

**A STUDY TO ASSESS THE EFFECTIVENESS OF  
MUSTARD PLASTER APPLICATION ON  
OSTEOARTHRITIC INDEX AMONG ELDERLY IN  
SELECTED COMMUNITY AREA, TIRUVANNAMALAI**



**DISSERTATION SUBMITTED TO  
THE TAMILNADU Dr.M.G.R. MEDICAL UNIVERSITY  
CHENNAI  
IN PARTIAL FULFILMENT OF REQUIREMENT FOR THE DEGREE OF  
MASTER OF SCIENCE IN NURSING  
OCTOBER 2019**

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Certified that this is the bonafide work of

**Mrs. D. RADHA, M.Sc (N) II Year Student**  
VIGNESH NURSING COLLEGE  
MANALURPET ROAD,  
KIZHANAİKARAI,  
TIRUVANNAMALAI -606 603  
TAMIL NADU

**COLLEGE SEAL**

**SIGNATURE:** \_\_\_\_\_

**Dr. (Mrs). S. VIJAYALAKSHMI**  
R.N., R.M., M.Sc. (N), M.A., Ph.D. (N),  
PRINCIPAL & PROFESSOR IN NURSING,  
VIGNESH NURSING COLLEGE,  
MANALURPET ROAD, KIZHANAİKARAI  
TIRUVANNAMALAI -606 603  
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Approved by Dissertation Committee in July 2018

**PROFESSOR IN NURSING RESEARCH**

**Dr. (Mrs). S. VIJAYALAKSHMI** \_\_\_\_\_

R.N., R.M., M.A., M.Sc.(N)., Ph.D (N).,  
Principal & Professor in Nursing  
Vignesh Nursing College,  
Manalurpet Road, Kizhanaikarai,  
Tiruvannamalai – 606 603, Tamil Nadu.

**CLINICAL SPECIALITY EXPERT**

**Mrs. R. JAYALAKSHMI** \_\_\_\_\_

R.N., R.M., M.Sc.(N)., Ph.D (N).,  
Head of the Department,  
Community Health Nursing,  
Vignesh Nursing College,  
Manalurpet Road, Kizhanaikarai,  
Tiruvannamalai – 606 603, Tamil Nadu

**MEDICAL EXPERT**

**Dr. CHANDRAMOHAN, M.S. Ortho** \_\_\_\_\_

Assistant Professor,  
Department of Orthopedic,  
Govt. Tiruvannamalai Medical College and Hospital,  
Tiruvannamalai - 606604, Tamil Nadu.

**Internal Examiner**

**External Examiner**

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## ACKNOWLEDGMENT

First of all, I praise God, the almighty for providing me with this opportunity and granting me the capability to proceed successfully. This dissertation appears in its current form due to the guidance and assistance of several people. Therefore I would like to offer my sincere thanks to all of them.

I express my heartfelt thanks to **Mr.R.Kuppusamy, Chairman**, Vignesh Group of Institutions, for giving me the opportunity to pursue my study in this prestigious institution and enduring support by giving all the facilities for pursuing my study.

I would like to express my sincere gratitude, heartfelt thanks and great honour to **Dr.(Mrs.)S.Vijayalakshmi**, Principal, Vignesh Nursing College, my esteemed promoter, for her motivation, enthusiasm and immense knowledge, her rich professional experience and efficient guidance, without whom this study would not have been moulded in this shape.

I would like to express my special appreciation and deep thanks to **Dr.(Mrs).C.Uma**, Vice Principal, Vignesh Nursing College for her trust, insightful discussion, offering valuable advice and constant support during the whole period of study and especially for her guidance during the writing process which helped me to step cautiously in the right direction.

I would like to express my sincere thanks to my class coordinator **Mr.V.Poovaragavan**, Professor, Head of the Department, Medical Surgical Nursing, Vignesh Nursing College for his effort, in timely correction and encouragement for successful completion of this study.

I feel pleasure my gratitude and sincere thanks to **Mrs.R.Jayalakshmi**, Head of the Department, Community health nursing, Vignesh Nursing College, for her compassionate spirit of stalwart support, valuable guidance, suggestions and encouragement, to frame the study in the right way and to complete my study.

I express my immense thanks to **Mrs.U.Udayasankari**, Associate professor, **Mrs.A.Padmavathi**, Associate professor, **Mr.S.Rajesh**, Associate professor,

**Mrs.R.Suguna**, Assistant professor, **Mrs.R.Tamilzhazhagi**, Assistant professor, **Mrs.K.Nisamasoothini**, Assistant professor and **Mr.N.Baskaran**, Assistant professor all M.Sc., Nursing faculties for their aspiring guidance, invaluable constructive criticism and sharing their truthful views and insightful discussion on the number of issues related to the study.

A memorable note of earnest gratitude to **Mr.Seetharaman, Deputy Tahsildar**. Tiruvannamalai block, for granting approval to precede the study at selected villages Tiruvannamalai.

I am grateful to the entire elderly women for participating in this study. Without their support this piece of work would not have come in reality.

I am greatly indebted to express my heartfelt thanks to all the **Community Health Nursing Experts** for their valuable suggestions in validating the tool for the study.

My immense thanks to **Mr.V.Suresh Babu**, Librarian and **Mr.P.Sugumar** Computer Operator, for their help throughout the entire period of study.

A special bouquet to **Mr.K.Govindaraj** and **Dr.N.Prabu** for Editing appropriately in English and Tamil language respectively.

A special Thanks to my family members, where words cannot express how grateful I am to my beloved husband **Mr.E.Soundarapandiyar**, my children's **S.Moneswaran, S.Parthiv**, my cousin brother **Mr.S.Parthiban** and to my friends **Mr. N. Baskaran, Mr. M. Karthik, Mrs. S. Smilly Juliet** and **Mr. G. Anandharaji** for all the sacrifices they made by them, their prayers and blessings sustained me to reach the proper destination.

Above all, I thank "**ALMIGHTY**" for being with me and sustaining me in all my endeavors to complete and bring out the dissertation as a successful one.

## LIST OF ABBREVIATION

ACR	-	American College of Rheumatology
ANOVA (F)	-	Analysis of Variance
BMI	-	Body Mass Index
CI	-	Confidence Interval
F	-	Frequency
FDA	-	Food & Drug Administration
IPD	-	Inpatient Department
KOOS	-	Knee Injury and Osteoarthritis Outcome Score
N	-	Number of Sample
NRS	-	Numerical Rating Scale
NS	-	Non-significant
NSAID	-	Nonsteroidal Anti-Inflammatory Drug
OA	-	Osteoarthritis
OPD	-	Outpatient Department
QOL	-	Quality Of Life
R	-	Correlation Coefficient
SAS	-	Statistical Analysis Software
SD	-	Standard Deviation
SDM	-	Sri Dharmasthala Manjunatheshwara
SIP	-	Sickness Impact Profile
SPSS	-	Statistical Package for Social Science
TMJ	-	Temporomandibular joint
TP	-	Tracheitis Plaster
UNFPA	-	United Nations Fund for Population Activities
US	-	United States
VAS	-	Visual Analogue Scale

- WHO - World Health Organization
- WOMAC - Western Ontario & McMaster Universities Osteoarthritis Index
- $\chi^2$  - Chi square

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## **ABSTRACT**

A Study to assess the Effectiveness of Mustard Plaster Application on Osteoarthritic Index among Elderly in Selected Community area at Tiruvannamalai.

### **INTRODUCTION**

Elderly are a transitional period between adulthood to old age. In Indian society, Old age people period begins from 60 years onwards. Old age also called senescence, in human beings, the final stage of the normal life span.

Osteoarthritis (OA) is degenerative joint disease or degenerative arthritis; it is the most common chronic condition of the joints. OA can affect any joint, but it occurs most often in knees, hip, lower back and neck, small joints of the fingers and the bases of the thumb and big toe.

The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) is a widely used, proprietary set of standardized questionnaires used by health professionals to evaluate the condition of patients with osteoarthritis of the knee and hip, including pain, stiffness, and physical functioning of the joints.

Non-pharmacological treatment for osteoarthritis includes bed rest, exercise, application of heat packs, mustard plaster, mud therapy and alternative treatments like yoga and acupressure which had no side effects. Mustard Plaster, a mixture of powdered black mustard seeds and an adhesive agent applied to the skin for its relaxing, stimulating or counter irritant effects. It reduces the pain, stiffness, increases the physical functions and strengthens to the bones and cartilages.

### **OBJECTIVE:**

To assess the Effectiveness of Mustard Plaster Application on Osteoarthritic Index among Elderly in Selected Community area at Tiruvannamalai.

### **DESIGN:**

Pretest - posttest design of basic experimental design which comes under true experimental design.

**SETTING:**

The study was conducted in 12 villages situated at Thiruvannamalai District.

**SAMPLING TECHNIQUE AND SAMPLE SIZE:**

Simple random sampling technique (random table method) was used to select the elderly, 30 were assigned in experimental group & 30 in control group.

**INTERVENTION:**

Mustard plaster application 15- 20 minutes for a period of 14 days.

**MEASUREMENT AND TOOL:**

The score of osteoarthritic index was assessed by using modified WOMAC index scale.

**RESULTS:**

The comparison of the pre test and post test score of osteoarthritic index among elderly within experimental group, revealed that the calculated paired value  $t=23.09$  was found to be statistically significant at  $p<0.001$ . This clearly shows that the implementation of mustard plasters application had shown a significant reduction in osteoarthritic index among elderly in experimental group than the control group.

The comparison of the pre test and post test score of osteoarthritic index among elderly women between experimental group and control group revealed that the calculated unpaired value  $t=19.76$  was found to be statistically significant at  $p<0.001$  which indicates that there was difference in the post test score of osteoarthritic index between the groups, this clearly shows that the practice of mustard plaster application had reduction in osteoarthritic index among elderly.

**CONCLUSION:**

The study findings concluded that there was a statistically significant difference in the score of osteoarthritic index after implementation of mustard plaster application and this proved to be an effective alternative therapy and non pharmacological therapy to reduction of osteoarthritic index.

**IMPLICATIONS FOR CLINICAL PRACTICE:**

The significant reduction of osteoarthritic index among elderly women after the mustard plaster application suggests that the investigator play an important role in creating awareness on mustard plaster application which reduction of osteoarthritic index and also educate, reinforce the public about the health benefits of mustard plaster application. Further, researches have suggested evaluating the effectiveness of mustard plaster application among elderly in different settings.

## **CHAPTER - I**

### **INTRODUCTION**

“Ageing is, simply and clearly, the accumulation of damage in the body.  
That's all that ageing is”.

- **Aubrey de Grey**

#### **1.1 BACKGROUND OF THE STUDY**

Population ageing is an inevitable and irreversible demographic reality that is associated with welcome improvements in health and medical care. With longevity and declining fertility rates, the population of older persons is globally growing faster than the general population.

**UNFPA, (2017)** the national policy on older persons defines ‘senior citizen’ or ‘Elderly’ as a person who is 60 years old or above. Globally the 60 years old population constitutes about 11.5 percent of the total population of 7 billion. By 2050 this proportion is projected to increase to about 22 percent.

According to Population Census 2011 there are nearly 104 million elderly persons (aged 60 years or above) in India; 53 million females and 51 million males. A report released by the United Nations Population Fund and Help Age India suggests that the number of elderly persons is expected to grow to 173 million by 2026. With the world's population growth, increased average age and decreased death rates, people are now living longer and becoming increasingly susceptible to the non-communicable diseases including musculoskeletal disorders.

**Pal CP, (2016)** 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 DALYs worldwide. The most common and disabling musculoskeletal disorders for elderly are osteoarthritis, back and neck pain, injuries and systemic inflammatory conditions such as rheumatoid arthritis, Psoriatic arthritis, gout, ankylosing spondylitis, osteoporosis, osteopenia and associated bone fragility fractures, muscles such as sarcopenia. Tendinitis, carpal tunnel syndrome, fibromyalgia and bone fractures. An estimated 10% to 15% of all elderly aged over 60



have some degree of OA, with prevalence higher among women than men. Osteoarthritis is the second most common rheumatologic problem and it is the most frequent joint disease with a prevalence of 22% to 39% in India. Nearly, 45% of women over the age of 65 years have symptoms while 70% of those over 65 years show radiological evidence of OA.

**Chandra Prakash Pal, (2016)** Osteoarthritis (OA) is a chronic degenerative disorder of multifactorial etiology characterized by the loss of articular cartilage, hypertrophy of bone at the margins, subchondral sclerosis and range of biochemical and morphological alterations of the synovial membrane and joint capsule. Osteoarthritis may develop in any joint but most commonly affects the knees, hip, hands, facet joints and feet. Osteoarthritis of the knee is a major cause of mobility impairment, particularly among female. There is no cure, but treatments are available to manage symptoms. Long-term management of the disease will include several factors and managing symptoms, such as pain, stiffness and swelling, Improving joint mobility and flexibility, maintaining a healthy weight, getting enough of exercise.

**Kapstad H, (2007)** Patients with the problem of OA on their hip did not change on any WOMAC scale before treatment. Knee patients get worse with time on the WOMAC stiffness and total scales, but not on the physical function subscales. In elderly patient categories, higher baseline WOMAC scores were associated with smaller changes on all subscales and the total score, and female sex was associated with deterioration on the pain subscale. Patients with OA of the hip reported no change in pain, stiffness or physical function, whereas patients with OA of the knee deteriorated on the stiffness and total scales of the WOMAC.

Many elderly women seeking pharmacological management are NSAIDS to eliminating the pain, stiffness and improve the physical function of osteoarthritis. According to the medication guidelines of the U.S. Food and Drug Administration (FDA), NSAIDs can increase the risk of heart attack or stroke, stomach ulcers, and bleeding, especially when used over a long time.

Non-pharmacological treatment for osteoarthritis includes bed rest, exercise, application of heat packs, mustard plaster, mud therapy and alternative treatments like yoga and acupressure which had no side effects. Mustard Plaster, a mixture of

powdered black mustard seeds and an adhesive agent applied to the skin for its relaxing, stimulating or counter irritant effects. It reduces the pain, stiffness, increases the physical functions and strengthens to the bones and cartilages.

There are many reasons why should consider using mustard plaster for knee pain. It's a natural way to reduce pain, and it's also an inexpensive and effective method. Mustard plaster consists of white/brown mustard seeds, water/vinegar, and flour. The solution of mustard plaster is for muscle pain associated with arthritis as well. Allyl isothiocyanate is an active ingredient found in the mustard plaster that is responsible for other forms of [arthritis joint pain](#). Allyl isothiocyanate, which is the organosulfur compound, is a counter irritant. When mustard plaster is applied to an inflamed area, it makes blood vessels to dilate, which will enhance the blood flow to an affected area for the removal of toxins in that particular area. Furthermore, an increased blood flow in an affected area can help in better absorption of pain relief, whether it is pharmaceutical or herbal. Mustard poultices have pain relief properties found in the mustard, and these pain relief qualities are often desired by patients looking for the solution for their arthritis back pain, [knee pain](#), or other types of pain.

