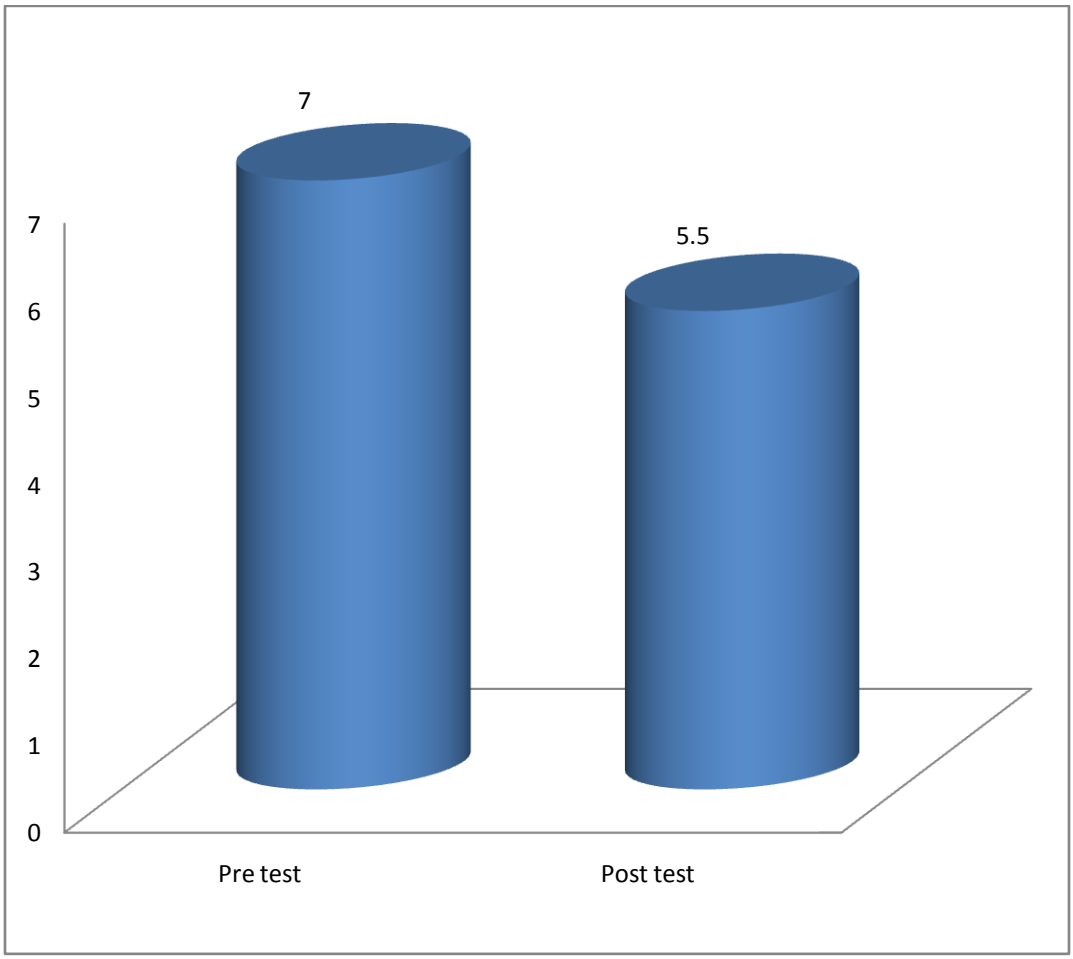
On the other hand, In Control Group 31% (n=5) were urban area and 19% (n=3) were rural area and in Experimental Group 37% (n=6) were urban area and 13% (n=2) were rural area.

Figure – 14: Reduction of Knee Osteoarthritis Pain on NPRS in Control Group



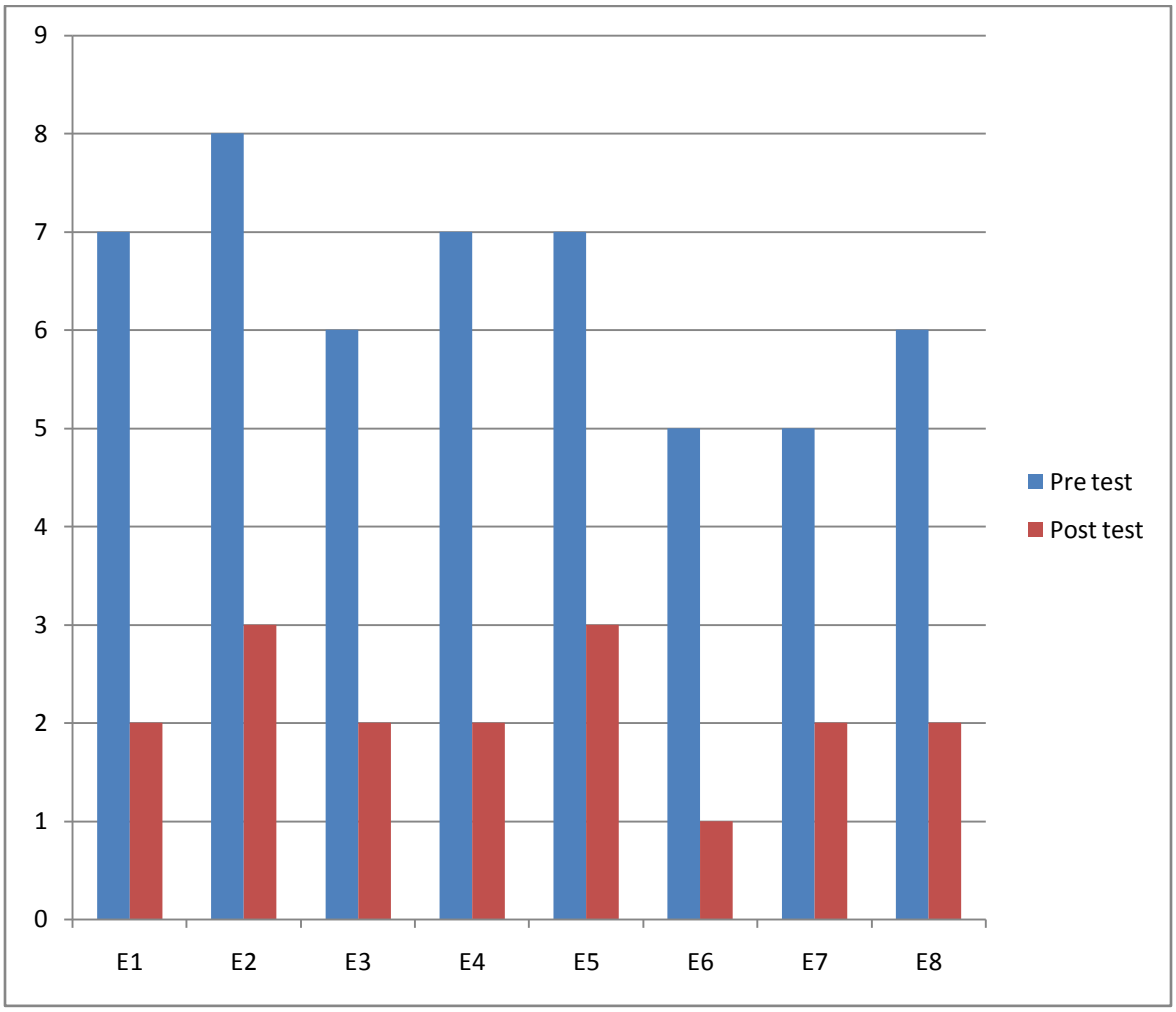
In Control Group reduction of pain are, pre-test 7 and post-test 5 (C1), pre-test 4 and post-test 2 (C2), pre-test 5 and post-test 4 (C3), pre-test 8 and post-test 6 (C4), pre-test 7 and post-test 6 (C5), pre-test 8 and post-test 6 (C6), pre-test 9 and post-test 8 (C7), pre-test 8 and post-test 7 (C8).

Figure-15: Mean Reduction of Knee Osteoarthritis Pain on NPRS in Control Group



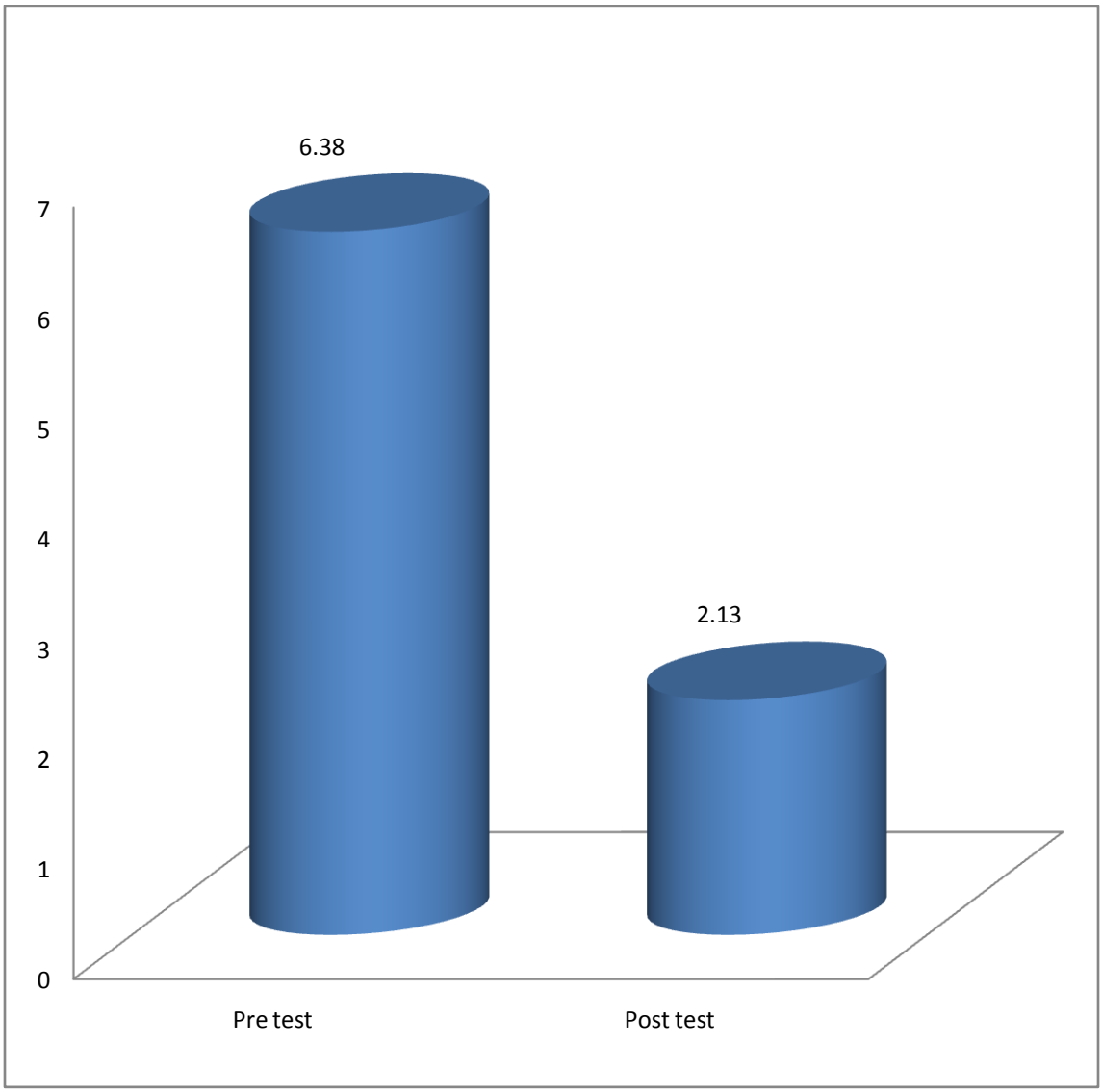
The mean pain reduction in knee in control group between pre-test and post-test are 7 and 5.5.

