

**EVALUATE THE EFFECTIVENESS OF HOT FOOT BATH  
WITH EPSOM SALT ON JOINT PAIN, STIFFNESS, AND  
PHYSICAL FUNCTION AMONG PATIENTS WITH  
OSTEOARTHRITIS IN SELECTED HOSPITALS AT  
OTTANCHATHIRAM.**

**A DISSERTATION SUBMITTED TO THE TAMILNADU  
DR.M.G.R MEDICAL UNIVERSITY, CHENNAI IN  
PARTIAL FULLFILLMENT OF THE REQUIREMENT  
FOR THE DEGREE OF MASTER OF SCIENCE IN  
NURSING  
2016-2018**

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**2016-2018**

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Because his mercy endures for ever”*

**Psalms 118:1**

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## ABSTRACT

Osteoarthritis is a common form of arthritis typically with onset during middle or old age that is characterized by progressive degenerative changes in the cartilage of one or more joints (as of the knees, hip, and hands) accompanied by thickening and overgrowth of adjacent bone and that is marked symptomatically chiefly by stiffness, swelling, pain, deformation of joints, and loss of range of motion.

The present study was conducted to evaluate the effectiveness of hot foot bath with Epsom salt on joint pain, stiffness, and physical function among patients with osteoarthritis in selected hospitals at Ottanchathiram.

Conceptual framework for the study has been based on modified Wiedenbech's helping art of clinical nursing theory. The research design used was Quasi experimental non-equivalent control group pretest and posttest design. Non probability convenience sampling technique was used to select 60 samples for the study, 30 in experimental group and 30 in control group. The tool used for the study was Womac osteoarthritis index scale to assess the joint pain, stiffness and physical function. Hot foot bath with Epsom salt procedure was done for 20 minutes daily once in the morning for a period of 10 days in experimental group. The collected data were analysed by using descriptive and inferential statistics.

The Independent 't' value of joint pain was 13.3 which was significant at  $P < 0.05$  level. This showed that there is a significant reduction in the level of joint pain between experimental and control group. The Independent 't' value of stiffness was 30.6 which was significant at  $P < 0.05$  level. This showed that there is a significant reduction in the level of stiffness between experimental and control group. The Independent 't' value of physical function was 81.5



which was significant at  $P < 0.05$  level .This showed that there is a significant improvement in the physical function between experimental and control group.

The findings revealed that there was no association between the level of joint pain among patients with osteoarthritis and their selected demographic variables in experimental group. There was no significant association between the level of stiffness among patients with osteoarthritis and their selected demographic variables in experimental group. There was no significant association between the level of difficulty in physical function among patients with osteoarthritis and their demographic variables in experimental group.

The results of the study concluded that foot bath with Epsom salt procedure was effective in reduction of joint pain, stiffness and improving the physical function among patients with osteoarthritis.

## **CHAPTER –I**

### **INTRODUCTION**

**“STRENGTH DOES NOT COME FROM PHYSICAL CAPACITY  
IT COMES FROM AN INDOMITABLE WILL.”**

**Mahatma Gandhi**

#### **BACKGROUND OF THE STUDY:**

Health is defined as a state of being well and using every power the individual possesses to the fullest extent.

**Nightingale., (2012)**

Health is a dynamic state of being in which the developmental and behavioral potential of an individual is realized to the fullest extent possible

**American Nurses Association., (2010)**

Wellness is the search for enhanced quality of life, personal growth, and potential through positive lifestyle behaviours and attitudes. If we take responsibility for our own health and wellbeing, we can improve our health on a daily basis. Certain factors influence our state of wellness, including nutrition, physical activity, stress, coping methods, good relationships, and career success.

**WHO., (2011)**

Wellness is defined as the quality or state of being in good health especially as an actively sought goal.

**Merriam Webster.,(2018)**

Illness is a state in which a person’s physical, emotional, intellectual, social development or spiritual functioning is diminished or impaired compared with previous experience.

**Perry. p., (2005)**

Illness is the condition of being ill or poor health resulting from diseases of body or mind. Also impairment of normal physiological function affecting part of all of an organ. Illness is an abnormal process in which aspects of social, physical, emotional or intellectual condition and function of a person are diminished or impaired compared with person's previous condition.

**Cloute.,(2009)**

A chronic disease can be defined as a disease that has a prolonged course, that does not resolve spontaneously, and for which a complete cure is rarely achieved. Chronic diseases are Alzheimer's disease, arthritis, asthma, cancer, cardiovascular diseases, diabetes, heart diseases, and stroke.

**Minnesota department of health.,(2007)**

Musculoskeletal system plays an important role as people age, their joints are affected by changes in cartilage and in connective tissues. The cartilage inside a joint becomes thinner, and components of the cartilage (the proteoglycans- substances that help provide the cartilage's resilience) become altered, which may make the joint less resilient and more susceptible to damage.

Additionally, joints become stiffer because the connective tissue within ligaments and tendons becomes more rigid and brittle. This change also limits the range of motion of joints.

**Alexandra villa- forte., (2018)**

Arthritis includes a variety of inflammatory and non-inflammatory joint disease such as osteoarthritis, gout, rheumatoid arthritis and juvenile rheumatoid arthritis. Arthritis is defined as the inflammation of any joint, it may be a result of such as several types of infection, a genetic causes or some other causes. Inflammation of the joints in arthritis may cause pain, stiffness in the affected joints and joint swelling and surrounding tissues of the joint

**Mellisa Conard.,(2008)**

The world arthritis day in October 12.

Osteoarthritis is a slowly progressive non inflammatory disorder of the diarthrodial (synovial) joints.

**Lewis et.al.,(2007)**

Osteoarthritis , also called osteoarthrosis or degenerative joint diseases, disorder of the joints characterized by progressive deterioration of the articular cartilage or of the entire joint, including the articular cartilage, the synovium (joint lining) ,the ligaments, and the subchondral bone (bone beneath the cartilage).

**Encyclopaedia Britannica.,(2018)**

Osteoarthritis is a chronic disorder characterized by pain and stiffness in the joints caused by damage to the cartilage and other supportive tissues. Though it can affect any joint, osteoarthritis is most commonly found in the weight-bearing joints of the hip, knees, and feet.

**Arthritis health., (2016)**

Osteoarthritis is a common form of arthritis typically with onset during middle or old age that is characterized by progressive degenerative changes in the cartilage of one or more joints (as of the knees, hip, and hands) accompanied by thickening and overgrowth of adjacent bone and that is marked symptomatically chiefly by stiffness, swelling, pain, deformation of joints, and loss of range of motion.

**Merriam Webster., (2018)**

Obesity Carrying extra body weight contributes to osteoarthritis in several ways, and greater the risk. Increased weight puts added stress on weight-bearing joints, such as hip and knees. In addition, fat tissue produces proteins that may cause harmful inflammation in and around the joints.

**Kalunian . K.C., (2018)**

Osteoarthritis symptoms often develop slowly and worsen over time. Signs and symptoms of osteoarthritis include in pain, tenderness, stiffness, loss of flexibility, grating sensation and bone spurs.

**Cheung. C., (2018)**

Possible complications of osteoarthritis include chondrolysis, osteonecrosis, stress fractures, bleeding inside the joint, infection in the joint, deterioration or rupture of the tendons and ligaments around the joint, leading to loss of stability, pinched nerve (in osteoarthritis of the spine).

**David Zelman , MD., (2016)**

Acetaminophen (Tylenol) has been shown to be effective for people with osteoarthritis who have mild to moderate pain. Taking more than the recommended dosage of acetaminophen can cause liver damage.

**Nonsteroidal anti-inflammatory drugs (NSAID).** Over-the-counter NSAID, including ibuprofen (Advil, Motrin IB,) and naproxen sodium (Aleve,) taken at the recommended doses, typically relieve osteoarthritis pain. Stronger NSAID, available by prescription, may also slightly reduce inflammation along with relieving pain.

NSAID can cause stomach upset, cardiovascular problems, bleeding problems, and liver and kidney damage. Topical NSAID have fewer side effects

**Christiansen. BA (2018)**

Joint pain causes discomfort, pain or inflammation arising from any part of a joint — including cartilage, bone, ligaments, tendons or muscles. Joint pain is also referred to as arthralgia.

**William Morrison.,(2018)**

Joint stiffness is the sensation of difficulty in moving a joint or the apparent loss of range of motion of a joint. Joint stiffness often accompanies joint pain and swelling. Joint stiffness, joint redness, tenderness,

warmth, tingling, or numbness of an affected area of the body may be present. Joint stiffness can be caused by injury or disease of the joint and is a common finding in the arthritis conditions. Sometimes injuries or inflammation of the adjacent areas, such as bursae, can cause pain that may limit the movement of a joint and be perceived as joint stiffness.

**Kasper, D.L., et al.,(2015)**

Physical functioning refers to movements of upper extremities (dexterity), lower extremities (walking or mobility), and central regions (neck, back), as well as one's activities of daily living.

**Jensen. R. E (2015)**

Many people with osteoarthritis use natural or alternative therapies to address symptoms and improve their overall well-being. These include nutritional supplements, acupuncture or acupressure, massage, relaxation techniques and hydrotherapy.

Transcutaneous electrical nerve stimulation (TENS) applies an electrical current through the skin. It controls pain by numbing some of the nerves endings in the spinal cord. A TENS unit is usually connected to the skin using two or more electrodes.

Thermotherapy uses warm and cold temperatures to help reduce pain and stiffness in the joints.

A hot water bottle filled with either hot or cold water, or hot and cold packs, can be applied to the affected area. Hot and cold packs can be cooled in a freezer or heated in a microwave.

Manual therapy is performed by a physical therapist. Stretching techniques help keep the joints flexible and supple. Not using the affected joint may weaken the muscles, further worsening osteoarthritis and stiffness.

**Christian Nordqvist.,(2017)**

One of the best ways to relax the ache and tired feet is with an Epsom salt foot bath. Fill a small tub with enough warm water to cover the feet up to the ankles and add a half cup of salt. Soak the feet for up to one hour. It will help relieve aches and pains, reduce stiffness and improve physical function.

In water, it breaks down into magnesium and sulphate. The theory is that when you soak in an Epsom salt bath, these get into the body through the skin and relax muscles and loosen stiff joints.

**Amit mazumdar.,(2017)**

### **NEED TOR THE STUDY:**

According to the **world health organization (WHO) Worldwide** estimates are that 9.6% of men and 18.0% of women aged over 60 years have symptomatic osteoarthritis, 80% of those with osteoarthritis will have limitations in movement, and 25% cannot perform their major daily activities of life

**-Deepak Chandrans.,(2017)**

**Global Burden of Disease 2010:** A systematic study review reported that the **global** age-standardized **prevalence** of knee **osteoarthritis** was 3.8%, and hip **osteoarthritis** was 0.85% have utilized large health administrative databases to document osteoarthritis incidence.

Osteoarthritis is the single most common cause of disability in older adults. The 2010 Global Burden of Disease Study reports that the burden of musculoskeletal disorders is much larger than estimated in previous assessments and accounts for 6.8% of day worldwide. An estimated 10% to 15% of all adults aged over 60 have some degree of osteoarthritis, with prevalence higher among women than men. Across the European union Member States, diagnosed osteoarthritis prevalence varies from 2.8% in Romania to 18.3% in Hungary.

The prevalence of osteoarthritis is increasing due to population ageing and an increase in related factors such as obesity. According to the United Nations, by 2050 people aged over 60 will account for more than 20% of the world's population of that 20%, a conservative estimate of 15% will have symptomatic osteoarthritis, and one-third of these people will be severely disabled. This means that by 2050, 130 million people will suffer from osteoarthritis worldwide, of whom 40 million will be severely disabled by the disease.

**Australian institution of health and welfare (AIHW)** estimated that there are some 27,000 new cases of radiological OA among women each year (peak rate of onset of 13.5 per 1000 population 65 -74 years age group and above 15,500 new cases among men Peak rate 9.0 per 1000 in those age 75 years and over).

The prevalence of OA increases with age symptomatic OA is uncommon occurring in fewer than 5% of people under the age of 40 prevalence increases to 10% of men and 20% of women aged 45 -65 years and even further to more than 30% of women aged 85 years.

**Lynette m.,(2004)**

Overall prevalence of knee OA was found to be 28.7%. The associated factors were found to be female gender (prevalence of 31.6%) ( $P = 0.007$ ), obesity ( $P = 0.04$ ), age ( $P = 0.001$ ) and sedentary work ( $P = 0.001$ ).

**-Indian journal of orthopaedics.,(2016)**

In Germany, four million people out of 82 million people suffer from some form of autoimmune conditions affecting joints.

**Salonitanna,,(2004)**

In the Robert Koch Institute's among those aged 65 and over, around half of all women (48.1%) and nearly one third of men (31.2%) are affected. According to GEDA (Gesundheit in Deutschland aktuell) 2014/2015-EHIS health interview survey, 17.9% of adults over 18 reported having suffered from



osteoarthritis during the past twelve months, where prevalence for women (21.8%) was higher than for men (13.9%). Osteoarthritis becomes more common with age. Due to population ageing, the prevalence of osteoarthritis in Germany can be expected to increase further in the future.

**Judith Fuchs,(2017)**

In England, the prevalence of knee osteoarthritis at local authority level in England as estimated by the MSK calculator (Musculo skeletal calculator). approximately 1 in 5 adults (18.2%) over 45 years of age in England has osteoarthritis of the knee. The prevalence ranges from around 15% to 21% across local authorities in England.

**National joint registry.,(2013)**

In **United States** Osteoarthritis (OA) is the most common joint disorder among adults 60 years of age or older the prevalence of symptomatic knee OA is approximately 10% in men and 13% in women. The number of people affected with symptomatic OA is likely to increase due to the aging of the population and obesity.

**ClinGeriatr med (2010)**

Osteoarthritis is a common arthropathy of the knee. **In India**, the prevalence of the disease in the adult rural population is estimated to be 5.8%

**Nisha Elizabeth Ajit., (2014)**

Osteoarthritis is the most prevalent form of arthritis **in India** affecting over 15 million adults every year.

**Alarming osteoarthritis states in India.,(2016)**

Osteoarthritis is a diseases of cartilage degradation, which results pain in major joints. The prevalence of OA is 3.66% which consists of 1.76%males and 4.48% females.

**Ranwa et.al. (2012)**

**In Indian settings particularly in urban colony in South Delhi osteoarthritis** is the fourth leading cause of Year Lived with Disability (YLD), accounting for 3.0% of total global YLD. It also accounts for the decrease in activities of daily living (ADL) in elderly dependent population in the community. Although osteoarthritis affects both males and females, prevalence of osteoarthritis reported to be high in females during premenopausal age and remains high throughout menopause. Many experimental, clinical and epidemiological studies suggest that loss of estrogens at the time of menopause increases a woman's risk of getting osteoarthritis. Average menopausal age in Indian women is 46.3 years as compared to 51 years in western countries. This predisposes Indian women to the risk of developing osteoarthritis at earlier age compared to their western counterpart.

**Harshalsaive., (2010)**

In Kerala osteoarthritis is the most common joint diseases in the elderly. Among the elderly knee osteoarthritis is a leading cause of chronic disability. In elderly hip osteoarthritis is more common in men while osteoarthritis of interphalangeal joints common in women. It is estimated that three out of four persons of more than 60 years of age has definite evidence of osteoarthritis in at least one joint.

**Dr.Dalus D.,(2010)**

Osteoarthritis traditionally was thought as a degenerative diseases affecting the articular cartilage and one on the 10 most disabling diseases. In Chennai 10% of men and 18% of women more than 60 years of age group have symptomatic arthritis. 80% of those with osteoarthritis have limitation of movement and 25% cannot perform their activities of daily living.

**Dr. Venkatachalam.,(2009)**

In Coimbatore over 40% of the people are suffering from hip or knee osteoarthritis. However food habits, life style and obesity had lead to increase incidence of arthritis.

**Dr. Balasubramanian, Sri Ramakrishna hospital.,(2009)**

A study was conducted on effectiveness of thermotherapy in the treatment of OA of the knee. The outcome of interest were relief of pain, reduction of edema, and improvement of flexion or range of motion (ROM) and physical function. Two independent reviewers selected randomized and controlled clinical trials with participants with clinical and/or radiological confirmation of OA of the knee; and interventions using heat or cold therapy compared with standard treatment and/or placebo. The results showed that three randomized controlled trials, involving 179 patients, were included in this review. In one trial, administration of 20 minutes of ice massage for 5 days per week, for 3 weeks, compared to control demonstrated a clinically important benefit for knee OA on increasing quadriceps strength (29% relative difference) and another study was to evaluate the effectiveness of Epsom salt fomentation on knee related symptoms among patients with knee osteoarthritis. The tool was used in the study was knee injury osteoarthritis outcome score scale. The main study was conducted in the 60 samples were recruited through simple random sampling technique. Epsom salt fomentation was done twice a day for 14 days for experimental group and no intervention was given for control group. Post-test was done at the end of 14<sup>th</sup> day. Study result showed that in experimental group the post-test mean score of knee related symptoms was 19.90 with standard deviation of 3.97 in experimental group and in control group post-test mean score of knee related symptoms was 36.46 with standard deviation of 4.30. The difference was 16.56 and the calculated t' value 15.482 significant at  $p < 0.001$  level.

**Brosseau L.,(2003)**

During clinical posting, the investigator found that, most of the osteoarthritis patients were admitted under the medical treatment as they have joint pain, stiffness and decreased physical function because of frequent occurrence of osteoarthritis. They are worried about their illness and experiencing side effects of pain killers and the cost of the medicines. So the investigator felt to reduce the level of joint pain, stiffness and improve the physical function by using an intervention using hot foot bath with Epsom salt which is cheaper and cost effective.

### **STATEMENT OF THE PROBLEM**

A study to evaluate the effectiveness of hot foot bath with Epsom salt on joint pain, stiffness, and physical function among patients with osteoarthritis in selected hospitals at Ottanchathiram.

### **OBJECTIVES:**

1. To assess the pretest and posttest level of joint pain, stiffness, and physical function among patients with osteoarthritis in experimental and control group.
2. To compare the pretest and posttest level of joint pain, stiffness, and physical function among patients with osteoarthritis in experimental group.
3. To compare the posttest level of joint pain, stiffness, and physical function among patients with osteoarthritis between experimental and control group.
4. To find the association between the posttest level of joint pain among patients with osteoarthritis and their selected demographic variables in experimental group.
5. To find the association between the posttest level of stiffness among patients with osteoarthritis and their selected demographic variables in experimental group.
6. To find the association between the posttest level of physical function among patients with osteoarthritis and their selected demographic variables in experimental group.

## **OPERATIONAL DEFINITION:**

### **Effectiveness:**

It refers to producing of an intended (or) desired result.

**Kindersley., (2007)**

In this study the effectiveness refers to determine the extent to which the hot water application with Epsom salt had brought about a significant difference between pre and posttest level of joint pain, stiffness and physical function among patients with osteoarthritis which is measured by using statistical measurements and its scores.

### **Hot foot bath:**

A hot foot bath is the immersion of both feet and ankles in hot water.

**Stanley j.swierzewski.,(2001)**

### **Epsom salt:**

Epsom salt is white crystalline salt that is a hydrated magnesium sulfate with cathartic properties. Epsom salt absorbed through the skin and enter into the blood stream which act on the nerves and muscles. It helps to promote muscle relaxation, reduce stress, pain, stiffness and swelling in joints.

**Merriam -webster.,(2010)**

### **Hot foot bath with Epsom salt:**

Hot foot bath with Epsom salt is a therapy used for therapeutic purposes to relieve pain, stiffness and improve the physical function.

**Merriam-webster.,(2010)**

In this study it refers to fill 3/4<sup>th</sup> of the bucket with warm water with a temperature of 105<sup>0</sup> F and add 4 grams of Epsom salt. Ask the patient to immerse both legs. It should cover both the feet and ankles. Instruct the patient to take a mug of water from the bucket and pour it over the knees alternatively. Duration of the procedure is for 20 minutes daily once in the morning and continue for 10days in experimental group.

## **JOINT PAIN:**

Joint pain is defined as unpleasant sensation felt in one (or) more joints often caused by inflammation and infection.

**University of maryland medical center,(2011)**

In this study the unpleasant sensation perceived by patient with osteoarthritis in the knee which is measured by the western ontario and mcmaster universities womac osteoarthritis index scale and its scores.

## **Stiffness:**

Stiffness is defined as difficulty in movement of a joint.

**Churchill living ston.,(2008)**

In this study stiffness refers to the knee and ankle joint (or) muscle stiffness among patients with osteoarthritis which is measured by the western ontario and mcmaster universities womac osteoarthritis index scale and its scores.

## **PHYSICAL FUNCTION:**

Physical function is defined as the ability to perform ADL(activities of daily living) and IADL (Instrumental activities of daily living) mobility tasks.

**Jill a benett.,(2002)**

In this study, It refers to assess the difficulty in performing daily activities including walking, climbing stairs, sitting, standing and lying which is measured by the western ontario and mcmaster universities womac osteoarthritis index and its scores. (Lower score indicates mild difficulty in physical function).

## **OSTEOARTHRITIS:**

Osteoarthritis is a slowly progressive non inflammatory disorder of the diarthrodial (synovial) joints.

**Lewis et al.,(2007)**

## **PATIENTS WITH OSTEOARTHRITIS:**

Patient who receives medical attention, care (or) treatment for osteoarthritis.

**Lois white.,(2005)**

In this study it refers to the patients with osteoarthritis within the age group of 50 – 65 years admitted in the inpatient unit and a minimum stay of 10 days.

## **HYPOTHESES:**

- H<sub>1</sub> : The mean posttest level of joint pain scores is significantly lower than the mean pretest level of joint pain scores among patients with osteoarthritis in experimental group.
- H<sub>2</sub> : The mean posttest level of stiffness scores is significantly lower than the mean pretest level of stiffness scores among patients with osteoarthritis in experimental group.
- H<sub>3</sub> : The mean posttest level of physical function scores is significantly lower than the mean pretest level of physical function scores among patients with osteoarthritis in experimental group.
- H<sub>4</sub> : The mean posttest level of joint pain scores in experimental group is significantly lower than the mean posttest level of joint pain scores in control group.
- H<sub>5</sub> : The mean posttest level of stiffness scores in experimental group is significantly lower than the mean posttest level of stiffness scores in control group.
- H<sub>6</sub> : The mean posttest level of physical function scores in experimental group is significantly lower than the mean posttest level of physical function scores in control group.

- H<sub>7</sub> : There will be significant association between the posttest level of joint pain scores among patients with osteoarthritis and their selected demographic variables in experimental group.
- H<sub>8</sub> : There will be significant association between the post -test level of stiffness scores among patients with osteoarthritis and their selected demographic variables in experimental group.
- H<sub>9</sub> : There will be significant association between the posttest level of physical function scores among patients with osteoarthritis and their selected demographic variables in experimental group.

**ASSUMPTIONS:**

- ❖ Osteoarthritis patients may experience joint pain, and stiffness.
- ❖ Osteoarthritis patients may have limited physical mobility due to joint pain and stiffness.
- ❖ Hot foot bath may reduce the inflammation, pain, stiffness and promote muscle relaxation.
- ❖ Nurses play an important role in reducing the joint pain, stiffness and improving the physical function of the patients with osteoarthritis.

**DELIMITATION:**

The study was delimited to

- Data collection period was only for 4 weeks.
- Sample size was limited to 60.



**PROJECTED OUTCOME:**

Hot foot bath with Epsom salt can reduce the joint pain, stiffness and improve the physical function among patients with osteoarthritis. It promotes comfort and improves the activities of daily living. Develop a positive attitude to continue to practice the hot foot bath with Epsom salt which helps to improve their quality of life.

## CONCEPTUAL FRAMEWORK

Conceptual framework helps to express about ideas in a more reality, understandable, or promise form of the original conceptualization. The conceptual framework for the this study was direction from wiedenbach's helping art of clinical nursing theory (1964)

According to Ernestine Wiedenbech's nursing is nurturing and caring for someone in a motherly fashion. Nursing is a helping service that is rendered with compassion, skill and understanding to those in need for care, counsel and confidence in the area of health. The practice of nursing comprises a wide variety of services each directed toward the attainment of one of its three components.

Step 1 : Identification of a need for help

Step 2 :Ministration the help needed

Step 3 : Validation that the need for help was met

### **CENTRAL PURPOSE:**

According to theorist the nurse's central purpose defines the quality of health. She desires to effect or sustain in her patient and specifies what she recognizes to be her special responsibility in caring for the patient

In this study, the central purpose is to reduce the level of joint pain , stiffness and improve the physical function among old age people with osteoarthritis.

### **STEP 1: Identification of a need for help**

According to the theorist within the identification component there are four distinct steps. First, the nurse observes the patient, looking for an inconsistency between the expected behaviour of the patient and the apparent behaviour. Second, she attempts to clarify what the inconsistency means. Third,

she determines the cause of inconsistency. Finally, she validate with the patient that her help is needed.