## **1.2 NEED FOR THE STUDY**

Osteoarthritis (OA) is a type of [joint disease](#) that results from breakdown of [joint cartilage](#) and underlying [bone](#). Pain is a sensation that is caused by stimuli of harmful nature. It is common and distressing manifestation. The standard treatment for knee joint pain and stiffness has been administration of non steroidal anti inflammatory drugs they worked well to mask the pain, with its own side effects. Alternative and complementary therapies are increasing in popularity.

Elderly clients are seeking alternatives to relieve themselves of their symptoms and to improve their quality of life. The Arthritis Foundation reports that two-thirds of people with arthritis have tried alternative therapies. Measures to relieve knee pain, joint stiffness and performing daily functional activity are exercise, physiotherapy, splints, reduction, massage and topical therapies such as mustard plaster, mud therapy and hot applications etc.

Mustard plaster is a home therapy that can be used for the treatment of rheumatism, arthritis, lumbago (low back pain) and sciatica (sciatic nerve pain).

Mustard plaster induces a warm sensation, increases blood circulation and dries up excessive moisture within the affected area of the body. It can help to relieve and improve the symptoms of rheumatism, joint pain, low back pain and sciatic nerve pain. The easy availability of mustard, its medicinal properties and its low cost with less side effects and long term in topical application makes mustard plaster as an adjuvant therapy in reduction of knee joint pain among elderly. The community health nurse has great part in caring such elderly; especially with those suffering from pain with stiffness and physical inactivity. Mustard plaster application can be very well used by community nurse during their home visit.

India being agriculture based country; people over here widely use mustard. They use it starting from cooking to external application. It is available easily and readily. It is naturally occurring plant product which has anti fungal, anti microbial, counter irritant, anticongestant properties. Elderly in our country are not interested to spend more money for their health especially in rural parts. Mustard can be beneficial to such elderly where they need not to be dependent economically on present generation.

**Hemavathy. V (2015)** conducted a pre experimental study among 30 osteoarthritis patients at Sivananda Gurukulam Old age home at Chennai. In pre test, out of 30 samples majority of them 15 (50%) had severe knee pain, 10 (33%) had moderate knee pain and 5 (17%) had mild pain and none of them no pain. In post test, out of 30 samples majority of them got relieved from knee joint pain 8 (27%), 18 (60%) had mild knee pain, 4 (13%) had moderate pain and none of them have severe and extreme pain. The overall paired 't' test value is 20.3. It is hypothesized that there is significant in effectiveness of Mustard plaster application. It was inferred that experimental group who received Mustard plaster application were found to be effective at the level of  $P < 0.001$ .

In India only few studies are available for effectiveness of mustard upon knee joint pain which shows less importance is given to this type of problem. Considering all these factors of the elderly and properties of mustard the researcher was interested to investigate the effect of mustard on knee pain among elderly. This evidence can be disseminated and utilized in various care setting to achieve its maximum benefits.

Due to its country wide presence easy availability, affordability and safety, mustard is best choice. Although osteoarthritis can damage any joint, the disorder most commonly affects joints in your hands, knees, hips and spine. Osteoarthritis symptoms can usually be managed, although the damage to joints can't be reversed. Staying active, maintaining a healthy weight and some treatments might slow progression of the disease and help improve pain and joint function. Osteoarthritis symptoms often develop slowly and worsen over time. Signs and symptoms of osteoarthritis include pain, stiffness, tenderness, loss of flexibility, grating sensation, bone spurs, swelling and physical inactivity. Hence the personal experience of the investigator working and staying with elderly also motivated her to take up this study. The researcher was interested in using mustard as plaster in her intervention to reduce osteoarthritic index score among elderly thus improving the quality of life.

### **1.3 STATEMENT OF THE PROBLEM**

A Study to assess the Effectiveness of Mustard Plaster Application on Osteoarthritic Index among Elderly in Selected Community Area, Tiruvannamalai.

### **1.4 OBJECTIVES OF THE STUDY**

- ❖ To assess the pre and post test level of Osteoarthritic index among elderly in experimental and control group.
- ❖ To compare pre and post test level of Osteoarthritic index among elderly within experimental and control group.
- ❖ To compare the pre and post test level of Osteoarthritic index among elderly between experimental and control group.
- ❖ To associate the mean difference score of Osteoarthritic index among elderly in experimental and control group with their selected demographic variables.

## **1.5 OPERATIONAL DEFINITIONS**

### **EFFECTIVENESS**

It refers to expected outcome of mustard plaster application in terms of reduction in pain, stiffness and improvement of physical functions of the knee joints which is measured by modified WOMAC index scale (Western Ontario and McMaster universities osteoarthritis index).

### **MUSTARD PLASTER APPLICATION**

It refers to preparation of paste from mixing of 20gms of raw mustard powder and 40gms of raw wheat flour needed with warm water and evenly spread in-between a cloth and apply over the knee with sitting position for 15-20 minutes once a day for a period of 14 days.

### **OSTEOARTHRITIC INDEX:**

It refers to assess the condition of elderly with osteoarthritis of knee including pain, stiffness and physical functioning of the joints by using modified WOMAC index scale which comprised 24 items with 3 subscales such as pain -5 items, stiffness-2 items and physical function-17 items.

#### **1. Pain:**

It refers to discomfort or unpleasant sensation in knee joint experienced by elderly.

#### **2. Stiffness:**

It is inability to move knee joint easily and without pain.

#### **3. Physical function:**

It refers ability to perform the daily activities that require essential for maintaining in degrees of mobility.

### **ELDERLY:**

It refers to female those who are 60 years and above.

## 1.6 ASSUMPTIONS

- ❖ Elderly may have risk of developing knee pain, stiffness and physical function.
- ❖ Osteoarthritic index may cause discomfort to elderly.
- ❖ Osteoarthritic index impairs the daily activities of elderly.
- ❖ Elderly may have little knowledge about home remedies to control Osteoarthritic index.
- ❖ Mustard plaster application may help in effective reduction of Osteoarthritic index.
- ❖ Mustard plaster application may not have any side effects other than the drugs.

## 1.7 NULL HYPOTHESIS

- ❖ **NH1:** There is no significant difference in pre and post test level of Osteoarthritic index among elderly within experimental and control group at  $p < 0.05$  level.
- ❖ **NH2:** There is no significant difference in pre and post test level of Osteoarthritic index among elderly between experimental and control group at  $p < 0.05$  level.
- ❖ **NH3:** There is no significant association mean difference in level of Osteoarthritic index among elderly in experimental and control group with their selected demographic variables at  $p < 0.05$  level.

## 1.8 DELIMITATIONS

- ❖ The study will be delimited to 4 weeks.
- ❖ Selected setting only.

## 1.9 CONCEPTUAL FRAME WORK

Modified conceptual frame work based on **KATHARINE KOLCABA THEORY OF COMFORT.**

Conceptual frame work is a device that helps to stimulate researcher and extension of knowledge by providing both direction and impetus (**Polit & Hungler, 2017**).

Katharine kolcaba theory of comfort was selected for this present study, this theory is used by a nurse to meet patient need for help, meeting this need and reduce the patient's behavior. The components are,

- ❖ Health care needs
- ❖ Comforting interventions
- ❖ Intervening variables
- ❖ Comfort
- ❖ Enhanced comfort
- ❖ Health seeking behavior
- ❖ Institutional integrity

Conceptual framework serves as a guide (or) map to systematically identify a logical, precisely defined relationship between variables. The conceptual work based on Katharine kolcaba theory of comfort was selected for this present study, the researcher compared the effectiveness of mustard plaster application on osteoarthritic index among elderly between experimental and control group.

#### **Health care needs;**

According to theory, health care needs are those identified by the family and elderly women in a particular setting. In this study, the clients identify their health needs such as knee joint pain, stiffness restricted range of motion.

#### **Comforting interventions;**

Comfort measures are the interventions that the investigator design and implement to meet the health care needs. The intervention has the explicit goal of enhancing the elderly comfort or facilitating subsequent desirable health seeking behavior. In this study, the comforting intervention carried out by the investigator is the application of mustard plaster for 14 days.

**Intervening variables;**

Intervening variables are those factors that are not likely to change and over which the health care provider has little control. In this study the variables such as age, educational status, working pattern, marital status, dietary pattern, family income, body mass index, duration of pain and presence of other diseases of osteoarthritic index are considered as intervening variables.

**Comfort**

The immediate experience of being strengthened through having the needs for relief. The intentional comforting actions of the investigator in this study is to strengthen the elderly by alleviating pain, joint stiffness, improving the range of motion and activities of daily living that the elderly will have either relief or any of the comfort need will be met.

**Health seeking behaviors**

Internal or external behaviors in which the elderly engages that facilitate health. In this study the health seeking behavior i.e.; the desirable outcome can be either internal such as reduction of knee joint pain and stiffness with mustard plaster application and externally the elderly involvement in day to day activities.

**Institutional integrity**

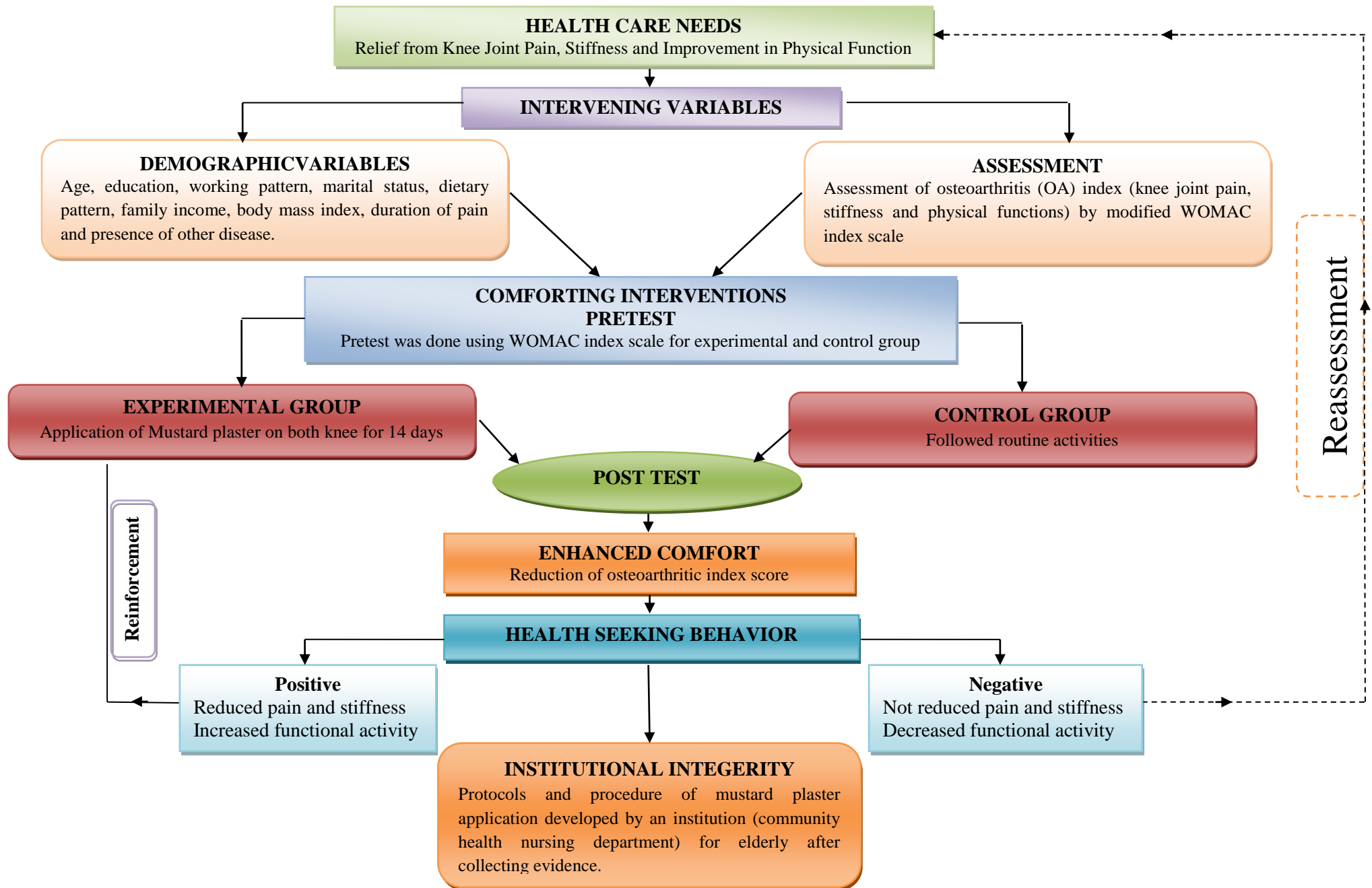
It is defined as the values, financial stability & the wholeness of health care organizations. Best policies are the protocols and procedures developed by an institution for overall use after collecting evidence. Best practices are those protocols and procedure developed by an institution for specific patient after collecting evidence. Here, the institution integrates mustard plaster application as a part of therapy for osteoarthritic index in the hamlets covered by community health nursing department.



**Deliberative action;**

It means exploring the meaning and relevance of action to the elderly, these actions are evaluated for effectiveness immediately after completion.

In this present study investigator activity is application of mustard plaster application on osteoarthritic index, In experimental group the mustard plaster was applied over the both knee with sitting knee extended position once a day with the duration of 15- 20 minutes for a period of 14 days continuously. Wait list control group followed the routine activities.



**FIGURE 1: CONCEPTUAL FRAME WORK BASED ON MODIFIED KATHARINE KOLCAB THEORY OF COMFORT**

## CHAPTER - II

### REVIEW OF LITERATURE

The review of literature is an essential aspect of scientific research. It entails the identification, the systematic identification, reflection, critical analysis and reporting of existing information related to the problem of interest. The purpose of review of literature is to obtain comprehensive knowledge and in depth information about the effectiveness of interventional package on osteoarthritic index among elderly.

Review of literature is a systemic study of a number of previous studies which helps to support the research work done. It gives an idea of how the study can be conducted and what is to be done for it. It is helpful for the investigator.

The review of literature is organized under the following sections

**SECTION A:** Studies related to prevalence, incidence and risk factors of osteoarthritis among elderly.

**SECTION B:** Studies related to pain, stiffness and physical function.

**SECTION C:** Studies related to uses of mustard plaster.

**SECTION D:** Studies related to effectiveness of mustard plaster application on osteoarthritic index among elderly.

**SECTION E:** Studies related to other therapies on osteoarthritic index among elderly people.

**SECTION A: studies related to prevalence, incidence and risk factors of osteoarthritis among elderly.**

**Rajvir Kaur, et al., (2017)** conducted a community-based cross-sectional study to estimate the prevalence of the knee OA and to ascertain the determinants of osteoarthritis knee among women of 30–60 years of age in Gurdaspur, Punjab, India from

November 2016–April 2017. The 422 women were participated in this study. A semi-structured interview schedule was used to collect the data. The overall prevalence was found to be 21.6%. The prevalence osteoarthritis knee of was found high in 50–60 years of age group. The proportion of the cases was more in high socioeconomic class, body mass index (BMI)  $\geq 25$  category, and sedentary lifestyle group. The results showed that prevalence was found to be increased with age and was also significantly associated with higher socioeconomic status, menopause, greater BMI, and sedentary lifestyle.