Figure – 16: Reduction of Knee Osteoarthritis Pain in Experimental Group.



In Experimental Group reduction of pain are, pre-test 7 and post-test 2 (E1), pre-test 8 and post-test 3 (E2), pre-test 6 and post-test 2 (E3), pre-test 7 and post-test 2 (E4), pre-test 7 and post-test 3 (E5), pre-test 5 and post-test 1 (E6), pre-test 5 and post-test 2 (E7), pre-test 6 and post-test 2 (E8).

Figure -17: Mean NPRS for Knee OsteoarthritisPain in Experimental Group



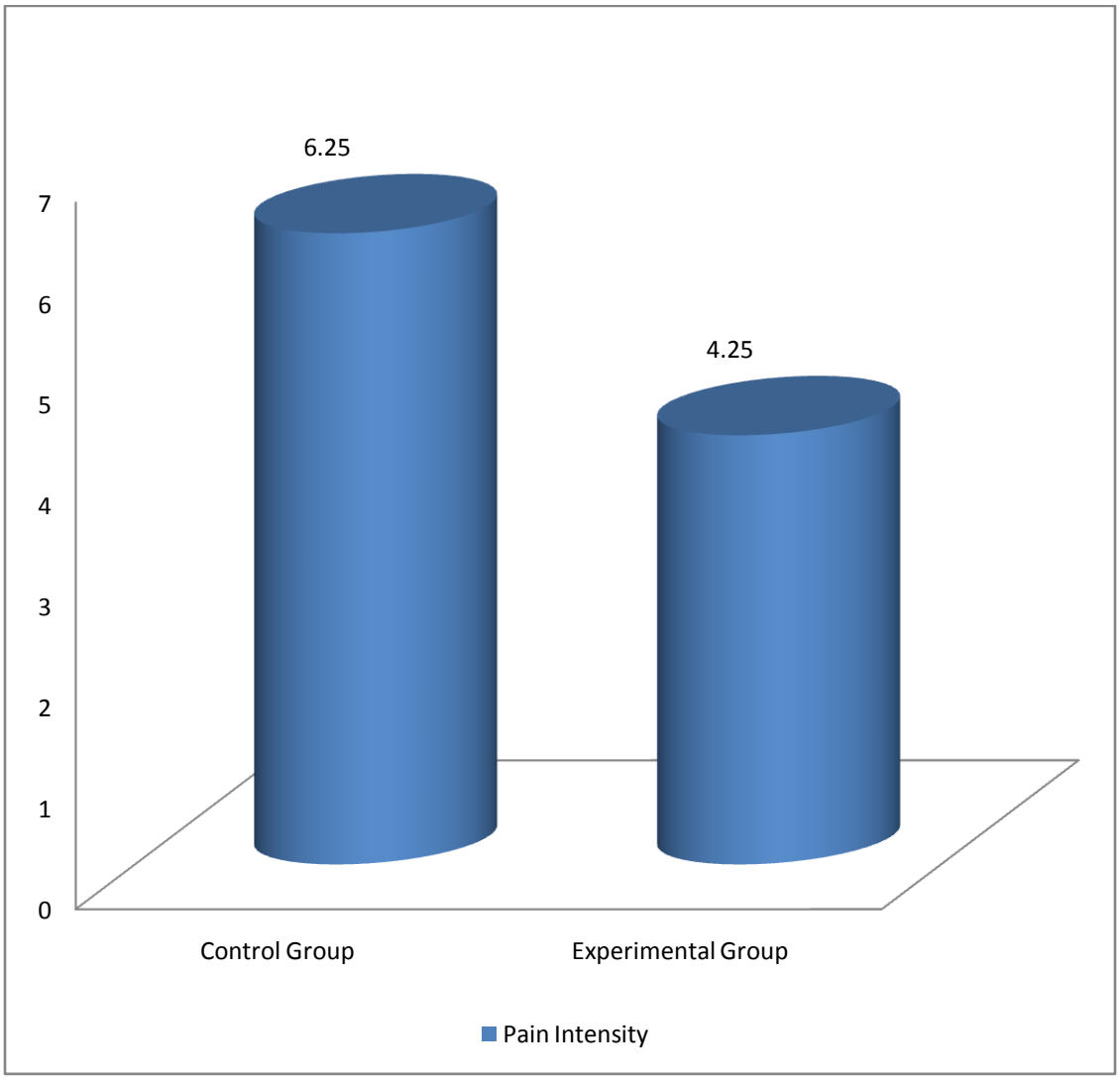
The mean of pain reduction in knee between pre-test and post-test of experimental group are 6.38 and 2.13.

Table-3: Mean Difference of Pain Reduction in Both Groups

Control Group	Pain Intensity	
	Pre-test	Post-test
Mean	7	5.5
Mean Difference	6.25	

Experimental Group	Pain Intensity	
	Pre-test	Post-test
Mean	6.38	2.13
Mean Difference	4.25	

Figure –18: Mean Difference of Pain Reduction in Both Groups



In this study mean difference of pain reduction between pre-test and post-test of Control Group are 6.25 and Experimental Group are 4.25.

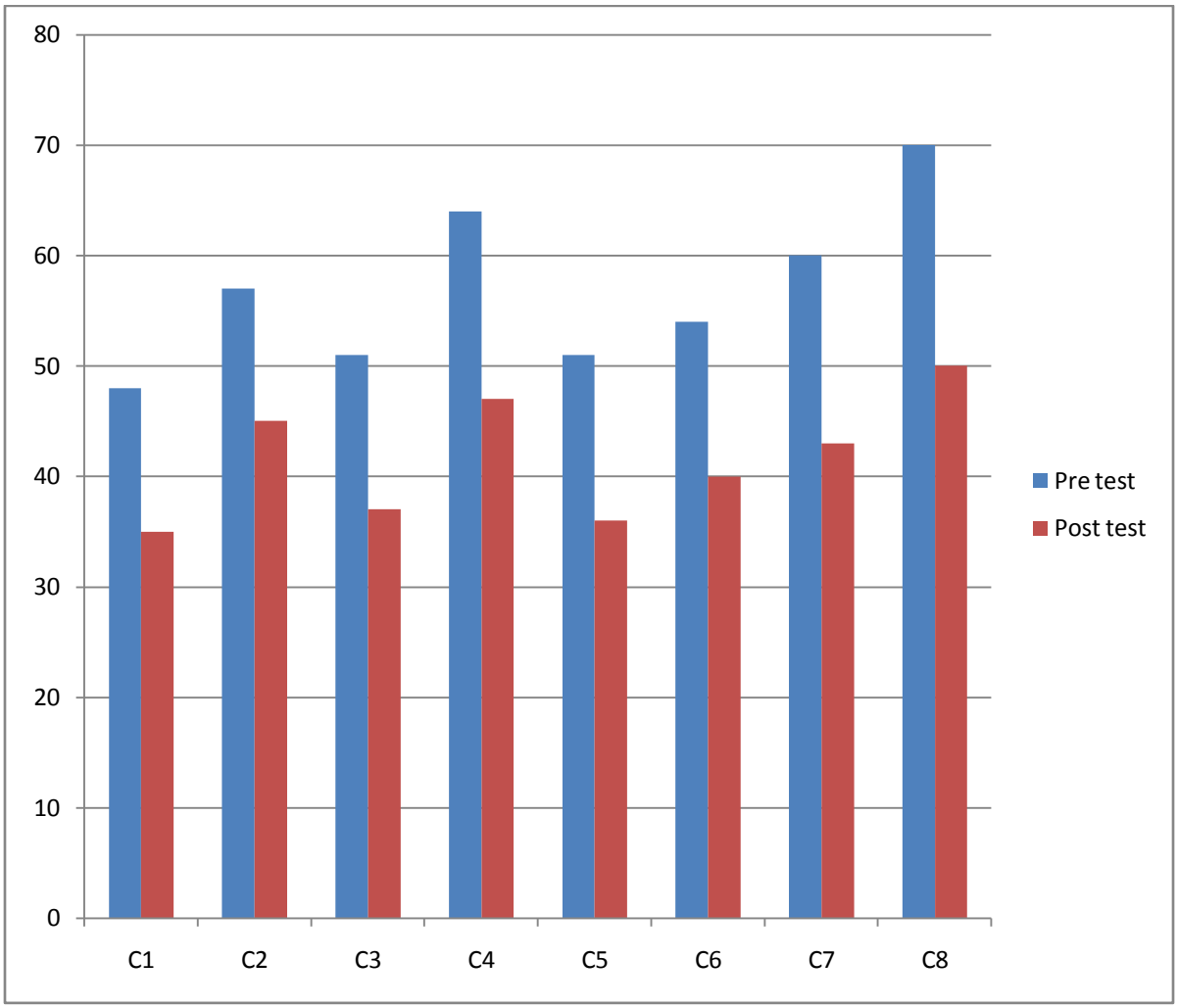
Table-4: Level of significance of pain intensity

Variables in the study statistically significance at the following level of significance:

No.	Variables	Observed 'u' value	Observed P Value	Level of significance
1	Pain intensity	14	<.05	Statistically significant

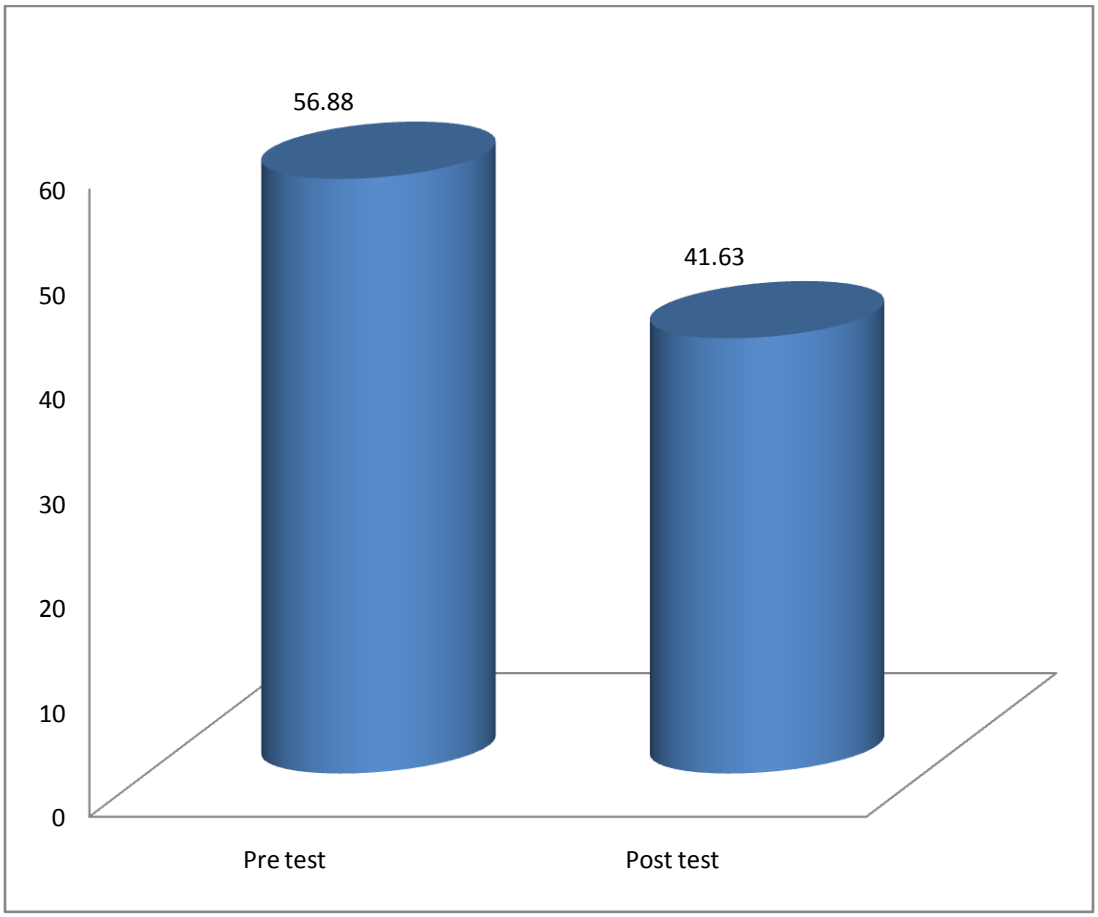
Observed 'u' value of pain intensity was 14, which showed statistically significant ($p<.05$) in case of knee osteoarthritis pain.