In this study, the demographic variables which comprises of the age, sex, educational status, religion, occupation, family monthly income, duration of illness. Pre assessment of level of joint pain, stiffness and physical function among patients with osteoarthritis by using WOMAC osteoarthritis index scale.

## **STEP 2: Ministration the help needed**

According to the theorist in ministry of the patient the nurse may give advice or information, make referral, apply a comfort measures or carry out the therapeutic procedure. The nurse will need to identify the cause and if necessary make an adjustment in the plan of action.

Ministration of help needed, it has two components,

- a) Prescription
- b) Realities

### **a) Prescription:**

According to the theorist a prescription is a directive activity. It specifies both the nature of the action that will most likely lead to fulfilment of the nurse's central purposes and the thinking process that determines it.

In this study prescription is plan of care to achieve the purpose which includes administration of hot foot bath with Epsom salt in reduction of level of joint pain, stiffness, and improving the physical function among patients with osteoarthritis. The duration of hot foot bath with Epsom salt is 20 minutes. It is continued for 10 days in the morning in the experimental group.

### **b) Realities:**

According to the theorist, the realities of the situation in which the nurse is to provide nursing care. Realities consist of all factors – physical, emotional, and spiritual that is at play in a situation in which nursing action occur at any

given moment. Wiedenbeck's defines the five realities as the agent, the recipient, the goal, the means, and the framework.

**(i) AGENT:**

According to theorist, the agent is the practicing nurse or her delegates is characterized by personal attributes, capacities, capabilities and most importantly commitment and competence in nursing

In this study, the investigator is the agent.

**(ii) RECIPIENT:**

According to theorist, the recipient is the patient, characterized by personal attribute, problems, capacities, aspirations, and most important, the ability to cope with the concerns or problems being experienced.

In this study, the recipients are patient with osteoarthritis in experimental group.

**(iii) GOAL:**

According to the theorist, the goal is the desired outcome the nurse wishes to achieve. The goal is the end result to be attained by nursing action .

In this study, it refers to reduce the level of joint pain, stiffness, and improving the physical function among patients with osteoarthritis.

**(iv) MEANS:**

According to the theorist, the means comprises the activities and devices through which the practitioner is enabled to attain her goal. The mean include skills, techniques, procedures, and devices that may be used to facilitate nursing practices.

In this study, it refers to administration of hot foot bath with Epsom salt by the researcher for 20 minutes daily in the morning for 10 days.

(v) **FRAMEWORK:**

According to the theorist the framework consists of the human, environmental, professional, and organizational facilities that not only make up the context within which nursing is practiced but also constitute its currently existing limits.

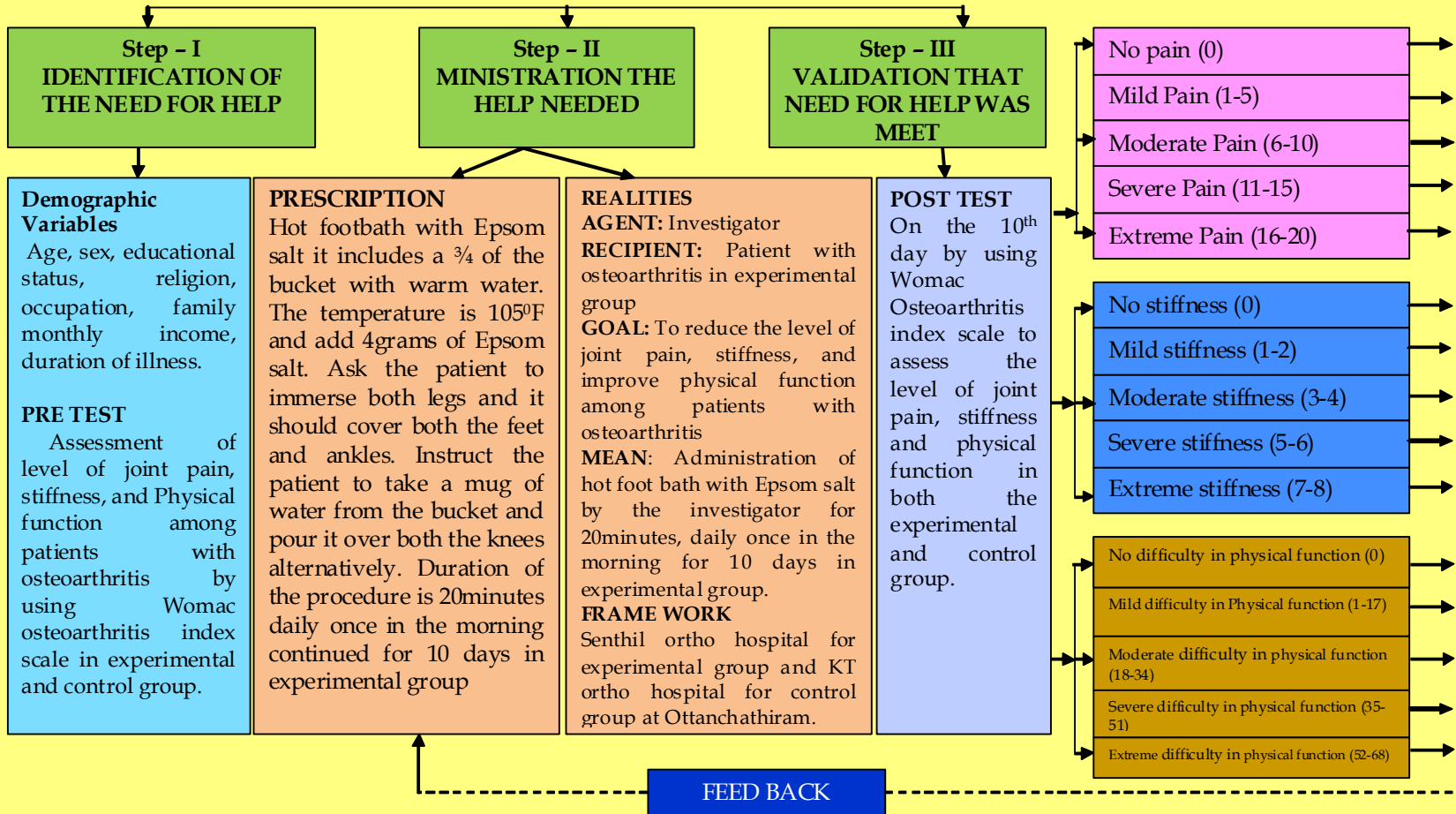
In this study, it refers to the Senthil Ortho Hospital.

**STEP III- Validation that need for help was met:**

According to the theorist the third component is validation. After the help has been ministered the nurse validates that the action were indeed helpful. Evidence must come from the patient that the purpose of the nursing action has fulfilled.

In this study the validating need for help was met by means of post assessment of level of joint pain, stiffness, and improvement in the physical function by using Womac osteoarthritis index scale.

**CENTRAL PURPOSE**  
To reduce the level of joint pain, stiffness, and improve the Physical function among patients with osteoarthritis



**FIG : 1 CONCEPTUAL FRAME WORK BASED ON MODIFIED WIEDENBACH'S HELPING ART OF CLINICAL NURSING THEORY (1964)**

## **CHAPTER –II**

### **REVIEW OF LITERATURE**

This chapter deals with the related review of literature. The literatures are classified under the following headings.

#### **PART – I**

- Overview of
  - a. Osteoarthritis
  - b. Hot foot bath with Epsom salt

#### **PART – II**

- Section A** : Studies related to incidence and prevalence of osteoarthritis.
- Section B** : Studies related to joint pain among patients with osteoarthritis.
- Section C** : Studies related to stiffness among patients with osteoarthritis.
- Section D** : Studies related to physical function among patients with osteoarthritis.
- Section E** : Studies related to effectiveness of hot foot bath with Epsom salt on joint pain, stiffness and physical function among patients with osteoarthritis.

## **PART – I**

### **a) OVERVIEW OF OSTEOARTHRITIS**

#### **DEFINITION:**

Osteoarthritis is a common form of arthritis typically with onset during middle or old age that is characterized by progressive degenerative changes in the cartilage of one or more joints (as of the knees, hips, and hands) accompanied by thickening and overgrowth of adjacent bone and that is marked symptomatically chiefly by stiffness, swelling, pain, deformation of joints, and loss of range of motion.

**Merriam Webster., (2018)**

**Incidence and Prevalence of Osteoarthritis:** According to the Arthritis Foundation, osteoarthritis is the most common joint disease in the United States, affecting approximately 21 million people. The condition is more common in patients over the age of 45. Prior to age 55, more men are affected than women, but after the age of 55, osteoarthritis is more common in women.

**John J. Swierzewski, D.P.M.,(2015)**

#### **Causes**

Osteoarthritis occurs when the cartilage that cushions the end of bones in the joints gradually deteriorates. Cartilage is a firm, slippery tissue that permits nearly frictionless joint motion.

In osteoarthritis, the slick surface of the cartilage becomes rough. Eventually, the cartilage wears down completely.

#### **Risk factors**

Factors that may increase the risk of osteoarthritis include:

- **Older age:** The risk of osteoarthritis increases with age.
- **Sex:** Women are more likely to develop osteoarthritis, though it isn't clear why.



- **Obesity:** Carrying extra body weight contributes to osteoarthritis in several ways, and more weight, greater the risk. Increased weight puts added stress on weight-bearing joints, such as hip and knees. In addition, fat tissue produces proteins that may cause harmful inflammation in and around the joints.
- **Joint injuries:** Injuries, such as those that occur when playing sports or from an accident, may increase the risk of osteoarthritis. Even injuries that occurred many years ago and seems healed can increase the risk of osteoarthritis.
- **Certain occupations:** If a job causes repetitive stress on a particular joint, that joint may eventually develop osteoarthritis.
- **Genetics:** Some people inherit a tendency to develop osteoarthritis.
- **Bone deformities:** Some people are born with malformed joints or defective cartilage, which can increase the risk of osteoarthritis.

-Mayo clinic,(2016)

#### **TYPES OF OSTEOARTHRITIS:**

There are two types of osteoarthritis—primary and secondary. **Primary osteoarthritis** is associated with aging, and **secondary osteoarthritis** is associated with an additional cause, such as injury, heredity or obesity.

**John J. Swierzewski, D.P.M.,(2015)**

#### **Primary Osteoarthritis (OA)**

This is the most commonly diagnosed form of OA and is considered to occur largely due to “wear and tear” over time. Because of this, it is associated with aging; in fact, age is the most potent risk factor of OA and the longer a person uses their joints, the more likely they are to suffer from this form of OA.

People tend to develop this type of OA starting from the age of 55 or 60 years. It may be localized to certain joints therefore; primary OA is usually subdivided by the site of involvement (eg, hands and feet, knee, hip) though it may also involve multiple joints.

### **Secondary Osteoarthritis (OA)**

This form of OA results from conditions that induce a change in the microenvironment of the cartilage. Such conditions include significant trauma, congenital joint abnormalities, metabolic defects (eg, Wilson disease), infections, diseases (eg, neuropathic), and disorders that alter the normal structure and function of cartilage (eg, Rheumatoid Arthritis, gout).

Secondary OA tends to appear in relatively young individuals aged approximately 45 or 50.

Common risk factors that can lead to secondary osteoarthritis include:

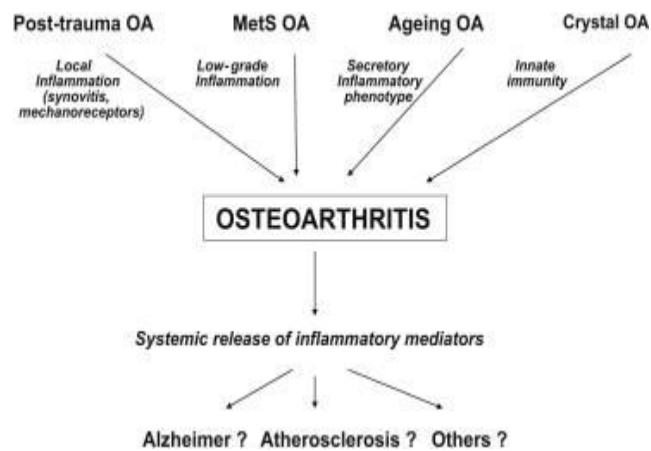
- **Trauma:** Fracturing a bone (common during sports) increases the likelihood of a person developing OA in the injured joint. Unfortunately, this also means that the person is more likely to suffer from OA at a younger age than those who have primary OA.
- **Obesity:** In a single leg stance, 3-6 times a person's body weight is transmitted across the knees. Therefore, it stands to reason that an increase in body weight would result in additional force across the knees during walking. This weight bears down on the joints (particularly in the knees and hip) and causes them to wear away faster.
- **Sedentary lifestyle:** Not only does this promote weight gain but inactivity is also correlated with weaker muscles and tendons surrounding the joints. This increases the risk of developing OA because the muscles are not strong enough to keep the joints correctly aligned, stable and supported. It is because of this that it

is so important to engage in low-impact activities that emphasize stretching, strengthening, posture, and range of motion. These include aerobics, swimming and yoga.

- **Heredity:** Epidemiological studies of family history have recently shed evidence of a genetic influence on OA (particular in the hands, knees and hips). Twin studies have shown that heritability varies depending on the afflicted joint but overall, the researcher suggest a heritability of OA is 50% or more. Studies have also suggested the involvement of specific chromosomes (eg. 2q, 9q, 11q, and 16p) and genes such as CRTM (cartilage matrix protein), CRTL (cartilage link protein), and collagen II, IX, and XI.
- **Joint overuse:** This is either due to repetitive joint use in occupation or during leisurely activity. One reason this happens during work is because over long days, the muscles will gradually become tired and no longer serve as effective joint protectors.
- **Other conditions:** These may include peripheral neuropathies and neuromuscular disorders that put abnormal stress on the joint. Diseases that cause inflammation, such as rheumatoid arthritis, can increase the risk of getting osteoarthritis later in life.

**Yolanda Smith, BPharm.,(2017)**

## PATHOPHYSIOLOGY:



## SINGS AND SYMPTOMS:

Characteristic signs and symptoms of osteoarthritis include:

- **Stiffness:** A common marker of osteoarthritis is stiffness in the joint that is most pronounced first thing in the morning, or after a prolonged period of inactivity (such as sitting in a car or airplane). The stiffness usually resolves within 30 minutes of light activity, as the joints “warm up” through gentle movement.
- **Pain:** Another common symptoms pain in the joint that worsens during or after too much movement. The pain may be experienced as dull and aching, or sharp and piercing. In the most severe cases of osteoarthritis, patients may also feel pain when the joints are at rest or only moving slightly
- **Soreness:** The joint may feel tender to touch or with slight pressure.
- **Inflexibility:** Patients may experience loss of full range of motion in the affected joint.
- **Swelling:** The joint may swell due to excess fluid buildup. This type of swelling is clinically referred to as effusion. If the swelling is severe, the joint may also feel warm to touch.

- **Grating or creaking:** There might be a sensation of grating or slight grinding when moving the joint, as the surfaces of the articulating points of the joint no longer move smoothly against each other.
- **Bone spurs:** Sometimes, bone bumps – which are points of the bone that grow outward as a result of the joint friction and dysfunction – can be felt under the skin. Bone spurs may also be referred to as osteophytes.
- **Deformity:** In some types of osteoarthritis, physical deformity may be noticeable. For example, enlarged finger joints may result from the friction causes bony enlargements of the finger joints, or advanced degeneration of knee cartilage can lead to an outward, or bowlegged, curvature of the knee.

#### DIAGNOSTIC EVALUATION:

- ❖ History collection
- ❖ Physical examination
- ❖ X-rays
- ❖ Bone scan
- ❖ Ct scan
- ❖ MRI scan
- ❖ Laboratory test
  - ✓ Sensitivity test
  - ✓ ESR
  - ✓ Erythrocyte
  - ✓ Complete blood count

Lewis.et.al.,(2007)

## **MANAGEMENT:**

### **DRUG THERAPY:**

- **Acetaminophen:** Acetaminophen (Tylenol, others) has been shown to be effective for people with osteoarthritis who have mild to moderate pain. Taking more than the recommended dosage of acetaminophen can cause liver damage.
- **Nonsteroidal anti-inflammatory drugs (NSAID):** Over-the-counter NSAID, including ibuprofen (Advil, Motrin IB, others) and naproxen sodium (Aleve, others), taken at the recommended doses, typically relieve osteoarthritis pain. Stronger NSAID, available by prescription, may also slightly reduce inflammation along with relieving pain.
- NSAID can cause stomach upset, cardiovascular problems, bleeding problems, and liver and kidney damage. Topical NSAID have fewer side effects and may relieve pain just as well.
- **Duloxetine (Cymbalta):** Normally used as an antidepressant, this medication is also approved to treat chronic pain, including osteoarthritis pain.

**Mayo clinic.,(2018)**

### **Hot and cold application:**

Application of heat and cold may help reduce complaints of pain and stiffness heat therapy is especially helpful for stiffness.

**Lewis et.al.,(2007)**

### **OTHER COMPLEMENTARY AND ALTERNATIVES THERAPY:**

- Physical therapy.
- Occupational therapy
- Tai chi and yoga
- Massage

- Guided imagery
- Therapeutic touch

**Black.m.,(2005)**

**SURGICAL MANAGEMENT:**

- Excision of loose bodies
- Meniscectomy
- Synovectomy
- Joint reconstruction or joint debridement
- Total knee arthroplasty
- Tidal irrigation

**John ebenazer.,(2005)**

**POSSIBLE COMPLICATIONS OSTEOARTHRITIS INCLUDE:**

- chondrolysis, osteonecrosis,
- stress fractures,
- bleeding inside the joint
- infection in the joint,
- Deterioration or rupture of the tendons and Osteoarthritis symptoms often develop slowly and worsen over time.

**Mayo clinic., (2018)**

**COMPLICATION:**

- \* Deformity
- \* Joint malalignment
- \* Cartilage loss

**Lewis.et.al.,(2007)**

**POSSIBLE COMPLICATIONS OF OSTEOARTHRITIS INCLUDE:**

- ❖ Rapid ,
- ❖ Complete breakdown of cartilage resulting in loose tissue material in the joint (chondrolysis).

- ❖ Bone death (osteonecrosis).
- ❖ Stress fractures (hairline crack in the bone that develops gradually in response to repeated injury or stress).
- ❖ Bleeding inside the joint.
- ❖ Infection in the joint.
- ❖ Deterioration or rupture of the tendons and ligaments around the joint, leading to loss of stability.
- ❖ Pinched nerve (in osteoarthritis of the spine).

**Anne C .et.al.,(2009)**

## **OVERVIEW OF EPSOM SALT:**

### **Definition of hot foot bath with Epsom salt:**

A combination of magnesium and sulfate, Epsom salt is a compound that can help flush toxins and heavy metals from the skin's cells, reduce inflammation, increase circulation and ease muscle cramps and joint pain.

**Canyon Ranch.,(2018)**

### **Benefits of Epsom salt :**

- **Eases stress and relaxes the body:** Stress drains the body of magnesium and increases levels of adrenaline. When dissolved in warm water, Epsom salt is absorbed through the skin and replenishes the level of magnesium in the body. The magnesium helps to produce serotonin, a mood-elevating chemical within the brain that creates a feeling of calm and relaxation. Research shows that magnesium also increases energy and stamina by encouraging the production of ATP (adenosine triphosphate), the energy packets made in the cells. Experts believe that bathing with Epsom salt at least three times a week helps to look better, feel better and gain more energy. Magnesium ions also help relax and reduce irritability by lowering the effects of adrenaline. They



create a relaxed feeling, improve sleep and concentration, and help muscles and nerves to function properly.

- **Relieves pain and muscle cramps:** An Epsom salt bath is known to ease pain and relieve inflammation, making it beneficial in the treatment of sore muscles, bronchial asthma, and migraine headaches. In addition, it has been known to heal cuts and reduce soreness from childbirth. Mix a thick paste of Epsom salt with hot water and apply to get soothing comfort. Try soaking the aching, tired (and smelly) feet in a tub of water with half a cup of Ultra Epsom Salt. Epsom salt softens skin and will even neutralize foot odor.
- **Helps muscles and nerves function properly:** Studies show that Epsom salt can help regulate electrolytes in the body, ensuring proper functioning of the muscles, nerves, and enzymes. Magnesium is also known to be critical in the proper use of calcium, which serves as a main conductor of the electric impulses in the body.
- **Helps prevent hardening of arteries and blood clots:** Epsom salt is believed to improve heart health and help prevent heart disease and strokes by improving blood circulation, protecting the elasticity of arteries, preventing blood clots, and reducing the risk of sudden heart attack deaths.
- **Makes insulin more effective:** Proper magnesium and sulfate levels increase the effectiveness of insulin in the body, and can help to lower the risk or severity of diabetes.
- **Relieves constipation:** studies have revealed that Epsom salt can be used to treat constipation. Taken internally, Epsom salt acts as a detoxifying agent for colon cleansing. The salt acts like a laxative by increasing water in the intestines and can bring about temporary relief from constipation. However, it is strictly

warned that Epsom salts should not be used to relieve constipation without the consultation of a physician.

- **Eliminates toxins from the body:** The sulfate in Epsom salt help flush toxins and heavy metals from the cells, easing muscle pain and helping the body to eliminate harmful substances. The skin is a highly porous membrane and adding the right minerals to the bathwater triggers a process called reverse osmosis, which actually pulls the salt out of the body, and harmful toxins along with it. For a detoxifying bath, at least once weekly add two of our Ultra Epsom Salt to the water in a bathtub and soak for 10 minutes.

**R.H.waring.,(2018)**

#### **Mechanism of hot water foot bath with Epsom salt:**

Epsom salt, derived from distilled mineral-rich water, is a widely used health and beauty product. Named after the town of Epsom in England, this commonly used bath salt is actually a mineral compound containing magnesium and sulfate. Epsom salt is widely used as a treatment for sore muscles, joint pain, arthritis and skin disorders. Despite sparse research on the effectiveness or even the mechanism of action, there are some reasons why Epsom salts may provide benefits to the foot.

**Noreen Kassem.,(2017)**

Applying the heat by general or local which produce the physiological change in the body such as vasodilatation and relaxation of muscles which produce the beneficial therapeutic effect of relieving the pain.

In the hot water application for the joint pain is Epsom salt hot water bath very effective in the treatment of joint pain. Epsom salt can act topically and immediately reduce the pain in joint. The 200 mg of Epsom salt mixed in hot water the painful joints can be bathed for 20 minutes. It can be used for thrice a week. It is very effective to relieve morning stiffness in joints.

**(html- Cached- Sim updated 2006)**

## **The Benefits of Epsom Salt Foot Bath**

Using Epsom salt foot soaks regularly can improve athlete's foot, toenail fungus, sprains, gout, muscle soreness and bruises. It may also be able to restore immunity as it pulls out harmful toxins from the body and reduces inflammation.

### **Other benefits of Epsom salt baths include relief from:**

- Stiff joints and tight muscles
- Arthritis pain and swelling
- Insomnia
- Psoriasis
- Soreness from diarrhea
- Swollen and tired feet
- Complications from sunburn
- Fibromyalgia
- Ingrown toenails
- Insulin sensitivity
- Poor circulation
- Acidity
- Stress
- Inflammation
- Migraines

## **PART – II:**

### **SECTION A: STUDIES RELATED TO INCIDENCE AND PREVALENCE OF OSTEOARTHRITIS**

**Geeta Mayar et.al.,(2007)** The exact prevalence of OA is difficult to establish, because clinical symptoms often do not correlated with objective findings. OA is rare before the age forty, yet 85% of the population has either clinical or radiographic evidence of disease by the age of 75 years, making it the most common joint disease and a major cause of pain and disability. In India prevalence of OA has been suggested to be 24.9% till recently OA was classified as mechanical wear and tear disorder of articular cartilage for which only pain modifying therapies such as analgesics were prescribed with little scientific attention focused on modification of course of disease leading to musculoskeletal disability and affecting quality of life.

**J.C. Fernandez-Lopez et.al.,(2008)** The study was conducted to estimate the point prevalence of knee pain suggesting osteoarthritis (OA) in the adult Spanish population. Secondary objectives were to examine the distribution of associated factors, as well as to assess the impact of knee pain on quality of life and function in the general population. A population survey was conducted in year 2000 for which 2,192 subjects over 20 years of age were selected by stratified polystage cluster sampling from the censuses of 20 towns. Trained rheumatologists administered structured interviews that permitted them to rule out the presence of rheumatic symptoms, and which included validated instruments to measure function and quality of life. The results showed that the estimated prevalence of knee pain suggesting OA in the general adult population is 10.2% (95% confidence interval: 7.9-12.5).

**Gupta V et.al., (2009)** This study was conducted to assess the prevalence of knee osteoarthritis among women in south Delhi. Osteoarthritis was diagnosed by using clinical criteria given by American college of rheumatology interviewed out of which 123 (47.3%) women were found to be

suffering from knee osteoarthritis. Prevalence of osteoarthritis found to be increased with age.