**Narasimha B. C, et al., (2015)** conducted a community based cross sectional study on prevalence of osteoarthritis of knee joint among women at the age of 40 years and above from January to March 2015 in urban field practice area of BMCR (Bangalore Medical College and Research Institute). Data collection was done by house to house visit. 120 subjects information was collected by using a pre-tested, semi-structured questionnaire. As per the criteria, Out of 120 (69.16%) had knee pain as a presenting complaint, tenderness was present in 66 (55%) individuals, followed by crepitation's 38(31%) and bony enlargement 22(18%) were found individuals respectively. The study shown that there was a significant association between osteoarthritis and activities of daily living (Chi-38.7 df- 1 p-<0.001).

**Viswanath. J, et al., (2015)** conducted a prospective study on Prevalence of osteoarthritis among elderly in S.V Ayurvedic Medical College, South India from Jan 2014 Dec 2015. Out of 71 subjects 60 were selected according to inclusion criteria. The prospective data was collected. The study showed 53.33% of previous family history of osteoarthritis and 46.66% were no family history of osteoarthritis. 76.66% gradual disease onset and 23.33% were insidious onset. 100% were having joint pain with swelling. 50% were average digestive power, 36.66% good and 13.33% poor. 30% patients were having addiction of alcohol, 16.66% smoking and alcohol, 16.66% smoking, 3.33% tobacco and 33.33% were no addiction. 66.66% patients were having irregular bowel habit and 33.33% was regular. 41.66% sedentary, 40% active and 18.33% were moderately active. 40% illness was observed during the period of 0-6 months, 30% 1-2 years, 16.66% 6-12 months and 13.33% were 2-5 yrs. 60% cold season and 40% were other seasons.

**Radha M.S et al., (2014)** conducted a cross-sectional study to measure the prevalence of knee osteoarthritis patients and identification of risk factors were involved among the age group of 40 to 65 years in Sri. Krishna Rajendra Hospital, Mysore from June 2013 to May 2014. Out of 150 patients 95 were female and 55 were male randomly selected from Out Patient department in the section of Orthopedic. 150 subjects were clinically diagnosed osteoarthritis. The WOMAC index scores for three subscales: pain, stiffness and physical function. An interviewer-administered questionnaire was used. Based on the study outcomes, about BMI overall mean average is 30 Standard Deviation 23.685. Based on WOMAC scores out of 150 subjects the mean average of 91 patients were having the mean average of moderate Pain (63.33%), Stiffness (51.33%) and Physical functions (67.33%) respectively, whereas one patients were extreme and rest of it severe, mild and no pain. Based on this study, Knee osteoarthritis (OA) is a common condition which represents a major contribution to the burden of physical disability.

**Ganvir S.D et al., (2012)** conducted an observational study to examine the prevalence and risk factors for knee osteoarthritis in among elderly men and women in Vikhe Hospital, Ahmednagar from July 2011 to June 2012. Out of 205 patients 145 were female and 60 were male osteoarthritis patients were randomly selected from OPD and IPD. The tool was used for this study were graded 0-4 described by Kellgren and Lawrence scale. Subjects were interviewed by standardized predesigned and a pre-tested questionnaire. The study has observed that there is relationship between age, sex and BMI with OA. The results showed, there was a slightly higher prevalence of radiographic changes of OA in women than in men however, there was a significantly higher proportion of women with symptomatic disease (11% of all women versus 7% of all men)  $P = 0.003$ . In this study observed that there is relationship between age, sex and BMI with OA.

**Arvind Kumar Singh, et al., (2010)** conducted a community-based cross sectional study to estimate the prevalence and determinants of osteoarthritis knee joint among elderly persons residing in an urban slum of Delhi in American College of Rheumatology (ACR) from December 2009 to February 2010. 496 elderly (male and female) were selected for this study. House to house survey interview was done for all

eligible participants using a semi-structures interview schedule. Among those having knee pain, presence of crepitus, tenderness, bone overgrowth and bone warmth were most specific factors. The prevalence of osteoarthritis knee (any joint) was 41.1%, out of which 37.7% had bilateral osteoarthritis, whereas 3.4% had unilateral osteoarthritis. Presence of osteoarthritis knee was found to be significantly higher among females. The results showed Chi-square t-test was applied for bivariate analysis to find the association between outcome and predictor variables. P-value  $<0.05$  was taken as significant. All the predictor variables significant at the level of  $p < 0.25$  were included as a factor in the multivariate model for logistic regression.

**Harshal Salve et al., (2009)** conducted a community-based cross-sectional study in an urban resettlement colony in South Delhi from 15 January to 28 February 2009. Study the prevalence of knee osteoarthritis in women aged 40 years and above. Osteoarthritis was diagnosed by using clinical criteria given by American College of Rheumatology for diagnosis of Idiopathic Osteoarthritis of knee joints. It includes knee joint pain with following five: presence of crepitus, stiffness  $< 30$  min, bony enlargement, bony tenderness and absence of palpable warmth. A total 150 houses visited and 260 women were interviewed, out of which 123 women 47.3% 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. The results showed prevalence of osteoarthritis in various age groups analyzed by using Pearson Chi-square test: 34.76, df 2 ( $P < 0.001$ ).

### **Section B: Studies related to pain, stiffness and physical function.**

**Faiq I. Gorial et al., (2017)** conduct a cross-sectional study was carried out in Baghdad Teaching Hospital/ Rheumatology outpatient clinic from March to October 2017. To assess the functional status in a cohort of Iraqi patients with knee Osteoarthritis (OA). Out of 150, 97 female subjects were involved in the study. Diagnosed by a rheumatologist according to revised ACR (American College of Rheumatology) criteria for classification of OA knee. Patients' age, gender, body mass index (BMI), smoking history, educational level, and disease duration were recorded. The Western Ontario and

McMaster Universities Osteoarthritis Index (WOMAC) score was used to measure functional status of patients with knee OA. The mean of total WOMAC score was  $8.05 \pm 2.10$  (Range 3-12). The mean WOMAC of pain score was  $3.22 \pm 0.76$  (1-4), stiffness score was  $2.05 \pm 1.01$  and for functional disability score was  $2.79 \pm 0.88$ . Chi square test was used for discrete variables to test the association  $P < 0.05$  or  $P = 0.05$  were considered significant. The results showed there was a positive significant correlation between age of the patients and severity of knee OA assessed with total WOMAC score ( $p = 0.026$ ). However, there was a significant negative correlation between educational level and total WOMAC score ( $p = 0.015$ ).

**Urwin M, et al., (2017)** conducted a descriptive study to assess the quality of life (QOL) of community living elderly people aged 55-74 with chronic osteoarthritis knee, episodic or sporadic knee pain were one group and another group were without pain. The simple random sampling technique was adapted and the sample size was 306. A Visual Analogue Scale was used to assess global QOL. Physical as well as psychosocial disability was assessed with the Sickness Impact Profile (SIP). Coping with problems in general was assessed with the Utrecht Coping List. As expected, a significantly lower QOL was found in people with more chronic knee pain ( $p = 0.045$ ). The results showed the difference in QOL between the group with chronic knee pain and a reference group without pain was 10%.

**Kim In ji, et al., (2011)** conducted a community based cross sectional study (prospective cohort study) Elderly Community Residents of Korea, Study subjects were selected over 65 years old represented about 504 were analyzed for this study. All subjects also completed the Korean version of Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), a cross-culturally adapted and validated instrument that measures knee pain and physical function in persons with knee OA (10), and the Short Form 12-item (SF-12) questionnaire for the evaluation of self-reported functional status and QOL (quality of life). The ORs (Odds ratio) and 95% confidence interval (CI) for belonging to the worst quartile of WOMAC were calculated by logistic regression analysis. The proportion of subjects belonging to each category of physical performance test was compared between subjects with and without knee pain using chi-square test.

Data were analyzed using SAS software version 9.1 (SAS Institute). The results showed P values < 0.05 (2- tailed) were considered statistically significant.

**Mary Luci Avelar di Sabatino Santos et al., (2011)** conducted a exploratory, cross-sectional study of elderly women with knee OA. To determine the correlation between performance of the knee muscles and pain, stiffness, and functionality. 392 elderly female volunteers were selected by convenience sample, 90 met the pre established inclusion and exclusion criteria. Through the Western Ontario and McMaste Universities Osteoarthritis Index (WOMAC) Questionnaire applied. The correlation between the variables was analyzed by Spearman's coefficient of correlation ( $\alpha = 0.05$ ). There was significant inverse correlation between muscle strength and resistance evaluated with all the domains of WOMAC and the overall score of the instrument ( $p < 0.05$ ). The results showed the strongest correlations were verified between peak torque/body mass at 60°/s of the hamstring muscles and self-reported function ( $r = -0.437$  and  $p < 0.001$ ) and the peak torque/body mass at 60°/s of the quadriceps muscles and pain of WOMAC ( $r = 0.437$  and  $p = 0.000$ ).

**Joseph A Zeni Jr and Jill S. Higginson (2010)** conducted a comparative study to reduced knee flexion excursion during the loading response of gait. 56 subjects (age 40-83 years) participated in the study. 12 persons with severe knee osteoarthritis (Kellgren-Lawrence score 4) and 22 persons with moderate knee osteoarthritis (Kellgren-Lawrence score 2-3) were 22 compared to a healthy control group. Group differences were compared at 1.0 m/s, self-selected and fast walking speeds using a one-way ANOVA, At all walking speeds, the severe group had significantly higher stiffness, even when accounting for differences in walking speed ( $p \leq 0.038$ ). A significant increase in dynamic joint stiffness was found for all groups when speed was increased ( $p = 0.001$ ). The results showed that was significantly higher than the moderate group (0.067 Nm/degree) ( $p = 0.034$ ) and the control group (0.066 Nm/degree) ( $p = 0.025$ ). No differences were found between the control and moderate group at 1.0 m/s ( $p = 0.993$ ).



### Section C: Studies related to uses of mustard plaster

**Sanjay Bajaj, et al., (2016)** conducted a study to assess the use of transdermal delivery of homemade medicinal preparations. It is stated that Transdermal delivery of medications is not a new concept it was early 20th century. Mustard plasters were used for severe chest congestion. The Belladonna Plaster, containing 0.25% of Belladonna alkaloid, had a place in the US pharmacopeia as a transdermal analgesic. The success of nicotine patches nearly two decades ago revolutionized the use of transdermal drug.

**Reka Szollosi, (2011)** Plants of the *Brassica* genus contains special sulfur compounds called glucosinolates, which are very important secondary metabolites. These glucosinolates are inactive until they react with water or any moisture. At this point, they are hydrolyzed to isothiocyanates, [glucose](#), and potassium bisulfate. The glucosinolates, which are generally present in the highest concentrations in seeds, may have a key role in cancer prevention, mainly in the initiation or promotion phases and in cell apoptosis. Results have shown that products of the enzymatic breakdown of glucosinolates can regulate cancer development through the induction of detoxification enzymes and/or inhibition of activation enzymes. There are also descriptions of antibacterial, insecticidal, nematocidal, and antifungal activities of glucosinolates and isothiocyanates. It is not only the glucosinolates and their breakdown products that have chemoprotective effects in several types of cancers; [sterols](#) of mustard seeds have similar properties. When the beneficial effects of mustard oil, which comprises a remarkable amount of  $\alpha$ -linolenic acid, was examined in India, a two-fold lower risk of ischemic heart disease was observed. Although glucosinolates are considered to have chemoprotective influences in several types of cancers, some of them, and their breakdown products, may cause damage or physiological disorders.

**Hua GR et al., (2001)** conducted a study the clinical effect and mechanism of Tracheitis Plaster (TP) in treating chronic bronchitis at china. TP is consisted of ephedra, almond, pinellia tuber and white mustard seed. Patients were randomly divided into two groups, out of 84; 59 patients were treated with TP sticking on acupoints along both sides of thoracic vertebrae 1-6. The 25 patients in the control group were treated with

intramuscular injection. Clinical symptoms, X-ray chest film, level of immunoglobulin and T-lymphocyte subsets was recorded before and after treatment and follow-up were carried out 6month-1 year later. Total effective rate was 93.2% and the X-ray improvement rate was 40.7% in the treated group, the control group, 80.0% and 20.0% respectively. 6month and 1 year follow-up studies showed the total effective rate in the treated group was 91.5% and 89.8% respectively, which was significantly higher than the control group (80.0% and 76.0%) respectively ( $P < 0.05$ ). The results showed improvement in levels of IgG and CD8 in the treated group was also superior to those in control group ( $P < 0.05$ ). Tracheitis Plaster (TP) is a highly effective transcutaneous absorbent with promising long-term effect,

**Paolo M Fiorentino (1999)** conducted a comparative study to assess the mustard oil to the TMJ (Temporomandibular joint) region is also inflammatory, but, it is not clear if application of glutamate is equally inflammatory. In this study the extent of plasma-protein extravasation and oedema induced by mustard oil application to the TMJ region was compared with that induced by glutamate. Application of mustard oil resulted in plasma-protein extravasation into the TMJ tissues and oedema of the TMJ region. In contrast, glutamate did not cause plasma-protein extravasation or oedema.

#### **Section D: Studies related to effectiveness of mustard plaster application on osteoarthritic index among elderly.**

**Yashoda. K (2014)** conducted a true experimental research design study to Effectiveness of Mustard Plaster on Knee Pain and inability among elderly in selected old age home at Vellore. Non-randomized Purposive sampling technique. 30 subjects were control and 30 subjects were experimental group. WOMAC Scale for Assessment of Knee pain, for inability Numeric rating scale was used. Intervention given for experimental group (mustard plaster application) daily 15 minutes duration for a period of 5 days. Assessed the level of pain and inability. The results showed, after application of Mustard plaster Pain and inability was ( $M = 3.30$ ;  $SD = 1.55$ ). The t value is 4.06 is noted that the difference is statistically significant at  $p < 0.05$  level.

**Dhivya. S (2012)** conducted a true experimental research design study to assess the effectiveness of mustard plaster application on knee pain among elderly at Ayanambakkam. Simple random sampling was used to select the elderly clients. 30 subjects were control and 30 subjects were experimental group. Observational checklist for signs and symptoms and rating scale to assess the level of satisfaction. Intervention given for experimental group (mustard plaster application) daily 15 minutes duration for a period of 1 week. After 7 days, the level of knee joint pain was assessed for both control and experimental group. The significant percentage of elderly was highly satisfied (40%) and most of them were satisfied (60%) regarding the mustard plaster application. The results showed, the experimental group ( $M=2.27$ ;  $SD=1.23$ ) t value is 21. In comparison with the control group ( $M = 3.53$ ;  $SD = 1.25$ ). The difference was found statistically significant at  $p < 0.001$  level of confidence and it attributed to the effectiveness of mustard plaster application.