Figure-19: Reduction of WOMAC Score in Control Group



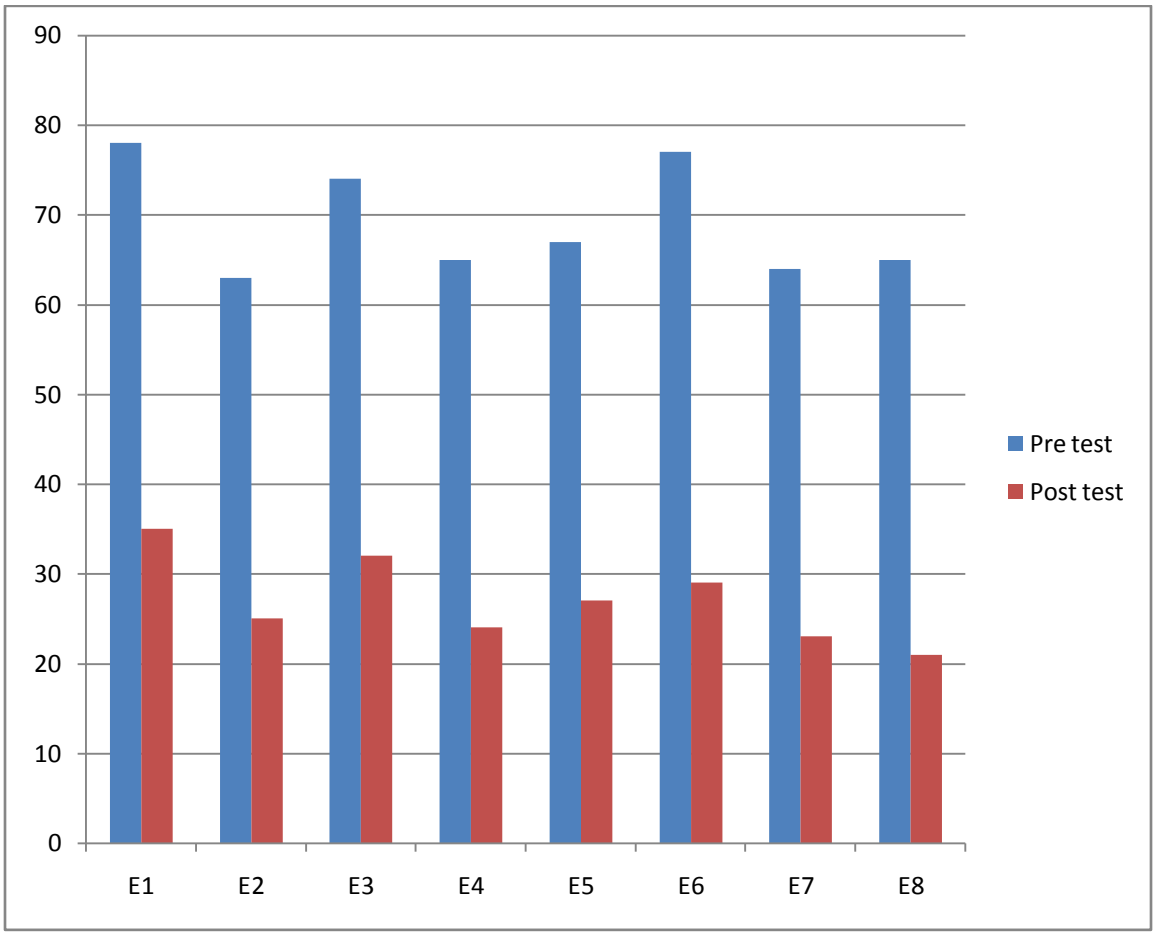
In Control Group reduction of WOMAC score are, pre-test 48 and post-test 35 (C1), pre-test 57 and post-test 45 (C2), pre-test 51 and post-test 37 (C3), pre-test 64 and post-test 47 (C4), pre-test 51 and post-test 36 (C5), pre-test 54 and post-test 40 (C6), pre-test 60 and post-test 43 (C7), pre-test 70 and post-test 50 (C8).

Figure-20: Mean Reduction of WOMAC Score in Control Group



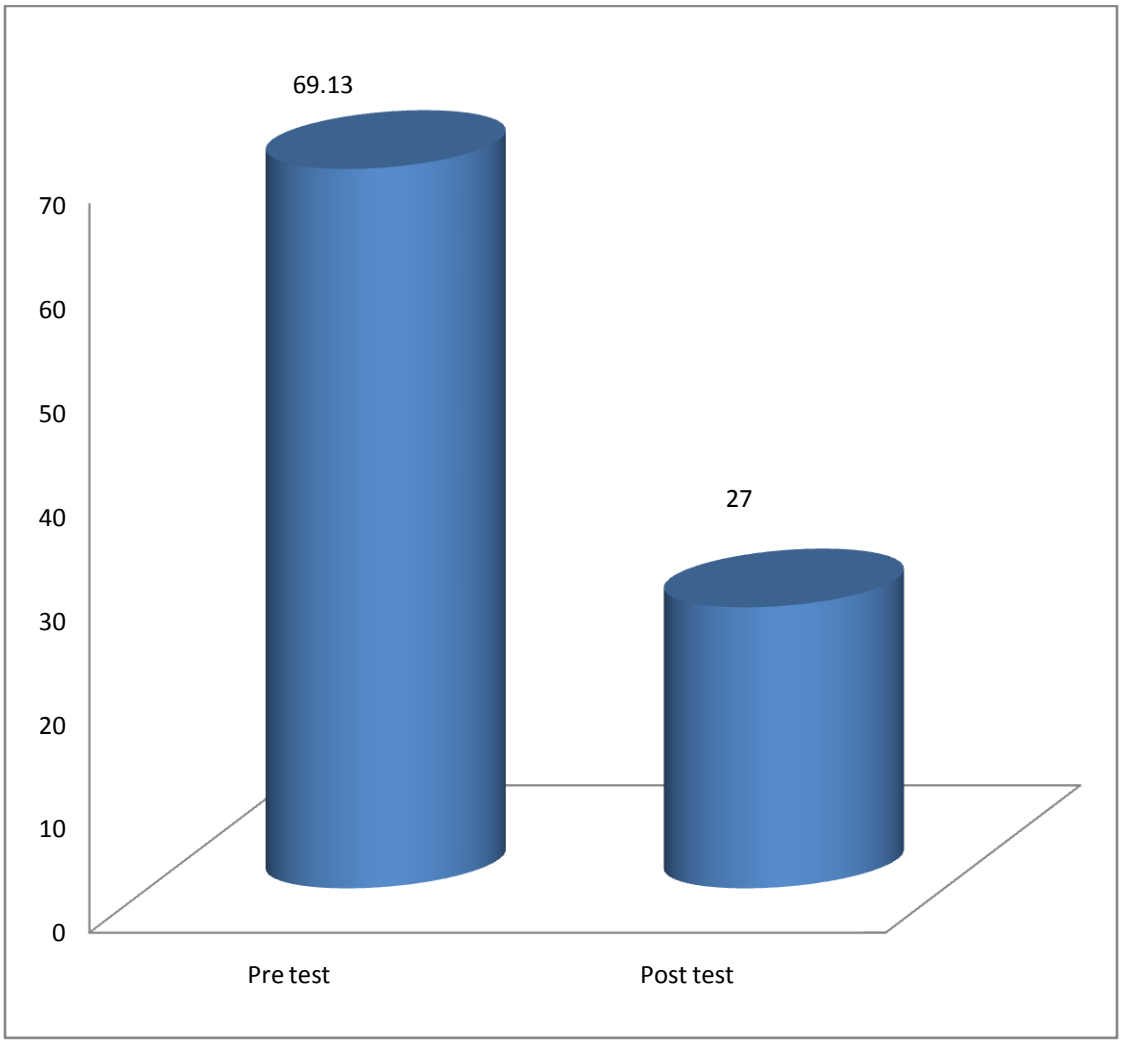
The mean of WOMAC score reduction in knee between pre-test and post-test of control group are 56.88 and 41.63.

Figure –21: Reduction of WOMAC Score in Experimental Group.



In Experimental Group reduction of WOMAC score are, pre-test 78 and post-test 35 (E1), pre-test 63 and post-test 25 (E2), pre-test 74 and post-test 32 (E3), pre-test 65 and post-test 24 (E4), pre-test 67 and post-test 27 (E5), pre-test 77 and post-test 29 (E6), pre-test 64 and post-test 23 (E7), pre-test 65 and post-test 21 (E8).