**Salve H.et.al., (2010)** A community – based cross – sectional study was carried out in an urban resettlement colony in south Delhi to study the prevalence of knee osteoarthritis in women aged  $\geq 40$  years and treatment seeking behaviour of women suffering from osteoarthritis. A total 260 women were interviewed out of which 123 (47.3%) women were found to be suffering from knee osteoarthritis. Prevalence of osteoarthritis found to be increased with age. Less than half of those with osteoarthritis underwent treatment. With this high prevalence of osteoarthritis, there is need to spread awareness about the disease, its prevention, and rehabilitation in the community.

**Eveline Nuesch.et.al., (2011)** The study was conducted to examine all causes and disease specific mortality in patients with osteoarthritis of the knee and hip in southwest of England. 1163 patients aged 35 years or over with symptoms and radiological confirmation of osteoarthritis of the knee and hip. Excess mortality was observed for all diseases specific causes of death but was particularly pronounced for cardiovascular (mortality ratio 1.71, 1.49 to 1.98) Mortality increased with increasing Age (p for trend $<0.001$ ), Male sex (adjusted hazard ratio 1.59, 1.30, to 1.96), self-reported history of diabetes (1.95, 1.31 to 2.90), cancer (2.28, 1.50 to 3.47), cardiovascular diseases (1.38, 1.12 to 1.71), And walking disability (1.48, 1.17 to 1.86). The more severe the walking disability, the higher was the risk of death (p for trend  $<0.001$ ).

**Felson et.al.,(2014)** A cross-sectional observational study of 401 patients with demonstrable radiological knee OA found a significant (p  $< 0.001$ ) bone marrow lesion in persons with a painful knee (77.5%) compared to 30% of persons without pain. Again large lesions were present almost exclusively in patients with knee pain compared to persons without pain (p  $< 0.001$ ). They concluded that bone marrow lesions on MRI are strongly associated with the presence of pain in knee OA.

**Lohmander.L.et.al.,(2014)**This study was conducted to find the prevalence of osteoarthritis in Manitoba, Canada. As a result, among 1517 people, 227 hip in 165 patients (77 men, 88 women) were diagnosed as having radiological primary hip osteoarthritis. The mean age at examination for these patients was 68 (35 – 89 years). The overall prevalence of osteoarthritis is among all examined patients about 35 years and older was 10.8% (12% for men, 10% for women), rising from 2% at 35 – 39 years to 35.4% for those 85 years or older.

**Richard Birtwhistle et.al.,(2015)**This study was conducted on International reports on the prevalence of osteoarthritis diagnoses showed an increasing number of patients with the condition. Previous studies have provided information about the state of osteoarthritis in Canada. In British Columbia, an overall prevalence of 10.8% was found using administrative data (i.e., physician billing and hospital admissions data); by age 70–74 years, 30% of men and 40% of women had osteoarthritis. In Ontario, linked survey and administrative data showed that quality of life was 10%–25% lower among people with osteoarthritis than in the general population, and healthcare costs were 2–3 times higher than in the non-osteoarthritis group. Therefore there is a high prevalence, reduction of quality of life and a large economic burden associated with osteoarthritis in Canada.

**Chandra Prakash Pal et.al., (2016)** conducted a study to find the prevalence of knee OA in the Indian population and the factors association with it by conducting a survey at community level in selected sample geographical areas. The study was a community based cross sectional study. The target population was from five sites or sample groups. To have geographical representation from all over India, the results showed that prevalence of 28.7% in the overall sample. The prevalence was higher in villages (31.1%) and big cities (33.1%) as compared to towns (17.1%) and small cities (17.2%).

**Ian J. Wallace et.al.,(2017)**conducted a study to assess the overall prevalence of knee osteoarthritis estimated to be  $\geq 50$  year old and whose BMI is higher . Overall, knee OA prevalence was found to be 15% along the postindustrial sample but only 6% and 8% among the early industrial and prehistoric samples, respectively. After controlling for age, BMI, and other variables, knee OA prevalence was 2.1 fold higher (95% confidence interval, 1.5-3.1) in the postindustrial sample than in the early industrial sample. The results was found that the increases in longevity and BMI are insufficient to explain the approximately doubling of knee OA prevalence that has occurred in the united states since the mid-20<sup>th</sup> century.

### **Section B : Studies related to joint pain among patients with osteoarthritis.**

**Yin Bing Yip. et. al.,( 2008)** a study to assess the efficacy of an aromatic essential oil ( 1% Zingier officinale and 0.5% citrus sinesis) massage among the elderly with moderate – to – severe knee pain. 59 older persons were enrolled in a double – blind, Placebo – controlled experimental study group from the community centre for senior citizens, Hong Kong. There were significant mean changes between the three time – points within the intervention group on three of the outcome measures: Knee pain intensity (p=0.02); stiffness level (p = 0.03); and enhancing physical function (p = 0.04) The improvement of physical function and pain were superior in the intervention group compared with both the placebo and the control group at post 1 – week time (both p = 0.03) but not sustained at post 4 weeks (p= 0.45 and 0.29).

**Gascon D.et.al., (2011)** a study to evaluate the effectiveness of chondroitin sulphate on reduction of pain and improve function in hand osteoarthritis, Haryana, India. In this study 162 patients with hand osteoarthritis were randomly assigned to 880 milligrams of chondroitin sulphate or placebo once in a day for 6 months. Before inclusion patients were identified as having

spontaneous hand pain and functional impairment. The researcher found that hand pain reduced significantly and hand function improved significantly for individuals treated with chondroitin sulphate when compared to those in the placebo group. So the researcher concluded that chondroitin sulphate may reduce pain and improve functioning for individuals with hand osteoarthritis.

**J Adamson et.al.,(2010)** This study was conducted to examine the association between three modified risk factors ( obesity, smoking, and alcohol). Cross sectional data were collected on 858 people aged 58 years living in the West of Scotland and on the same individuals four years later, aged 62 years. There was a positive relation between obesity and reported pain in the hips, knees, ankles, and feet. The strongest relation was with knee pain (odds ratio=2.42 (95% confidence interval, 1.65 to 3.56)). There were no strong consistent associations between smoking habits and pain in any joint after adjusting for sex, alcohol consumption, body mass index, social class, and occupational exposures. Similarly, alcohol was not consistently related to pain in any joint in the fully adjusted models. Obesity had consistent and readily explained associations with lower limb joint pain. The data suggest that smoking behaviour and alcohol consumption are not consistently associated with joint pain across the body.

**Judith M.et.al., (2010)** This quasi experimental two-group pilot study tested an intervention aimed at educating older adults in rural communities about the appropriate use of non-drug treatments for pain. Individuals aged > 60 years who experienced pain in the preceding 2 weeks were recruited from rural Midwestern communities all participants (n=53) completed a series of questionnaires (Brief pain Inventory, symptom distress scale, perceived control scale) at the initial education session (T1) and at a two week follow – up session (T2) hot and cold packs and relaxation breathing instruction were provided for use over the 2 – weeks period. There was a significant increase in the use of all non-drug treatments and a decrease in pain – related distress and current pain scores in the experimental group compared with the control group.



**Maggie Sullivan et.al.(2013)** conducted a descriptive study from 1192 Africans and Caucasians to evaluate pain severity and mobility limitations in osteoarthritis knee patients. Multiple logistic regression analysis showed that 43% reported difficulty in performing 1 task. Mild radiographic knee osteoarthritis was associated with difficulty in mobility like climbing, taking a tub bath, getting in and out of car. Moderate pain was associated with difficulty in performing 17 out of 20 tasks, except lifting cup, opening car door, and turning faucets. Knee pain severity was the strongest risk factors for self-reported difficulty in performing upper and lower extremity tasks.

### **Section C: Studies related to Stiffness among patients with osteoarthritis.**

**Health & Wellness Common ailments(2007)** the article reported that 30 grams of Epsom salts added to one liter of water(the temperature of the boiling water is as tolerated by the client) creating a hot compress by dipping a clean wash cloth in the boiling water, wringing it out, and applying for 20mins, twice a day for 7days to 10days will often relieve the joint pain, leg pain and other joint muscle ligaments. This will relieve the pain and reduce the swelling and stiffness of arthritic pain around ankle. It can also be used to smooth achy, burning feet.

**Mary LuciAvelar di Sabatino Santos et.al.,(2012)** The study was conducted to determine the correlation between performance of the knee muscles and pain, stiffness, and functionality, through the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) Questionnaire applied to an elderly population with osteoarthritis of the knee (OA). This study uses an observational, cross-sectional approach applied to a convenience sample of 80 elderly individuals ( $71.2 \pm 5.3$  years of age) with a clinical diagnosis of OA of the knee. Muscle strength, resistance, and balance of the knee were evaluated using the Biodex System 3 Pro isokinetic dynamometer at angular speeds of 60°/s and 180°/s. The self-reported functionality, presence of pain, and stiffness were evaluated by the WOMAC questionnaire. The results showed that a

significant inverse correlation was observed between muscle strength and resistance of the quadriceps muscle (Q) and the hamstring muscle (H) at speeds of 60°/s and 180°/s, respectively, as well as in the relation between H/Q muscle balance at 180°/s and all domains of the WOMAC ( $p < 0.05$ ). These results aimed at reducing the impact of OA in relation to pain, stiffness, and functionality in elderly individuals.

**Didaruzzaman Sohel et.al.,(2017)** this study was to explore the risk factor, prevalence and treatment pattern for patient with osteoarthritis, to survey the socio-demographic information of the patient, to compare the number of affected gender, to know their pain mode, to know the percentage treatment pattern and to identify the outcome of the treatment. The study design was a non-experimental retrospective survey. Total number of sample was 200 osteoarthritis patient's documents. Result shows that 30-64 years age group were most affected and female were mostly affected by osteoarthritis. Among them the rate of housewife was 39%. They are more vulnerable. Effectiveness of treatment and complementary and alternative therapy was good. Percentage of improvement or satisfied with the treatment was approximately 49%. In total achievement, approximately 17% aims of treatment are not satisfied due to some causes and 34% have no improvement since many of them are new patient. Osteoarthritis is a common physiotherapy related problem. Because it is not a curable disease but regular physical exercise, treatment can reduce the symptoms.

**Jun-Hong Yan et.al.,(2013)** A study was performed to assess the effectiveness of Tai Chi exercise for pain, stiffness, and physical function in patients with osteoarthritis. Two investigators identified eligible studies and extracted data independently. The quality of the included studies was assessed by the Jadad score. Standard mean differences (SMDs) and 95% confidence intervals (CIs) were calculated and pooled using a random effects model. The results showed that a total of seven randomized controlled trials involving 348 patients with osteoarthritis met the inclusion criteria. The mean Jadad score

was 3.6. The pooled SMD was  $-0.45$  (95% CI  $-0.70$ – $-0.20$ ,  $P=0.0005$ ) for pain,  $-0.31$  (95% CI  $-0.60$ – $-0.02$ ,  $P=0.04$ ) for stiffness, and  $-0.61$  (95% CI  $-0.85$ – $-0.37$ ,  $P<0.00001$ ) for physical function. Twelve-week Tai Chi is beneficial for improving arthritic symptoms and physical function in patients with osteoarthritis.

#### **Section D: Studies related to physical function among osteoarthritis**

**Rabini et.al., (2007)** this study was conducted on compared and determined the effects of deep heating therapy and superficial heat therapy among 44 patients with knee osteoarthritis at outpatient clinic of the department of geriatrics, Gerontology University and hospital. Deep heating therapy with local microwave diathermy and short heating therapy with hot packs application was given for three 30 minutes sessions a week for four weeks.

**Wafaalshereif et.al., (2011)** this study was conducted on analyzed the uses of therapeutic exercise and heat application on improvement of physical function among patients with knee osteoarthritis.90 osteoarthritis patients are randomly selected and divided into three groups.group1 received training to use heat application with pharmacological treatment, group 2 received training of physical exercise with pharmacological treatment, and group 3 received a combination training of physical exercise and heat application with pharmacological treatment. The results showed that the use of a combination of therapeutic exercise and heat application together was effective.

**Tveit M et.al., (2012)** :Conducted an experimental study to assess the physical function of older clients with clinical knee osteoarthritis.106 sedentary subjects more than 60 years (mean 69.4, standard deviation 5.9) with knee osteoarthritis (mean 12.2, standard deviation 11.0) were participated in the study were evaluated by recording time to ascend 4 stairs, rise from sitting or sit down from chair (5 times). Using spearman correlation walking, stairs

climbing, chair rise were significantly correlated with each other and with the pain rating scale index ( $p < 0.001$ ).

**Kuang-Hui Huang et.al.,(2015)** This study was conducted to evaluate the associations between pain and physical functional limitation and health status in patients with knee osteoarthritis (OA). A correlational study. In a convenience sample of 73 patients with knee OA, pain and physical function were assessed using the Western Ontario and McMaster University Osteoarthritis Index. Health status was evaluated using multiple instruments under the International Classification of Functioning, Disability, and Health framework. In the study patients with knee OA, pain and physical functional limitation exhibited mild to strong associations with health status, including body function and structure ( $r = .26-.71$ ), activities and participation ( $r = .24-.88$ ), and personal and environmental factors ( $r = .24-.62$ ). In patients with knee OA, health status is mildly to strongly associated with pain and physical functional limitation.

#### **Section E: Studies related to effectiveness of hot foot bath Epsom salt on joint pain, stiffness, and physical function among patients with osteoarthritis.**

**Neharora et.al.,(2008)** This study was conducted on personal health posted about the home remedies for joint pain. Joint pain is a very common problem encountered by many peoples. As in a day to day life because of more work and less by aggravation in the body. Home remedies for leg pain and joint pain is a warm water bath of Epsom salt. Warm water bath of Epsom salt, which is rich in magnesium, is a good pain reliever. This is very helpful for arthritis. In experimental group posttest mean score was  $17.8 \pm 2.397$  and control group posttest mean score was  $38.49 \pm 4.30$  calculated t value 16.492 was statistically significant at  $p < 0.001$  level.

**Fioravanti A, Tenti S, Giannitti C, M.,et.al.,(2013)** conducted a prospective randomized, single blind controlled trial to evaluate the

effectiveness of Epsom Salt compress in 60 outpatients with bilateral pain divided into two groups with experimental group (n=30) treated with 12 daily generalized thermal baths with magnesium sulphate mineral water added to usual treatment, and the control group (n=30) continued regular outpatient care routine ( exercise, NSAIDS and/or analgesics) for a duration of 3 months the study result confirmed that Epsom salt compress had a beneficial effect in patients with joint osteoarthritis.

**Adam ramsay et.al., (2014)** conducted a study to assess the effectiveness of Epsom salts, which are high in magnesium, can help to relieve joint pain, Christine Horner, nutritional therapist says at Margaret hills clinic the Epsom salt compress that helps patients with arthritis. Before bed, dissolve three teacups of Epsom salts into hot water soak a clean cloth in to hot water and make a compress, apply the compress to joint for 10 to 15 minutes, whilst slowly exercising the joints and muscles this will help to relieve the joint pain.

**Ruby Anitha et.al.,(2015)** conducted a study to assess the effectiveness of Epsom salt formation on knee joint pain, knee swelling and activities of daily living among elderly. It was one group[ pretest and posttest experimental design with 30 samples. Results reveals with significant improvement ( $p < 0.01$ ) pain, swelling and activities of daily living after 5 days if therapy.

**SorubaRani.et.Al., (2016)** A True experimental pretest and posttest design was adopted. The was conducted in Melanalandhula village at Tirunelveli. Sixty patients selected by simple random sampling method and 30 were recruited to each group used tool for knee injury osteoarthritis outcome score to assess the knee related symptoms, experimental group received Epsom salt fomentation twice a day for 14 days. In experimental group posttest mean score was  $19.90 \pm 3.97$  and control group posttest mean score was  $36.46 \pm 4.30$  calculated t value 15.482 was statistically significant at  $p < 0.001$  level.

**Ruth Benita.F.et.al., (2016)** A True experimental pretest and posttest design was adopted. The was conducted in Coimbatore.60 patients selected by

simple random sampling technique and 30 were recruited to each group used tool for joint pain osteoarthritis outcome score to assess the effectiveness of Hot water compress with Epsom salt among old age patients with osteoarthritis. Experimental group received hot water compress with Epsom salt was prepared by adding 30 grams of Epsom salt liter of boiling water (The temperature of the boiling water was as tolerated by the client) creating a hot compress by dipping a clean washcloth in the boiling water, wringing it out, and applying for 20 minutes twice a day for 10 days. The mean posttest level of osteoarthritis pain among old age in experimental group was significantly lower than the mean posttest level of pain among old age patients in control group ( $t=10.95$ )  $p=0.001$ .

## **CHAPTER III METHODOLOGY**

This chapter includes research approach, research design, setting, population, sample, criteria for selection of sample, sampling procedure, description of the tool, scoring procedure, validity, reliability, pilot study method of data collection and plan for data analysis.

### **RESEARCH APPROACH**

An evaluative approach was used for this study.

### **RESEARCH DESIGN**

The Quasi experimental non-equivalent control group pretest and posttest design was adopted to assess the effectiveness of hot foot bath with Epsom salt among patients with osteoarthritis.

### **SCHEMATIC REPRESENTATION**

<b>GROUP</b>	<b>PRE TEST</b>	<b>INTERVENTION</b>	<b>POST TEST</b>
Experimental group	0 <sub>1</sub>	X	0 <sub>2</sub>
Control group	0 <sub>1</sub>	-	0 <sub>2</sub>

- 0<sub>1</sub> - Collection of demographic data, pre test to assess the level of joint pain, stiffness, and physical function among patients with osteoarthritis in experimental and control group.
- X - Hot foot bath with Epsom salt was given for 20 minutes daily once in the morning and continued for 10 days in experimental group.
- 0<sub>2</sub> - Post test to assess the level of joint pain, stiffness, and physical function among patients with osteoarthritis in experimental and control group.

## **SETTING OF THE STUDY:**

The study is conducted at Senthil Ortho Hospital Ottanchathiram for experimental group and K.T Ortho Hospital Ottanchathiram for control group. Senthil Ortho hospital is 50 bedded hospital with various departments like medical, surgery, and orthopaedics. Number of outpatients treated in this hospital were 150 per day and number of inpatients treated were 30 per month. Every day 10 – 15 patients with osteoarthritis were treated in inpatient department.

The K.T Ortho hospital is a 100 bedded Ortho hospital. The number of average outpatient is about 100 per day. In which 25 are diagnosed to have osteoarthritis and inpatient case of osteoarthritis were about 35 – 40 per month. The distance between these hospital were around 4km.

## **POPULATION:**

The target population selected for the study was patients who were diagnosed with osteoarthritis.

## **SAMPLE:**

Patients with osteoarthritis who were admitted in Senthil Ortho hospital and K.T Ortho hospital at Ottanchatharam.

## **CRITERIA FOR SELECTION OF SAMPLE:**

### **INCULSION CRITERIA:**

- Patients between the age group of 50-65 years.
- Both male and female
- Patients who were diagnosed as osteoarthritis admitted as inpatient for a minimum stay of 10 days.
- Patients who were willing to participate



## **EXCULSION CRITERIA:**

- ❖ Patients with chronic illness such as cardiac and renal problem.
- ❖ Patients with open wound and diabetic foot ulcers.
- ❖ Patients diagnosed as peripheral vascular diseases.
- ❖ Patients who had undergone surgery in knees and below knees.
- ❖ Patients undergoing physiotherapy.

## **SAMPLE AND SAMPLING PROCEDURE:**

### **SAMPLE SIZE:**

The sample size for the study consists of 60. Out of which 30 were in experimental group and 30 were in control group.

### **SAMPLING TECHNIQUE:**

Non probability convenience sampling technique was used to select the samples for the study.

## **INSTRUMENT AND SCORING PROCEDURE:**

### **DESCRIPTION OF TOOL:**

The tool consists of four parts,

#### **Part I**

It consists of demographic variables such as age, sex , educational status, religion , occupation , family monthly income , and duration of the illness.

#### **Part II**

Womac osteoarthritis index scale was used to assess the level of joint pain among patients with osteoarthritis. It consists of 5 items. It is rated as No

pain, Mild pain, Moderate pain, Severe pain, Extreme pain .It is scored as 0, 1, 2, 3, 4,respectively. The total score is 20.

### **Part III**

Womac osteoarthritis index scale was used to assess the level of stiffness among patients with osteoarthritis. It consists of 2 items. It was rated as none, mild stiffness, moderate stiffness, severe stiffness, extreme stiffness, It was scored as 0, 1, 2, 3, 4, respectively. The total score is 8.

### **Part IV**

Womac osteoarthritis index scale was used to assess the level of physical function among patients with osteoarthritis .It consists of 17 items. It was rated as none, mild difficulty in physical function, moderate difficulty in physical function, severe difficulty in physical function, extreme difficulty in physical function. It was scored as 0,1,2,3,4, respectively. The total score is 68.

### **SCORING PROCEDURE:**

#### **Part II**

The Scores were interpreted as follows

<b>S. NO</b>	<b>LEVEL OF JOINT PAIN</b>	<b>SCORE</b>	<b>PERCENTAGE</b>
1	No Pain	0	0
2	Mild Pain	1-5	1-25
3	Moderate Pain	6-10	26-50
4	Severe Pain	11-15	51-75
5	Extreme Pain	16-20	76-100

### Part III

The Scores were interpreted as follows

<b>S. NO</b>	<b>LEVEL OF STIFFNESS</b>	<b>SCORE</b>	<b>PERCENTAGE</b>
1	None (no stiffness)	0	0
2	Mild Stiffness	1-2	1-25
3	Moderate Stiffness	3-4	26-50
4	Severe Stiffness	5-6	51-76
5	Extreme Stiffness	7-8	76-100

### Part IV

The Scores were interpreted as follows

<b>S. NO</b>	<b>LEVEL OF PHYSICAL FUNCTION</b>	<b>SCORE</b>	<b>PERCENTAGE</b>
1	None (no difficulty in physical function)	0	0
2	Mild difficulty in physical function	1-17	1-25
3	Moderate difficulty in physical function	18-34	26-50
4	Severe difficulty in physical function	35-51	51-75
5	Extreme difficulty in physical function	52-68	76-100

## **VALIDITY AND RELIABILITY OF THE TOOL:**

The content of the tool was established in consultation with guide and 4 experts in the field of medical surgical nursing and orthopedic surgeon.

## **RELIABILITY OF THE TOOL:**

Reliability of the modified WOMAC osteoarthritis index scale was established by testing the internal consistency by using Cronbach's alpha formula and found to be reliable ( $\alpha=0.98$ ).

## **PILOT STUDY:**

The pilot study was conducted in Maruthi Hospital at Erode. The researcher obtained written permission from the institution and oral permission from the participants prior to the study, the purpose of the study was explained to the subjects. The pilot study was conducted for a period of 10 days. The sample size for this study was 10, out of which 5 were in experimental group and 5 were in control group. Based on inclusive criteria samples were selected by convenience sampling method. On the first day, data pertaining to the demographic variables were collected by structured interview method, then the pretest was conducted by using Womac osteoarthritis scale to assess the joint pain, stiffness and physical function among patients with osteoarthritis in both experimental and control group. On the first day onwards Hot foot bath with 4gms of Epsom salt was given to the experimental group individually for 20 minutes daily once in the morning for 10 days. On the 10<sup>th</sup> day post-test was conducted for the experimental and control group using the same scale.

Data were analysed and findings of the pilot study showed that in experimental group the posttest mean score of joint pain 6.2 (SD $\pm$ 0.83) was lower than the mean pretest score 14.2(SD $\pm$ 1.64). The posttest mean score of stiffness 2(SD $\pm$ 0.7) was lower than the mean pretest score 7.6 (SD $\pm$ 0.54).The posttest mean score of difficulty in physical function 8.2(SD $\pm$ 2.16) was lower than the mean pretest score 55.4 (SD $\pm$ 4.82). The paired t value for joint pain in

experimental group was 17.8 (table value = 2.778) at  $p < 0.05$  level of significance. The paired 't' value for stiffness 23.3 (table value = 2.778) at  $p < 0.05$  level of significance. The paired t value for physical function was 26.12 (table value = 2.778) at  $p < 0.05$  level of significance. Independent t value for joint pain was 13.82 (table value = 2.78) at  $p < 0.05$  level of significance showed that there was a significant reduction in the joint pain between experimental and control group. Independent t value for stiffness was 23.2 (table value = 2.78) at  $p < 0.05$  level of significance showed that there was a significant reduction in the stiffness between experimental and control group. Independent t value for physical function was 41.4 (Table value = 2.78) at  $p < 0.05$  level of significance showed that there was a significant improvement in the physical function between experimental and control group. Results of the pilot study revealed that the study was cost effective, feasible and practicable to conduct the main study.