#### **Section E: Studies related to other therapies on osteoarthritic index among elderly people.**

**Archanah T.et al., (2018)** conducted a study to assess the effect of hydrotherapy based alternate compress on osteoarthritis knee in SDM College of Naturopathy and Yogic Sciences, Ujire, Karnataka, India. A randomized controlled trial was done by using a lottery method. Assessed by NRS (Numerical rating scale) and Knee injury and Osteoarthritis Outcome Score (KOOS). It consists of 5 subdivisions to assess a) symptoms, b) stiffness, c) pain, d) functions and daily living, e) functions, sports and recreational activities. The calculated t value is  $t=3.009$ . The study result shows that, statistical Significant at  $p < 0.01$  level. Comparison between control and case group using unpaired t test showed significant in both NRS (Numerical rating scale) and KOOS scores. The results showed in KOOS scores like symptoms score  $t=10.05$  ( $p < 0.01$ ), stiffness score  $t=7.36$  ( $p < 0.01$ ), pain score  $t= 6.27$  ( $p < 0.01$ ), functional score  $t=09$  ( $p < 0.01$ ), sports score  $t=1.95$  ( $p < 0.01$ ) and quality of life score  $t=5.59$  ( $p < 0.01$ ) respectively.

**Hania MM (2015)** conducted a study to assess the effectiveness of camphor oil in reduction of pain in arthritis at pathanamthitta district, Kerala. 30 samples in experimental and 30 in control group. The purposive sampling technique was adapted. The oil containing camphor is administered topically to patients thrice a day (morning, noon & evening) for 14 days. The tool used was Visual Analogue Scale and Questionnaire. The results showed mean of experimental group were compared against the mean of control group. The mean 3.5 and SD 1.36 of the experimental group reveals t value of 3.29 which is highly significant at  $P < 0.01$  level.

**Remya Mohan et al., (2014)** conducted a quasi-experimental study pretest and posttest design to compare the effectiveness of warm mustard oil and warm mustard oil with camphor on reduction of knee joint pain among rural women in selected areas of Pondicherry. Totally 60 women participated in the study. The age group between 51-75 years. Majority of the samples in both group I and II had moderate level of pain. Data were collected using structured questionnaire and modified WOMAC scale. Posttest after application of warm mustard oil massage, the pain level reduced as mild 53.3% and moderate 46.7%. In group II after the application of warm mustard oil with camphor, the pain level reduced to mild 33.3% and moderate 66.7%. The results showed the coefficient of variance of group I was 51.05 and group II was 69.60. It indicates there was increased variation in the level of pain reduction in group II than group I. The level of pain reduction in group II Highly significant at  $p < 0.001$  level.

**Fredrick (2009)** conducted a comparative study to determine the effectiveness of mud therapy in Sanjeevini Hospital, Hassan. A total 57 patients with bilateral primary knee pain, 32 of the patient received daily mud pack treatment on weekdays only for 3 weeks. The mud pack treatment was applied to both the knees for 30 minutes at  $45^{\circ}\text{C}$ , the remaining 25 patients, serving as control group, were given acetaminophen (2g/day). Non-probability sampling approach was used. The results suggested that mudpack treatment significantly reduced the level of pain and improved functional status of patient with knee joint pain. The experimental group 't' value 3.901 is highly significant at  $P < 0.01$  level.

**Parminder Kaur et al., (2007)** conducted a quasi-experimental study the effect of ‘moist heat application’ on the intensity of knee joint pain among elderly population (60 years and above) residing at Chandigarh from January and February 2007. Every individual was selected as a systematic random sampling technique .The sample size consisted of 87 subjects. 43 in the experimental and 44 in the control group. The experimental and the control groups were similar in respect to age, marital status, intensity of knee joint pain, intake of pain killer, duration and experience of knee joint pain. Intensity of knee joint pain was assessed on the 1st and 8th day of intervention among both experimental and control group. ‘Moist heat’ was applied at the knee joint twice a day for seven days in the experimental group. The results show that intensity of knee joint pain and intake of painkiller was reduced significantly in the experimental group as compared to the control group as indicated by chi-square test. The t value is 7.65 is ( $p>0.05$ ) results were statistically significant in favor of the use of moist heat application. 1st day and 8th day of intervention in the current study ( $p<0.01$ ) as indicated as chi-square test.

**Max Karner et al., (2005)** conducted a prospective randomized trial with a novel double-blinded study design in Osteoarthritis Knee, between April 2004 and May 2005. The study to determine the efficacy of different acupuncture treatment modalities. To compare between three different forms of acupuncture.116 subjects were aged from 35 to 82 with osteoarthritis knee were participated in three study centre. Interventions were individualized classical/ modern semi standardized acupuncture and non-specific needling. Outcome assessment comprised knee flexibility and changes in pain according to the WOMAC score. Each patient received all three forms of acupuncture (a, b, and c) in a random order. Each session was spaced seven days. Improvement in knee flexibility was significantly higher after classical Chinese acupuncture (10.3 degrees; 95% CI 8.9 to 11.7) as compared to modern acupuncture no effect was observed for non-specific needling (0.34 degrees, 95% CI—0.61 to 1.3;  $F=27.3$ ;  $df=3.1$   $P <0.001$ ). Adjusting for the Kellgren classification revealed that the difference between *classical acupuncture* and *modern acupuncture* was even larger in patients with more severe illness ( $P = 0.02$ ).

## **CHAPTER-III**

### **RESEARCH METHODOLOGY**

This chapter describes the methodology adopted in this study to assess the effectiveness of mustard plaster application on osteoarthritic index among elderly in selected community area at Tiruvannamalai.

This study includes Research Approach, Research Design, Variables, Setting, Population, Sample, Sample Size, Sapling Technique, Criteria for Sample Selection, Development and Description of Tool, Scoring Procedure, Content Validity, Pilot Study, Reliability, Procedure for data collection and Plan for data analysis.

#### **3.1 RESEARCH APPROACH:**

The research approach used in this study was Quantitative research approach.

#### **3.2 RESEARCH DESIGN:**

Research design is the researchers overall plan for obtaining answers to research question (**Polit, 2017**)

The research design adopted for the study was pretest-posttest basic experimental design which comes under true experimental design.

<b>GROUP</b>	<b>PRETEST</b>	<b>INTERVENTION</b>	<b>POSTTEST</b>
<b>EXPERIMENTAL</b>	RE1	X	RE2
<b>CONTROL</b>	RC1	-	RC2

- R- Randomization
- E- Experimental group
- C-Wait list control group
- X- Mustard plaster application for experimental group
- 1-pretest
- 2-post test

In this study the pre test level of osteoarthritic index in the experimental and control group was assessed by modified WOMAC index scale followed by implementation of mustard plaster application was given in experimental group and post test level of osteoarthritic index was assessed on 15<sup>th</sup> day.

### **3.3 VARIABLES**

#### **Independent variable:**

Mustard plaster application.

#### **Dependent variable:**

Osteoarthritic index–Pain, stiffness and physical function.

#### **Extraneous variable:**

The extraneous variables were include Age, Educational status, Working pattern, Marital status, Dietary pattern, Family Income, Body mass index, Duration of pain and Presence of other diseases.

### **3.4 SETTING OF THE STUDY**

The study was conducted in selected villages situated in Tiruvannamalai District.

### **3.5 POPULATION**

Population is the entire set of individuals or objects having some common characteristics. On this study population was elderly with osteoarthritis residing in selected villages. The total population is 26,664 and elderly female were 2027. Among those, 190 were diagnosed as osteoarthritis with symptoms of pain, stiffness and impaired physical function.

**Target population:**

The target population of this study is elderly with osteoarthritis. Who fulfill the sample selection criteria.

**Accessible Population:**

The accessible population for this study in elderly with osteoarthritis with age group of 60 years and above residing in selected villages at Tiruvannamalai Block.

**3.6 SAMPLE**

Sample refers to a subset of a population selected to participate in a research study. The study sample comprises of elderly at the age group of 60 years and above who satisfy the sample selection criteria of the study and selected by sampling technique.

**3.7 SAMPLE SIZE**

The sample size is 30 elderly in experimental group & 30 in control group.

**3.8 SAMPLING TECHNIQUE**

In this study, simple random sampling technique was adopted by using random table who met the sample selection criteria. The selected elderly is listed and assigned a numbers from 1 to 95. The researcher used the table of random numbers to select each member of the sample. The first selected 30 elderly were assigned to control group and next 30 in experimental group.

**3.9 CRITERIA FOR SAMPLE SELECTION****Inclusion Criteria:**

The elderly who:

- is female having the age of 60 years and above.
- are willing to participate in the study.
- diagnosed as osteoarthritis.



- had moderate, severe and extreme osteoarthritic index.
- can speak and understand tamil.
- have bilateral knee joint pain.

**Exclusion Criteria:**

The elderly people who:

- have fracture and knee surgeries.
- have neurological disorders like paralysis.
- have skin diseases and allergic to skin.

### **3.10 DEVELOPMENT AND DESCRIPTION OF THE TOOL**

The tool constructed in the study has two sections:

**Section A:** Demographic variables.

**Section B:** Tool to assess the osteoarthritic index.

#### **Section A: Demographic variable**

This section consist of demographic variable such as Age, Educational status, Working pattern, Marital status, Dietary pattern, Family Income, Body mass index, Duration of pain and presence of Other diseases which was assessed by using structured interview method.

#### **Section B: Tool to assess the osteoarthritic index.**

The modified WOMAC index scale comprised of 24 items with 3 subscales such as pain -5 items, joint stiffness-2 items and physical function-17 items which were assessed by using rating scale.

The measurements on the scale are set according to the following scoring system;

<b>Osteoarthritic index</b>	<b>None</b>	<b>Mild</b>	<b>Moderate</b>	<b>Severe</b>	<b>Extreme</b>
Scores	0	1	2	3	4

The osteoarthritic index is rated and interpreted under following classification.

<b>S.NO</b>	<b>INDEX</b>	<b>LEVEL OF INDEX</b>				
		<b>None</b>	<b>Mild</b>	<b>Moderate</b>	<b>Severe</b>	<b>Extreme</b>
1	Pain	0	1-5	6-10	11-15	16-20
2	Stiffness	0	1-2	3-4	5-6	7-8
3	Physical function	0	1-17	18-34	35-51	52-68
<b>Osteoarthritic index</b>		<b>0</b>	<b>1-24</b>	<b>25-48</b>	<b>49-72</b>	<b>73-96</b>

### **3.11 CONTENT VALIDITY**

Validity is the degree to which an instrument measures what it is intended to measure. (Polit, 2017)

The content validity of modified WOMAC index scale was established and obtained opinion from one community medicine expert, one Orthopedician and five nursing experts specialized in community health nursing. Based on the suggestions of the experts changes were made in the demographic variables and the osteoarthritic index after consultation with research guide.

### **3.12 ETHICAL CONSIDERATION**

The ethical principles followed in the study were,

## **A. Beneficence**

### **a) Freedom from harm and discomfort**

Participants were not subjected to unnecessary risks for harm or discomfort during the study period.

### **b) Protection from exploitation**

Participants were assumed that their participated or information provided would not be used against them in any way.

## **B. Respect for human dignity**

The investigator followed the second ethical principles of respect for human dignity. It includes the right to self determination and the right to self disclosure.

### **a) The right to self determination**

The investigator gave full freedom to the participants to decide voluntarily whether to participate in the study or to withdraw from the study and the right to ask questions.

### **b) The right to full disclosure**

The investigator has fully described the nature of the study, the person's right to refuse participation and the researcher's responsibilities based on which both oral and written informed consent was obtained from the participants.

## **C. Justice**

The researcher adhered to the ethical principal of justice, it includes participants right to fair treatment and right to privacy.

### **a) Right to fair treatment**

The investigator selected the study participant based on the research requirements. The investigator followed the routine for control group.

### **b) Right to privacy**

The investigator maintained the participants privacy throughout the study.

## **D. Confidentiality**

The investigator maintained confidentiality of the data provided by the study participants.

### **3.13 RELIABILITY**

Reliability is defined as the extent to which the instrument yields the same result on repeated measures. It is thus concerned with consistency, accuracy, stability, and homogeneity.

The Tamil version of modified WOMAC index scale was tested using the test and retest reliability method. The reliability score was  $r = 0.98$ . Hence, the tool was considered highly reliable for proceeding with the study.

### **3.14 PILOT STUDY**

A pilot study is defined as a small scale version or a trial run designed to test the methods to be used in a large group, more rigorous study which is sometimes referred to as the parent study (**Polit, 2017**).

Pilot study is a trial for main study to test the reliability, appropriateness and feasibility of the study and the tool. The formal permission was obtained from principal of Vignesh nursing college. The investigator obtained permission from village administrative officer in Tiruvannamalai. The investigator selected 10 subjects by using simple random sampling technique method. 5 samples were assigned to experimental group and 5 sample to control group.

The investigator explained about the aims, purpose, advantages of the study to the experimental group and control group. After obtaining the demographic details, pre test was done regarding the osteoarthritic index. The investigator gave intervention mustard plaster application which is a simplest home remedies with the duration of 15 – 20 minutes daily. The post test of pilot study concludes that there is a significant reduction of osteoarthritic index in experimental group at  $p < 0.001$  and non significant

reduction in osteoarthritic index of control group. So it is feasible and practicable to conduct the main study for the researcher.

### **3.15 PROCEDURE FOR DATA COLLECTION**

Data collection is the gathering of information needed to address the research problem. The word data means information that is systematically collected in the course of study.

The study was conducted in 12 villages, Tiruvannamalai District. The data was collected for a period of 4 weeks in the month of December 2018. Prior permission was sought from the village administrative officer by the investigator after explaining the purpose of the study. The investigator introduced herself to the elderly women and established rapport. They were assured that no physical or emotional harm would be done in the course of the study.

The elderly women were selected by simple random sampling technique based on sample selection criteria. The elderly women with osteoarthritis were selected in this study (experimental group 30 and control group 30). They were made to sit comfortably in a well ventilated room and confidentiality regarding the data was assured. After obtaining their verbal consent for willingness to participate in the study, the investigator conducted pre test level of osteoarthritic index by using modified WOMAC index scale in experimental and control group.

In experimental group the mustard plaster was applied over the both knee with sitting position (knee extended) once a day with the duration of 15- 20 minutes for a period of 14 days continuously in predefined period. Wait list control group followed the routine activities. The post test was conducted on 15<sup>th</sup> day in experimental and wait list control group with the same tools used in pretest. After the post test same intervention was applied to the wait list control group for a period of 14 days.