Figure -22: Mean Reduction of WOMAC Score in Experimental Group



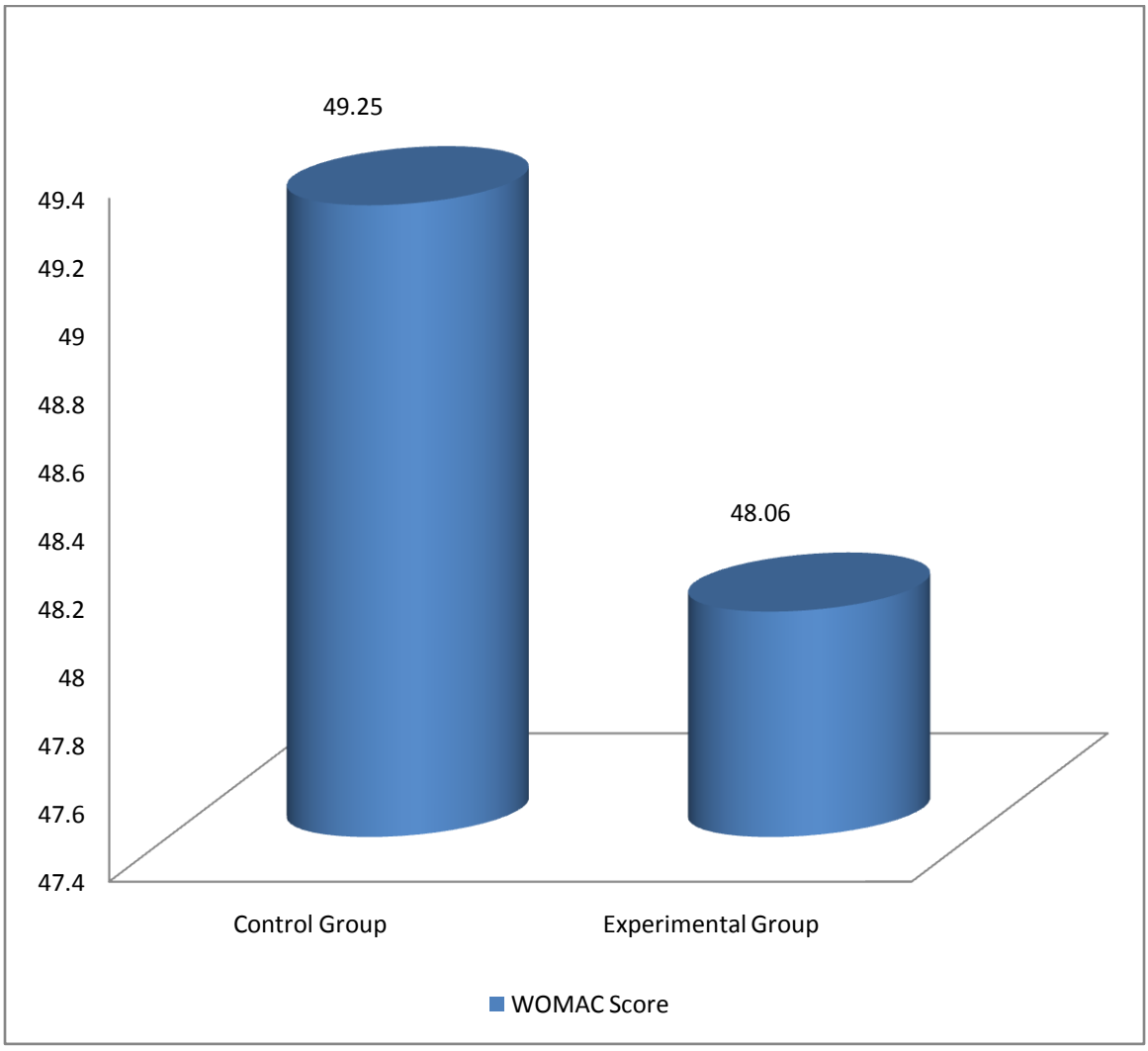
The mean of WOMAC score reduction in knee between pre-test and post-test of experimental group are 69.13 and 27.

Table-5: Mean Difference of WOMAC Score Reduction in Both Groups

Control Group	WOMAC Score	
	Pre-test	Post-test
Mean	56.88	41.63
Mean Difference	49.25	

Experimental Group	WOMAC Score	
	Pre-test	Post-test
Mean	69.13	27
Mean Difference	48.06	

Figure –23: Mean Difference of WOMAC Score in Both Groups



In this study mean difference of reduction WOMAC score between pre-test and post-test of Control Group are 49.25 and Experimental Group are 48.06.

Table-6: Level of significance of WOMAC score

Variables in the study statistically significance at the following level of significance:

No.	Variables	Observed 'u' value	Observed P Value	Level of significance
1	WOMAC Score	8	<.05	Statistically Significant

Observed 'u' value of WOMAC score was 8, which showed statistically significant ($p<.05$) in case of knee osteoarthritis pain.

Interpretation of results

NPRS score

The researcher interprets the results by using the values of pain intensity on NPRS that come from this study.

General Pain Intensity

16 patients were enrolled and 8 patients were assigned to control group who receive only home exercise. The rest of 8 patients were assigned to experimental group who received home exercise with class-based exercise.

Mean difference of pain between pre-test and post-test of experimental group and control group were 4.25 and 6.25. Following application of treatment the study found that the experimental group showed a significant improvement ($p<.05$) in case of knee osteoarthritis pain.

WOMAC Score

The researcher interprets the results by using the values of WOMAC that come from this study.16 patients were enrolled and 8 patients were assigned to control group who receive only home exercise. The rest of 8 patients were assigned to experimental group who received home exercise with class-based exercise.

Mean difference between pre-test and post-test of experimental group and control group were 48.06 and 49.25. Following application of treatment the study found that the experimental group showed a significant improvement ($p<.05$) in case of knee osteo arthritis pain,stiffness and disability.

CHAPTER :V DISCUSSION

The study was indicated a process that could be continuing to establish the result. Here the aim of this study could be achieved if the researcher could show effective support. The purpose of this study was to evaluate the efficacy of home exercise with class-based exercise compare to only home exercise on functional disability for the patient with knee osteoarthritis.

In this experimental study 16 patients were enrolled and 8 patients were assigned to control group who receive only home exercise. The rest of 8 patients were assigned to experimental group who received home exercise with class-based exercise. Each group attended for 6 sessions of treatment within three weeks in the Physiotherapy outpatient Unit of CRP, Savar in order to demonstrate the improvement. The outcome was measured by using Numeric Pain Rating Scale (NPRS) for pain intensity and Ontario &McMaster Universities Osteoarthritis Index was used as measurement tools for measuring the level of pain, stiffness and functional activities in several functional positions.

The researcher found the male female ratio between 16 the patients, and 12% (n=2) were Male and 88% (n=14) were Female. Among them, In Control Group 6% (n=1) were Male and 44% (n=7) were Female and in Experimental Group 6% (n=1) were Male and 44% (n=7) were Female.

McCarthy et al in 2004 had a study on effects on home exercise with class-based exercise on pain, stiffness and physical function in patients with knee osteoarthritis. In their study there was 214 patients. The result of their study about age told that the mean age of experimental group was 64.5 years and the mean age of control group is 64.9 years.

In this study there were total 16 participants. The mean age of experimental group was 53 years and the mean age of control group is 51 years.

16 Patients with knee osteoarthritis were included as sample of the study, among them almost 88% (n=14) were house wife, about 6 % (n=1) were business, about 6% (n=1) were retired of the occupation.Among them almost 69% (n=11) were urban area, about 31 % (n=5) were rural area.On the other hand, In Control Group 31% (n=5) were urban area and 19% (n=3) were rural area and in Experimental Group 37% (n=6) were urban area and 13% (n=2) were rural area.

The researcher found significant improvement (p= <.05) of pain intensity in experimental group on NPRS. In Experimental group, the post-test Mean on NPRS was 2.13.

In 2004 McCarthy et al had a study with 214 patients on Effectiveness of home exercise with class-based exercise among knee osteoarthritis. In this study they found significant improvement (p=0.06) of pain in experimental group on NPRS. In Experimental group, the post-test Mean on NPRS was 37.3.
In this study the researcher found a significant improvement in case of level of pain, stiffness, functional activities in several functional position on WOMAC. Mean difference reducing WOMAC score between pre-test and post-test of experimental group and control group were 48.06 and 49.25.

McCarthy et al in 2004 had a study on effectiveness of home exercise with class-based exercise for the treatment of knee osteoarthritis with 214 patients. . In this study they found significant improvement in case of pain, stiffness, physical function on WOMAC. Mean difference reducing WOMAC score between pre-test and post-test of experimental group and control group were 38.93 and 43.31.

So in this studymean difference of pain between pre-test and post-test of experimental group and control group were 4.25 and 6.25, Mean difference between pre-test and post-test of experimental group and control group were 48.06 and 49.25 which is showed a significant improvement (p<.05) in case of knee osteoarthritis pain, stiffness and disability.

The study was conducted with 18 patients of knee osteoarthritis, which was a very small number of samples in both groups and was not sufficient enough for the study to generalize the wider population of this condition.

The research was carried out in CRP, Savar such a small environment, so it was difficult to keep confidential the aims of the study for blinding procedure. Therefore, single blind method was used in this study.

There was no available research done in this area in Bangladesh. So, relevant information about class-based exercise of knee OA for Bangladesh was very limited in this study.

CHAPTER: VI CONCLUSION AND RECOMMENDATION

6.1 Conclusion

The result of the study have identified that the efficacy of home exercise with class-based exercise was better than the home exercise alone on functional disability for the patient with knee osteoarthritis which was a Quantitative experimental study. The result of the current study indicates that the home exercise with class-based exercise can be an effective therapeutic approach for patient with knee osteoarthritis. Participants in the home exercise with class-based exercise group showed a greater benefit than those in the only home exercise group. The result indicate that the significant changes in both groups are due to the selection of a well- defined population of knee osteoarthritis patients using specific inclusion and exclusion criteria. It may be helpful for patient with knee osteoarthritis to increase return to normal daily activities, work and to measure longer term effects for determining cost effectiveness of home exercise with class based exercise as an intervention forknee osteoarthritis.

6.2 Recommendation

In this study, the researcher provided 6 session of treatment to both groups and measure pain intensity, stiffness and functional activities in different functional positions.

As a consequence of the research it is recommended that with further well-controlled double blinding study include comparison of the home exercise with class-based exercise and home exercise alone and assessing effects and efficacy of these treatments. In particular, since the knee is very important area of the lower limb to do daily living activities and this area is a frequent cause of functional disability and pain. This study directed towards an assessment of the specific management in treating knee of specific knee problem in an outpatient, if pursued further could prove extremely fruitful. Furthermore, chronic associated with many cases of knee pain, and the extensive pathology that exists in the surrounding structure that was joints, tissues and bone, may suggest a further study of a longer duration as this may give even better results.

These samples were selected between the age group of 41-70 years, but the researcher could not find out which age group was more effective. If the most effective age group were found then the study will be more effective.

The researcher did random assigned in both group rather than random selection. That's why researcher recommended to do further study with enough time and by maintaining random selection to make the study more valid.

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February 17, 2016
The Chairman
Institutional Review Board (IRB)
Bangladesh Health Professions Institute (BHPI)
CRP-Savar, Dhaka-1343, Bangladesh

Subject: **Application for review and ethical approval.**

Sir,

With due respect I would like to draw your kind attention that I am a student of Bachelor of Science in Physiotherapy at Bangladesh Health Professions Institute (BHPI)- an academic institute of CRP under Faculty of Medicine of University of Dhaka (DU). I have to conduct a thesis entitled, "Efficacy of Class-Based Home Exercise along with Conventional Physiotherapy on Functional Disability for the Patient with Knee Osteoarthritis" under honorable supervisor, Nasirul Islam, Associate Professor & Principal (Acting) BHPI, CRP, Savar, Dhaka. The purpose of the study is to find out efficacy of class-based home exercise along with conventional physiotherapy on functional disability for the patient with knee osteoarthritis. Questionnaire will be used that will take about 20 to 30 minutes. Data collectors will receive informed consents from all participants. Any data collected will be kept confidential.

Therefore I look forward to having your kind approval for the thesis proposal and to start data collection. I can also assure you that I will maintain all the requirements for study.

Sincerely yours,
Marina Akter Soma
Marina Akter Soma
Bachelor of Science in Physiotherapy (B.Sc PT)
Session: 2011-2012, DU Reg. No.: 1719
BHPI, CRP, Savar, Dhaka-1343, Bangladesh.

Recommendation from the thesis supervisor:

.....
Nasirul Islam
Associate Professor & Principal (Acting)
BHPI, CRP, Savar, Dhaka.

Attachment: Thesis Proposal including measurement tools and process and procedure for maintaining confidentiality, Questionnaire (English and Bengali version), Information sheet & consent form.