#### **DATA COLLECTION PROCEDURE:**

The main study was conducted in Senthil Ortho hospital in experimental group and K.T Ortho hospital in control group at Ottanchatharam. Data collection was done for a period of 4 weeks. The investigator obtained written permission from the chief medical officer Senthil Ortho hospital and K.T Ortho Hospital Ottanchathiram. The oral permission was obtained from each participant prior to the study. Based on the inclusive criteria 30 samples in experimental group and 30 samples in control group by using convenience sampling technique. The patients were divided into 3 groups for experimental and 3 groups for control group. On the first day 10 samples were selected for experimental group and 10 for control group. On the 11<sup>th</sup> day 10 samples were selected for experimental group and 10 for control group. On the 21<sup>st</sup> day remaining 10 samples were selected for experimental group and 10 for control group.

On the 1<sup>st</sup> day, in experimental group data pertaining to the demographic variables was collected by structured interview method then the pretest was conducted to the participants by using Womac osteoarthritis index scale. Hot foot bath with 4gms of Epsom salt was given to the participants which was carried out as single session (20 minutes) daily once in the morning and continued for 10 days. After the intervention post test was conducted on the 10<sup>th</sup> day. For control group the demographic variables was collected by structured interview method then pretest was conducted on the 1<sup>st</sup> day and 10<sup>th</sup> day the post test was conducted by using Womac osteoarthritis index scale to assess the level of joint pain, stiffness and physical function. Same procedure was carried out for the other 2 groups in experimental and control group.

**PLAN FOR DATA ANALYSIS:**

<b>S.NO</b>	<b>DATA ANALYSIS</b>	<b>METHOD</b>	<b>PURPOSE</b>
1	Descriptive statistics	Frequency percentage mean, standard deviation	<ul style="list-style-type: none"> <li>• To assess the demographic variables among patients with osteoarthritis in experimental and control group.</li> <li>• To assess the pretest and posttest level of joint pain among patients with osteoarthritis in experimental and control group.</li> <li>• To assess the pretest and posttest level of stiffness among patients with osteoarthritis in experimental and control group.</li> <li>• To assess the pretest and posttest level of physical function among patients with osteoarthritis in experimental and control group.</li> </ul>

S.NO	DATA ANALYSIS	METHOD	PURPOSE
2	Inferential statistics	Paired 't' test	<ul style="list-style-type: none"> <li>• To compare the pre and posttest level of joint pain among patients with osteoarthritis in experimental group.</li> <li>• To compare the pre and posttest level of stiffness among patients with osteoarthritis in experimental group.</li> <li>• To compare the pre and posttest level of physical function among patients with osteoarthritis in experimental group.</li> </ul>
		Independent 't' test	<ul style="list-style-type: none"> <li>• To find out the effectiveness of hot foot bath with Epsom salt on level of joint pain among patients with osteoarthritis between experimental and control group.</li> <li>• To find out the effectiveness of hot foot bath with Epsom salt on level of stiffness among patients with osteoarthritis between experimental and control group.</li> <li>• To find out the effectiveness of hot foot bath with Epsom salt on level of physical function among patients with osteoarthritis between experimental and control group.</li> </ul>

S.NO	DATA ANALYSIS	METHOD	PURPOSE
		Chi square test	<ul style="list-style-type: none"> <li>• To find out the association between the posttest level of joint pain among patients with osteoarthritis and their selected demographic variables in experimental group.</li> <li>• To find out the association between the posttest level of stiffness among patients with osteoarthritis and their selected demographic variables in experimental group.</li> <li>• To find out the association between the posttest level of physical function among patients with osteoarthritis and their selected demographic variables in experimental group.</li> </ul>

**PROTECTING THE HUMAN SUBJECTS:**

The research proposal was approved by the ethical committee prior to the conduct of main study. Written permission was obtained from the Director, Senthil ortho hospital and K.T hospital at Ottanchathiram. Before the study verbal consent was obtained from each subject.



## **CHAPTER-IV**

### **DATA ANALYSIS AND INTERPRETATION**

This chapter deals with the description of sample characteristics, analysis and interpretation of the data collection to evaluate the effectiveness of hot foot bath with Epsom salt on level of joint pain, stiffness and physical function among patients with osteoarthritis.

#### **ORGANIZATION DATA**

The data has been organized and tabulated as follows:

- SECTION A** : Distribution of demographic variables among patients with osteoarthritis in experimental and control group.
- SECTION B** : Assess the pretest level of joint pain, stiffness and physical function among patients with osteoarthritis in experimental group and control group.
- SECTION C** : Assess the posttest level of joint pain, stiffness and physical function among patients with osteoarthritis in experimental group and control group.
- SECTION D** : Comparison between the pretest and posttest level of joint pain, stiffness and physical function among patients with osteoarthritis in experimental group.
- SECTION E** : Find out the effectiveness of hot foot bath with Epsom salt on level of joint pain among patients with osteoarthritis between experimental and control group.
- SECTION F** : Find out the effectiveness of hot foot bath with Epsom salt on level of stiffness among patients

with osteoarthritis between experimental and control group.

**SECTION G** : Find out the effectiveness of hot foot bath with Epsom salt on level of physical function among patients with osteoarthritis between experimental and control group.

**SECTION H** : Association between the mean posttest level of joint pain among patients with osteoarthritis and their selected demographic variables in experimental group.

**SECTION I** : Association between the mean posttest level of stiffness among patients with osteoarthritis and their selected demographic variables in experimental group.

**SECTION J** : Association between the mean posttest level of physical function among patients with osteoarthritis and their selected demographic variables in experimental group.

**SECTION –A : Distribution of demographic variables among patients with osteoarthritis in experimental and control group.**

**TABLE-1 : Frequency and percentage distribution of demographic variables among patients with osteoarthritis in experimental and control group.**

$n_1 = 30, n_2 = 30$

S. NO	DEMOGRAPHIC VARIABLES	EXPERIMENTAL GROUP		CONTROL GROUP	
		F	%	F	%
<b>1</b>	<b>Age( in years)</b>				
1.1	50-53 Years	3	10	9	30
1.2	54-57 years	12	40	8	27
1.3	58-62 years	10	33	7	23
1.4	63-65 years	5	17	6	20
<b>2.</b>	<b>Sex</b>				
2.1	Male	15	50	16	53
2.2	Female	15	50	14	47
<b>3.</b>	<b>Educational status</b>				
3.1	Primary school education	8	26	6	20
3.2	Higher secondary school	11	37	8	27
3.3	Degree holder	4	13	8	27
3.4	No formal education	7	24	8	26
<b>4.</b>	<b>Religion</b>				
4.1	Hindu	24	80	9	30
4.2	Christian	5	17	10	33
4.3	Muslim	1	3	11	37
<b>5.</b>	<b>Occupation</b>				
5.1	Private employee	3	10	5	17
5.2	Government employee	4	13	7	23
5.3	Self employee	9	30	9	30
5.4	Unemployed	14	47	9	30

S. NO	DEMOGRAPHIC VARIABLES	EXPERIMENTAL GROUP		CONTROL GROUP	
		F	%	F	%
<b>6.</b>	<b>Family monthly Income</b>				
6.1	Rs.5000-8000/-	6	20	7	23
6.2	Rs.8001-12,000/-	8	27	6	20
6.3	Rs.12,001-15,000/-	11	37	10	34
6.4	Above 15,001/-	5	16	7	23
<b>7.</b>	<b>Duration of illness</b>				
7.1	1-2 years	9	30	8	27
7.2	3-4 years	8	27	8	27
7.3	5 -6 years	13	43	9	30
7.4	7-8 years	-	-	5	16

**Table : 1** showed that the distribution of demographic variables among patients with osteoarthritis in both experimental and control group such as age, sex, education status, religion, occupation, family monthly income and duration of illness.

Regarding age in experimental group, majority of patients 12 (40%) belonged to the age group of 54-57 years, 10(33%) belonged to the age group of 58-62 years, 5(17%) belonged to the age group of 63-65, 3(10%) belonged to the age group of 50-53 years. In control group, majority of patients 9(30%) belonged to the age group of 50-53 years, 8(27%) belonged to the age group of 54-57 years, 7(23%) belonged to the age group of 58-62 years and 6(20%) belonged to the age group of 63-65 years.(**fig 2**)

Regarding sex, in experimental group, majority of patients 15 (50%) were males, 15(50%) were females. In control group, majority of patients 16(53%) were males, 14(47%) were females. (**fig3**)

Regarding educational status in experimental group, majority of the patients 11 (37%) had higher secondary school education, 8(26%) had primary school education, 7(24%) had no formal education, 4(13%) were degree

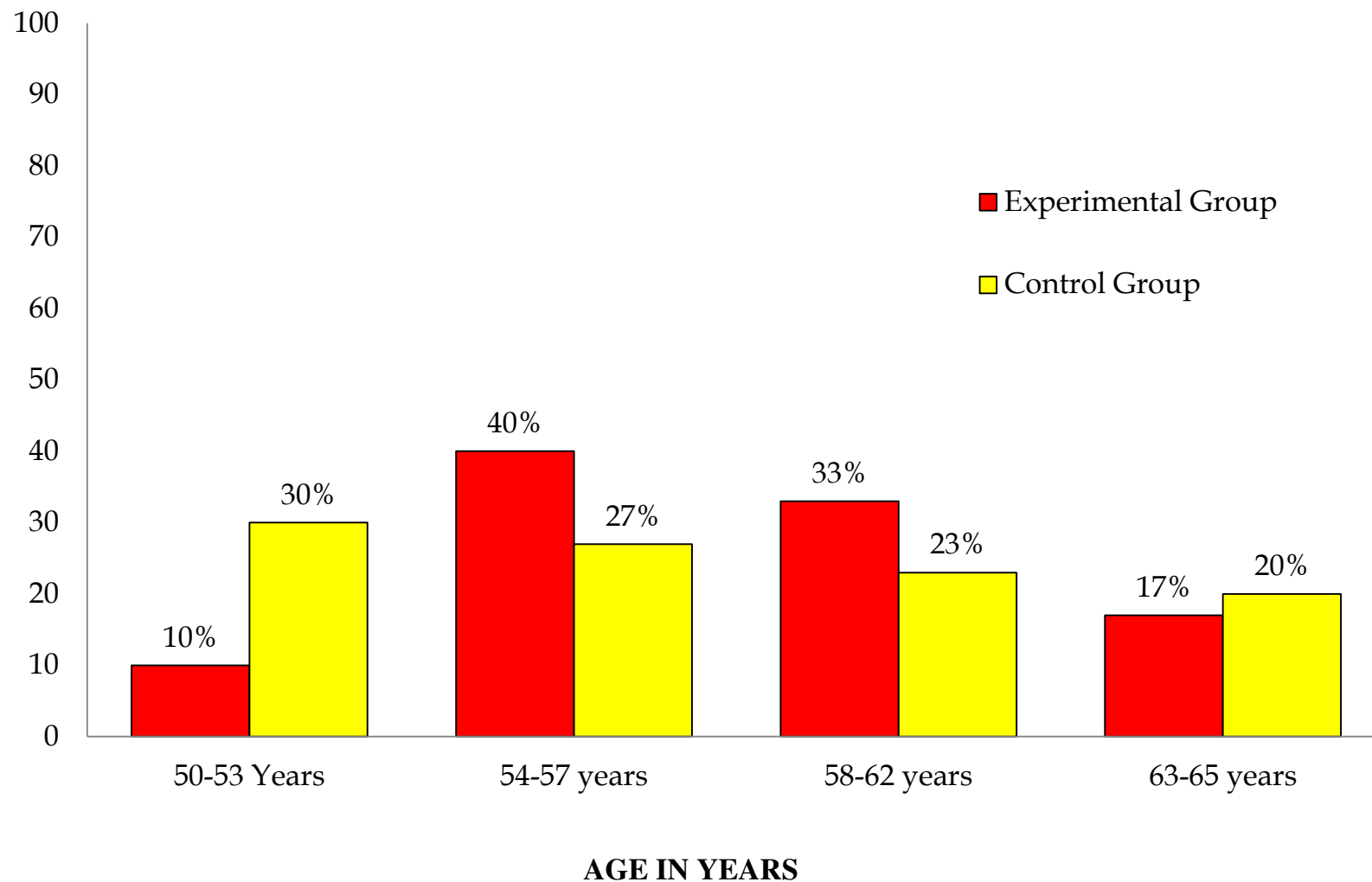
holders. In control group majority of patients 8(27%) had higher secondary school education, 8(27%) were degree holders, 8(27%) had no formal education, 6(20%) had primary school education. **(fig 4)**

Regarding education in experimental group, majority of the patients 24(80%) were Hindus, 5(17%) were Christians, and 1(3%) was a Muslim. In control group majority of patients 11(37%) were Muslims, 10(33%) were Christians, 9(30%) were Hindus. **(fig 5)**

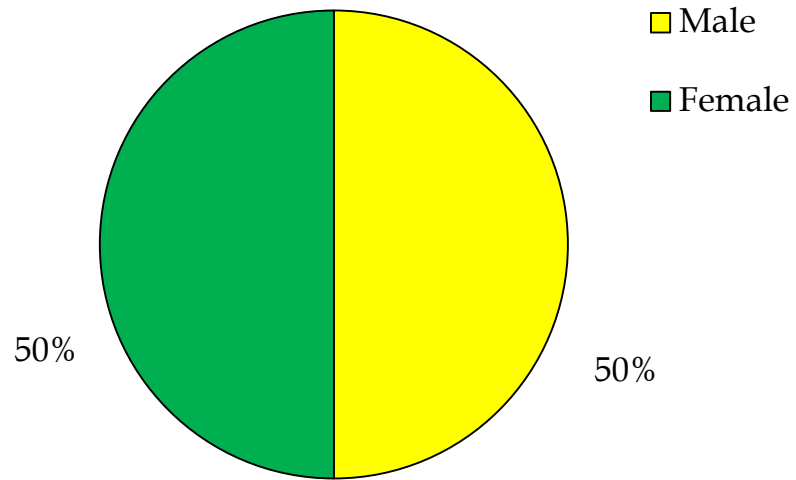
Regarding occupational status in experimental group, majority 14(47%) were un employed, 9(30%) were self-employee, 4(13%) were government employee, and 3(10%) were private employee. In control group, majority 9(30%) were unemployed, 9(30%) were self-employed, 7(23%) were government employee, and 5(17%) were private employee.**(fig 6)**

Regarding family monthly income in experimental group, majority 11(37%) were earning between Rs 12,001-Rs 15,000, 8(27%) were earning between Rs.8, 001-Rs.12,000 , 6(20%) were earning between Rs 5000-Rs.8000, and 5(16%) were earning between above Rs.15,001. In control group, majority 10(34%) had an income between Rs.12,001-15,000, 7(23%) were earning between Rs.5000-8000, and 7(23%) were earning above 15001, 6(20%) were earning between Rs 8001-12,000. **(fig 7)**

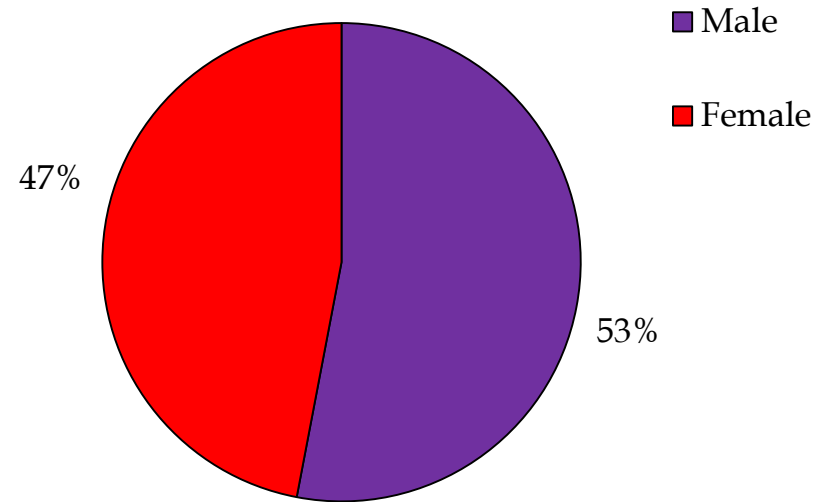
Regarding duration of illness, in experimental group majority of the patients with osteoarthritis 13(43%) had duration of illness for 5-6 years, 9(30%) had duration of illness for 1-2 years and 8(27%) had duration of illness for 3 to 4 years. In control group majority 9(30%) had duration of illness between 5-6 years, 8(27%) had duration of illness for 1-2 years, 8(27%) had duration of illness for 3 to 4 years and 5(16%) had the illness for 7-8 years **(fig 8)**



**Fig : 2 Percentage distribution of patients with osteoarthritis according to their age**



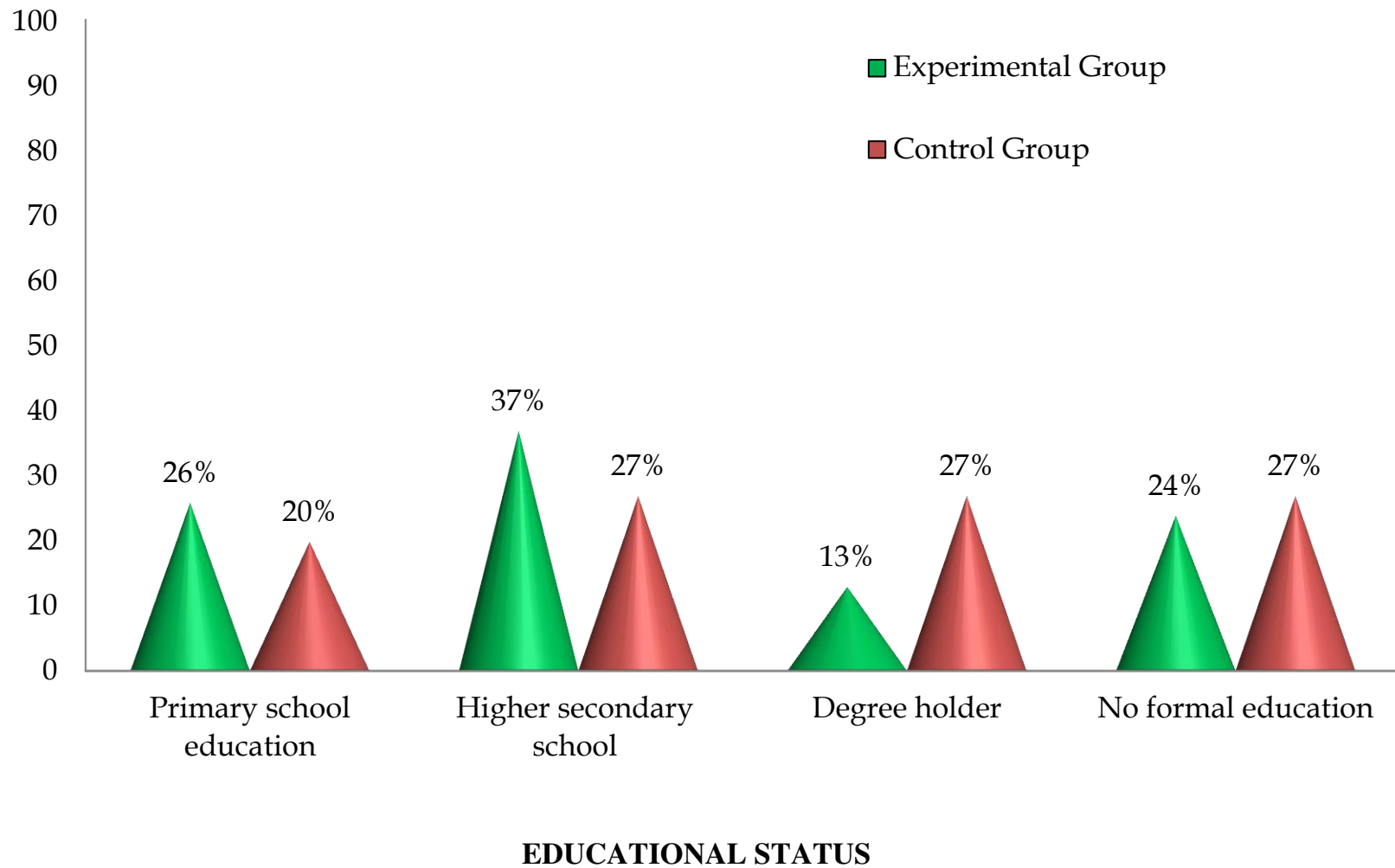
**3a Experimental Group**



**3b Control Group**

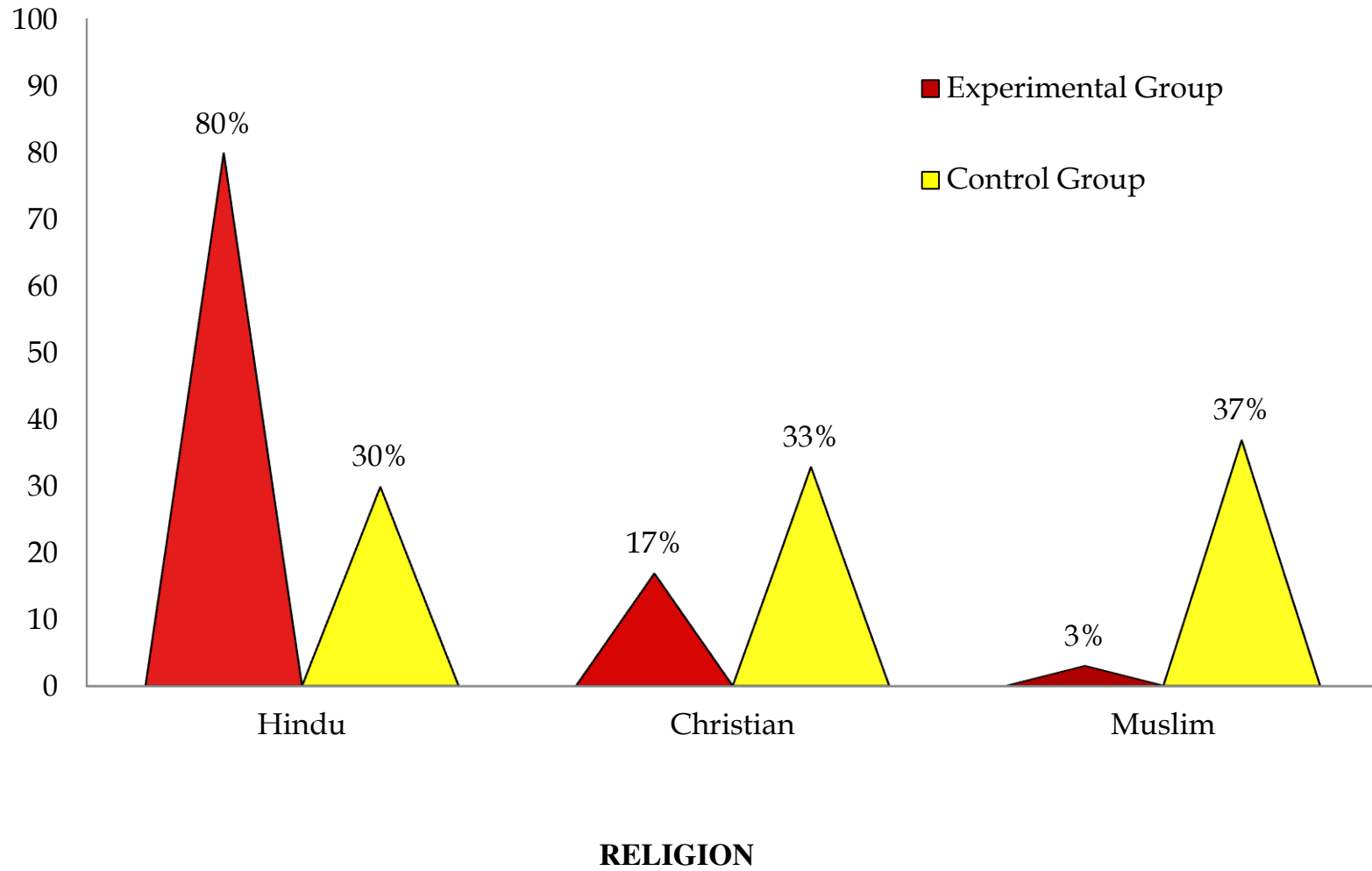
**SEX**

**Fig : 3 a and b Percentage distribution of patients with osteoarthritis according to their sex in experimental and control group**