### **3.16 PLAN FOR DATA ANALYSIS**

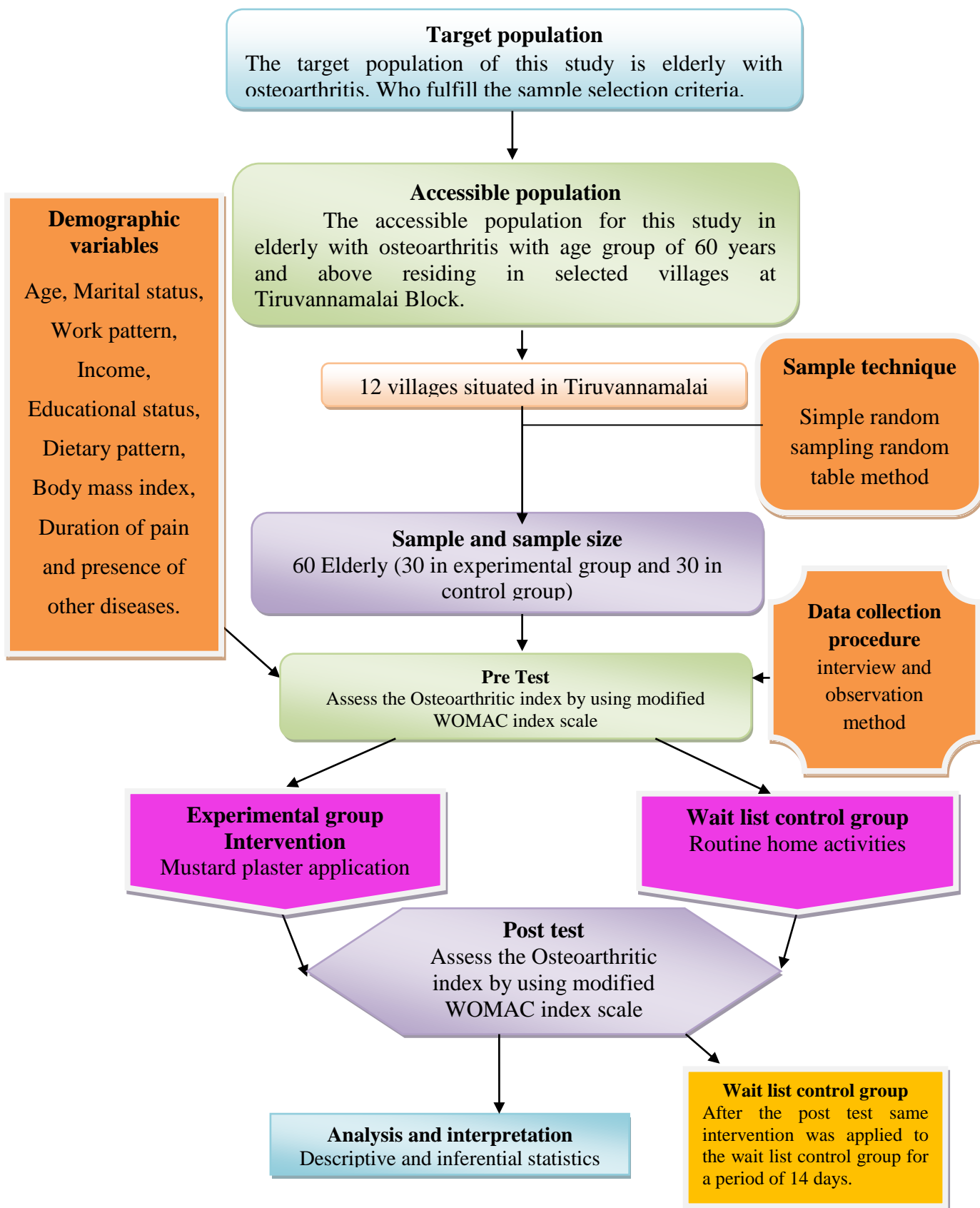
Quantitative data is analyzed by using descriptive and inferential statistics (Manual method and SPSS).

#### **Descriptive statistics:**

- Frequency and percentage distribution is used to analyze the demographic variables.
- Mean and standard deviation is to assess the level of pre and post test level of osteoarthritic index.

#### **Inferential statistics:**

- Chi-square is used to see the homogeneity of the sample in experimental and control group.
- Paired't' test is used to compare the pre and post test level of osteoarthritic index in the experimental and control group.
- Unpaired't' test is used to compare the pre and post test level of osteoarthritic index between the experimental and control group.
- One way ANOVA is used to associate the mean difference level of osteoarthritic index in experimental and control group with their selected demographic variables.



**FIGURE 2: SCHEMATIC REPRESENTATION OF RESEARCH METHODOLOGY**

## **CHAPTER – IV**

### **DATA ANALYSIS AND INTERPRETATION**

This chapter deals with the analysis and interpretation of the data collected from 60 elderly women. The data collected was organized, tabulated and analyzed according to the objectives. The findings based on the descriptive and inferential statistical analysis are presented under the following sections.

#### **ORGANIZATION OF DATA**

**SECTION 4.1:** Description of demographic variables of the Osteoarthritic index among elderly in Experimental and Control group.

**SECTION 4.2:** Assessment of pre and post test level of Osteoarthritic index among elderly in Experimental and Control group.

**SECTION 4.3:** Comparison of pre and post test level of Osteoarthritic index among elderly within Experimental and Control group.

**SECTION 4.4:** Comparison of pre and post test level of Osteoarthritic index among elderly between Experimental and Control group.

**SECTION 4.5:** Association of mean difference score of Osteoarthritic index in Experimental and Control group with their selected demographic variables.



**SECTION 4.1; DESCRIPTION OF DEMOGRAPHIC VARIABLES OF THE ELDERLY IN EXPERIMENTAL AND CONTROL GROUP.**

**Table 1: Frequency and percentage distribution of demographic variables in respect to Age, Educational status, Working pattern and Marital status in Experimental and control group.**

**n = 30+30**

S.No	Demographic Variables	Experimental group		Control group		Chi-square $\chi^2$
		f	%	f	%	
<b>1</b>	<b>Age</b>					$\chi^2 = 3.85$ NS
	a) 60 -65	18	60	13	43.3	
	b) 66 -70	11	36.7	12	40	
	c) 71 -75	-	-	3	10	
	d) Above 75	1	3.3	2	6.7	
<b>2</b>	<b>Educational status</b>					$\chi^2 = 1.22$ NS
	a) Non literate	25	83.3	27	90	
	b) Primary/middle school	4	13.3	3	10	
	c) High school/Higher secondary	1	3.3	-	-	
	d) Graduate/above	-	-	-	-	
<b>3</b>	<b>Working pattern</b>					$\chi^2 = 1.27$ NS
	a) Sedentary worker	1	3.3	-	-	
	b) Moderate worker	3	10	2	6.7	
	c) Heavy worker	26	86.7	28	93.3	
<b>4</b>	<b>Marital status</b>					$\chi^2 = 2.50$ NS
	a) Married	21	70	15	50	
	b) Single	-	-	-	-	
	c) Divorced	-	-	-	-	
	d) Widow	9	30	15	50	

**NS-Non significant at P<0.05 level.**

The table 1: shows Frequency and percentage distribution of demographic variables in respect to Age, Educational status, Working pattern and Marital status in Experimental and Control group.

In Experimental group, with regard to age in years 18 (60%) subjects were between the age group of 60-65 years, 11 (36.7%) were between the age group of 66-70 years and 1 (3.3%) were the age group of above 75 years.

In Experimental group, with regard to educational status, 25 (83.3%) subjects were in non- literate, 4 (13.3%) were completed primary school and 1 (3.3%) subjects were completed high school.

In Experimental group, with regard to working pattern 26 (86.7%) were in heavy workers, 3 (10%) were in moderate workers and 1 (3.3%) were in sedentary worker.

In Experimental group, with regard to marital status majority 21 (70%) were married and 9 (30%) were widow.

In Control group, with regard to age in years 13 (43.3%) were between the age group of 60-65 years, 12 (40%) were between the age group of 66-70 years, 3 (10%) were between the age group of 71-75 years and 2 (6.7%) were the age group of above 75 years.

In Control group, with regard to Educational status, 27 (90%) were in non-literate and 3 (10%) were in primary school.

In Control group, with regard to working pattern 28 (93.33%) were in heavy workers and 2 (6.66%) were in moderate workers.

In Control group, with regard to marital status 15 (50%) were married and 15 (50%) were widow.

On overall analysis, there is no significant association in demographic variables between experimental and control group similar with respect to Age, Educational status, Working pattern and Marital status.

**Table 2: Frequency and percentage distribution of demographic variables in respect to Dietary pattern, Family income and Body mass index in Experimental and Control group.**

**n = 30+30**

S.NO	Demographic Variables	Experimental group		Control group		Chi-square $\chi^2$
		f	%	f	%	
<b>5</b>	<b>Dietary pattern</b>					$\chi^2=3.16$ NS
	a) Vegetarian	3	10	-	-	
	b) Non vegetarian	27	90	30	100	
	c) Lacto ova vegetarian	-	-	-	-	
<b>6</b>	<b>Family income per month</b>					$\chi^2=7.30$ S*
	a) Below Rs.5,000	13	43.3	23	76.7	
	b) Rs.5,001-10,000	16	53.3	7	23.3	
	c) RS.10,001-20,000	1	3.3	-	-	
	d) Above Rs. 20,000	-	-	-	-	
<b>7</b>	<b>Body mass index</b>					$\chi^2=6.66$ NS
	a) <18.50 Underweight	2	6.7	-	-	
	b) 18.50-24.99 Normal range	19	63.3	26	86.7	
	c) 25.00-29.99 Pre obese	3	10	3	10	
	d) 30.00-34.99 Obese class-I	6	20	1	3.3	
	e) 35.00-39.00 Obese class-II	-	-	-	-	
	f) >40.00 Obese class-III	-	-	-	-	

**NS-Non significant at P<0.05 level, S\*-Significant at p<0.05 level.**

The table 2: shows Frequency and percentage distribution of demographic variables in respect to Dietary pattern, Family income and Body mass index.

In Experimental group, with regard to dietary pattern, 27 (90%) were taking non vegetarian and 3 (10%) were taking vegetarian food.

In Experimental group, with regard to family income majority of the subjects 16 (53.3%) had a family income of 5,001-10,000 rupees, 13 (43.3%) had a family income of below 5000 rupees and 1 (3.3%) had a family income of 10,001-20,000 rupees.

In Experimental group, with regard to body mass index, 19 (63.3%) were in 18.50-24.99 (Normal range), 6 (20%) were in 30.00-34.99 (Obese class-I), 3 (10%) were in 25.00-34.99 (Pre obese) and 2 (6.7%) were in <18.50 (Underweight).

In Control group, with regard to dietary pattern, all the subjects 30 (100%) were taking non vegetarian food.

In Control group, with regard to family income majority of the subjects 23 (76.7%) had a family income of below 5000 rupees and 7 (23.3%) had a family income of 5,001-10,000 rupees,

In Control group, with regard to body mass index, 26 (86.7%) were in 18.50-24.99 (Normal weight), 3 (10%) were in 25.00-34.99 (Pre obese) and 1 (3.33%) were in 30.00-34.99 (Obese class-II),

On overall analysis, there is significant association in demographic variables between experimental and control group with respect to Family income ( $\chi^2=7.30$ ).

**Table 3: Frequency and percentage distribution of demographic variables in respect to Duration of pain and Presence of other diseases in Experimental and Control group.**

**n = 30+30**

S.NO	Demographic Variables	Experimental group		Control group		Chi-square $\chi^2$
		f	%	f	%	
<b>8</b>	<b>Duration of pain</b>					$\chi^2=1.82$ NS
	a) 1year	-	-	-	-	
	b) 2years	15	50	12	40	
	c) 3years	6	20	4	14	
	d) 4 years and Above	9	30	14	46	
<b>9</b>	<b>Presence of other diseases</b>					$\chi^2=4.76$ NS
	a) Hypertension	4	13.3	1	3.3	
	b) Diabetes mellitus	1	3.3	1	3.3	
	c) HT/ DM	4	13.3	3	10	
	d) HT/DM/Heart disease	1	3.3	-	-	
	e) Hyperthyroidism	1	3.3	-	-	
	f) No other diseases	19	63.3	25	83.3	

**NS-Non significant at P<0.05 level.**

The table 2: shows Frequency and percentage distribution of demographic variables in respect to Duration of pain and presence of other diseases.

In Experimental group, with regard to duration of pain, 15 (50%) subjects had since 2years, 9 (30%) were had since 4 years and above 6 (20%) were had since 3years.

In Experimental group, with regard to other diseases, 19 (63.3%) subjects not having other diseases, 4 (13.3%) were in hypertension and HT/DM, 1 (3.3%) were diabetes mellitus, HT/DM/Heart disease and hyperthyroidism respectively.

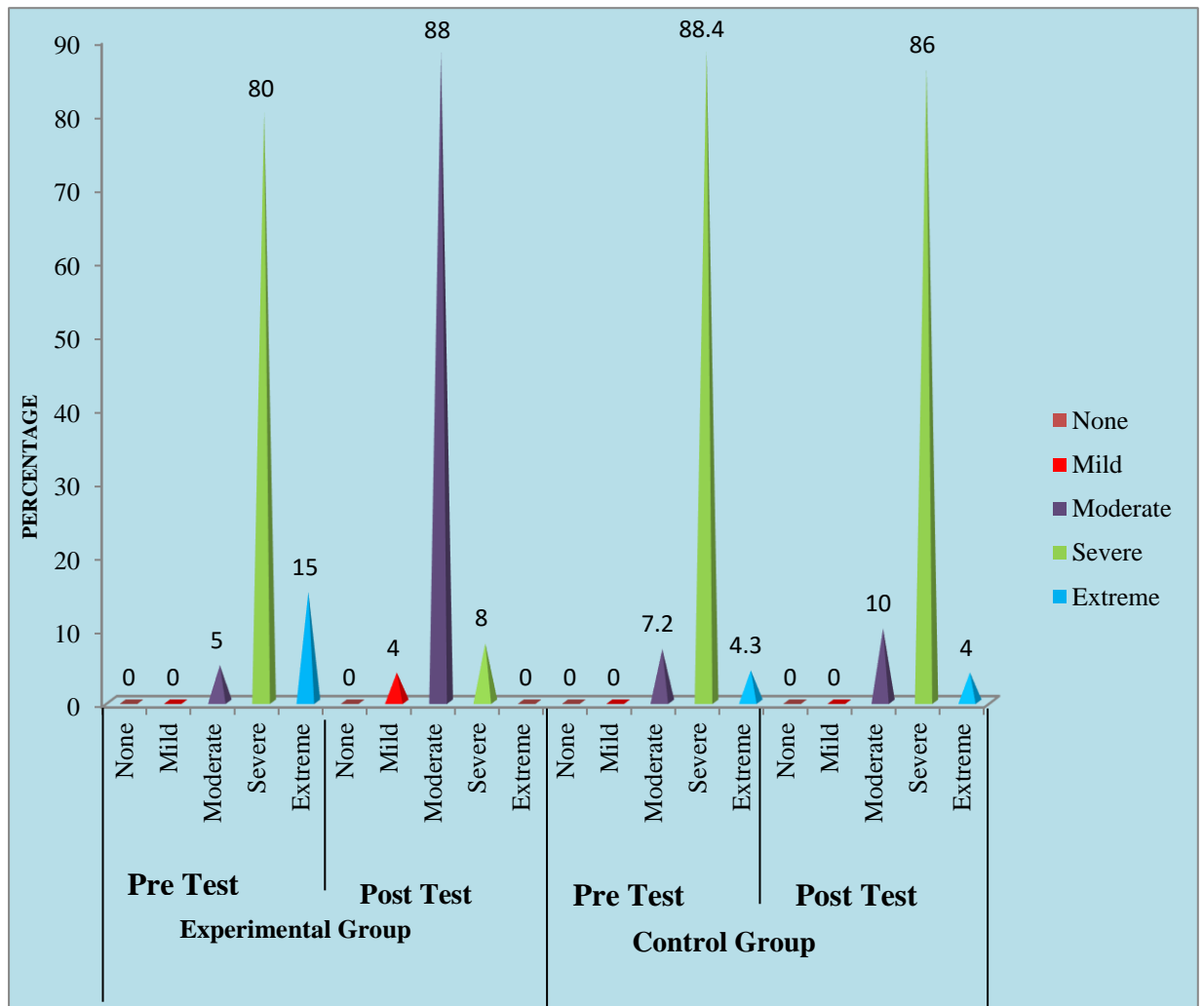
In Control group, with regard to duration of pain, 14 (46%) subjects had since 4 years and above, 12 (40%) were had since 2years and 4 (14%) were had since 4years.