বাংলাদেশ হেল্‌থ প্রফেশন্স ইনষ্টিটিউট (বিএইচপিআই)
BANGLADESH HEALTH PROFESSIONS INSTITUTE (BHPI)
(The Academic Institute of CRP)

Ref: CRP-BHPI/IRB/04/17/80 *Date:* 05/04/2017

To

Marina Akter Soma
Bachelor of Science in Physiotherapy
Session: 2011-2012, DU Reg. No.: 1719
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

Subject: Approval of the thesis proposal – Efficacy of Class-Based Home Exercise along with Conventional Physiotherapy on Functional Disability for the Patient with Knee Osteoarthritis.

Dear Marina Akter Soma,

The Institutional Review Board (IRB) of BHPI has reviewed and discussed your application on February 17, 2016 to conduct the above mentioned thesis, with yourself, as the Principal investigator. The Following documents have been reviewed and approved:

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

Since the study involves answering a questionnaire that takes 20 to 30 minutes, have no likelihood of any harm to the participants, the members of the Ethics committee has approved the study to be conducted in the presented form at the meeting held at 08:30 AM on February 25, 2016 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,

Millathossain

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

CRP-Chapain, Savar, Dhaka-1343. Tel: 02-7745464-5, 7741404 , Fax: 02-7745069,
Email: contact@crp-bangladesh.org, www.crp-bangladesh.org

Permission Letter

Date: September 04, 2016

Head

Department of Physiotherapy

Centre for the Rehabilitation of the Paralysed (CRP)

Chapain, Savar, Dhaka-1343.

Through: Head, Department of Physiotherapy, BHPI.

Subject: Prayer for seeking permission to collect data for research project.

Sir,

With due respect and humble submission, I beg most respectfully to state that I am Marina Akter Soma, student of 4th Professional B. Sc. in Physiotherapy at Bangladesh Health Professions Institute (BHPI). I am seeking your permission to collect data at musculoskeletal outpatient physiotherapy unit of CRP, Savar for my research project in regards to the partial fulfillment of requirements for the Bachelor degree. My research project is entitled, **"Compare the Efficacy of Class-based Exercise and Home Exercise Among Knee Osteoarthritis Patient".** Data will be collected before application of treatment and after completion of six treatment sessions. I hereby also assure you that during data collection procedure, any participant would not feel any disadvantage of regular service.

In the light of above circumstances, I favorably pray and hope that you would be kind enough to give me permission for data collection and oblige thereby.

Yours faithfully

Marina Akter Soma

Marina Akter Soma

Student of 4th Professional B. Sc. in Physiotherapy

Class roll: 15 Session: 2011-2012

BHPI, CRP, Chapain, Savar, Dhaka-1343.

Forwarded
04.09.16
Md. Obaidul Haque
Associate Professor & Head of the Department
Department of Physiotherapy
Bangladesh Health Professions Institute (BHPI)
CRP, Chapain, Savar, Dhaka-1343

Approved
5/09/16
Mohammad Anwar Hossain
Associate Professor &
Head of Physiotherapy Dept.
CRP, Chapain, Savar, Dhaka-1343

ANNEXURE

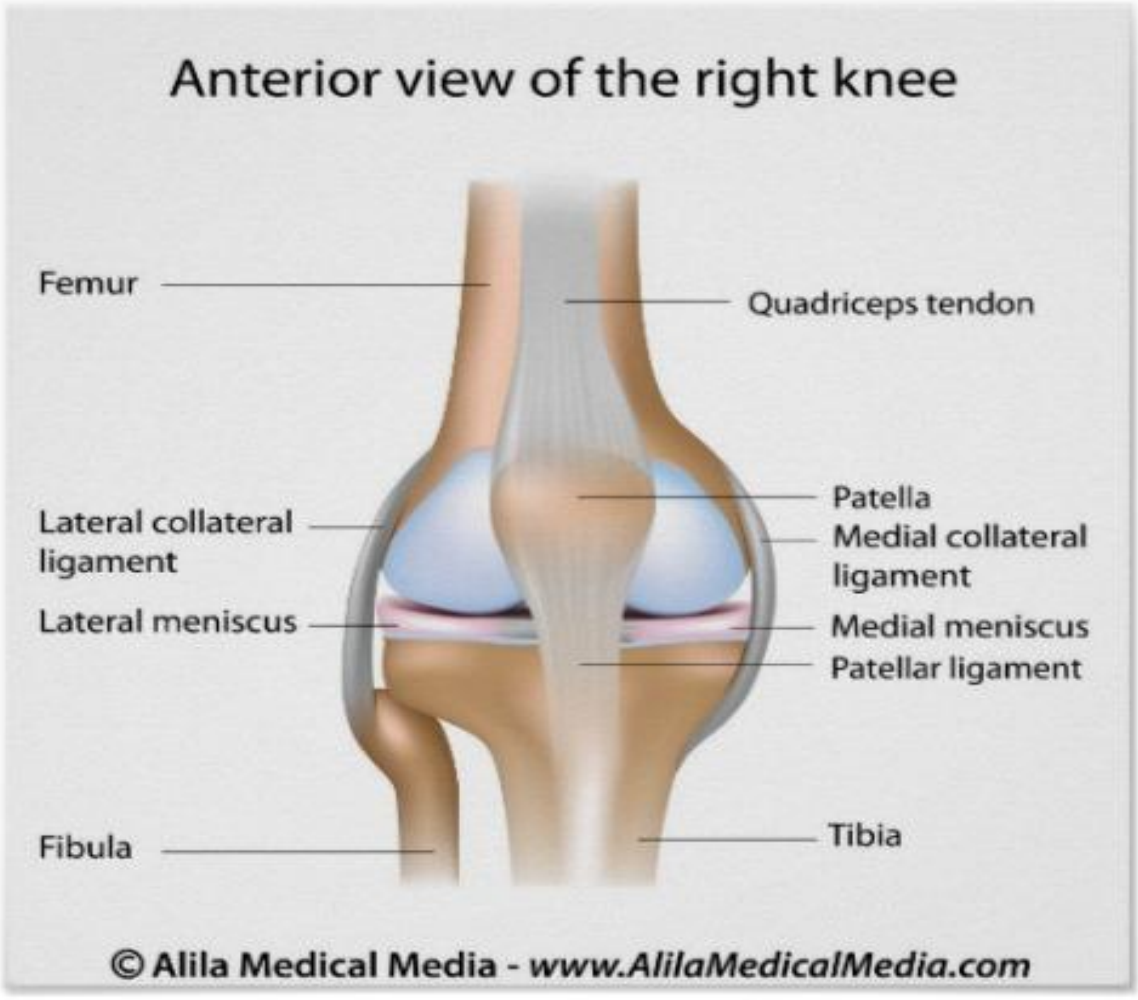
1. Class-based Home Exercise (Bengali Version)
2. Consent Form (Bengali Version)
3. Questionnaire (Bengali Version)
4. Consent Form (English Version)
5. Questionnaire (English Version)
6. Statistical Analysis
7. Statistical Probability Table

ক্লাস-বেস্ড হোম এক্সারসাইজ

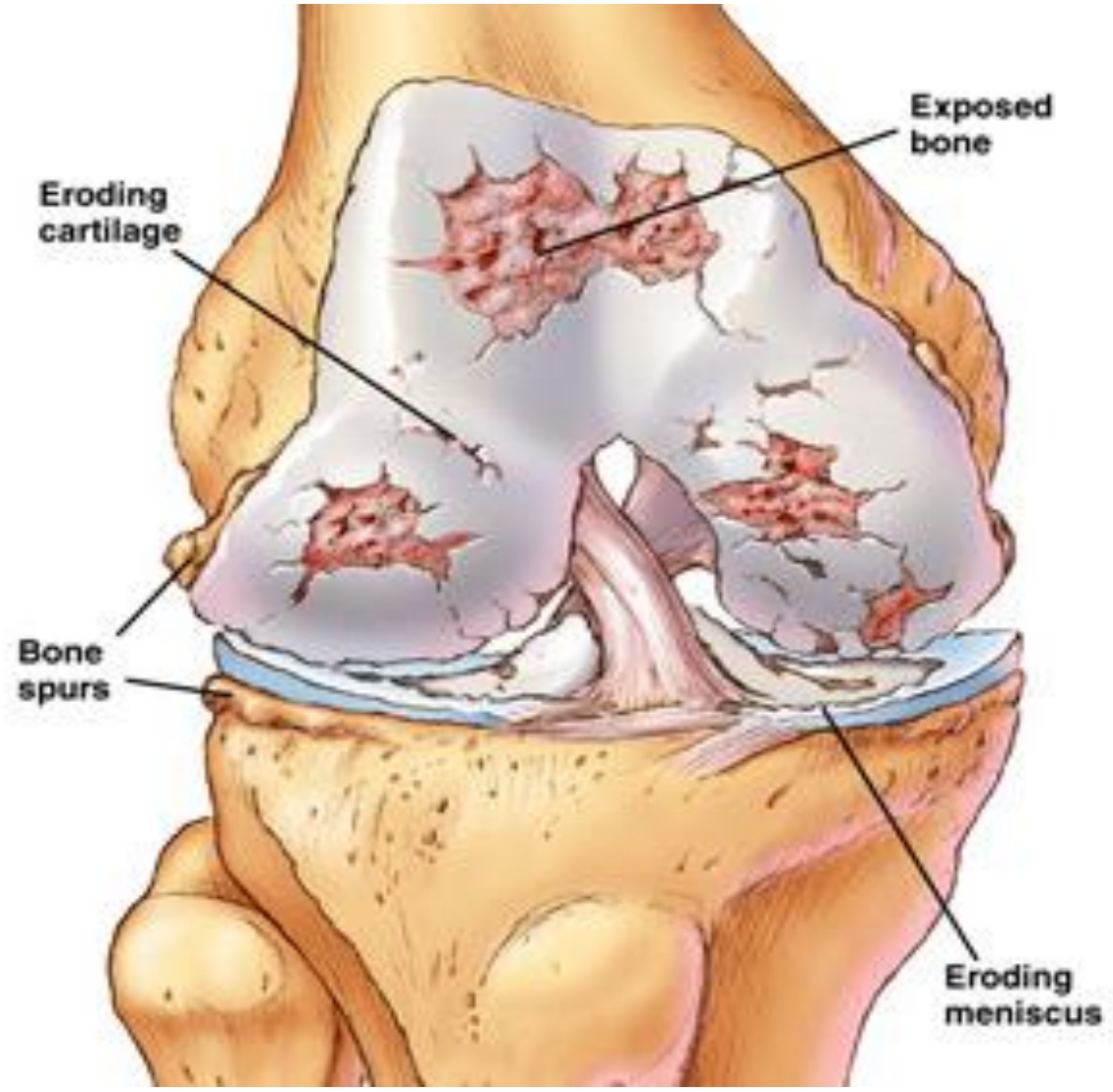
হাটুর এনাটমিঃ

হাটু শরীরের সবচেয়ে বড় এবং জটিল জয়েন্টগুলোর মধ্যে একটি। হাটুর জয়েন্ট মূলত গঠিত হয় ফিমার, টিবিয়া, ফিবুলা এবং প্যাটেলা এই হাড় গুলোর সমন্বয়ে। হাটুর চারপাশের মাংসপেশী গুলোতে কিছু টেনডন থাকে যারা এই হাড়গুলোকে সংযুক্ত করে রাখে, যা হাটুকে নাড়াচাড়া (ভাঁজ/ সোজা) করতে সাহায্য করে। এছাড়াও কিছু লিগামেন্ট আছে যারা হাড়গুলোকে সংযুক্ত করে রাখার পাশাপাশি হাটুর জয়েন্টকে স্থায়িত্ব প্রদান করে। এখানে 'C' আকৃতির দুটো কারটিলেজ থাকে যাদের মিনিছকি বলে।