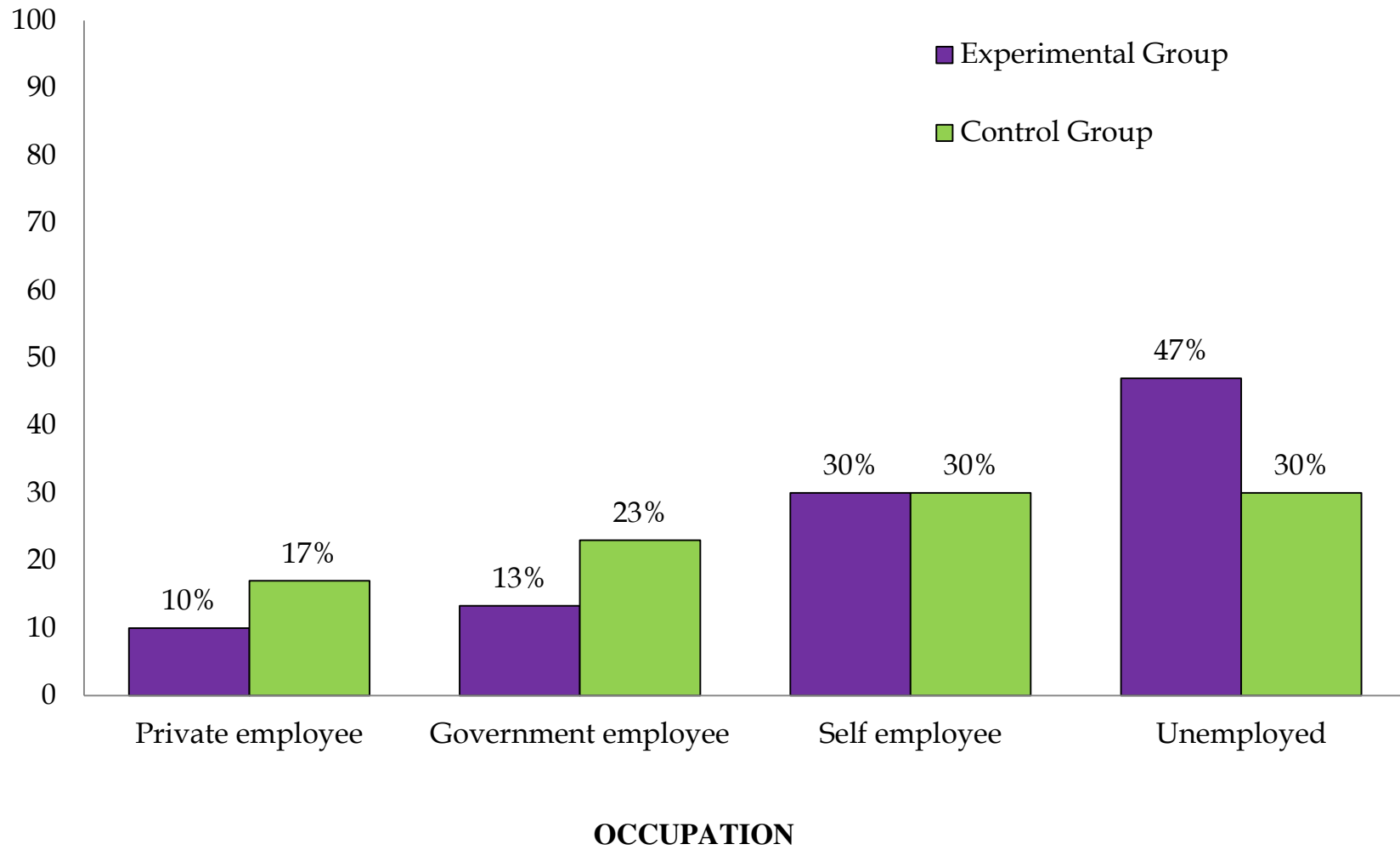


**Fig : 4 Percentage distribution of patients with osteoarthritis according to their Educational status**

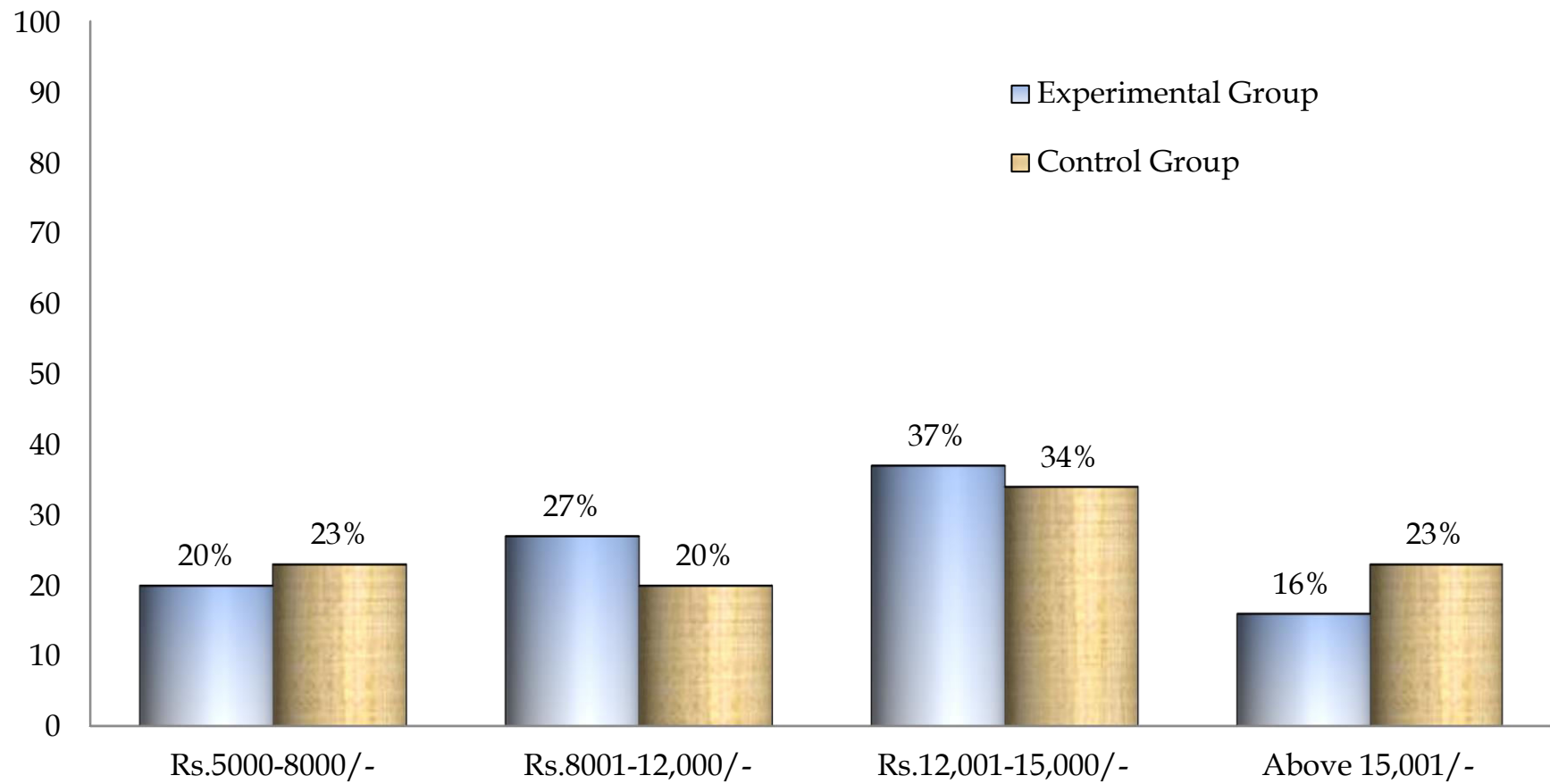




**Fig : 5 Percentage distribution of patients with osteoarthritis according to their Religion**

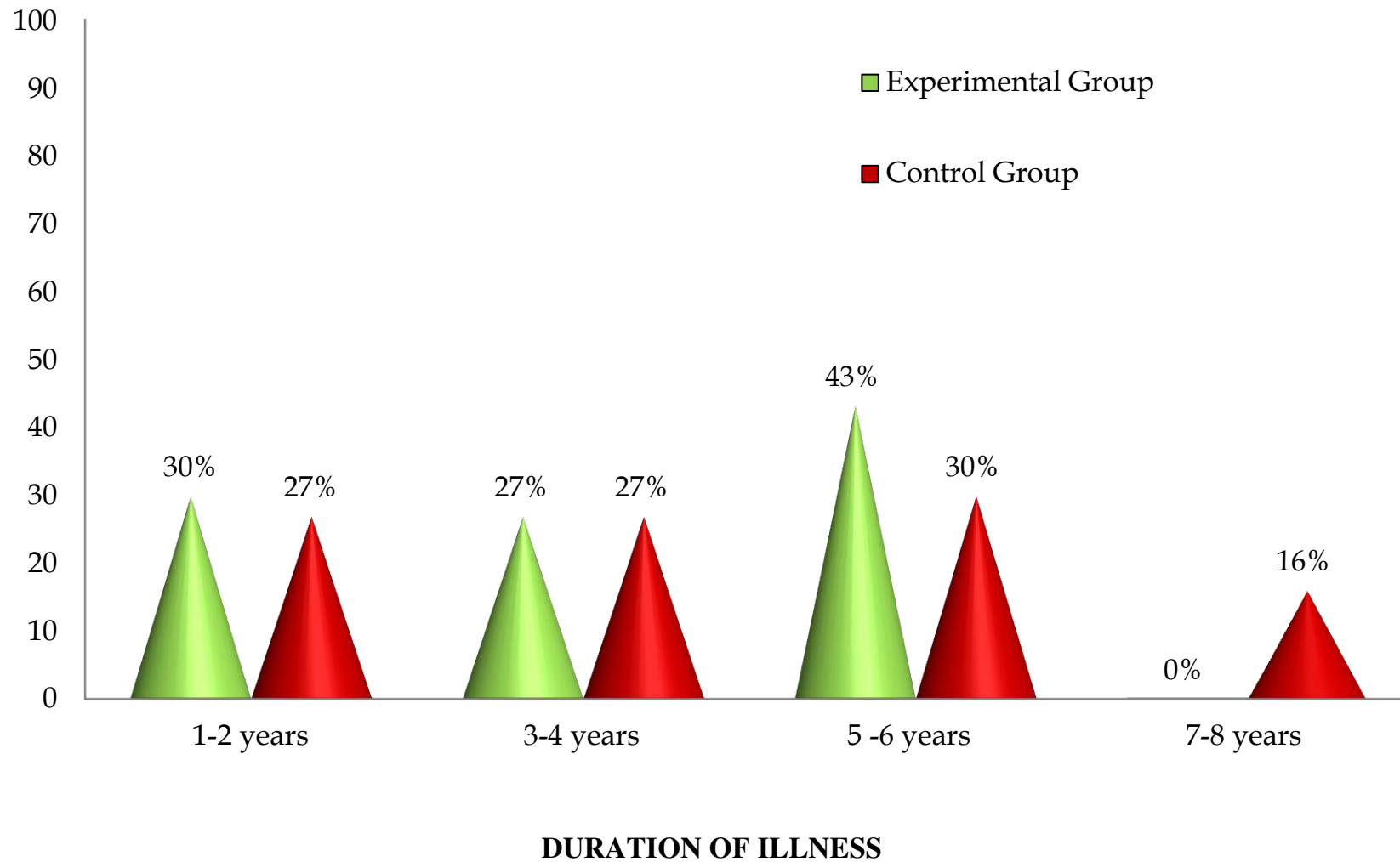


**Fig : 6 Percentage distribution of patients with osteoarthritis according to their Occupation**



**FAMILY MONTHLY INCOME**

**Fig : 7 Percentage distribution of patients with osteoarthritis according to their family Monthly Income**



**Fig : 8 Percentage distribution of patients with osteoarthritis according to their Monthly Income**

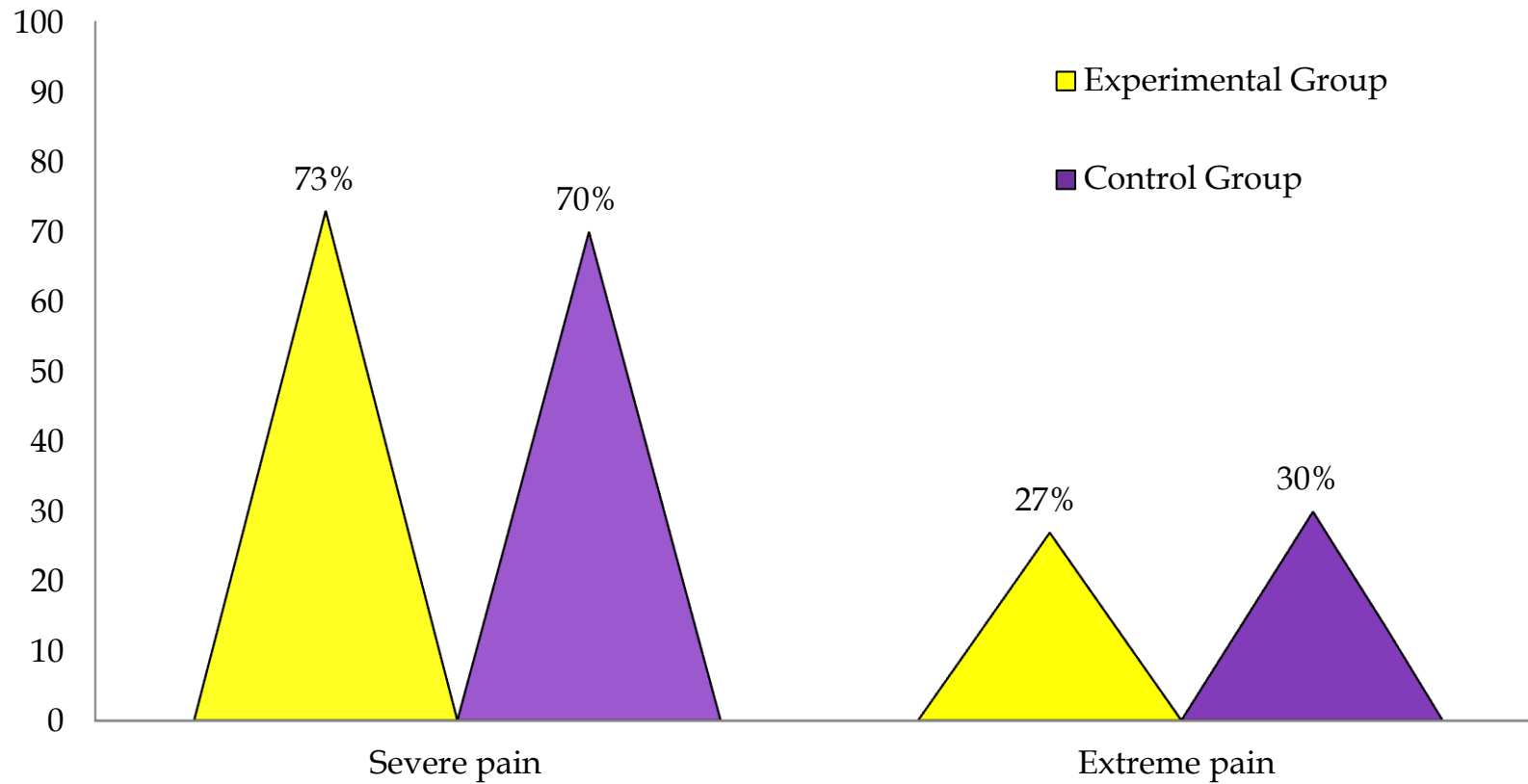
**SECTION B : Assess the pretest level of joint pain, stiffness and physical function among patients with osteoarthritis in experimental and control group.**

**TABLE 2 :** Frequency and percentage distribution of pretest level of joint pain among patients with osteoarthritis in experimental and control group

$n_1 = 30, n_2 = 30$

S.NO	LEVEL OF JOINT PAIN	EXPERIMENTAL GROUP		CONTROL GROUP	
		f	%	F	%
1.	No pain	-	-	-	-
2.	Mild pain	-	-	-	-
3.	Moderate pain	-	-	-	-
4.	Severe pain	22	73	21	70
5.	Extreme pain	8	27	9	30

**Table 2** depicts that, in experimental group, in pretest majority 22(73%) had severe level of joint pain and 8(27%) had extreme level of joint pain, where as in the control group 21(70%) of them had severe level of joint pain and 9(30%) had extreme level of joint pain. **(Fig 9)**.



**PRE TEST LEVEL OF JOINT PAIN**

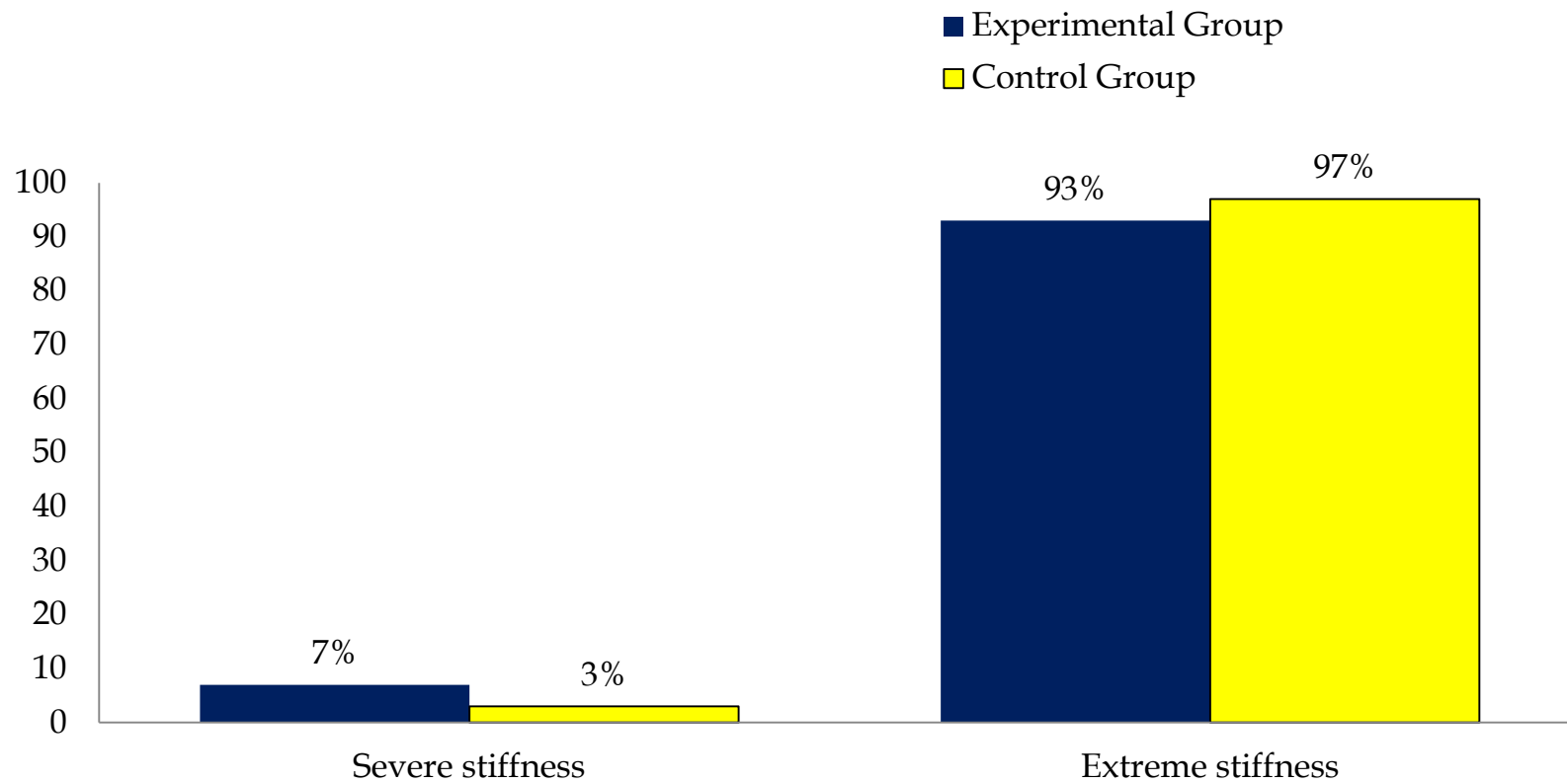
**Fig : 9 Percentage distribution of pre test level of joint pain among patients with osteoarthritis in experimental and control group**

**TABLE: 3** Frequency and percentage distribution of pretest level of stiffness among patients with osteoarthritis in experimental and control group:

$n_1 = 30, n_2 = 30$

S.NO	LEVEL OF STIFFNESS	EXPERIMENTAL GROUP		CONTROL GROUP	
		f	%	F	%
1.	None (no stiffness)	-	-	-	-
2.	Mild stiffness	-	-	-	-
3.	Moderate stiffness	-	-	-	-
4.	Severe stiffness	2	7	1	3
5.	Extreme stiffness	28	93	29	97

**Table: 3** depicts that, in experimental group in pretest majority 28(93%) had extreme level of stiffness and 2(7%) had severe level of stiffness, where as in the control group 29(97%) of them had extreme level of stiffness and 1(3%) had severe level of stiffness. **(fig:10)**



**PRE TEST LEVEL OF STIFFNESS**

**Fig : 10 Percentage distribution of pre test level of stiffness among patients with osteoarthritis in experimental and control group**

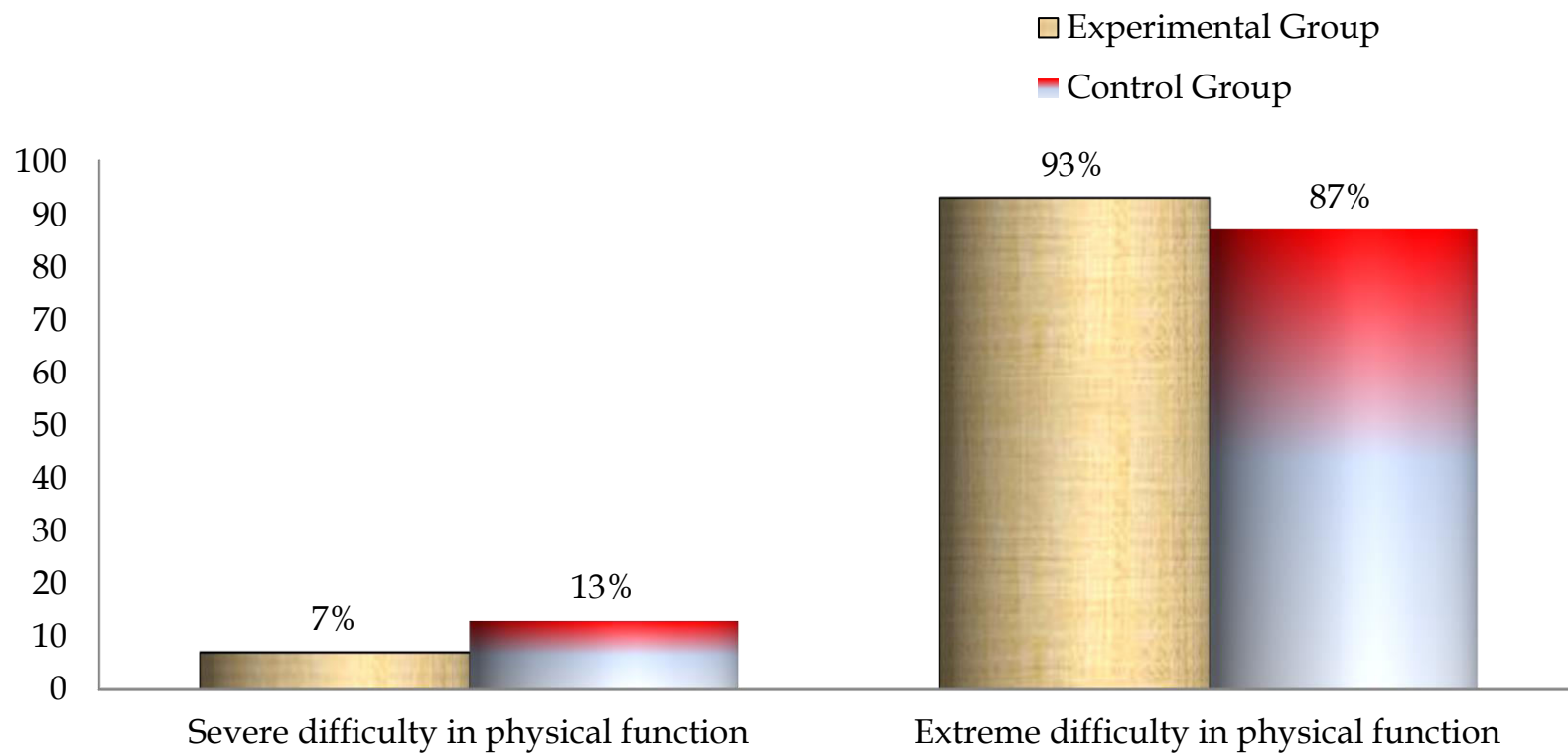


**TABLE: 4** Frequency and percentage distribution of pretest level of physical function among patients with osteoarthritis in experimental and control group:

$n_1 = 30, n_2 = 30$

S.NO	LEVEL OF PHYSICAL FUNCTION	EXPERIMENTAL GROUP		CONTROL GROUP	
		F	%	f	%
1.	None (no difficulty in physical function)	-	-	-	-
2.	Mild difficulty in physical function	-	-	-	-
3.	Moderate difficulty in physical function	-	-	-	-
4.	Severe difficulty in physical function	2	7	4	13
5.	Extreme difficulty in physical function	28	93	26	87

**Table: 4** depicts that, in experimental group in pretest majority 28(93%) had extreme level of difficulty in physical function and 2(7%) had severe level of difficulty in physical function, where as in the control group 26(87%) of them had extreme level of difficulty in physical function and 4(3%) of them had severe level of difficulty in physical function. **(fig:11)**