In Control group, with regard to other diseases, 25 (83.33%) subjects not having other diseases, 3 (10%) were had hypertension and DM, 1 (3.33%) were had hypertension and diabetes mellitus.

On overall analysis, there is no significant association in demographic variables between experimental and control group similar with respect to Duration of pain and Presence of other diseases.

**SECTION 4.2: ASSESSMENT OF PRE AND POST TEST LEVEL OF OSTEOARTHRITIC INDEX AMONG ELDERLY IN EXPERIMENTAL AND CONTROLGROUP.**

**n =30+30**



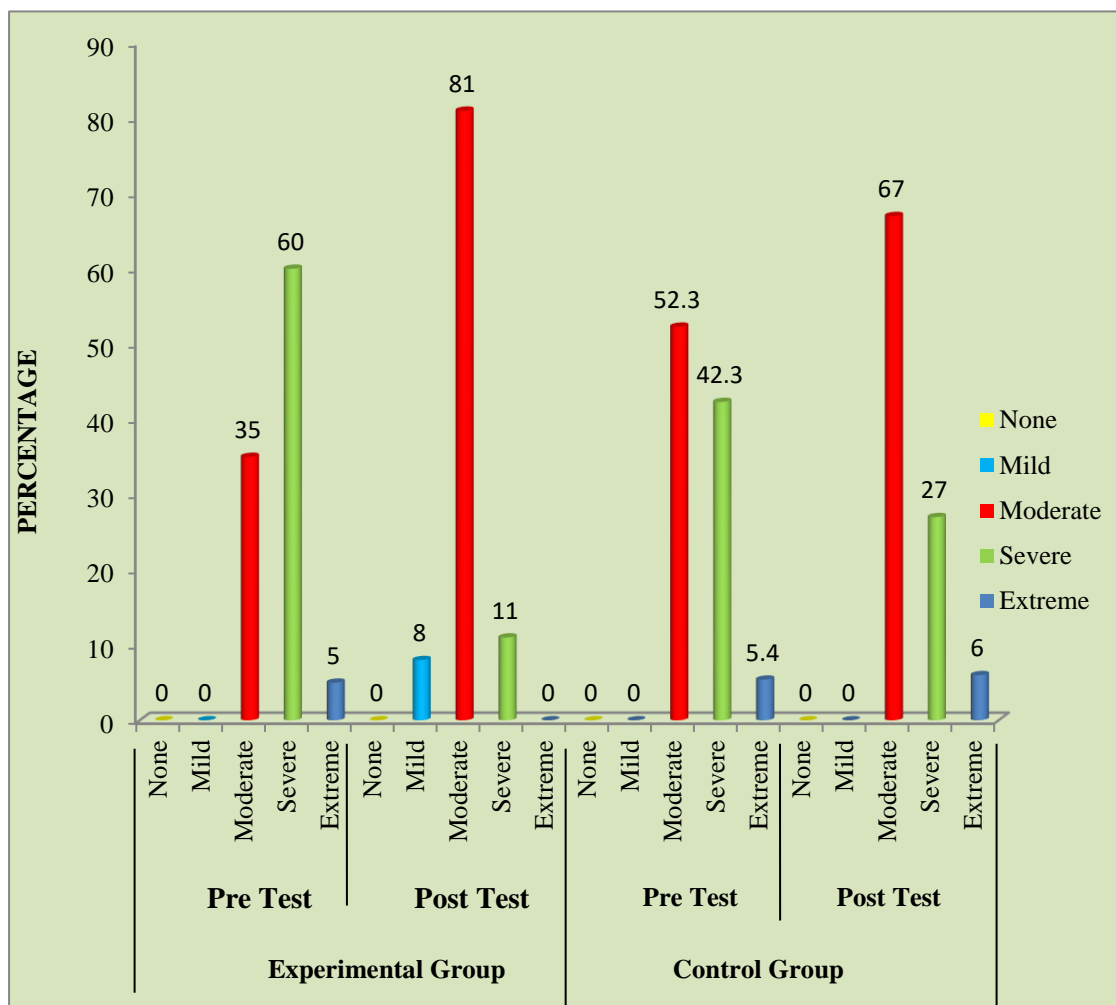
**Figure 3: Percentage distribution of pre and post test level of pain in experimental and control group.**

Figure 3: shows the **pre test** score of pain in experimental group, majority 24 (80%) subjects had severe pain, 4 (15%) had extreme pain and 2 (5%) had moderate pain, where as in control group majority 27 (88.4%) had severe pain, 3 (7.2%) had moderate pain and 1 (4.3%) had extreme pain.

The analysis on the **post test score** of pain in experimental group, majority 26 (88%) subjects had moderate pain, 2 (3.6%) had mild pain and 2 (8%) had severe pain, whereas in control group majority 25 (86%) had severe pain 4 (10%) had moderate pain and 1 (4%) had extreme pain.



n =30+30

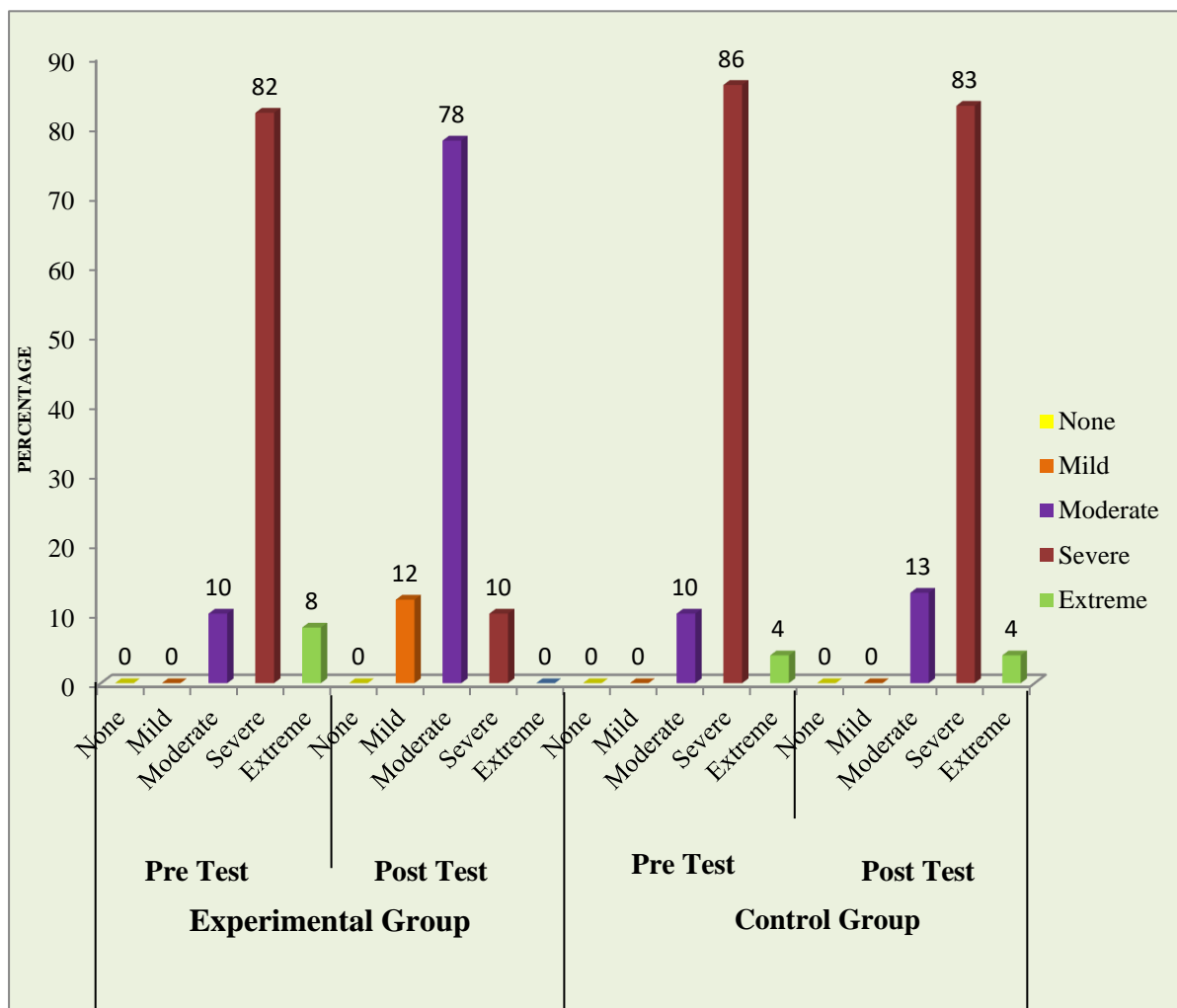


**Figure 4: Percentage distribution of pre and post test level of stiffness in experimental and control group.**

Figure 4: shows the **pre test score** of stiffness in experimental group, majority 16 (60%) subjects had severe stiffness, 13 (35%) had moderate stiffness and 1 (5%) had extreme stiffness, whereas in control group majority 18 (52.3%) had moderate stiffness, 11 (42.3%) had severe stiffness and 1 (5.3%) had extreme stiffness.

The analysis on the **post test score** of stiffness in experimental group, majority 24 (81%) subjects had moderate stiffness, 2 (11%) had severe stiffness and 4 (8%) had mild stiffness, whereas in control group majority 22 (67%) had moderate stiffness, 7 (27%) had severe stiffness and 1 (6%) had extreme stiffness.

n =30+30

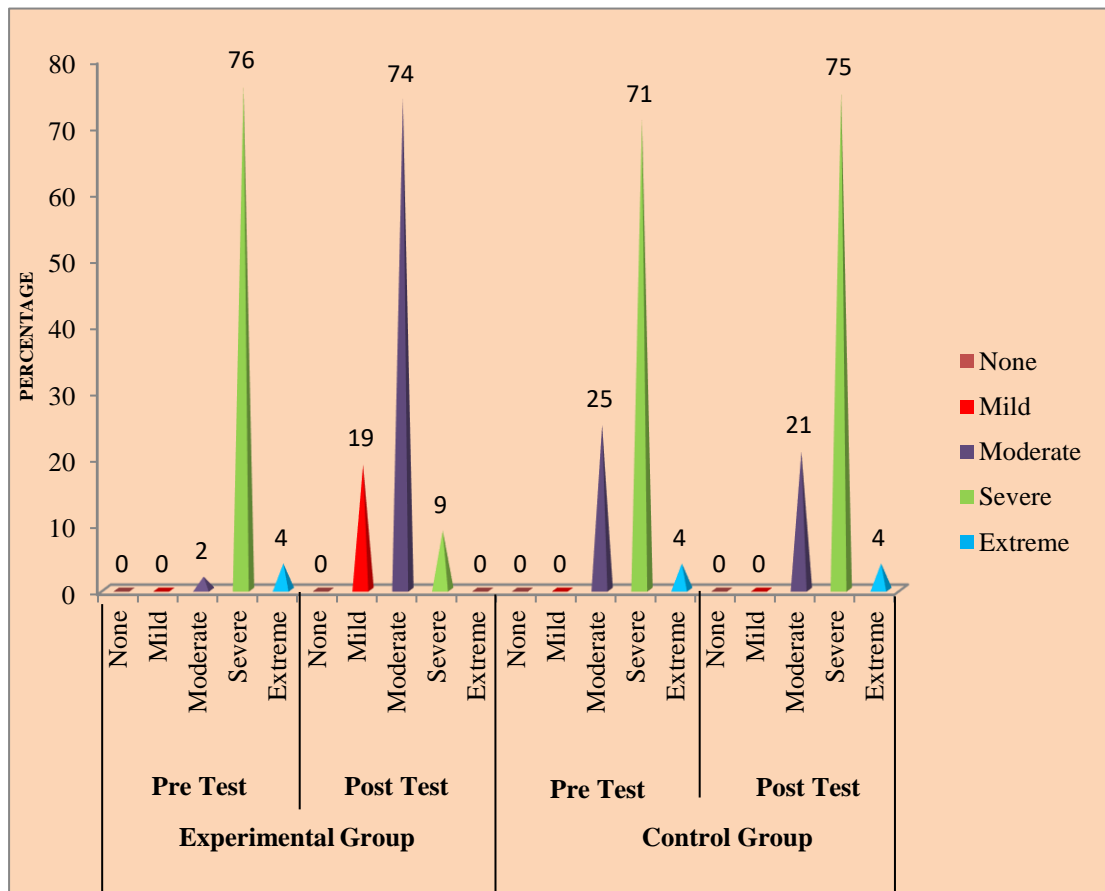


**Figure 5: Percentage distribution of pre and post test level of physical function in experimental and control group.**

Figure 5: shows the **pre test score** of physical function in experimental group, majority 24 (82%) subjects had severe physical function, 4 (10%) had moderate physical function and 2 (8%) had extreme physical function, whereas in control group majority 26 (86%) had severe physical function, 3 (10%) had moderate physical function and 1 (4%) had extreme physical function.

The analysis on the **post test score** of physical function in experimental group, majority 23 (78%) subjects had moderate physical function, 5 (12%) had mild physical function and 2 (10%) had severe physical function, whereas in control group majority 24 (83%) had severe physical function 5 (13%) had moderate physical function and 1 (4%) had extreme physical function.

n =30+30



**Figure 6: Percentage distribution of pre and post test level of osteoarthritic index in experimental and control group.**

Figure 6: shows the **pre test score** of osteoarthritic index in experimental group, majority 21 (76%) subjects had severe osteoarthritic index, 8 (20%) had moderate osteoarthritic index and 1(4%) had extreme osteoarthritic index, where as in control group majority 19 (71%) had severe osteoarthritic index, 10 (25%) had moderate osteoarthritic index and 1 (4%) had extreme osteoarthritic index.

The analysis on the **post test score** of osteoarthritic index in experimental group, majority 18 (72%) subjects had moderate osteoarthritic index, 10 (19%) had mild osteoarthritic index and 2 (9%) had severe osteoarthritic index, whereas in control group majority 21 (75%) had severe osteoarthritic index 8 (21%) had moderate osteoarthritic index and 1 (4%) had extreme osteoarthritic index.

**SECTION 4.3: COMPARISON OF PRE AND POST TEST LEVEL OF OSTEOARTHRITIC INDEX AMONG ELDERLY WITHIN EXPERIMENTAL AND CONTROL GROUP.**

**Table 4: Comparison of pre and post test level of Osteoarthritic index among elderly within experimental group.**

**n = 30**

Group	Osteoarthritic index	Pre test		Post test		Paired 't' test
		Mean	SD	Mean	SD	
Experimental group	Pain	14.53	1.19	9.17	1.24	t =20.42 S*** (P=0.0001)
	Stiffness	4.7	0.79	3.07	0.78	t =7.92 S*** (P=0.0001)
	Physical Function	45.7	3.25	24.77	3.48	t =21.27 S*** (P=0.0001)
	Total	64.9	5.26	37.03	5.51	t =23.09 S*** (P=0.0001)

**S\*\*\*-Significant at p<0.001 level.**

The table 4: shows that in Experimental group, the pre test mean score of **pain** was 14.53 with S.D±1.19 and the post test mean score was 9.17 with S.D±1.24. The calculated paired 't' test is t =20.42 (P=0.0001) was found to be highly significant at p<0.001 level.