চিত্র-১: স্বাভাবিক হাটুর জয়েন্ট



চিত্র-২: হাটুর অস্টিওআর্থ্রাইটিসের কার্যকারী গঠন



হাটুতে অস্টিওআর্থ্রাইটিস হলে হাটুর জয়েন্টে যেধরনের পরিবর্তন আসে:

কার্টিলেজ অথবা মিনিছকি ক্ষয় হয়ে হাড় বাহিরে বের হয়ে আসে। হাটুর জয়েন্টে হাড়ের অস্বাভাবিক বৃদ্ধি হতে থাকে যার জন্য জয়েন্টের ভেতরে জায়গা কমে যায়, এতে করে হাটু ভাজ এবং সোজা করার সময় হাড়ের ঘর্ষনের ফলে ব্যথা অনুভব হয়।

চিত্র-৩: স্বাভাবিক এবং অস্টিওআর্থ্রাইটিস হাটুর জয়েন্টে

হাটুর অস্টিওআর্থ্রাইটিস:

অস্টিওআর্থ্রাইটিস এক ধরনের জয়েন্টের রোগ যা জয়েন্টের কার্টিলেজ এবং হাড়ের ক্ষয়ের কারনে হয়ে থাকে। এটা মূলত শরীরের সবচেয়ে বড় এবং ওজন বহনকারী জয়েন্ট গুলোতে হয়ে থাকে, যেমন- মেরুদন্ডের জয়েন্ট, নিতম্বের জয়েন্ট, হাটুর জয়েন্ট অন্যতম। এছাড়াও গোড়ালরি জয়েন্ট এবং হাতের জয়েন্ট গুলোতে অস্টিওআর্থ্রাইটিস হয়ে থাকে, তবে এদের মধ্যে সবচেয়ে বেশি অস্টিওআর্থ্রাইটিস হয়ে থাকে হাটুর জয়েন্টে।

হাটুর জয়েন্টে যখন কার্টিলেজ এবং হাড়ের ক্ষয় হতে থাকে এবং সময় বাড়ার সাথে সাথে এই ক্ষয়ও বাড়তে থাকে, তখন একে হাটুর অস্টিওআর্থ্রাইটিস বলে।

যেসব কারণে হাটুতে অস্টিওআর্থ্রাইটিস হয়ে থাকেঃ

১। হাটুর অস্টিওআর্থ্রাইটিসের অনেক গুলো কারণের মধ্যে বয়স একটি অন্যতম কারণ, বয়স বাড়ার সাথে সাথে জয়েন্টের ভেতরের কার্টিলেজের কার্যক্ষমতা হ্রাস পেতে থাকে বা কমতে থাকে ফলে খুব সহজেই ক্ষত সৃষ্টির মাধ্যমে হাটুতে অস্টিওআর্থ্রাইটিস হতে পারে।

২। শরীরের ওজন বাড়ার ফলেও অস্টিওআর্থ্রাইটিস হয়ে থাকে, অতিরিক্ত ওজনের ফলে হাটুতে বেশি পরিমানে চাপ পরে যা ধীরে ধীরে জয়েন্টে ক্ষত সৃষ্টি করতে সক্ষম।

৩। বংশগত কারণেও অস্টিওআর্থ্রাইটিস হয়ে থাকে।

৪। মহিলাদের অস্টিওআর্থ্রাইটিস বেশি হয়ে থাকে পুরুষদের চেয়ে ।

৫। যারা বাড়ীতে বা অফিসে এমন ধরনের কাজ করেন যেখানে হাটু ভাজ করে অনেক সময় বসে থাকতে হয়, সামনের দিকে ঝুকে কোন ভারী জিনিস উঠাতে হয় এদের অস্টিওআর্থ্রাইটিস হওয়ার সম্ভাবনা বেশি কারণ এই কাজগুলো কররে হাটুতে খুব বেশি চাপ পরে।

৬। অনেক সময় অন্য কোন রোগের কারণেও অস্টিওআর্থ্রাইটিস হয়ে থাকে।

হাটুতে অস্টিওআর্থ্রাইটিস হলে যেসব লক্ষণ দেখা যায়ঃ

১। হাটু ফুলে যাবে এবং হাটুতে ব্যথা বেড়ে যাবে, ব্যথাটা হাটু থেকে উপরে এবং নিচে ছড়িয়ে যেতে পারে।

২। মাংশপেশী শক্ত হয়ে যাবে এবং আস্তে আস্তে শুকিয়ে যাবে।

৩। হাটু ভাজ এবং সোজা করার ক্ষমতা কমে যাবে।

৪। অস্টিওআর্থ্রাইটিস দীর্ঘদিন যাবৎ নিয়ন্ত্রন না করলে অঙ্গবিকৃতিও হতে পারে।

হাটুর অস্টিওআর্থ্রাইটিস নিয়ন্ত্রনের জন্য বাড়ীতে করণীয় থেরাপীঃ

হাটুতে অস্টিওআর্থ্রাইটিস হলে, হাটুর চারপাশের মাংশপেশীকে প্রসারিত করা এবং মাংশপেশীর শক্তি বৃদ্ধি করা প্রয়োজনীয় যাতে করে হাটুর জয়েন্টের চারপাশের অতিরিক্ত চাপ কমে যায় এবং হাটুর নাড়াচাড়া সাভাবিক হয়।

নিচের থেরাপী গুলো আপনার হাটুর ব্যথা কমাতে এবং আপনাকে আরও শক্তিশালী ও সতেজ করতে সাহায্য করবে। কিন্তু মনে রাখতে হবে থেরাপী গুলো যেন ব্যথাদায়ক না হয়, যদি থেরাপী করার সময় আপনি খুব বেশি ব্যথা অনুভব করেন তাহলে থেরাপী বন্ধ রাখতে হবে এবং থেরাপীস্ট এর পরামর্শ নিতে হবে।

চিত্র-৪: উরুর সামনের ভাগের মাংশপেশীর শক্তি বৃদ্ধির থেরাপী

১। উরুর সামনের ভাগের মাংশপেশীর শক্তি বৃদ্ধির থেরাপী: (হাটুকে নাড়াচাড়া না করার মাধ্যমে)

প্রথমত আপনি চিৎ হয়ে শুয়ে যে পায়ের থেরাপী করবেন সেই পাটিকে সোজা রেখে অপর পাটিকে ভাজ করে রাখবেন। একটি ছোট টাওয়াল (গামছা) মুরিয়ে অথবা কোন ছোট বালিশ আপনার হাটুর নিচে রাখুন। এবার উরুর সামনের মাংশপেশীকে ধীরে ধীরে শক্ত করুন এবং হাটু দিয়ে টাওয়াল বা বালিশের উপর চাপ দিন, এভাবে ৫ সেকেন্ড চাপ দিয়ে ধরে রাখুন, ৫ সেকেন্ড পর ধীরে ধীরে বালিশের উপর থেকে চাপ ছেড়ে দিন, এভাবে পর পর ১০ বার করবেন দিনে দুই বেলা।

থেরাপীর উপকারিতা: এই থেরাপীটি হাটুর সামনের ভাগের মাংশপেশীকে শক্তিশালী করবে এবং হাটুর ভারসাম্যকে বজায় রাখতে সাহায্য করবে।

চিত্র-৫: উরুর সামনের ভাগের মাংশপেশীর শক্তি বৃদ্ধির থেরাপী

২। উরুর সামনের ভাগের মাংশপেশীর শক্তি বৃদ্ধির থেরাপী: (হাটুকে নাড়াচাড়া করার মাধ্যমে)

প্রথমত একটি চেয়ারে বসুন, এসময় খেয়াল রাখতে হবে যেন দুই পা মেঝেতে রাখা থাকে, এবার যে পায়ের থেরাপী করবেন সেই পাটিকে মেঝে থেকে ধীরে ধীরে উপরের দিকে নিয়ে আসুন এবং এই অবস্থায় পাটিকে ৩০ সেকেন্ড ধরে রাখুন, ৩০ সেকেন্ড পর পাটিকে আবার মেঝেতে নামিয়ে নিয়ে আসুন, এভাবে পর পর ১০ বার করবেন দিনে দুই বেলা।

থেরাপীর উপকারিতা: হাটুর চারপাশের মাংশপেশীর শক্তি বৃদ্ধি করবে এবং ব্যথা কমাবে।

চিত্র-৬: উরুর সামনের ভাগের মাংশপেশীকে প্রসারিত করার থেরাপী

৩। উরুর সামনের ভাগের মাংশপেশীকে প্রসারিত করার থেরাপী: (দাড়িঁয়ে)

প্রথমত কিছুটা দুরত্ব বজায় রেখে একটি দেয়ালের সামনে মুখ দিয়ে দাড়াঁন, একটি হাত দেয়ালে রাখুন ভারসাম্য রক্ষা করার জন্য, এবার যে হাতটি দেয়ালে রেখেঝেন তার অপর পাশের পায়ের হাটুকে ভাজ করে উপরের দিকে নিয়ে আসুন এবং ঐ একই পাশের হাত দিয়ে পাটিকে ধরে চাপ দিন এতে আপনার উরুর সামনের ভাগের মাংশপেশতে চাপ অনুভূত হবে, এভাবে ৩০ সেকেন্ড চাপ দিয়ে ধরে রাখুন, ৩০ সেকেন্ড পর পা ছেড়ে দিয়ে সোজা হয়ে দাড়াঁন, এভাবে পর পর ৩ বার করবেন দিনে দুই বেলা।

থেরাপীর উপকারিতা: হাটুর জয়েন্টের চাপ কমাবে।

চিত্র-৭: উরুর পেছনের ভাগের মাংশপেশীকে প্রসারিত করার থেরাপী

৪। উরুর পেছনের ভাগের মাংশপেশীকে প্রসারিত করার থেরাপী:

প্রথমত আপনি চিৎ হয়ে শুয়ে যে পায়ের থেরাপী করবেন সেই পায়ের পাতার সামনের অংশে একটি কাপড় পেচিয়ে নিয়ে কাপড়টিকে দুই হাত দিয়ে ভাল করে ধরে টেনে পাকে ধীরে ধীরে উপরের দিকে নিয়ে আসুন, এভাবে কাপড়ের সাহায্যে পাটিকে উপরে ঝুলিয়ে রাখুন যতক্ষণ না পর্যন্ত আপনি উরুর পেছনের মাংশপেশীতে সামান্য চাপ অনুভব করবেন। ৩০ সেকেন্ড উপরে ঝুলিয়ে রাখুন, ৩০ সেকেন্ড পর পা ধীরে ধীরে নামিয়ে ফেলুন, এভাবে পর পর ৩ বার করবেন দিনে দুই বেলা।

থেরাপীর উপকারিতা: এই থেরাপী আপনার হাটুর নির্দিষ্ট পরিমান নাড়াচাড়াকে স্বাভাবিক করবে এবং এটি আপনাকে সাহায্য করবে আরও সতেজ অনুভব করতে।