**PRE TEST LEVEL OF PHYSICAL FUNCTION**

**Fig : 11 Percentage distribution of pre test level of physical function among patients with osteoarthritis in experimental and control group**

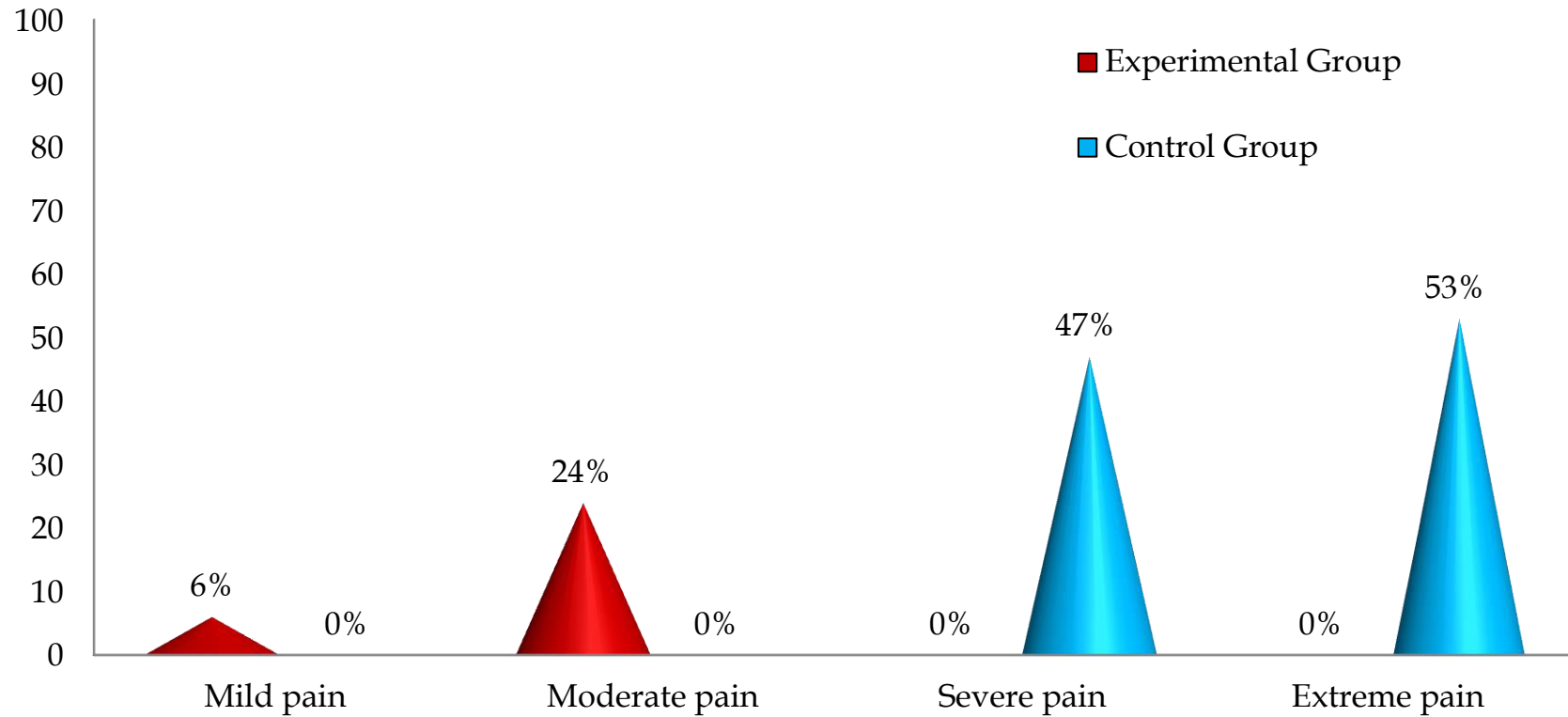
**SECTION C :** Assess the posttest level of joint pain, stiffness and physical function among patients with osteoarthritis in experimental and control group.

**TABLE 5 :** Frequency and percentage distribution of posttest level of joint pain among patients with osteoarthritis in experimental and control group

$n_1 = 30, n_2 = 30$

S. NO	LEVEL OF JOINT PAIN	EXPERIMENTAL GROUP		CONTROL GROUP	
		F	%	F	%
1.	No pain	-	-	-	-
2.	Mild pain	6	20	-	-
3.	Moderate pain	24	80	-	-
4.	Severe pain	-	-	14	47
5.	Extreme pain	-	-	16	53

**Table 5** depicts that, in experimental group, Inposttest majority 24(80%) had moderate level of joint pain and 6(20%) had mild level of joint pain, where as in the control group 16(53%) of them had extreme level of joint pain, 14(47%) had severe level of joint pain.(**fig:12**)



**POSTTEST LEVEL OF JOINT PAIN**

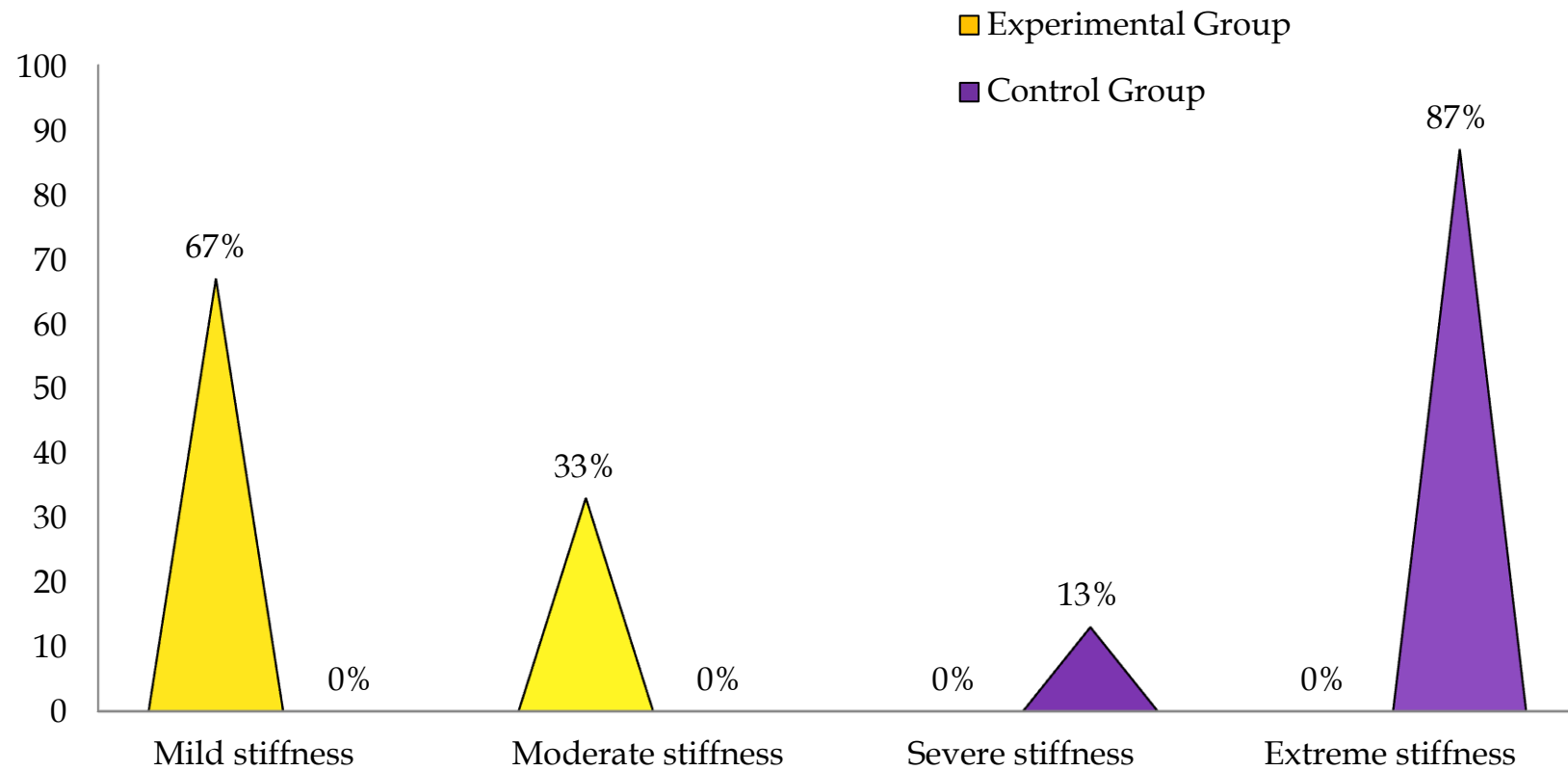
**Fig : 12 Percentage distribution of posttest level of joint pain among patients with osteoarthritis in experimental and control group**

**TABLE: 6** Frequency and percentage distribution of posttest level of stiffness among patients with osteoarthritis in Experimental and control group:

$n_1 = 30, n_2 = 30$

S.NO	LEVEL OF STIFFNESS	EXPERIMENTAL GROUP		CONTROL GROUP	
		F	%	F	%
1.	None (no stiffness)	-	-	-	-
2.	Mild stiffness	20	67	-	-
3.	Moderate stiffness	10	33	-	-
4.	Severe stiffness	-	-	4	13
5.	Extreme stiffness	-	-	26	87

**Table: 6** depicts that, in experimental group in posttest majority 20(67%) had mild level of stiffness and 10(33%) had moderate level of stiffness, whereas in the control group 26(87%) of them had extreme level of stiffness and 4(13%) had severe level of stiffness.(**fig:13**)



**POSTTEST LEVEL OF STIFFNESS**

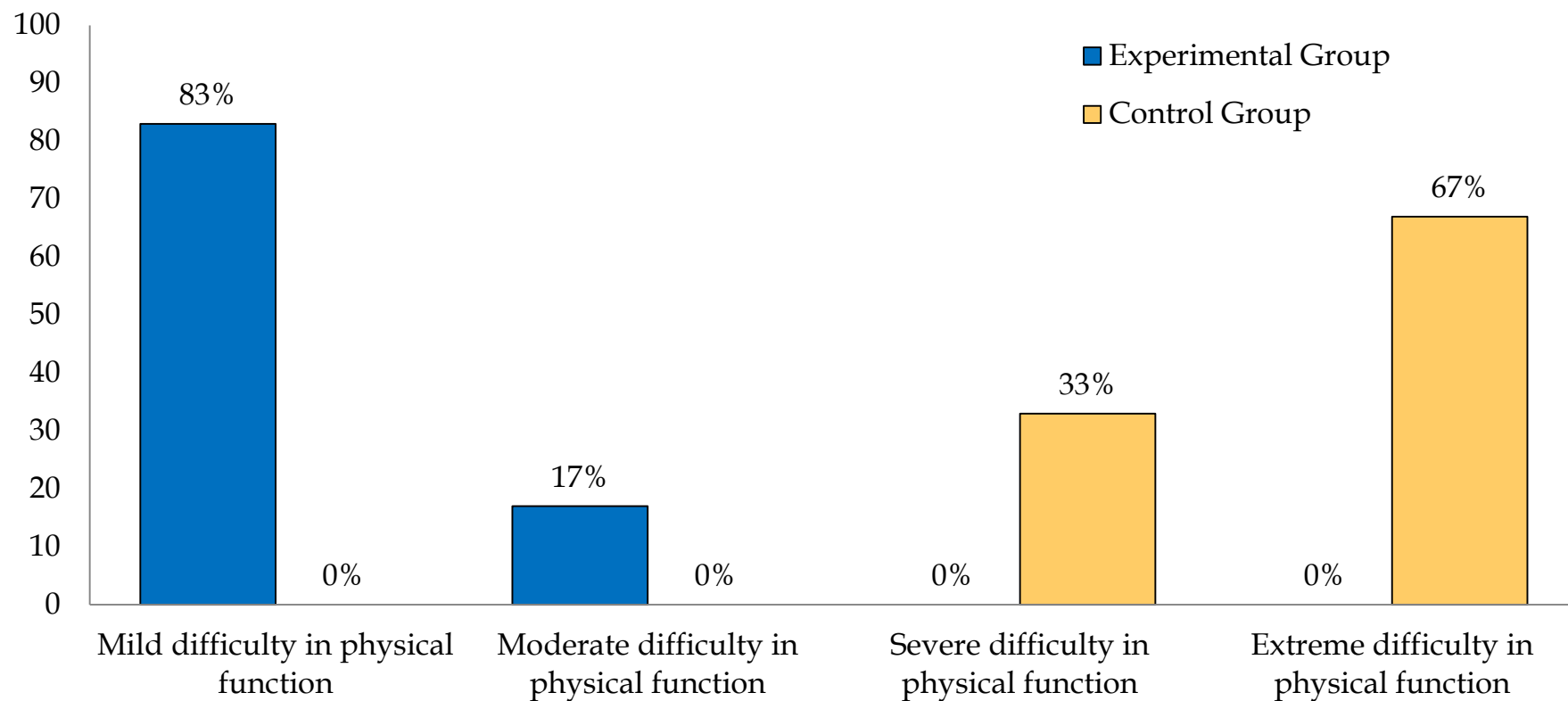
**Fig : 13 Percentage distribution of posttest level of stiffness among patients with osteoarthritis in experimental and control group**

**TABLE: 7** Frequency and percentage distribution of posttest level of physical function among patients with osteoarthritis in experimental and control group:

$n_1 = 30, n_2 = 30$

S.NO	LEVEL OF PHYSICAL FUNCTION	EXPERIMENTAL GROUP		CONTROL GROUP	
		f	%	F	%
1.	None (no difficulty in physical function)	-	-	-	-
2.	Mild difficulty in physical function	25	83	-	-
3.	Moderate difficulty in physical function	5	17	-	-
4.	Severe difficulty in physical function	-	-	10	33
5.	Extreme difficulty in physical function	-	-	20	67

**Table: 7** depicts that, in experimental group in posttest majority 25(83%) had mild level of difficulty in physical function, and 5(17%) had moderate level of difficulty in physical function. Where as in the control group 20(67%) of them had extreme level of difficulty in physical function and 10(33%) of them had severe level of difficulty in physical function.(**Fig: 14**)



**POSTTEST LEVEL OF PHYSICAL FUNCTION**

**Fig : 14 Percentage distribution of posttest level of physical function among patients with osteoarthritis in experimental and control group**



**SECTION D : Comparison between the pretest and posttest level of joint pain, stiffness and physical function among patients with osteoarthritis in experimental group.**

**TABLE8:** Comparison of mean, standard deviation and paired 't' value of pretest and posttest level of joint pain among patients with osteoarthritis in experimental group.

n=30

S. No	Variable	Mean	Standard deviation	Mean difference	Paired 't' test	Table value
1.	Pretest	14.2	13.6	5.7	34.06	2.045
2.	Posttest	8.5	1.71			

df=29

p<0.05

**Table 8** showed that the mean pretest scores of level of joint pain in experimental group is 14.2 (SD  $\pm$  13.6) and posttest mean score is 8.5 (SD  $\pm$  1.71) and mean difference is 5.7. The posttest mean score (8.5) was lower than the pretest mean score is (14.2) The paired 't' value was 34.06 which was significant at P< 0.05 level , which showed that hot foot bath with Epsom salt intervention is effective in reducing the joint pain. Hence, H<sub>1</sub> the mean posttest level of joint pain score is significantly lower than the mean pretest level of joint pain score among patients with osteoarthritis in experimental group was accepted.

**TABLE 9 :** Comparison of mean, standard deviation and paired ‘t’ value of pretest and posttest level of stiffness among patients with osteoarthritis in experimental group.

n=30

S. No	Variable	Mean	Standard deviation	Mean difference	Paired ‘t’ test	Table value
1.	Pretest	11.6	17.4	9.5	28.3	2.045
2.	Posttest	2.1	0.78			

df=29

p<0.05

**Table 9** showed that the mean pretest scores of level of stiffness in experimental group is 11.6 (SD  $\pm$ 17.4) and posttest mean score is 2.1 (SD  $\pm$  0.78) and mean difference is 9.5. The posttest mean score (2.1) was lower than the pretest mean score (11.6). The paired ‘t’ value was 28.3 which was significant at  $P < 0.05$  level, which showed that the hot foot with Epsom salt intervention is effective in reducing stiffness. Hence,  $H_2$  the mean posttest level of joint pain score is significantly lower than the mean pretest level of stiffness score among patients with osteoarthritis in experimental group was accepted.

**TABLE 10 :** Comparison of mean, standard deviation and paired ‘t’ value of pretest and posttest level of physical function among patients with osteoarthritis in experimental group.

n=30

S. No	Variable	Mean	Standard deviation	Mean difference	Paired ‘t’ test	Table value
1.	Pretest	264.06	262.4	255.4	61.2	2.045
2.	Posttest	8.6	16.7			

df=29

p<0.05

**Table 10** showed that the mean pretest scores of level of difficulty in physical function in experimental group is 264.06(SD  $\pm$ 262.4) and posttest mean scores 8.6 (SD  $\pm$  16.7) and mean difference is 255.4. The posttest mean scores (8.6) was lower than the pretest mean scores (264.06). The paired ‘t’ value was 61.2 which was significant at P< 0.05 level , which showed that the hot foot with Epsom salt intervention is effective in improving the physical function. Hence, H<sub>3</sub> the mean posttest level of physical function scores is significantly lower than the mean pretest level of physical function scores among patients with osteoarthritis in experimental group was accepted.

**SECTION E** : Find out the effectiveness of hot foot bath with Epsom salt on level of joint pain among patients with osteoarthritis between experimental and control group.

**TABLE 11** : Comparison of mean, standard deviation and independent 't' value of posttest level of joint pain among patients with osteoarthritis between experimental and control group.

$n_1=30, n_2=30$

S. No	Group	Mean	Standard deviation	Mean difference	Independent 't' value	Table value
1.	Experimental group	8.5	1.71	7.5	13.3	2.002
2	Control group	16	2.04			

df=58

$p < 0.05$

**Table 11** showed that the mean posttest of level of joint pain scores in experimental group 8.5(SD± 1.71) was significantly lower than the mean posttest level of joint pain scores in control group 16 (SD ± 2.04) and mean difference is 7.5. The Independent 't' value was 13.3 which was significant at  $P < 0.05$  level. Hence,  $H_0$  the mean posttest level of joint pain scores in experimental group is significantly lower than the mean posttest level of joint pain scores in control group was accepted.

**SECTION F** : Find out the effectiveness of hot foot bath with Epsom salt on level of stiffness among patients with osteoarthritis between experimental and control group.

**TABLE 12** : Comparison of mean, standard deviation and independent 't' value of posttest level of stiffness among patients with osteoarthritis between experimental and control group.

$n_1=30, n_2=30$

S. No	Group	Mean	Standard deviation	Mean difference	Independent 't' value	Table value
1.	Experimental group	2.1	0.78	5.4	30.6	2.002
2	Control group	7.5	1.58			

df=58

$p < 0.05$

**Table 12** Showed that the mean posttest of level of stiffness scores in experimental group 2.1(SD± 0.78) was significantly lower than the mean posttest level of stiffness score in control group 7.5 (SD ± 1.58) and mean difference is 5.4. The Independent 't' value was 30.6 which was significant at  $P < 0.05$  level. Hence,  $H_5$  the mean posttest level of stiffness score in experimental group is significantly lower than the mean posttest level of stiffness score in control group was accepted.

**SECTION G** : Find out the effectiveness of hot foot bath with Epsom salt on level of physical function among patients with osteoarthritis between experimental and control group.

**TABLE 13** : Comparison of mean, standard deviation and independent 't' value of posttest level of difficulty in physical function among patients with osteoarthritis between experimental and control group.

$n_1=30, n_2=30$

S. No	Group	Mean	Standard deviation	Mean difference	Independent 't' value	Table value
1.	Experimental group	8.6	16.7	54.4	81.5	2.002
2	Control group	63	19.2			

df=58

$p < 0.05$

**Table 13** showed that the mean posttest of level of difficulty in physical function scores in experimental group 8.6(SD± 16.7) was significantly lower than the mean posttest level of difficulty in physical function scores in control group 63 (SD ± 19.2) and mean difference is 54.4. The Independent 't' value was 81.5 which was significant at  $P < 0.05$  level. Hence,  $H_0$  the mean posttest level of physical function scores in experimental group is significantly lower than the mean posttest level of physical function scores in control group was accepted.

**SECTION H : Association between the mean posttest level of joint pain among patients with osteoarthritis and their selected demographic variables in experimental group.**

**TABLE 14 : Association between the mean posttest level of joint pain among patients with osteoarthritis and their selected demographic variables in experimental group.**

**n = 30**

s. No	Demographic Variables	Level of Joint Pain										Chi-Square Value	Table Value	Inference
		No pain		Mild pain		Moderate pain		Severe pain		Extreme pain				
		F	%	F	%	F	%	F	%	F	%			
1	<b>Age in years</b>											1.977	7.82 df=3	NS
1.1	50-53 years	-	-	1	3	2	7	-	-	-	-			
1.2	54-57 years	-	-	1	3	11	37	-	-	-	-			
1.3	58-62 years	-	-	3	10	7	23	-	-	-	-			
1.4	63-65 years	-	-	1	4	4	13	-	-	-	-			
2	<b>Sex</b>											0.832	3.84 df=1	NS
2.1	Male	-	-	4	13	11	37	-	-	-	-			
2.2	Female	-	-	2	7	13	43	-	-	-	-			
3	<b>Educational status</b>											6.342	7.82 df =3	NS
3.1	Primary school education	-	-	1	3.4	7	23.3	-	-	-	-			
3.2	Higher secondary education	-	-	4	13.	7	23.4	-	-	-	-			
3.3	Degree holder	-	-	1	2	3	10	-	-	-	-			
3.4	No formal education	-	-	-	3.4	7	23.3	-	-	-	-			
4	<b>Religion</b>											0.26	5.99 df =2	NS
4.1	Hindu	-	-	5	17	19	63.4	-	-	-	-			
4.2	Christian	-	-	1	3	4	13.3	-	-	-	-			
4.3	Muslim	-	-	-	-	1	3.3	-	-	-	-			

s. No	Demographic Variables	Level of Joint Pain										Chi-Square Value	Table Value	Inference	
		No pain		Mild pain		Moderate pain		Severe pain		Extreme pain					
		F	%	F	%	F	%	F	%	F	%				
5	<b>Occupation</b>														
5.1	Private employee	-	-	-	-	3	10	-	-	-	-	0.820	7.28 df =3	NS	
5.2	Government employee	-	-	1	3	3	10	-	-	-	-				
5.3	Self employed	-	-	2	7	7	23	-	-	-	-				
5.4	Unemployed	-	-	3	10	11	37	-	-	-	-				
6	<b>Monthly income</b>														
6.1	Rs 5000 -8000	-	-	-	-	6	20	-	-	-	-	4.306	7.28 df =3	NS	
6.2	Rs 8001 -12,000	-	-	4	13.3	4	13.3	-	-	-	-				
6.3	Rs 12,001 -15,000	-	-	2	6.7	9	30	-	-	-	-				
6.4	Above 15001	-	-	-	-	5	16.7	-	-	-	-				
7	<b>Duration of illness</b>														
7.1	1 - 2 years	-	-	3	10	6	20	-	-	-	-	0.287	5.99 df =2	NS	
7.2	3 - 4 years	-	-	1	3	7	23	-	-	-	-				
7.3	5 – 6 years	-	-	2	7	11	37	-	-	-	-				
7.4	7 - 8 years	-	-	-	-	-	-	-	-	-	-				

**P<0.05**

**S- Significant**

**NS- Non significant**

**Table 14** Chi Square values were calculated to find out the association between posttest level of joint pain scores among patients with osteoarthritis and their demographic variables. The findings revealed that there was no significant association with demographic variables at P<0.05 level of significance in experimental group. Hence, **H<sub>7</sub>** there was no significance association between the posttest level of joint pain score among patients with osteoarthritis and their selected demographic variables in experimental group was accepted.



**SECTION I** : Association between the mean posttest level of stiffness among patients with osteoarthritis and their selected demographic variables in experimental group.