The pre test mean score of **stiffness** was 4.7 with S.D±0.79 and the post test mean score was 3.07 with S.D±0.78. The calculated paired 't' test is t =7.92 (P=0.0001) was found to be highly significant at p<0.001 level.

The pre test mean score of **physical function** was 45.7 with S.D±3.25 and the post test mean score was 24.77 with S.D±3.48. The calculated paired 't' test is t =21.27 (P=0.0001) was found to be highly significant at p<0.001 level.

The pre test mean score of **Osteoarthritic index** was 64.9 with S.D±5.26 and the post test mean score was 37.03 with S.D±5.51. The calculated paired 't' test is  $t=23.09$  ( $P=0.0001$ ) was found to be highly significant at  $p<0.001$  level.

**Table 5: Comparison of pre and post test level of osteoarthritic index among elderly within control group.**

**n = 30**

Group	Osteoarthritic index	pre test		post test		Paired 't' test
		Mean	SD	Mean	SD	
Control Group	<b>Pain</b>	13.87	1.18	13.93	1.14	t =0.29 NS (P=0.84)
	<b>Stiffness</b>	4.63	0.19	4.23	0.43	t =0.9 NS (P=0.37)
	<b>Physical function</b>	43.6	3.02	43.6	3.14	t =0.00 NS (P=1.00)
	<b>Total</b>	62.03	4.2	61.73	4.71	t =0.49 NS (P=0.76)

**NS-Non significant at P<0.05 level.**

The table 5: shows that, In control group, the pre test mean score of **pain** was 13.87 with S.D±1.18 and the post test mean score was 13.93 with S.D±1.14. The calculated paired 't' test is t =0.29 (P=0.84) was found to be statistically no significant at p<0.05 level.

The pre test mean score of **stiffness** was 4.63 with S.D±0.19 and the post test mean score was 4.23 with S.D±0.43. The calculated paired 't' test is t =0.9 (P=0.37) was found to be statistically no significant at p<0.05 level.

The pre test mean score of **physical function** was 43.6 with S.D±3.02 and the post test mean score was 43.6 with S.D±3.14. The calculated paired 't' test is t =0.00 (P=1.00) was found to be statistically no significant at p<0.05 level.

The pre test mean score of **Osteoarthritic index** was 62.03 with S.D±4.2 and the post test mean score was 61.73 with S.D±4.71. The calculated paired 't' test is  $t=0.49$  ( $P=0.76$ ) was found to be statistically no significant at  $p<0.05$  level.

**SECTION 4.4: COMPARISON OF PRE AND POST TEST LEVEL OF OSTEOARTHRITIC INDEX AMONG ELDERLY BETWEEN EXPERIMENTAL AND CONTROL GROUP.**

**Table 6: Comparison of pre test level of osteoarthritic index among elderly between experimental and control group.**

**n=30+30**

Assessment	Osteoarthritic index	Experimental Group		Control group		Unpaired 't' test
		Mean	SD	Mean	SD	
Pre Test	Pain	14.43	1.19	13.47	1.08	t =1.77 NS (P=0.08)
	Stiffness	4.8	0.59	4.03	0.11	t =2.00 NS (P=0.08)
	Physical function	45.7	3.45	44.6	3.02	t =1.11 NS (P=0.06)
	Total	64.9	5.26	62.03	4.2	t =1.27 NS (P=0.04)

**NS-Non significant at P<0.05 level.**

The table 5: shows that, the pre test mean score of **pain** in experimental group was 14.43 with SD±1.19 and in control group was 13.47 with SD±1.08. The calculated unpaired 't' value is t=1.77 (P=0.08) was found to be statistically non significant at p<0.05 which indicates that there was no significant difference in the pre test level of pain between the experimental and control group.

The pre test mean score of **stiffness** in experimental group was 4.8 with SD±0.59 and in control group were 4.03 with SD±0.11. The calculated unpaired 't' value is t=2.00 (P=0.08) was found to be statistically non significant at p<0.05 which indicates that there was no significant difference in the pre test level of stiffness between the experimental and control group.



The pre test mean score of **physical function** in experimental group was 45.7 with  $SD\pm 3.45$  and in control group were 44.6 with  $SD\pm 3.02$ . The calculated unpaired 't' value is  $t=1.11$  ( $P=0.06$ ) was found to be statistically non significant at  $p<0.05$  which indicates that there was no significant difference in the pre test level of physical function between the experimental and control group.

The pre test means score of **Osteoarthritic index** in the experimental group was 64.9 with  $SD\pm 5.26$  and in control group was 62.03 with  $SD\pm 4.2$ . The calculated unpaired 't' value is  $t=1.27$  ( $P=0.04$ ) was found to be statistically non significant at  $p<0.05$  which indicates that there was no significant difference in the pre test level of Osteoarthritic index between the experimental and control group.

**Table 7: Comparison of post test level of osteoarthritic index among elderly between experimental and control group.**

**n=30+30**

Assessment	Osteoarthritic index	Experimental group		Control group		Unpaired 't' test
		Mean	SD	Mean	SD	
Post Test	<b>Pain</b>	9.15	1.74	13.93	1.34	t =13.28 S*** (P=0.0001)
	<b>Stiffness</b>	3.07	0.78	4.23	0.63	t =6.36 S*** (P=0.0001)
	<b>Physical function</b>	24.81	2.98	43.60	2.74	t =19.45 S*** (P=0.0001)
	<b>Total</b>	37.03	5.51	61.73	4.71	t =19.7 S*** (P=0.0001)

**S\*\*\*-Significant at p<0.001 level.**

The table 7: shows that, the post test mean score of **pain** in experimental group was 9.15 with SD±1.74 and in Control group was 13.93 with SD±1.34. The calculated unpaired 't' value is t=13.28 (P=0.0001) was found to be statistically highly significant at p<0.001 which indicates that there was difference in the post test level of pain between the experimental and control group.

The post test mean score of **stiffness** in experimental group was 3.07 with SD±0.78 and in Control group were 4.23 with SD±0.63. The calculated unpaired 't' value is t=6.36 (P=0.0001) was found to be statistically highly significant at p<0.001 which indicates that there was difference in the pre test level of stiffness between the experimental and control group.

The post test mean score of **physical function** in experimental group was 24.81 with SD±2.98 and in Control group were 43.60 with SD±2.74. The calculated

unpaired 't' value is  $t=19.45$  ( $P=0.0001$ ) was found to be statistically highly significant at  $p<0.001$  which indicates that there was difference in the pre test level of physical function between the experimental and control group.

The post tests mean score of **Osteoarthritic index** in the experimental group was 37.03 with  $SD\pm 5.51$  and in control group were 61.73 with  $SD\pm 4.71$ . The calculated unpaired 't' value is  $t=19.76$  ( $P=0.0001$ ) was found to be statistically highly significant at  $p<0.001$  which indicates that there was difference in the post test level of Osteoarthritic index between the experimental and control group. This clearly shows that the practice of mustard plaster application had significant reduction of Osteoarthritic index score in the experimental group than the control group.

**SECTION 4.5: ASSOCIATION OF MEAN DIFFERENCE SCORE OF OSTEOARTHRITIC INDEX IN EXPERIMENTAL AND CONTROL GROUP WITH THEIR SELECTED DEMOGRAPHIC VARIABLES.**

**Table 8: Association of mean difference score of osteoarthritic index in experimental group with their selected demographic variables such as age and working pattern.**

**n=30**

S.NO	Demographic variables	Pre test		Post test		Difference		ANOVA 'F'
		Mean	SD	Mean	SD	Mean	SD	
<b>1</b>	<b>Age</b>							F=0.008 NS (P=0.95)
	a) 60-65 yrs	63.5	4.27	37.11	4.72	26.39	0.45	
	b) 66-70 yrs	66.6	6.37	36	6.26	30.6	0.11	
	c) 71-75 yrs	-	-	-	-	-	-	
	d) Above 75	70	0	47	0	23	0	
<b>2</b>	<b>Working pattern</b>							F=0.21 NS (P=0.64)
	a) Sedentary worker	63	0	42	0	21	0	
	b) Moderate worker	61.3	4.04	37	1	24.3	3.04	
	c) Heavy worker	65.3	5.37	36.8	5.84	28.5	0.47	

**NS-Non significant at P<0.05 level.**

The table 8: shows in experimental group, there is no statistical significant association of mean difference score of osteoarthritic index with their selected demographic variables such as age (F=0.008) and Working pattern (F=0.21).

**Table 9: Association of mean difference score of osteoarthritic index in experimental group with their selected demographic variables such as Body mass index and Presence of other diseases.**

**n =30**

S.No	Demographic variables	Pre test		Post test		Difference		ANOVA 'F'
		Mean	SD	Mean	SD	Mean	SD	
<b>3</b>	<b>Body mass index</b>							F=4.46 NS (P=0.011)
	a) <18.50	70.5	0.7	47	0	23.5	0.7	
	b) 18.50-24.99	63.68	4.08	35.52	3.65	28.16	0.43	
	c) 25.00-29.99	69	9.53	34.66	4.16	34.34	5.37	
	d) 30.00-34.99	64.83	5.97	39.66	3.66	25.17	2.31	
	e) 35.00-39.00	-	-	-	-	-	-	
	f) >40.00	-	-	-	-	-	-	
<b>4</b>	<b>Presence of other diseases</b>							F=13.44 S* (P=0.000)
	a) Hypertension	62.72	1.26	62.75	1.25	0.03	0.01	
	b) Diabetes mellitus	58	0	38	0	22	0	
	c) HT/ DM	70.5	6.65	39.25	5.25	31.25	1.4	
	d) HT/DM/ Heart disease	62	0	38	0	23	0	
	e) Hyperthyroidism	63	0	40	0	23	0	
	f) No other diseases	64.78	5.06	36.26	5.88	28.52	0.82	

**NS-Non significant, S\*-Significant at p<0.05 level.**

The table 9: shows in experimental group, there is statistical significant association of mean difference score of osteoarthritic index with presence of other diseases (F=13.44) at p<0.05 and the other demographic variables were not shown statistically significant.

**Table 10: Association of mean difference score of osteoarthritic index in control group with their selected demographic variables such as age and working pattern.**

**n =30**

S.NO	Demographic variables	Pre test		Post test		Difference		ANOVA 'F'
		Mean	SD	Mean	SD	Mean	SD	
<b>1</b>	<b>Age</b>							F=0.05 NS (P=0.94)
	a) 60-65 yrs	61.81	4.63	61.69	5.35	0.15	0.72	
	b) 66-70 yrs	62	4.32	61.58	4.61	0.42	0.29	
	c) 71-75 yrs	62.66	3.78	61.33	4.03	1.33	0.83	
	d) Above 75	64	2.82	64	4.24	0	1.42	
<b>2</b>	<b>Working pattern</b>							F=0.05 NS (P=0.82)
	a) Sedentary worker	-	-	-	-	-	-	
	b) Moderate worker	62.5	2.12	61	2.82	1.5	0.7	
	c) Heavy worker	62.4	4.33	61.78	4.85	0.36	0.52	

**NS-Non significant at P<0.05 level.**

The table 10: shows in control group, there is no statistical significant association of mean difference score of osteoarthritic index with their selected demographic variables such as age (F=0.05) and working pattern (F=0.05).

**Table 11: Association of mean difference level of osteoarthritic index in control group with their selected demographic variables such as body mass index and presence of other diseases.**

**n =30**

S.NO	Demographic variables	Pre test		Post test		Difference		ANOVA 'F'
		Mean	SD	Mean	SD	Mean	SD	
<b>3</b>	<b>Body mass index</b>							F=6.43 S* (P=0.01)
	a) <18.50	-	-	-	-	-	-	
	b) 18.50-24.99	62.11	4.1	61.76	4.68	0.35	0.58	
	c) 25.00-29.99	64.66	4.16	63	5.56	1.66	1.4	
	d) 30.00-34.99	56	0	57	0	1	0	
	e) 35.00-39.00	-	-	-	-	-	-	
	f) >40.00	-	-	-	-	-	-	
<b>4</b>	<b>presence of other diseases</b>							F=1.79 NS (P=0.19)
	a) Hypertension	61	0	60	0	1	0	
	b) Diabetes mellitus	60	0	60	0	0	0	
	c) HT/ DM	66.30	2.51	66.66	3.5	0.36	0.99	
	d) HT/DM/Heart disease	-	-	-	-	-	-	
	e) Hyperthyroidism	-	-	-	-	-	-	
	f) No other diseases	61.6	4.1	61.08	4.53	0.52	0.43	

**S\*- significant at P<0.05 level, NS- Non significant.**

The table 11: shows in control group, there is statistical significant association of mean difference score of osteoarthritic index with body mass index (F=6.43) at p<0.05 and the other demographic variables were not shown statistically significant.

## CHAPTER -V

### DISCUSSION

The study was conducted to evaluate the effectiveness of Mustard Plaster Application on Osteoarthritic Index among Elderly.

The discussion is based on the objectives, the review of literature and null hypotheses specified in this study.

#### **5.1 The first objective was to assess the pre and post test level of Osteoarthritic index among elderly in experimental and control group.**

The overall analysis on the **pre test score of pain** in experimental group, majority 24 (80%) subjects had severe pain, 4 (15%) had extreme pain and 2 (5%) had moderate pain, where as in control group majority 27 (88.4%) had severe pain, 3 (7.2%) had moderate pain and 1 (4.3%) had extreme pain.

The overall analysis on the **post test score of pain** in experimental group, majority 26 (88%) subjects had moderate pain, 2 (3.6%) had mild pain and 2 (8%) had severe pain, whereas in control group majority 25 (86%) had severe pain 4 (10%) had moderate pain and 1 (4%) had extreme pain.

The overall analysis on the **pre test score of stiffness** in experimental group, majority 16 (60%) subjects had severe stiffness, 13 (35%) had moderate stiffness and 1 (5%) had extreme stiffness, where as in control group majority 18(52.3%) had moderate stiffness, 11 (42.3%) had severe stiffness and 1 (5.3%) had extreme stiffness.

The overall analysis on the **post test score of stiffness** in experimental group, majority 24 (81%) subjects had moderate stiffness, 2 (11%) had severe stiffness and 4 (8%) had mild stiffness, whereas in control group majority 22 (67%) had moderate stiffness, 7 (27%) had severe stiffness and 1 (6%) had extreme stiffness.

The overall analysis on the **pre test score of physical function** in experimental group, majority 24 (82%) subjects had severe physical function, 4 (10%) had moderate physical function and 2 (8%) had extreme physical function,



where as in control group majority 26 (86%) had severe physical function, 3 (10%) had moderate physical function and 1 (4%) had extreme physical function.

The overall analysis on the **post test score of physical function** in experimental group, majority 23 (78%) subjects had moderate physical function, 5 (12%) had mild physical function and 2 (10%) had severe physical function, whereas in control group majority 24 (83%) had severe physical function 5 (13%) had moderate physical function and 1 (4%) had extreme physical function.