চিত্র-৮: হাটুর নিচের পেচনের ভাগের মাংশপেশীকে প্রসারিত করার থেরাপী

৫। হাটুর নিচের পেচনের ভাগের মাংশপেশীকে প্রসারিত করার থেরাপী:

প্রথমত একটি দেয়ালের সামনে সোজা হয়ে দাড়াবেন, এরপর একটি পা সামনের দিকে এগিয়ে মেঝেতে রাখুন এসময় অপর পাটি পেছনে মেঝেতে রাখা থাকবে। এখন ভারসাম্য রক্ষার জন্য আপনার হাত দুটি দেয়ালে রাখুন, এবার সামনে রাখা পাটির হাটু ভাজ করুন এবং ধীরে ধীরে দেয়ালে ভর দিয়ে সামনের দিকে শুধুমাত্র শরীরটাকে এগিয়ে নিয়ে যান, এই সময় আপনি আপনার হাটুর নিচের পেছনের ভাগের মাংশপেশীতে চাপ অনুভব করবেন, এই অবস্থায় ৩০ সেকেন্ড থাকুন, ৩০ সেকেন্ড পর ধীরে ধীরে আবার সোজা হয়ে দাড়াঁন, এভাবে পর পর ৩ বার করবেন দিনে দুই বেলা।

থেরাপীর উপকারিতা: এই থেরাপী হাটর সময় আপনার শরীরের ভারসাম্যকে রক্ষা করতে সাহায্য করবে।

চিত্র-৯: হাটুর অস্টিওআর্থ্রাইটিস নিয়ন্ত্রনে বাড়ীতে করনীয় উপদেশ

হাটুর অস্টিওআর্থ্রাইটিস নিয়ন্ত্রনে বাড়ীতে যেসব উপদেশ মেনে চলতে হবে:

১। সবসময় শারীরিক ওজন নিয়ন্ত্রনের মধ্যে রাখতে হবে।

২। বাড়ীতে স্বাস্থ্যকর খাবার খেতে হবে।

৩। হাটু ফোলা ও অতিরিক্ত ব্যথা কমানোর জন্য বাড়ীতে দিনে ৩ বেলা ৫ মিনিটের জন্য কয়েকটি বরফের টুকরা একটি পাতলা টাওয়ালে বা কাপড়ে পেচিয়ে হাটুতে ধরে রাখতে হবে।

৪।হাটুর ব্যথা এবং শক্তভাব কমাতে বাড়ীতে দিনে ৩ বেলা ১৫ থেকে ২০ মিনিটের জন্য গরম সেক দিতে হবে, এক্ষেত্রে গরম পানি একটি বোতলে ভরে বোতলটিকে একটি পাতলা টাওয়াল দিয়ে পেচিয়ে সেটি দিয়ে হাটুতে গরম সেক দিতে পারেন।

৫। মেঝেতে অনেক সময় ধরে হাটু ভাজ করে বসে থাকা এড়িয়ে চলতে হবে, যেমন মেঝেতে হাটু ভাজ করে বসে নামায পড়া অথবা অন্য যেকোন কাজ যেখানে হাটু ভাজ করে বসে থাকতে হয় এই কাজগুলো করার সময় হাটু ভাজ করে মেঝেতে বসাটাকে বাদ দিতে হবে। এক্ষেত্রে ছোট একটি টুল বা চেয়ারে বসে এই কাজগুলো করতে পারেন।

৬। গৃহস্থালী কাজকর্ম যেমন শাকসবজি কাটা, ঘড় ঝাড়ু দেয়া, মেছে থেকে ঝুকে কিছু উঠানো এইসব কাজ করার সময় মনে রাখতে হবে হাটু যেন অনেক সময় ধরে ভাজ হয়ে না থাকে।

৭। সবসময় সতর্ক থাকবেন যেন পড়ে গিয়ে বা আঘাত পেয়ে পুনরায় হাটুতে কোন ব্যথা না পান।

সম্মতি পত্র

আসসালামু আলাইকুম/ নমস্কার,

আমি মেরিনা আক্তার সোমা, ৪র্থ পেশাগত বাংলাদেশ হেলথ্ প্রফেশন্স ইন্সটিটিউট (বিএইচপিআই), ঢাকা বিশ্ববিদ্যালয়ের মেডিসিন অনুষদের একজন ছাত্রী। আমার ব্যচেলর ডিগ্রী প্রাপ্তির জন্য আমার একটি গবেষণা পরিকল্পনা, পরিচালনা করা এবং এটা আমার পড়াশুনার একটি অংশ। আমার গবেষণা প্রকল্পটি হচ্ছে "Efficacy of Class-Based Home Exercise along with Conventional Physiotherapy on Functional Disability for the Patient with Knee Osteosrthritis". আমার গবেষণা প্রকল্পটি পূরণে আমার কিছু তথ্য সংগ্রহ করা প্রয়োজন। সুতরাং এই গবেষণার জন্য অংশগ্রহণকারীর সম্মতি প্রয়োজন এবং তথ্য সংগ্রহের জন্য গবেষক অংশগ্রহণকারীর কাছ থেকে ২০-৩০ মিনিট সময় নিবেন। আমি আপনাকে অবহিত করছি যে, এটি একটি একাডেমিক গবেষণা, এবং অন্য কোনও উদ্দেশ্যে ব্যবহার করা হবে না। আমি আশ্বস্ত করতে চাই যে, সব তথ্য গোপন রাখা হবে। অংশগ্রহণকারী যেকোন মুহূর্তে সম্মতি প্রত্যাহার করতে পারেন। এছাড়াও আপনি যে প্রশ্ন পছন্দ করেন না সেটার উত্তর না দেয়ার অধিকার আছে। আপনার গবেষণা সম্পর্কে যদি কোন জিজ্ঞাসা থাকে তবে আপনি অনুগ্রহপূর্বক যোগাযোগ করতে পারবেন গবেষক মেরিনা আক্তার সোমা অথবা নাসিরুল ইসলাম, সহযোগী অধ্যাপক এবং অধ্যক্ষ (ভারপ্রাপ্ত) বিএইচপিআই, সি আর পি, সাভার, ঢাকা ।

শুরু করার আগে আপনার কি কোন প্রশ্ন আছে ?

সুতরাং, আমরা ইন্টারভিউর দিকে এগিয়ে যেতে পারি।

হ্যাঁ ☐

না ☐

অংশগ্রহণকারীর স্বাক্ষর ও তারিখ .....

গবেষকের স্বাক্ষর ও তারিখ.....

সাক্ষীর স্বাক্ষর ও তারিখ.....

প্রশ্নপত্র (বাংলা)

অংশ-১: সামাজিক-প্রেক্ষাপটের তথ্যাবলী

এই প্রশ্নপত্রটি তৈরি করা হয়েছে অস্টিওআর্থ্রাইটিস রোগীদের হাটু ব্যথার পরিমাপ এবং অক্ষমতা জনিত তথ্যাবলী। এই অংশটি ফিজিওথেরাপিস্ট / গবেষক কালো কলম / পেন্সিল দ্বারা পূরণ করবেন

i) রোগীর নাম: কোড নং:

ii) মোবাইল নং: তারিখ:

iii) ঠিকানা: গ্রাম: পোস্ট অফিস:

থানা: জেলা:

iv) পেশা:

v) বয়স:

vi) লিঙ্গ: ☐ পুরুষ

☐ মহিলা

vii) বৈবাহিক অবস্থা: ☐ বিবাহিত

☐ অবিবাহিত

☐ তালাকপ্রাপ্ত

☐ বিধবা

viii) আবাসিক এলাকা: ☐ শহর

☐ গ্রাম

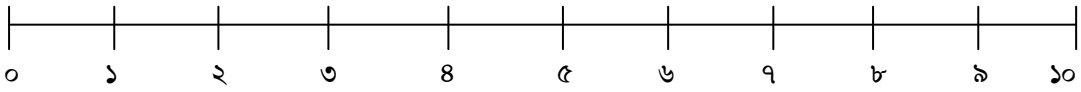
চিকিৎসার পূর্ববর্তী প্রশ্নাবলী

অংশ-২: ব্যথার পরিমান

এই প্রশ্নাবলী অস্টিওআর্থ্রাইটিস রোগীদের হাটুর ব্যথার জন্য পরিকল্পনা করা হয়েছে।

McCaffery & Beebe,(১৯৯৩) রোগীদের ব্যথার অভিজ্ঞতা ব্যাখ্যা করার জন্য নিওমেরিক পেইন রেটিং স্কেল করেন। এটা সংখ্যাসূচক ব্যথা নির্ধারক স্কেল হিসেবে পরিচিত।

১। আপনার ব্যথার তীব্রতা আজকে কতটুকু ?



ব্যথা নাই সর্বাধিক ব্যথা

অংশ ৩: শারিরীক অক্ষমতার প্রশ্নাবলী

নির্দেশিকা: দয়া করে প্রত্যেক ধরনের কাজ কে নিচের কাঠিন্যের মাপকাঠি অনুযায়ী নির্ধারণ করুন

০ = নাই

১ = অল্প

২ = মাঝারী

৩ = অনেক

৪ = সর্বাধিক

প্রত্যেক কাজের জন্য একটা সংখ্যায় গোল দাগ দিন

i) ব্যাথা:

১। যখন হাটেন	০	১	২	৩	৪
২। যখন সিড়িতে উঠেন	০	১	২	৩	৪
৩। রাতের বেলায়	০	১	২	৩	৪
৪। বিশ্রামের সময়	০	১	২	৩	৪
৫। যখন ওজন বহন করেন	০	১	২	৩	৪

ii) শক্ত হয়ে যায়:

১। সকালে শক্ত হয়ে যায়	০	১	২	৩	৪
২। দিনের অন্য সময় শক্ত হয়ে যায়	০	১	২	৩	৪

iii) শারিরীক কাজ:

১। সিঁড়ি দিয়ে নামতে	০	১	২	৩	৪
২। সিঁড়ি দিয়ে উঠতে	০	১	২	৩	৪
৩। বসা থেকে ওঠার সময়	০	১	২	৩	৪
৪। দাড়িয়ে থাকার সময়	০	১	২	৩	৪
৫। আসন দিয়ে বসার সময়	০	১	২	৩	৪
৬। সমতলে হাটার সময়	০	১	২	৩	৪
৭। যানবাহনে ওঠার সময়/ যানবাহন থেকে নামার সময়	০	১	২	৩	৪
৮। কেনাকাটা করার সময়	০	১	২	৩	৪
৯ । মোজা পরার সময়	০	১	২	৩	৪
১০। বিছানায় শুতে	০	১	২	৩	৪
১১। মোজা খোলার সময়	০	১	২	৩	৪
১২। শোয়া থেকে ওঠার সময়	০	১	২	৩	৪
১৩। গোসলে যাওয়ার সময়/বের হওয়ার সময়	০	১	২	৩	৪
১৪। বসে থাকা অবস্থায়	০	১	২	৩	৪
১৫। টয়লেটে যাওয়ার সময়	০	১	২	৩	৪
১৬। বাসার ভারী কাজ গুল করতে	০	১	২	৩	৪
১৭। বাসার হালকা কাজ গুল করতে	০	১	২	৩	৪

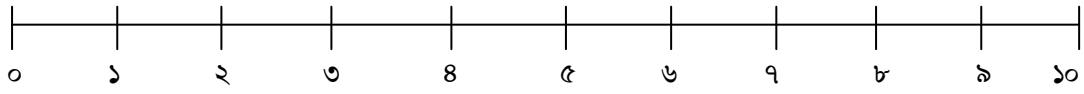
চিকিৎসার পরবর্তী প্রশ্নাবলী

অংশ-২: ব্যথার পরিমান

এই প্রশ্নাবলী অস্টিওআর্থ্রাইটিস রোগীদের হাটু ব্যথার জন্য পরিকল্পনা করা হয়েছে।

McCaffery & Beebe,(১৯৯৩) রোগীদের ব্যথার অভি ব্যাখ্যা করার জন্য নিওমেরিক পেইন রেটিং স্কেল করেন। এটা সংখ্যাসূচক ব্যথা নির্ধারক স্কেল হিসেবে পরিচিত।

১। আপনার ব্যথার তীব্রতা আজকে কতটুকু ?