**TABLE 15** : Association between the mean posttest level of stiffness among patients with osteoarthritis and their selected demographic variables in experimental group .

n = 30

s. No.	Demographic Variables	Level of stiffness										Chi-Square Value	Table Value	Inference	
		None		Mild stiffness		Moderate stiffness		Severe stiffness		Extreme stiffness					
		F	%	F	%	F	%	F	%	F	%				
1	<b>Age in years</b>														
1.1	50-53 years	-	-	2	7	1	3	-	-	-	-	2.704	7.82	NS	
1.2	54-57 years	-	-	9	30	3	10	-	-	-	-				df=3
1.3	58-62 years	-	-	6	20	4	13	-	-	-	-				
1.4	63-65 years	-	-	3	10	2	7	-	-	-	-				
2	<b>Sex</b>														
2.1	Male	-	-	11	37	4	13	-	-	-	-	0.6	3.84	NS	
2.2	Female	-	-	9	30	6	20	-	-	-	-				df=1
3	<b>Educational status</b>														
3.1	Primary school education	-	-	5	17	3	10	-	-	-	-	0.765	7.82	NS	
3.2	Higher secondary education	-	-	7	23	4	13	-	-	-	-				df=3
3.3	Degree holder	-	-	3	10	1	3	-	-	-	-				
3.4	No formal education	-	-	5	17	2	7	-	-	-	-				

s. No.	Demographic Variables	Level of stiffness										Chi-Square Value	Table Value	Inference	
		None		Mild stiffness		Moderate stiffness		Severe stiffness		Extreme stiffness					
		F	%	F	%	F	%	F	%	F	%				
4	<b>Religion</b>														
4.1	Hindu	-	-	16	54	8	27	-	-	-	-	0.693	5.99 df =2	NS	
4.2	Christian	-	-	3	10	2	6	-	-	-	-				
4.3	Muslim	-	-	1	3	-	-	-	-	-	-				
5	<b>Occupation</b>														
5.1	Private employee	-	-	2	7	1	3	-	-	-	-	0.173	7.28 df =3	NS	
5.2	Government employee														
	Self employed	-	-	3	10	1	3	-	-	-	-				
5.3	Unemployed	-	-	6	20	3	10	-	-	-	-				
5.4		-	-	9	30	5	17	-	-	-	-				
6	<b>Monthly income</b>														
6.1	Rs 5000 -8000	-	-	5	17	1	3	-	-	-	-	4.186	7.28 df =3	NS	
6.2	Rs 8001 -12,000	-	-	5	17	3	10	-	-	-	-				
6.3	Rs 12,001 -15,000	-	-	10	33	1	3	-	-	-	-				
6.4	Above 15001	-	-	-	-	5	17	-	-	-	-				
7	<b>Duration of illness</b>														
7.1	1 - 2 years	-	-	-	-	9	30	-	-	-	-	2.873	7.28 df =3	NS	
7.2	3 - 4 years	-	-	8	27	-	-	-	-	-	-				
7.3	5 – 6 years	-	-	12	40	1	3	-	-	-	-				
7.4	7 - 8 years	-	-	-	-	-	-	-	-	-	-				

**P<0.05**

**S- Significant**

**NS- Non significant**

**Table 15** Chi Square values were calculated to find out the association between posttest level of stiffness scores among patients with osteoarthritis and their demographic variables. The findings revealed that there was no significant association with demographic variables at  $P < 0.05$  level of significance in experimental group. Hence,  $H_8$  there was no significant association between the posttest level of stiffness scores among patients with osteoarthritis and their selected demographic variables in experimental group was accepted.

**SECTION J : Association between the mean posttest level of physical function among patients with osteoarthritis and their selected demographic variables in experimental group.**

**TABLE 16 : Association between the mean posttest level of difficulty in physical function among patients with osteoarthritis and their selected demographic variables in experimental group.**

n = 30

s. No	Demographic Variables	Level of physical function										Chi-Square Value	Table Value	Inference	
		None		Mild difficulty in physical function		Moderate difficulty in physical function		Severe difficulty in physical function		Extreme difficulty in physical function					
		F	%	F	%	F	%	F	%	F	%				
1	<b>Age in years</b>														
1.1	50-53 years	-	-	2	6.6	1	3.2	-	-	-	-	0.765	7.82	NS	
1.2	54-57 years	-	-	12	40	-	-	-	-	-	-				
1.3	58-62 years	-	-	8	26.6	2	6.6	-	-	-	-				
1.4	63-65 years	-	-	3	10	2	6.6	-	-	-	-				
2	<b>Sex</b>														
2.1	Male	-	-	10	33.3	5	16.7	-	-	-	-	0.6	3.84	NS	
2.2	Female	-	-	15	50	-	-	-	-	-	-				
3	<b>Educational status</b>														
3.1	Primary school education	-	-	6	20	2	6.7	-	-	-	-	2.704	7.82	NS	
3.2	Higher secondary education	-	-	9	30	2	6.7	-	-	-	-				
3.3	Degree holder	-	-	4	13.4	-	-	-	-	-	-				
3.4	No formal education	-	-	6	20	1	3.2	-	-	-	-				

s. No	Demographic Variables	Level of physical function										Chi-Square Value	Table Value	Inference	
		None		Mild difficulty in physical function		Moderate difficulty in physical function		Severe difficulty in physical function		Extreme difficulty in physical function					
		F	%	F	%	F	%	F	%	F	%				
4	<b>Religion</b>														
4.1	Hindu	-	-	20	66	4	13.6	-	-	-	-	0.693	7.82	NS	
4.2	Christian	-	-	5	17	-	-	-	-	-	-				
4.3	Muslim	-	-	-	-	1	3.4	-	-	-	-				
5	<b>Occupation</b>														
5.1	Private	-	-	2	7	1	3.4	-	-	-	-	2.873	7.28	NS	
5.2	employee														
5.3	Government employee	-	-	4	13	-	-	-	-	-	-				
5.4	Self employed	-	-	5	17	4	13.6	-	-	-	-				
5.4	Unemployed	-	-	14	46	-	-	-	-	-	-				
6	<b>Monthly income</b>														
6.1	Rs 5000 -8000	-	-	5	17	1	3.5	-	-	-	-	4.186	7.28	NS	
6.2	Rs 8001 - 12,000	-	-	5	17	3	10	-	-	-	-				
6.3	Rs 12,001 - 15,000	-	-	11	36	-	-	-	-	-	-				
6.4	Above 15001	-	-	4	13	1	3.5	-	-	-	-				
7	<b>Duration of illness</b>														
7.1	1 - 2 years	-	-	7	23	2	7	-	-	-	-	0.173	7.28	NS	
7.2	3 - 4 years	-	-	7	23	1	3	-	-	-	-				
7.3	5 – 6 years	-	-	11	37	2	7	-	-	-	-				
7.4	7 - 8 years	-	-	-	-	-	-	-	-	-	-				

**P<0.05**

**S- Significant**

**NS- Non significant**

**Table 16** Chi Square values were calculated to find out the association between posttest level of difficulty in physical function scores among patients with osteoarthritis and their demographic variables. The findings revealed that there was no significant association with demographic variables at  $p < 0.05$  level of significance in experimental group. Hence,  $H_0$  there was no significant association between the posttest level of physical function scores among patients with osteoarthritis and their selected demographic variables in experimental group was accepted.

## **CHAPTER- V**

### **DISCUSSION**

The discussion chapter deals with sample characteristics and objectives of the study. The aim of the present study was to evaluate the effectiveness of hot foot bath with Epsom salt on joint pain, stiffness, and physical function among patients with osteoarthritis.

#### **DISTRIBUTION OF SAMPLE CHARACTERISTICS:**

The demographic characteristics of patients with osteoarthritis were age, sex, educational status, religion, occupation, family monthly income and duration of illness.

In experimental group, majority of patients 12 (40%) belonged to the age group of 54-57 years, 10(33%) belonged to the age group of 58-62 years, 5(17%) belonged to the age group of 63-65, 3(10%) belonged to the age group of 50-53 years. In control group, majority of patients 9(30%) belonged to the age group of 50-53 years, 8(27%) belonged to the age group of 54-57 years, 7(23%) belonged to the age group of 58-62 years and 6(20%) belonged to the age group of 63-65 years.

**A Shane Anderson. et.al., (2010)** Who reported that the prevalence of radiographic OA increased with each decade of life from 33% among those aged 60-70 to 43.7% among those over 80 years of age. The prevalence of symptomatic knee OA in all subjects was 9.5% and increased with age in women but not men.

Regarding sex, in experimental group, majority of patients 15 (50%) were males, 15(50%) were females. In control group, majority of patients 16(53%) were males, 14(47%) were females.

**Chandra Prakash Pal et. al.,( 2016)** Who reported that the association of gender and OA of this study is in congruence with the Available literature on knee OA. OA of the knees was found to be more prevalent in females (31.6%) than in males (28.1%). This findings is statistically significant ( $p=0.007$ ).

In experimental group, majority of patients 11 (37%) had higher secondary school education, 8(26%) had primary school education, 7(24%) had no formal education, 4(13%) were degree holders. In control group majority of patients 8(27%) had higher secondary school education, 8(27%) were degree holders, 8(27%) had no formal education, 6(20%) had primary school education.

This study was consistent with the findings of **Rajvir Kaur. et. al., (2015)** educational status was found to be significantly associated with prevalence of KOA. Less educated study subjects were found to have more prevalence than literates.

In experimental group, majority of the patients 24(80%) were Hindus, 5(17%) were Christians, and 1(3%) was a Muslim. In control group majority of patients 11(37%) were Muslims, 10(33%) were Christians, 9(30%) were Hindus.

In experimental group, regarding occupational status, majority of patients 14(47%) were un employed, 9(30%) were self-employee, 4(13%) were government employee, and 3(10%) were private employee. In control group, majority 9(30%) were unemployed, 9(30%) were self-employed, 7(23%) were government employee, and 5(17%) were private employee.

In experimental group, regarding family monthly income majority 11(37%) were earning between Rs 12,001-Rs 15,000, 8(27%) were earning between Rs.8, 001-Rs.12,000 , 6(20%) were earning between Rs 5000-Rs.8000, and 5(16%) were earning between above Rs.15,001. In control group, majority 10(34%) had an income between Rs.12,001-15,000, 7(23%)



were earning between Rs.5000-8000, and 7(23%) were earning above 15001, 6(20%) were earning between Rs 8001-12,000.

In experimental group, regarding duration of illness, in experimental group majority of the patients with osteoarthritis 13(43%) had duration of illness for 5-6 years, 9(30%) had duration of illness for 1-2 years and 8(27%) had duration of illness for 3 to 4 years. In control group majority 9(30%) had duration of illness between 5-6 years, 8(27%) had duration of illness for 1-2 years, 8(27%) had duration of illness for 3 to 4 years and 5(16%) had the illness for 7-8 years.

This study was consistent with the findings of **Grena,J. et.al., (2016)** with regard to duration of illness, majority of patients 12 (40%) were in more than 1 year to 2 years of illness, whereas in control group also majority of patients were in 14 (46%) were in more than 1 year to 2 years of illness. With regard to duration of treatment, majority of patients were in 16 (54%) were in more than 1 year to 2 years of treatment, whereas in control group also the majority of patients were in 16 (54%) were in the category of 6 months to 1 year of treatment.

## **FINDINGS OF THE STUDY WERE DISCUSSED ACCORDING TO THE OBJECTIVES AS FOLLOWS:**

### **OBJECTIVES :**

1. To assess the pretest and posttest level of joint pain, stiffness, and physical function among patients with osteoarthritis in experimental and control group.
2. To compare the pretest and posttest level of joint pain, stiffness, and physical function among patients with osteoarthritis in experimental group.
3. To compare the posttest level of joint pain, stiffness, and physical function among patients with osteoarthritis between experimental and control group.

4. To find the association between the posttest level of joint pain among patients with osteoarthritis and their selected demographic variables.
5. To find the association between the posttest level of stiffness among patients with osteoarthritis and their selected demographic variables.
6. To find the association between the posttest level of physical function among patients with osteoarthritis and their selected demographic variables.

### **OBJECTIVE:1**

**To assess the pretest and posttest level of joint pain, stiffness, and physical function among patients with osteoarthritis in experimental and control group.**

In experimental group, in pretest majority 22(73%) had severe level of joint pain and 8(27%) had extreme level of joint pain, where as in the control group 21(70%) of them had severe level of joint pain and 9(30%) had extreme level of joint pain. In experimental group, posttest majority 24(80%) had moderate level of joint pain and 6(20%) had mild level of joint pain, where as in the control group 16(53%) of them had extreme level of joint pain, 14(47%) had severe level of joint pain.

**International journal of innovative research and development.,(2015)**who reported that in pretest out of 30 samples majority of them have severe joint pain 15(50%), 10(33%) of them were having moderate knee pain and 5(17%) have mild pain and none of them having no pain. In posttest out of 30 samples majority of them got relieved from knee joint pain 8(27%) and 18(60%) of them were having mild knee pain and 4(13.3%) have moderate pain and none of them have severe and extreme pain.

In experimental group pretest majority 28(93%) had extreme level of stiffness and 2(7%) had severe level of stiffness, where as in the control group 29(97%) of them had extreme level of stiffness and 1(3%) had severe level of stiffness. In experimental group in posttest majority 20(67%) had mild level of stiffness and 10(33%) had moderate level of stiffness, where as in the control group 26(87%) of them had extreme level of stiffness and 4(13%) had severe level of stiffness.

In experimental group in pretest majority 28(93%) had extreme level of difficulty in physical function and 2(7%) had severe level of difficulty in physical function, where as in the control group 26(87%) of them had extreme level of difficulty in physical function and 4(3%) of them had severe level of difficulty in physical function. In experimental group in posttest majority 25(83%) had mild level of difficulty in physical function, and 5(17%) had moderate level of difficulty in physical function. Where as in the control group 20(67%) of them had extreme level of difficulty in physical function and 10(33%) of them had severe level of difficulty in physical function.

This study findings are consistent with the findings of **SorubaRani.et.al., (2016)**, Who reported that the experimental group the pretest, majority 23(76.67%) had severe level of knee related symptoms, 6(20%) had extreme level of knee related symptoms and only one (3.3%) had mild level of knee related symptoms. Whereas in the post test majority 24(80%) had moderate level of knee related symptoms and 6(20%) had mild level of knee related symptoms. In control group the pretest, majority 28(93.34%) had severe level of knee related symptoms and 2(6.67%) had extreme level of knee related symptoms. Whereas in the post test which routine measures, 27(90%) had severe level of knee related symptoms, 2(6.67%) had moderate level of knee related symptoms and only one (3.33%) had extreme level of knee related symptoms.

**OBJECTIVE: 2 To compare the pretest and posttest level of joint pain, stiffness, and physical function among patients with osteoarthritis in experimental group.**

Data analysis showed that, the mean pretest scores of level of joint pain scores in experimental group is 14.2 (SD  $\pm$  13.6) and posttest mean scores is 8.5 (SD  $\pm$  1.71) and mean difference is 5.7. The posttest mean scores (8.5) was lower than the pretest mean scores (14.2) The paired 't' value was 34.06 which was significant at  $P < 0.05$  level , which showed that hot foot bath with Epsom salt intervention was effective in reducing joint pain. The mean pretest scores of level of stiffness scores in experimental group is 11.6 (SD  $\pm$ 17.4) and posttest mean scores 2.1 (SD  $\pm$  0.78) and mean difference is 9.5. The posttest mean scores (2.1) was lower than the pretest mean scores (11.6) The paired 't' value was 28.3 which was significant at  $P < 0.05$  level , which showed that hot foot with Epsom salt intervention was effective in reducing stiffness. The mean pretest scores of level of difficulty in physical function scores in experimental group is 264.06(SD  $\pm$ 262.4) and posttest mean scores 8.6 (SD  $\pm$  16.7) and mean difference is 255.4. The posttest mean scores (8.6) was lower than the pretest mean scores (264.06) The paired 't' value was 61.2 which was significant at  $P < 0.05$  level , which showed that hot foot with Epsom salt intervention was effective in improving the physical function.

This study findings are consistent with the findings of **SorubaRani.et.al.,(2016)**, Who reported that the experimental group pretest mean score of knee related symptoms was  $41.3 \pm 4.41$  and the posttest mean score of knee related symptoms was  $19.90 \pm 3.97$ . The calculated paired 't' value of  $t=31.052$  was found to be statistically significant at  $p < 0.001$  level.

**OBJECTIVE: 3 To compare the post-test level of joint pain, stiffness, and physical function among patients with osteoarthritis between experimental and control group.**

Data analysis showed that, the mean posttest of level of joint pain scores in experimental group 8.5(SD± 1.71) was significantly lower than the mean posttest level of joint pain scores in control group 16 (SD ± 2.04) and mean difference is 7.5. The Independent 't' value was 13.3 which was significant at P < 0.05 level. The mean posttest of level of stiffness scores in experimental group 2.1 (SD ± 0.78) was significantly lower than the mean posttest level of stiffness scores in control group 7.5 (SD ± 1.58) and mean difference is 5.4. The Independent 't' value was 30.6 which was significant at P < 0.05 level. The mean posttest of level of difficulty in physical function scores in experimental group 8.6(SD± 16.7) was significantly lower than the mean posttest level of difficulty in physical function scores in control group 63 (SD ± 19.2) and mean difference is 54.4. The Independent 't' value was 81.5 which was significant at P < 0.05 level which showed that hot foot with Epsom salt intervention was effective in reducing the level of joint pain, stiffness and in improving the physical function in experimental group

This study findings are consistent with the findings of **SorubaRani.et.al., (2016)** Who reported that the experimental group posttest men score was 19.90 ± 3.97 and control group posttest men score was 36.46 ± 4.30 calculated t value 15.482 was statistically significant at p<0.001 level.

**OBJECTIVE: 4To find the association between the posttest level of joint pain among patients with osteoarthritis and their selected demographic variables in experimental group.**

Chi Square values were calculated to find out the association between posttest level of joint pain scores among patients with osteoarthritis and their demographic variables. The findings revealed that there was no significant

association with demographic variables in experimental group at  $P < 0.05$  level of significance.

**OBJECTIVE: 5 To find the association between the posttest level of stiffness among patients with osteoarthritis and their selected demographic variables in experimental group.**

Chi Square values were calculated to find out the association between posttest level of stiffness scores among patients with osteoarthritis and their demographic variables. The findings revealed that there was no significant association with demographic variables in experimental group at  $P < 0.05$  level.

**OBJECTIVE : 6 To find the association between the posttest level of physical function among patients with osteoarthritis and their selected demographic variables in experimental group.**

Chi Square values were calculated to find out the association between posttest level of difficulty in physical function scores among patients with osteoarthritis and their demographic variables. The findings revealed that there was no significant association with demographic variables in experimental group at  $P < 0.05$  level.

This study findings are consistent with the findings of **Dougados et.al., (2016)** Who reported that the studies of multiple linear regression analysis performed at baseline showed that all the clinical measures (pain, physical functional disability) explained only 0.4% of the variations in radiographic osteoarthritis (chi-square test  $p=0.4$ ) and it showed that there is no significant association with joint pain and physical function with selected demographical variables.

## **CHAPTER VI**

### **SUMMARY, CONCLUSION, IMPLICATIONS, RECOMMENDATION AND LIMITATIONS**

**This chapter is discussed under 5 headings**

1. Summary
2. Conclusion
3. Implications
4. Recommendation
5. Limitation

#### **SUMMARY OF THE STUDY**

The aim of the study was to evaluate the effectiveness of hot foot bath with Epsom salt on joint pain, stiffness, and physical function among patients with osteoarthritis. The design used for the present study was Quasi experimental nonequivalent control group pretest and posttest design. The conceptual frame work was based on Modified Wiedenbach's helping art of clinical nursing theory (1964). Sample size was 60 out of which 30 were in experimental group and 30 were in control group. The samples were selected by non-probability convenience sampling technique. The data collection period was 4 weeks.

Patients were divided in to 3 groups. On the first day 10 samples were selected for experimental group and 10 for control group and data pertaining to the demographic variables were collected by interview then pretest was conducted by using Womac osteoarthritis index scale by structured interview schedule in both groups. From 1<sup>st</sup> day onwards hot foot bath with Epsom salt intervention was given to the experimental group individually for 20 minutes

daily once in the morning and continued for 10 days. On the 10<sup>th</sup> day post test was conducted for the experimental and control group by using the same scale. Same procedure was continued for the other 2 groups in experimental and control group.

The data were analyzed by using descriptive and inferential statistics.

## **MAJOR FINDINGS OF THE STUDY**

The major findings were,

- In experimental group, majority of patients 12 (40%) belonged to the age group of 54-57 years. In control group, majority of patients 9(30%) belonged to the age group of 50-53 years.
- In experimental group, majority of patients 15 (50%) were males, 15(50%) were females. In control group, majority of patients 16(53%) were males, 14(47%) were females.
- In experimental group, majority of patients 11 (37%) had higher secondary school education. In control group majority of patients 8(27%) had higher secondary school education.
- In experimental group, majority of the patients 24(80%) were Hindus, 5(17%) were Christians, and 1(3%) was a Muslim. In control group majority of patients 11(37%) were Muslims, 10(33%) were Christians, 9(30%) were Hindus.
- In experimental group, regarding occupational status, majority of patients 14(46.6%) were un employed and 3(10%) were private employee. In control group, majority 9(30%) were unemployed.
- In experimental group, regarding family monthly income majority 11(37%) were earning between Rs 12,001-Rs 15,000. In



control group, majority 10(34%) had an income between Rs.12,001-15,000.

- In experimental group, regarding duration of illness, in experimental group majority of the patients with osteoarthritis 13(43%) had duration of illness for 5-6 years. In control group majority 9(30%) had duration of illness between 5-6 years.

With regard to level of joint pain, the paired 't' value in experimental group, the mean pre-test scores of level of joint pain is 14.2 (SD  $\pm$  13.6) and post-test mean score is 8.5 (SD  $\pm$  1.71) and mean difference is 5.7. The post-test mean score (8.5) was lower than the pre-test mean score (14.2). The paired 't' value was 34.06 which was significant at  $P < 0.05$  level, which showed that the hot foot bath with Epsom salt intervention was effective in reducing joint pain.

With regard to level of stiffness, the paired 't' value in experimental group, the mean pretest scores of level of stiffness is 11.6 (SD  $\pm$ 17.4) and posttest mean score is 2.1 (SD  $\pm$  0.78) and mean difference is 9.5. The posttest mean score (2.1) was lower than the pretest mean score (11.6) The paired 't' value was 28.3 which was significant at  $P < 0.05$  level , which showed that the hot foot with Epsom salt intervention was effective in reducing stiffness.

With regard to level of physical function, the paired 't' value in experimental group, the mean pretest scores of level of difficulty in physical function is 264.06(SD  $\pm$ 262.4) and posttest mean score is 8.6 (SD  $\pm$  16.7) and mean difference is 255.4. The posttest mean score (8.6) was lower than the pretest mean score (264.06) The paired 't' value was 61.2 which was significant at  $P < 0.05$  level , which showed that the hot foot with Epsom salt intervention was effective in improving the physical function.

The mean posttest of level of joint pain scores in experimental group 8.5(SD± 1.71) was significantly lower than the mean posttest level of joint pain scores in control group 16 (SD ± 2.04) and the mean difference is 7.5. The Independent 't' value was 13.3 which was significant at P < 0.05 level which showed that hot foot bath with Epsom salt was effective in reducing the joint pain.

The mean post-test of level of stiffness scores in experimental group 2.1 (SD ± 0.78) was significantly lower than the mean posttest level of stiffness scores in control group 7.5 (SD ± 1.58) and mean difference is 5.4. The Independent 't' value was 30.6 which was significant at P < 0.05 level which showed that hot foot bath with Epsom salt was effective in reducing the stiffness.

The mean posttest of level of difficulty in physical function scores in experimental group 8.6(SD± 16.7) was significantly lower than the mean posttest level of difficulty in physical function scores in control group 63 (SD ± 19.2) and mean difference is 54.4. The Independent 't' value was 81.5 which was significant at P < 0.05 level which showed that hot foot bath with Epsom salt was effective in improving the physical function.

In experimental group the association between posttest level of joint pain scores among patients with osteoarthritis and their demographic variables using Chi Square value, revealed that there was no significant association with demographic variables at P< 0.05 level.

In experimental group the association between posttest level of stiffness scores among patients with osteoarthritis and their demographic variables using Chi Square value, revealed that there was no significant association with their demographic variables at P< 0.05 level.

In experimental group the association between posttest level of difficulty in physical function scores among patients with osteoarthritis and their demographic variables using Chi Square value, revealed that there was no significant association with their demographic variables at  $P < 0.05$  level.

The findings showed that practicing hot foot bath with Epsom salt played an important role in reducing the joint pain, stiffness, and improved in the physical function among patients with osteoarthritis.

### **CONCLUSION:**

The present study was conducted to evaluate the effectiveness of hot foot bath with Epsom salt on joint pain, stiffness and physical function among patients with osteoarthritis. The mean posttest level of joint pain scores in experimental group 8.5(SD $\pm$  1.71) was significantly lower than the mean posttest level of joint pain scores in control group 16 (SD  $\pm$  2.04) and mean difference is 7.5. The Independent 't' value was 13.3 which was significant at  $P < 0.05$  level. The mean posttest of level of stiffness scores in experimental group 2.1 (SD  $\pm$  0.78) was significantly lower than the mean posttest level of stiffness scores in control group 7.5 (SD  $\pm$  1.58) and mean difference is 5.4. Independent 't' value was 30.6 which was significant at  $P < 0.05$  level. The mean posttest of level of difficulty in physical function scores in experimental group 8.6(SD $\pm$  16.7) was significantly lower than the mean posttest level of difficulty in physical function scores in control group 63 (SD  $\pm$  19.2) and mean difference is 54.4. The Independent 't' value was 81.5, which was significant at  $P < 0.05$  level.

The present study concluded that practicing hot foot bath with Epsom salt reduced the joint pain, stiffness and improved the physical function among patients with osteoarthritis, which is non expensive and affordable by the patients with osteoarthritis.

## **IMPLICATIONS**

The findings of the study have certain important implications for nursing service, nursing education, nursing administration, and nursing research.

### **Nursing service**

- ♣ Nurses could be motivated to practice various non-pharmacological measures such as hot foot bath with Epsom salt to reduce the level of joint pain, stiffness, and improve the physical function among patients with osteoarthritis.
- ♣ Nurse as the change agent, could introduce the various measures for the reduction of joint pain, stiffness and improve the physical function among patients with osteoarthritis.

### **Nursing education:**

- ♣ The nurse educator could orient the students with alternative therapies in reducing the level of joint pain, stiffness and improve the physical function among patients with osteoarthritis.
- ♣ Demonstration of hot foot bath with Epsom salt to the nursing students.
- ♣ Nurse educators to motivate the nursing students to update their knowledge on hot foot bath with Epsom salt and give health education in the hospitals, and in community settings.

### **Nursing administration:**

- ♣ Nurse administrator could organize continuing education programmes regarding promoting optimal wellbeing of the patients with osteoarthritis.

- ♣ Nurse administrator has more responsibility as supervisor on creating awareness among patients with osteoarthritis regarding hot foot bath using Epsom salt by facilitating free distribution of handouts, Obooklets, regularly in outpatient department of hospitals and in primary health centers in urban and rural.
- ♣ Observing world arthritis day on October 12.

### **Nursing research:**

- ♣ The study findings will be a baseline for further studies to build upon for improving the body of knowledge in nursing.
- ♣ The study findings could be effectively utilized by the emerging researchers to conduct further studies.

### **RECOMMENDATIONS**

Based on the findings, the following recommendations were stated:

- Similar study could be replicated in a larger samples thereby findings could be generalized to a large population.
- Comparative study could also be done between the effectiveness of various non pharmacological measures on reducing discomfort such as joint pain, stiffness and improving the physical function among patients with osteoarthritis.

### **LIMITATION:**

- Investigator found that it was time consuming to conduct the interview schedule for questionnaire because of the different level of understanding.

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## APPENDIX – A

### LETTER SEEKING PERMISSION FOR CONDUCTING THE STUDY



# BISHOP'S COLLEGE OF NURSING

(C.S.I. Trichy - Tanjore Diocese)

C.S.I.Mission Compound, DHARAPURAM - 638 656.

Tiruppur District.

☎ Off : 04258 : 221224, 223962

Fax : 04258 - 221224

e.mail : principalbcndpm@gmail.com

Ref:

Date : 7.8.2017.....

LETTER SEEKING PERMISSION FOR CONDUCTING THE STUDY

To:

The Director,  
Senthil Ortho Hospital,  
Oddanchatram,  
Dindigul dist.

Respected sir,

This is to certify that Ms.M.Sabitha is a bonafide student of our college doing her M.Sc.,(N) programme II year. As part of her requirement under, the Tamil Nadu Dr.MGR Medical University, Chennai, she has to do a project on "A study to evaluate the effectiveness of hot foot bath with Epsom salt on joint pain, stiffness, and physical function among patients with osteoarthritis in selected hospitals at Oddanchatram."

Kindly permit her to carry out the study in your hospitals.

Thanking you,

Yours faithfully,

*OKT 7/8/17*  
**Dr.V. SHANMUGARAJA**  
B.Sc.,M.B.B.S.,D.Ortho.,DNB.(Ortho)  
REGD. No. 40488  
ORTHOPAEDIC SURGEON

*V. Shanmugaraaja*  
**PRINCIPAL,**  
BISHOP'S COLLEGE OF NURSING,  
C.S.I.MISSION COMPOUND,  
DHARAPURAM-638 656,  
TIRUPUR DISTRICT



# BISHOP'S COLLEGE OF NURSING

(C.S.I. Trichy - Tanjore Diocese)

C.S.I.Mission Compound, DHARAPURAM - 638 656.

Tiruppur District.

☎ Off : 04258 : 221224, 223962

Fax : 04258 - 221224

e.mail : principalbcndpm@gmail.com

Ref:

Date : .....

25.09.2017

## LETTER SEEKING PERMISSION FOR CONDUCTING THE STUDY

To:

The Director,  
KT Ortho Hospital,  
Oddanchatram,  
Dindigul dist.

Respected sir,

This is to certify that Ms.M.Sabitha is a bonafide student of our college doing her M.Sc.,(N) programme II year. As part of her requirement under, the Tamil Nadu Dr.MGR Medical University, Chennai, she has to do a project on "A study to evaluate the effectiveness of hot foot bath with Epsom salt on joint pain, stiffness, and physical function among patients with osteoarthritis in selected hospitals at Oddanchatram."

Kindly permit her to carry out the study in your hospitals.

Yours faithfully,

**Dr. T. DURAI MURUGAN**  
M.B.B.S., MS.Ortho., Mch Ortho.,  
ANTHROSCOPY KNEE SURGEON

**PRINCIPAL,**  
BISHOP'S COLLEGE OF NURSING,  
C.S.I.MISSION COMPOUND,  
DHARAPURAM-638 656,  
TIRUPUR DISTRICT

## **APPENDIX – B**

### **LETTER SEEKING EXPERT'S OPINION FOR CONTENT VALIDITY**

From

Ms. M. Sabitha,  
M.Sc (Nursing) II year,  
Bishop's College of Nursing,  
Dharapuram.

To

Respected Madam/ Sir,  
Sub : Requisition for content validity of tool.

I am doing M.Sc (Nursing) II year in Bishop's College of Nursing, Dharapuram under the Tamil Nadu Dr. M.G.R. Medical University, Guindy, Chennai. As a partial fulfilment of my M.Sc., (Nursing) Degree Programme, I am conducting research on, **“A STUDY TO EVALUATE THE EFFECTIVENESS OF HOT FOOT BATH WITH EPSOM SALT ON JOINT PAIN, STIFFNESS, AND PHYSICAL FUNCTION AMONG PATIENTS WITH OSTEOARTHRITIS IN SELECTED HOSPITAL AT ERODE”**. A tool has been developed for the research study. I am sending the above stated for your expert and valuable opinion. I will be thankful for your kind consideration. Kindly return it to the undersigned.

Thanking you,

Yours faithfully,

(M.Sabitha)

#### **Enclosure :**

1. Certificate of content validity.
2. Statement of problem, objectives, operation definition, hypothesis.
3. Description of the tool and tool for data collection.
4. Self addressed envelope.

## **APPENDIX – C**

### **LETTER SEEKING PERMISSION FOR ETHICAL COMMITTEE**

#### **MEMBERS**

- 1. Rt.Rev.Dr.Daniel James Srinivasan,**  
Former Bishop, Theologian,  
C.S.I.Nagar,  
Dharapuram.
  
- 2. Mrs.Grace Srinivasan,**  
Former Bishop Amma, Ratarian,  
C.S.I.Nagar,  
Dharapuram.
  
- 3. Dr.Dheivamathi,M.B.B.S.,D.G.O.,**  
Nivetha Hospital,  
114 Udumalpet Road,  
Dharapuram.
  
- 4. Mr.Dhanapal,M.Sc.,(Statistics)**  
Statistician,  
82/12/2.Ganga Nagar,  
Pachapali Road,  
Railway Colony (PO),  
Erode.
  
- 5. Mr.Kalachaezhian,B.A.,B.L.,**  
Advocate,  
Dharapuram.
  
- 6. Dr.Udayakumar,M.Com.,M.Phil.,P.hd.,**  
Principal,  
Bishop Thorp College,  
Dharapuram.

## **APPENDIX – D**

### **MEDICAL SURGICAL NURSING LIST OF EXPERTS OF VALIDATION**

- 1 . **Dr. V. Shanmugaraja, B.Sc., M.B.B.S., D.Ortho., DNB,**  
Consultant Orthopedic Surgeon,  
Senthil Ortho Hospital,  
Ottanchathiran.
- .  
2. **Prof.E.ShobaMerina, Msc(N)**  
Principal,  
Sara college of nursing,  
Dharapuram.
3. **Prof.Sasikala, Msc(N),**  
Professor,  
College of Nursing, Sri Ramakrishna Institute of paramedical Sciences,  
Coimbatore.
4. **Prof. Kanchana, Msc(N),**  
Professor,  
College of Nursing, Sri Ramakrishna Institute of Paramedical Sciences,  
Coimbatore-44
5. **Prof.Mangayarkarasi, M.sc(N),**  
Pricipal,  
Magarani college of Nursing,  
Dharapuram.

**APPENDIX – E**

**7f. Ethical Committee Clearance Certificate**

We, the Undersigned Chairman/Members of the Ethical Committee, functioning in  
.....Bishop's.....College of Nursing.....C.S.I.Mission  
Compound.....Dharapuram.....Tiruppur Dist.....  
.....have studied the proposed research Subject/Project of .....  
.....M. Sabitha (M.Sc.(Nursing)) I year.....  
.....  
a candidate applying for provisional registration and hereby give the certificate  
of clearance of approval by this Ethical Committee.

Station : Signature of the Chairman/ Members of the Ethical Committee

Date : Name of the Institution:

Seal : PRINCIPAL,  
BISHOP'S COLLEGE OF NURSING,  
C.S.I.MISSION COMPOUND,  
DHARAPURAM-638 666,  
TIRUPUR DISTRICT

K. Deepa (K. DHANAPAL)  
3/16/17  
Professor of Statistics

D. James Arnan  
Grace Srinivasan  
B. Kalai

B. KALAICHEZHIAN, B.Com, B.L., M.L.,  
ADVOCATE  
ENROLL No: 872/1997  
P.R. Complex, West Cuicherry Street  
DHARAPURAM - 638 698, Tiruppur Dt.  
Cell: 94433 45553

Principal  
3/16/2017

PRINCIPAL  
BISHOP THORP COLLEGE,  
DHARAPURAM - 638 657.

Dr. L. DEIVAMATHI, M.B.B.S., D.C.C.  
Regd. No. : 54780  
NIVETHA HOSPITAL,  
DHARAPURAM-638656

## CERTIFICATE FOR VALIDITY


This is to certify that the standardized tool on “**A STUDY TO EVALUATE THE EFFECTIVENESS OF HOT FOOT BATH WITH EPSOM SALT ON JOINT PAIN, STIFFNESS, AND PHYSICAL FUNCTION AMONG PATIENTS WITH OSTEOARTHRITIS IN SELECTED HOSPITAL AT ERODE**”, has been validated by me and found appropriate with mentioned suggestions.



Handwritten signature in blue ink, appearing to read 'V. Shanmugaraja' with the date '9/8/19' written below it.

Signature:

Name:



Professional stamp of Dr. V. Shanmugaraja, Orthopaedic Surgeon. The stamp is rectangular with a double-line border and contains the following text: 'Dr. V. SHANMUGARAJA', 'B.Sc., M.B.B.S., D.Ortho., DNB.(Ortho)', 'REGD. No. 40488', and 'ORTHOPAEDIC SURGEON'.

Designation:



## CERTIFICATE FOR VALIDITY

This is to certify that the standardized tool on “A STUDY TO EVALUATE THE EFFECTIVENESS OF HOT FOOT BATH WITH EPSOM SALT ON JOINT PAIN, STIFFNESS, AND PHYSICAL FUNCTION AMONG PATIENTS WITH OSTEOARTHRITIS IN SELECTED HOSPITAL AT ERODE”, has been validated by me and found appropriate with mentioned suggestions.

Signature:



**PRINCIPAL**

Sava Nursing College,  
Dharapuram - 638 673.

Name:



Designation:



## CERTIFICATE FOR VALIDITY

This is to certify that the standardized tool on “**A STUDY TO EVALUATE THE EFFECTIVENESS OF HOT FOOT BATH WITH EPSOM SALT ON JOINT PAIN, STIFFNESS, AND PHYSICAL FUNCTION AMONG PATIENTS WITH OSTEOARTHRITIS IN SELECTED HOSPITAL AT ERODE**”, has been validated by me and found appropriate with mentioned suggestions.

Signature:



Name:

K. SASIKALA

Designation:

AST. PROFESSOR,

CON, SRIPMS,

COIMBATORE-44.

## CERTIFICATE FOR VALIDITY

This is to certify that the standardized tool on “A STUDY TO EVALUATE THE EFFECTIVENESS OF HOT FOOT BATH WITH EPSOM SALT ON JOINT PAIN, STIFFNESS, AND PHYSICAL FUNCTION AMONG PATIENTS WITH OSTEOARTHRITIS IN SELECTED HOSPITAL AT ERODE”, has been validated by me and found appropriate with mentioned suggestions.

Signature:



Name:

K. KANEHAWA.

Designation:

ASSO. PROFESSOR,

CON. SRIPMS,

Coimbatore - 44.

## CERTIFICATE FOR VALIDITY

This is to certify that the standardized tool on “A STUDY TO EVALUATE THE EFFECTIVENESS OF HOT FOOT BATH WITH EPSOM SALT ON JOINT PAIN, STIFFNESS, AND PHYSICAL FUNCTION AMONG PATIENTS WITH OSTEOARTHRITIS IN SELECTED HOSPITAL AT ERODE”, has been validated by me and found appropriate with mentioned suggestions.

Signature:



Name:


Mrs. A. MANGAIYARKARAI, MSc(N)

Designation:

PRINCIPAL  
PRINCIPAL  
MAHARANI NURSING COLLEGE  
DHARAPURAM-638 657

**APPENDIX – F**  
**CERTIFICATE OF ENGLISH EDITION**  
**TO WHOM SO EVER IT MAY CONCERN**

This is to certify that the dissertation work on “**A STUDY TO EVALUATE THE EFFECTIVENESS OF HOT FOOT BATH WITH EPSOM SALT ON JOINT PAIN, STIFFNESS, AND PHYSICAL FUNCTION AMONG PATIENTS WITH OSTEOARTHRITIS IN SELECTED HOSPITALS AT OTTANCHATHIRAM** done by Miss.M.Sabitha II year M.Sc., (Nursing) student of Bishop’s College of Nursing, Dharapuram is edited for English language appropriateness by \_\_\_\_\_

Date:	
Address:	Signature
	<b>S. INBANATHAN M.A.,M.Ed.,M.Phil.,</b> <b>PG. Assistant in English</b> <b>C.S.I. Girls Hr.Sec. School,</b> <b>Dharapuram- 638 656.</b>

**APPENDIX - G**

**CERTIFICATE OF TAMIL EDITION**

**TO WHOM SO EVER IT MAY CONCERN**

This is to certify that the dissertation work on **“A STUDY TO EVALUATE THE EFFECTIVENESS OF HOT FOOT BATH WITH EPSOM SALT ON JOINT PAIN, STIFFNESS, AND PHYSICAL FUNCTION AMONG PATIENTS WITH OSTEOARTHRITIS IN SELECTED HOSPITALS AT OTTANCHATHIRAM** done by Miss.M.Sabitha II year M.Sc., (Nursing) student of Bishop’s College of Nursing, Dharapuram is edited for English language appropriateness by \_\_\_\_\_

Date:

Address:

  
Signature




**APPENDIX - H**  
**EPSOM SALT BILL**

**MDPCCWS LTD.,**  
மதுரை.

TIN: 274320104      மின். நூ. 2337871  
CST: 105199      தே. 4/11/2017

Internal area      2 4 8      இராக்கச்சீட்டு  
Code number

      No. 8006

மொ.ப.:

எண்	விவரம்	விலை	ரூ.	பை.
1 box	Epsom Salt		250	
			250	

For The Madurai District Pandian Consumer Co-op. Whole Sale Stores Ltd., Madurai

நன்றி மீண்டும் வருக

விற்பனை சாபங்கள் திரும்ப ஏற்றுக் கொள்ளப்பட மாட்டாது.

விற்பனை சாபங்கள்

## **APPENDIX – I**

### **HOT FOOT BATH WITH EPSOM SALT PROCEDURE**

#### **Definition of hot foot bath with Epsom salt:**

A combination of magnesium and sulfate, Epsom salt is a compound that can help flush toxins and heavy metals from the skin's cells, reduce inflammation, increase circulation and ease muscle cramps and joint pain.

#### **ARTICLES:**

A clean tray containing;

- ❖ Lotion thermometer
- ❖ Epsom salt
- ❖ Towel
- ❖ Teaspoon

#### **Other articles:**

- Bucket
- Mug
- Hot water
- Chair \ stool

#### **STEPS OF PROCEDURE:**

1. Explain the procedure to the patient and get oral consent.
2. Arrange all the articles.
3. Ask the patient to wash the legs thoroughly.
4. Dry the legs with a towel.
5. Put off the fan.
6. Make the patient to sit comfortably on chair\stool.
7. Fill 3/4<sup>th</sup> of the bucket with warm water with a temperature of 105<sup>0</sup> F and add 4 grams of Epsom salt.



8. Ask the patient to immerse both legs. It should cover the both feet and ankles.
9. Instruct the patient to take a mug of water from the bucket and pour it over the knees alternatively.
10. Duration of the procedure is for 20 minutes daily once in the morning and continued for 10days.
11. After the procedure dry the patient's legs with a towel.
12. Replace all the articles.

**பகுதி - அ**  
**செயல்முறை படிக்க**

**வரையறை**

எப்சம் உப்பு என்பது மக்னீசியம் மற்றும் சல்பைடு கலந்த கலவை, எப்சம் உப்பு நச்சுக்களை வெளியேற்றவும், வீக்கத்தை குறைக்கவும், இரத்த ஓட்டத்தை அதிகரிக்கவும், தசை பிடிப்பு மற்றும் மூட்டு வலியை குறைக்கவும் பயன்படுகிறது.

**தேவையான பொருட்கள்**

- ❖ லோஷன் தெர்மாமீட்டர்
- ❖ எப்சம் உப்பு
- ❖ துவாலை
- ❖ தேக்கரண்டி

**மற்ற பொருட்கள்**

- ❖ வாளி
- ❖ குவளை
- ❖ வெந்நீர்
- ❖ நாற்காலி

**செயல்முறை படிக்க**

1. நோயாளியிடம் செயல்முறையை விளக்கி வாய்வழி ஒப்புதல் பெற்றுக்கொள்ள வேண்டும்.
2. தேவையான பொருட்களை தயார் நிலையில் வைக்க வேண்டும்.
3. நோயாளியிடம் கால்களை சுத்தமாக கழுவுமாறு கூற வேண்டும்.
4. துவாலையை பயன்படுத்தி கால்களை உலர்த்த வேண்டும்
5. மின்விசிறையை அணைக்க வேண்டும்.
6. நோயாளிக்கு ஏற்றவாறு நாற்காலியில் அமர வைக்க வேண்டும்.
7. 105° வெப்பநிலையுள்ள வெந்நீரை வாளியில் ¾ பங்கு அளவு எடுத்துக் கொண்டு அதில் 4 கிராம் எப்சம் உப்பை சேர்க்க வேண்டும்.
- 8.

9. நோயாளியின் இருபாதங்கள் மற்றும் கணுக்கால்களை எடுத்துக்கொள்ளப்பட்ட வெந்நீரில் முழுமையாக மூழ்கிய நிலையில் வைக்குமாறு கூற வேண்டும்.
10. நோயாளியிடம் வாளியில் உள்ள வெந்நீரை குவளையில் எடுத்து இரு முழங்கால்களிலும் மாறி மாறி ஊற்றுமாறு கூற வேண்டும்.
11. தினமும் காலையில் இச்செயல்முறை படிசை 20 நிமிடம், தொடர்ந்து பத்து நாட்களுக்கு செய்து வர வேண்டும்.
12. செயல்முறை முடிந்தபின் நோயாளியின் கால்களை துவாலைக் கொண்டு உலர்த்த வேண்டும்.
13. பயன்படுத்திய பொருட்களை சுத்தம் செய்து இருந்த நிலையில் வைக்க வேண்டும்.

**APPENDIX – J**  
**DEMOGRAPHIC VARIABLE**

- 1. Age( in years)**
  - a) 50-53 Years
  - b) 54-57 years
  - c) 58-62 years
  - d) 63-65 years
  
- 2. Sex**
  - a) Male
  - b) Female
  
- 3. Educational status**
  - a) Primary school education
  - b) Higher secondary school
  - c) Degree holder
  - d) No formal education
  
- 4. Religion**
  - a) Hindu
  - b) Christian
  - c) Muslim
  
- 5. Occupation**
  - a) Private employee
  - b) Government employee
  - c) Self employee
  - d) Unemployed

**Family monthly Income**

- a) Rs.5000-8000/-
- b) Rs.8001-12,000/-
- c) Rs.12,001-15,000/-
- d) Above 15,001/-

**7. Duration of illness**

- a) 1-2 years
- b) 3-4 years
- c) 5 -6 years
- d) 7-8 years

**APPENDIX – J**  
**TOOL**  
**ASSESSMENT ON LEVEL OF JOINT PAIN, STIFFNESS, AND**  
**PHYSICAL FUNCTION BY MODIFIED WOMAC**  
**OSTEOARTHRITIS INDEX SCALE DEVELOPED BY NICHOLAS**  
**BELLAM (1994)**

S. No	Scale of Difficulty	Activities	No	ne	o	gh	t	od	er	ate	Ve	ry	3	tre	me	lv
1	Pain	Walking														
		Stair Climbing														
		Nocturnal														
		Rest														
		Weight Bearing														
2	Stiffness	Morning Stiffness														
		Stiffness Occurring later in the day														
3	Physical Function	Descending stairs														
		Ascending stairs														
		Rising from sitting														
		Standing														
		Bending to floor														
		Walking on flat surface														
		Getting in/ out of car														
		Going shopping														
		Putting on socks														
		Lying in bed														
		Taking off socks														
		Rising from bed														
		Getting in/ out of bath														
		Sitting														
		Getting on/ off toilet														
		Heavy domestic duties														
		Light domestic duties														

பகுதி - ஆ  
சுயகுறிப்பேடு

1. வயது  
அ) 50-53 வயது  
ஆ) 54-57 வயது  
இ) 58-62 வயது  
ஈ) 63-65 வயது
2. பாலினம்  
அ) ஆண்  
ஆ) பெண்
3. கல்விதகுதி  
அ) ஆரம்பக்கல்வி  
ஆ) மேல்நிலைப்பள்ளி  
இ) பட்டபடிப்பு  
ஈ) படிக்காதவர்
4. மதம்  
அ) இந்து  
ஆ) கிறிஸ்தவர்  
இ) முஸ்லிம்
5. வேலைவாய்ப்பு  
அ) தனியார் பணி  
ஆ) அரசு பணி  
இ) சுயதொழில்  
ஈ) வேலையில்லாதவர்
6. குடும்ப மாத வருமானம்  
அ) ரூ.5000 - 8000  
ஆ) ரூ.8001- 12000  
இ) ரூ.12001- 15000  
ஈ) 15001 க்கு மேல்

7. வியாதிப்பட்டிருக்கும் காலங்கள்
- அ) 1-2 வருடம்
  - ஆ) 3-4 வருடம்
  - இ) 5-6 வருடம்
  - ஈ) 7-8 வருடம்



பகுதி - இ  
**TAMIL TOOL**  
கேள்விகள்

வ. எண்	கேள்வி வகைகள்	பொருளடக்கம்	எதுவுமில்லை 0	சிறிய 1	லேசான 2	மிதமான 3	கடிமையாக 4	மிகக்கடிமையாக 5
1.	வலி	நடைப்பயிற்சி						
		படியேறுதல்						
		இரவில் நடமாடுதல்						
		ஓய்வு						
		எடைதாங்குதல்						
2.	விறைப்பு	காலை விறைப்பு ஏற்படுதல்						
		விறைப்பு அந்நாளில் தாமதமாக ஏற்படுதல்						
3.	தினசரி வேலைகள் செய்வதில் கஷ்டங்கள்	படிகளிலிருந்து கீழ் இறங்குதல்						
		படிகளிலிருந்து மேல் ஏறுதல்						
		அமர்ந்தநிலையிலிருந்து எழுந்திருத்தல்						
		நிற்புத						
		கீழேகுனிந்து தரையை தொடுதல்						
		சமமானதரையில் நடத்தல்						
		கடைகளுக்கு செல்லுதல்						

வ. எண்	கேள்வி வகைகள்	பொருளடக்கம்	எதுவுமில்லை 0	சிறிய 1	லேசான 2	மிதமான 3	கடிமையாக 4	மிகக்கடிமையாக 5
		முழங்கால்களை குறுக்காக வைத்து அமருதல்						
		படுக்கையில் படுத்தல்						
		முழங்கால்களை குறுக்கான நிலையிலிருந்து எடுத்து எழுந்திருதல்						
		படுக்கையில் இருந்து எழுந்திருத்தல்						
		கழிப்பறைக்கு உள்ளே சென்று வெளியே வருதல்						
		உட்காருதல்						
		கழிப்பறைக்கு செல்லுவது						
		கடினமான வீட்டு வேலைகள்						
		எளிதான வீட்டு வேலைகள்						

## APPENDIX – K

### PHOTOS