ব্যথা নাই সর্বাধিক ব্যথা

অংশ ৩: শারিরীক অক্ষমতার প্রশ্নাবলী

নির্দেশিকা: দয়া করে প্রত্যেক ধরনের কাজ কে নিচের কাঠিন্যের মাপকাঠি অনুযায়ী নির্ধারণ করুন

০ = নাই

১ = অল্প

২ = মাঝারী

৩ = অনেক

৪ = সর্বাধিক

প্রত্যেক কাজের জন্য একটা সংখ্যায় গোল দাগ দিন

i) ব্যাথা:

১। যখন হাটেন	০	১	২	৩	৪
২। যখন সিড়িতে উঠেন	০	১	২	৩	৪
৩। রাতের বেলায়	০	১	২	৩	৪
৪। বিশ্রামের সময়	০	১	২	৩	৪
৫। যখন ওজন বহন করেন	০	১	২	৩	৪

ii) শক্ত হয়ে যায়:

১। সকালে শক্ত হয়ে যায়	০	১	২	৩	৪
২। দিনের অন্য সময় শক্ত হয়ে যায়	০	১	২	৩	৪

iii) শারিরীক কাজ:

১। সিঁড়ি দিয়ে নামতে	০	১	২	৩	৪
২। সিঁড়ি দিয়ে উঠতে	০	১	২	৩	৪
৩। বসা থেকে ওঠার সময়	০	১	২	৩	৪
৪। দাড়িয়ে থাকার সময়	০	১	২	৩	৪
৫। আসন দিয়ে বসার সময়	০	১	২	৩	৪
৬। সমতলে হাটার সময়	০	১	২	৩	৪
৭। যানবাহনে ওঠার সময়/ যানবাহন থেকে নামার সময়	০	১	২	৩	৪
৮। কেনাকাটা করার সময়	০	১	২	৩	৪
৯ । মোজা পরার সময়	০	১	২	৩	৪
১০। বিছানায় শুতে	০	১	২	৩	৪
১১। মোজা খোলার সময়	০	১	২	৩	৪
১২। শোয়া থেকে ওঠার সময়	০	১	২	৩	৪
১৩। গোসলে যাওয়ার সময়/বের হওয়ার সময়	০	১	২	৩	৪
১৪। বসে থাকা অবস্থায়	০	১	২	৩	৪
১৫। টয়লেটে যাওয়ার সময়	০	১	২	৩	৪
১৬। বাসার ভারী কাজ গুল করতে	০	১	২	৩	৪
১৭। বাসার হালকা কাজ গুল করতে	০	১	২	৩	৪

Inform Consent

Assalamualaikum\ Namashker,

I am Marina Akter Soma, 4th Professional B.Sc. in Physiotherapy student at Bangladesh Health Professions Institute (BHPI) under the Faculty of Medicine, University of Dhaka. To obtain my Bachelor degree, I shall have to conduct a research project and it is a part of my study. My research title is **"Efficacy of Class-Based Home Exercise along with Conventional Physiotherapy on Functional Disability for the Patient with Knee Osteoarthritis".** I would like to know some personal and other related questions about your low back pain .To fulfill my research project I need to collect data. So, you can be a respected participant of this research and the conversation time will be two times. Each time consists of 20-30 minutes. I would like to inform you that this is a purely academic study and will not be used for any other purposes. I also assure that all data will be kept confidential. Your participation will be voluntary. You may have the rights to withdraw consent and discontinue participation at any time from this study. You also have the rights to reject a particular question that you don't like.I am committed that the study will not pose any harm or risk to you. If you have any query about the study, you may contact with the researcher Marina Akter Soma or research supervisor Nasirul Islam, Associate Professor & Principal (Acting), BHPI.

Do you have any questions before I start?

So, I can proceed with the interview.

Yes ☐ No ☐

Signature of the participant and Date……

Signature of the researcher and Date…….

Signature of the witness and Date…….

Questionnaire (English)

This questionnaire is developed to measure the pain of the patient with knee osteoarthritis and this portion will be filled by physiotherapist/researcher using a pencil.

Part-I: Socio-demographic information

Patient name: Code name:

Contact name: Date:

Adress: Village: Post office:

Police station: District:

Occupation:

Age:

Sex: ☐ Male

☐ Female

Marital status: ☐ Married

☐ Unmarried

☐ Divorced

☐ Widow

Residential area: ☐ Urban

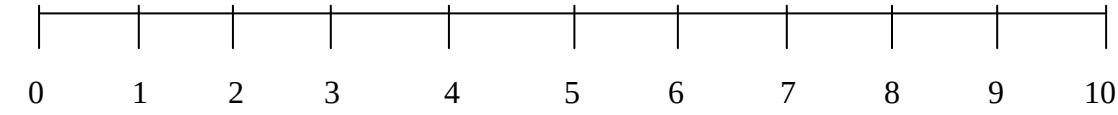
☐ Rural

Pre-test questionnaire

Part-II: Pain Intensity

Pain Rating Scale
McCaffery & Beebe (1993) suggested Numeric Pain Rating Scale.

1. How much you feel pain today ?



No pain Severe pain

Part-III: Physical disability questionnaire

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

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

Stiffness:

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

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

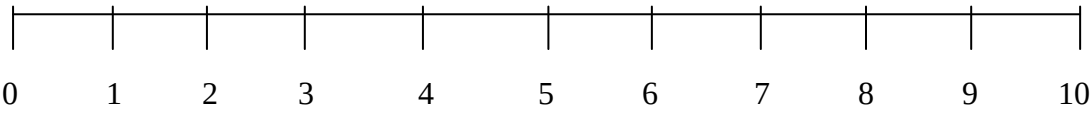
12. Rising from bed	0	1	2	3	4
13. Getting in/ out of bath	0	1	2	3	4
14. Sitting	0	1	2	3	4
15.Getting on/ off toilet	0	1	2	3	4
16. Heavy domestic duties	0	1	2	3	4
17. Light domestic duties	0	1	2	3	4

Post-test questionnaire

Part-II: Pain Intensity

Pain Rating Scale
McCaffery & Beebe (1993) suggested Numeric Pain Rating Scale.

1. How much you feel pain today ?



Part-III: Physical disability questionnaire

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

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

Stiffness:

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

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

Statistical Analysis

Table -7: Calculation of U - value for Pain intensity

Reduction of pain scores in experimental group and only control group in the knee osteoarthritis were differences between pre-test and post-test pain scores

Subjects of Experimental Group	**Pain Score**	**Rank**	**Subjects of Control Group**	**Pain Score**	**Rank**
E1	2	4	C1	5	10
E2	3	7.5	C2	2	4
E3	2	4	C3	4	9
E4	2	4	C4	6	12
E5	3	7.5	C5	6	12
E6	1	1	C6	6	12
E7	2	4	C7	8	14
E8	2	4	C8	7	13
n_1 = 8		**Total = 36**	**n_2 = 8**		**Total = 86**

Here,

n_1 = 8

n_2 = 8

T_x= 86

Now ‘U’ formula

$$U = n_1 \times n_2 + \frac{n_x(n_x + 1)}{2} - T_x$$

$$= 8 \times 8 + \frac{8(8 + 1)}{2} - 86$$

$$= 100 - 86$$

$$= 14$$

[Here,

n_1 = the number of the subjects in trail group

n_2= the number of the subject in control group.

n_x= the number of the subjects of the group with larger rank total.

T_x= the larger rank total.]

Table – 7: Calculation of U - value for WOMAC sore

Reduction of WOMAC scores in experimental group and only control group in the knee osteoarthritis were differences between pre-test and post-test pain scores

Subjects of Experimental Group	**WOMAC Score**	**Rank**	**Subjects of Control Group**	**WOMAC Score**	**Rank**
E1	35	8	C1	35	8
E2	25	4	C2	45	13
E3	32	7	C3	37	10
E4	24	3	C4	47	14
E5	27	5	C5	36	9
E6	29	6	C6	40	11
E7	23	2	C7	43	12
E8	21	1	C8	50	15
n_1 = 8		**Total = 36**	**n_2 = 8**		**Total = 92**

Here,

n_1 = 8

n_2 = 8

T_x= 92

Now ‘U’ formula

$$U = n_1 \times n_2 + \frac{n_x(n_x + 1)}{2} - T_x$$

$$= 8 \times 8 + \frac{8(8 + 1)}{2} - 92$$

$$= 100 - 92$$

$$= 8$$

[Here,

n_1 = the number of the subjects in trail group

n_2= the number of the subject in control group.

n_x= the number of the subjects of the group with larger rank total.

T_x= the larger rank total.]

Statistical Probability Table

Critical values of *U* for a one tailed test at 0.05

n_2 \ n_1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	—	—	—	—	—	—	—	–	—	—	—	—	—	—	—	—	—	—	0	0
2	—	—	—	—	0	0	0	1	1	1	1	2	2	2	3	3	3	4	4	4
3	—	—	0	0	1	2	2	3	3	4	5	5	6	7	7	8	9	9	10	11
4	—	—	0	1	2	3	4	5	6	7	8	9	10	11	12	14	15	16	17	18
5	—	0	1	2	4	5	6	8	9	11	12	13	15	16	18	19	20	22	23	25
6	—	0	2	3	5	7	8	10	12	14	16	17	19	21	23	25	26	28	30	32
7	—	0	2	4	6	8	11	13	15	17	19	21	24	26	28	30	33	35	37	39
8	—	1	3	5	8	10	13	15	18	20	23	26	28	31	33	36	39	41	44	47
9	—	1	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54
10	—	1	4	7	11	14	17	20	24	27	31	34	37	41	44	48	51	55	58	62
11	—	1	5	8	12	16	19	23	27	31	34	38	42	46	50	54	57	61	65	69
12	—	2	5	9	13	17	21	26	30	34	38	42	47	51	55	60	64	68	72	77
13	—	2	6	10	15	19	24	28	33	37	42	47	51	56	61	65	70	75	80	84
14	—	2	7	11	16	21	26	31	36	41	46	51	56	61	66	71	77	82	87	92
15	—	3	7	12	18	23	28	33	39	44	50	55	61	66	72	77	83	88	94	100
16	—	3	8	14	19	25	30	36	42	48	54	60	65	71	77	83	89	95	101	107
17	—	3	9	15	20	26	33	39	45	51	57	64	70	77	83	89	96	102	109	115
18	—	4	9	16	22	28	35	41	48	55	61	68	75	82	88	95	102	109	116	123
19	0	4	10	17	23	30	37	44	51	58	65	72	80	87	94	101	109	116	123	130
20	0	4	11	18	25	32	39	47	54	62	69	77	84	92	100	107	115	123	130	138

*Dashes in the table mean that no decision is possible for those *n* values at the given level of significance.