The overall analysis on the **pre test score of osteoathritic index** in experimental group, majority 21 (76%) subjects had severe osteoathritic index, 8 (20%) had moderate osteoathritic index and 1 (4%) had extreme osteoathritic index, where as in control group majority 19 (71%) had severe osteoathritic index, 10 (25%) had moderate osteoathritic index and 1 (4%) had extreme osteoathritic index.

The overall analysis on the **post test score of osteoathritic index** in experimental group, majority 18 (72%) subjects had moderate osteoathritic index, 10 (2%) had mild osteoathritic index and 2 (9%) had severe osteoathritic index, whereas in control group majority 21 (75%) had severe osteoathritic index 8 (21%) had moderate osteoathritic index and 1 (4%) had extreme osteoathritic index.

**Chandra Parkas' pal et al., (2016)** conducted the study on community based cross sectional study to find out the prevalence of primary knee OA in India which has a population of 1.252 billion across five sites in India. The total sample size was 5000 subjects. Tools consisted of a structured questionnaire and plain skiagrams for confirmation of OA. Diagnosis was done using Kellgren and Lawrence scale for osteoarthritis. Overall prevalence of knee OA was found to be 28.7%. The result showed that 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 ( $P = 0.001$ ).

## **5.2 The second objective was to compare pre and post test level of Osteoarthritic index among elderly within experimental and control group.**

**In Experimental group**, the analysis of pre test mean score of **pain** was 14.53 with  $S.D \pm 1.19$  and the post test mean score was 9.17 with  $S.D \pm 1.24$ . The calculated paired 't' test is  $t = 20.42$  ( $P = 0.0001$ ) was found to be highly significant at  $p < 0.001$  level.

The analysis of pre test mean score of **stiffness** was 4.7 with S.D±0.79 and the post test mean score was 3.07 with S.D±0.78. The calculated paired 't' test is  $t = 7.92$  ( $P = 0.0001$ ) was found to be highly significant at  $p < 0.001$  level.

The analysis of pre test mean score of **physical function** was 45.7 with S.D±3.25 and the post test mean score was 24.77 with S.D±3.48. The calculated paired 't' test is  $t = 21.27$  ( $P = 0.0001$ ) was found to be highly significant at  $p < 0.001$  level.

The analysis of pre test mean score of **Osteoarthritic index** was 64.9 with S.D±5.26 and the post test mean score was 37.03 with S.D±5.51. The calculated paired 't' test is  $t = 23.09$  ( $P = 0.0001$ ) was found to be highly significant at  $p < 0.001$  level.

**In Control group**, the pre test mean score of **pain** was 13.87 with S.D±1.18 and the post test mean score was 13.93 with S.D±1.14. The calculated paired 't' test is  $t = 0.29$  ( $P = 0.84$ ) was found to be statistically no significant at  $p < 0.05$  level.

The pre test mean score of **stiffness** was 4.63 with S.D±0.19 and the post test mean score was 4.23 with S.D±0.43. The calculated paired 't' test is  $t = 0.9$  ( $P = 0.37$ ) was found to be statistically no significant at  $p < 0.05$  level.

The pre test mean score of **physical function** was 43.6 with S.D±3.02 and the post test mean score was 43.6 with S.D±3.14. The calculated paired 't' test is  $t = 0.00$  ( $P = 1.00$ ) was found to be statistically no significant at  $p < 0.05$  level.

The pre test mean score of **Osteoarthritic index** was 62.03 with S.D±4.2 and the post test mean score was 61.73 with S.D±4.71. The calculated paired 't' test is  $t = 0.49$  ( $P = 0.76$ ) was found to be statistically no significant at  $p < 0.05$  level.

This clearly shows that the implementation mustard plaster application had shown a significant reduction in Osteoarthritic index in the experimental group than the control group. Hence the null hypothesis ( $NH_1$ ) stated earlier that **“there is no significant difference in the pre and post test level of Osteoarthritic index among elderly in experimental and control group at  $p < 0.05$ ”** was rejected in experimental group and retained in control group.

### 5.3 The third objective was to compare the pre and post test level of Osteoarthritic index among elderly between experimental and control group.

The analysis on the **pre test** mean score of **pain** in experimental group was 14.43 with  $SD\pm 1.19$  and in Control group was 13.47 with  $SD\pm 1.08$ . The calculated unpaired 't' value is  $t=1.77$  ( $P=0.08$ ) was found to be statistically non significant at  $p<0.05$  which indicates that there was no significant difference in the pre test level of pain between the experimental and control group.

The analysis on the **pre test** mean score of **stiffness** in experimental group was 4.8 with  $SD\pm 0.59$  and in Control group were 4.03 with  $SD\pm 0.11$ . The calculated unpaired 't' value is  $t=2.00$  ( $P=0.08$ ) was found to be statistically non significant at  $p<0.05$  which indicates that there was no significant difference in the pre test level of stiffness between the experimental and control group.

The analysis on the **pre test** mean score of **physical function** in experimental group was 45.7 with  $SD\pm 3.45$  and in Control group were 44.6 with  $SD\pm 3.02$ . The calculated unpaired 't' value is  $t=1.11$  ( $P=0.06$ ) was found to be statistically non significant at  $p<0.05$  which indicates that there was no significant difference in the pre test level of physical function between the experimental and control group.

The analysis on the **pre test** mean score of **Osteoarthritic index** in the experimental group was 64.9 with  $SD\pm 5.26$  and in Control group was 62.03 with  $SD\pm 4.2$ . The calculated unpaired 't' value is  $t=1.27$  ( $P=0.04$ ) was found to be statistically non significant at  $p<0.05$  which indicates that there was no significant difference in the pre test level of Osteoarthritic index between the experimental and control group.

The analysis on the **post test** mean score of **pain** in experimental group was 9.15 with  $SD\pm 1.74$  and in Control group was 13.93 with  $SD\pm 1.34$ . The calculated unpaired 't' value is  $t=13.28$  ( $P=0.0001$ ) was found to be statistically highly significant at  $p<0.001$  which indicates that there was difference in the post test level of pain between the experimental and control group.

The analysis on the **post test** mean score of **stiffness** in experimental group was 3.07 with  $SD\pm 0.78$  and in Control group were 4.23 with  $SD\pm 0.63$ . The calculated unpaired 't' value is  $t=6.36$  ( $P=0.0001$ ) was found to be statistically highly significant

at  $p < 0.001$  which indicates that there was difference in the pre test level of stiffness between the experimental and control group.

The analysis on the **post test** mean score of **physical function** in experimental group was 24.81 with  $SD \pm 2.98$  and in Control group were 43.60 with  $SD \pm 2.74$ . The calculated unpaired 't' value is  $t = 19.45$  ( $P = 0.0001$ ) was found to be statistically highly significant at  $p < 0.001$  which indicates that there was difference in the pre test level of physical function between the experimental and control group.

The analysis on the **post test** mean score of **Osteoarthritic index** in the experimental group was 37.03 with  $SD \pm 5.51$  and in Control group were 61.73 with  $SD \pm 4.71$ . The calculated unpaired 't' value is  $t = 19.76$  ( $P = 0.0001$ ) was found to be statistically highly significant at  $p < 0.001$  which indicates that there was difference in the post test level of Osteoarthritic index between the experimental and control group. This clearly shows that the practice of mustard plaster application had significant reduction of Osteoarthritic index score in the experimental group than the control group.

This clearly shows that the implementation of mustard plaster application had significant reduction of Osteoarthritic index score in the experimental group than the control group.

Hence the null hypothesis ( $NH_2$ ) stated earlier that **“there is no significant difference in the pre and post test level of osteoarthritic index among elderly between experimental and control group at  $p < 0.05$ ”** was rejected in pretest and retained in post test.

**Dushyant Kumar et.al., (2016)** Conducted a Randomized control trial, comparative study to compare the effect of hot mud and mustard applications in patients with Osteoarthritis. Sixty subjects were randomly assigned to either group 1 (hot mud application) or group 2 (mustard application). They were used tools of Visual Analogue Scale (VAS), Western Ontario and McMaster Universities Osteoarthritis index (WOMAC). Data were analyzed using IBM- SPSS 21.0. The data was checked for normality and Mann -Whitney U test was employed to compare means between the two groups. For all the analysis, we present 95% confidence intervals and considered  $p < 0.05$  as significant. The study result suggests that

mustard application is more effective than hot mud application in patients with Osteoarthritis.

**5.4 The fourth objective was to associate the mean difference score of osteoarthritic index among elderly in experimental and control group with their selected demographic variables.**

The result shows the association score of osteoarthritic index among elderly with their selected demographic variables. **In experimental group**, there was a statistical significant association of post test score of osteoarthritic index with presence of other diseases ( $F=13.44$ ) at  $p<0.05$  and other demographic variables was not shown statistical significant.

**In control group**, there was a statistically significant association of post test score of osteoarthritic index with body mass index ( $F=6.43$ ) at  $p<0.05$  and other demographic variables was not shown statistical significant.

Hence the null hypothesis ( $NH_3$ ) stated earlier that **“there is no significant association in the post test score of osteoarthritic index among elderly in experimental and control group at  $p<0.05$ ”** was retained for age, working pattern and body mass index in experimental group and age, working pattern and presence of other diseases in control group.

## CHAPTER - VI

### SUMMARY, CONCLUSION, IMPLICATIONS, RECOMMENDATIONS AND LIMITATIONS

This chapter deals with the summary of the study, conclusion drawn, implication, recommendations and limitations of the study.

#### SUMMARY

This study was undertaken to determine the effectiveness of mustard plaster application on Osteoarthritic Index among elderly in selected community area, Tiruvannamalai.

Aging in living organisms, usually refers to a series of time-dependent anatomical and physiological changes that reduce physiological reserve and functional capacity, although occasionally the term refers to the positive processes of maturation or acquiring a desirable quality.

Old age people are a transitional period between adulthood to old age. In Indian society, Old age people period begins from 60 years onwards. (WHO 2015)

Old age refers to ages nearing or surpassing the life expectancy of human beings, and is thus the end of the human [life cycle](#).

People worldwide are living longer. Most people can expect to live into their sixties and beyond. By 2050, the world's population aged 60 years and older is expected to total 2 billion, up from 900 million in 2015. Today, 125 million people are aged 80 years or older.

Osteoarthritis is a form of [arthritis](#) that features the breakdown and eventual loss of the cartilage of one or more joints. Cartilage is a protein substance that serves as a "cushion" between the bones of the joints.

Osteoarthritis is a degeneration of joint cartilage and the underlying bone, most common from middle age onward. It causes pain and stiffness, especially in the hip, knee, and thumb joints.

A mustard plaster is a [poultice](#) of [mustard seed](#) powder spread inside a protective dressing and applied to the body to stimulate healing. It can be used to warm muscle tissues and for chronic aches and pains. It was once part of conventional medical treatment, and available in prepared versions in pharmacies. It fell from favor in the 20th century and is now only used as a home remedy.

The implementation of mustard plaster application helps the elderly, improving blood circulation and provides nourishment and analgesic effects through release of enzymes and allyl isothiocyanate. It is a non-invasive, non-pharmacological, economical and more effective method to reduce the osteoarthritic index.

**The Objectives of the study were:**

- ❖ To assess the pre and post test level of Osteoarthritic index among elderly in experimental and control group.
- ❖ To compare the pre and post test level of Osteoarthritic index among elderly within experimental and control group.
- ❖ To compare the pre and post test level of Osteoarthritic index among elderly between experimental and control group.
- ❖ To associate the level of Osteoarthritic index among elderly in experimental and control group with their selected demographic variables.

**The Null Hypothesis stated were:**

- **NH<sub>1</sub>:** There is no significant difference in pre and post test level of Osteoarthritic index among elderly within experimental and control group at  $p < 0.05$  level.
- **NH<sub>2</sub>:** There is no significant difference in pre and post test level of Osteoarthritic index among elderly between experimental and control group at  $p < 0.05$  level.
- **NH<sub>3</sub>:** There is no significant association in mean difference score of osteoarthritic index among elderly in experimental and control group with their selected demographic variables at  $p < 0.05$  level.

### **The Assumptions were**

- ❖ Elderly may have risk of developing knee pain, stiffness and physical function.
- ❖ Osteoarthritic index may cause discomfort to elderly.
- ❖ Osteoarthritic index impairs the daily activities of elderly.
- ❖ Elderly may have little knowledge about home remedies to control osteoarthritic index.
- ❖ Mustard plaster application may help in effective reduction of osteoarthritic index.
- ❖ Mustard plaster application may not have any side effects other than the drugs.

The conceptual framework for this study was developed based on the modified Katharine Kolcaba comfort theory. This provides health care needs, comforting interventions, intervening variables, comfort, enhanced comfort, health seeking behavior and institutional integrity.

The research design selected for this study was true experimental design. Pre test - post test design were used and the study was conducted in 12 villages situated at Tiruvannamalai. The tools used for data collection were consisting of demographic variables, modified WOMAC index scale for assessing Osteoarthritic index among elderly.

The pilot study was conducted in Adiannamalai village in Tiruvannamalai. The findings revealed that the tool was feasible, reliable and practicable to conduct the main study.

The content validity of the tool was established by eight experts consisting of one community medicine experts, one orthopedician and six nursing experts and the reliability of the tool was confirmed by test-retest method  $r = 0.98$ . So the tool was highly reliable.

The main study was conducted in 12 villages situated at Tiruvannamalai. Based on the inclusion criteria, the investigator selected 60 subjects. The 30 elderly



female were assigned to experimental group and 30 in control group through simple random sampling technique was adopted by using random table method.

Data pertaining to the demographic variables were collected by the investigator through interview method. The pre test score of osteoarthritic index in experimental and wait list control group was assessed using modified WOMAC index scale. Subjects of the experimental group were implemented mustard plaster application and wait list control group was practiced routine home activity. The post test score of osteoarthritic index was assessed 15<sup>th</sup> day by using modified WOMAC index scale. Both inferential and descriptive statistics were used to analyze the data.

**The major findings of the study were:**

The majority of the subjects before practicing of mustard plaster application were on severe and extreme score of osteoarthritic index, whereas after implementation of mustard plaster application majority 72% subjects had moderate osteoarthritic index, 19% had mild and 9% had severe score of osteoarthritic index.

The comparison of the pre test and post test score of osteoarthritic index among elderly within experimental group, revealed that the calculated paired value  $t=23.09$  was found to be statistically significant at  $p<0.001$ . This clearly shows that the implementation of mustard plasters application had shown a significant reduction in osteoarthritic index among elderly in experimental group than the control group.

The comparison of the pre test and post test score of osteoarthritic index among elderly women between experimental group and control group revealed that the calculated unpaired value  $t=19.76$  was found to be statistically significant at  $p<0.001$  which indicates that there was difference in the post test score of osteoarthritic index between the groups, this clearly shows that the practice of mustard plaster application had reduction in osteoarthritic index among elderly.

## **CONCLUSION**

The present study assessed the effectiveness of mustard plaster application on osteoarthritic index among elderly in selected community area at Triruvannamalai. The study findings concluded that there was a statistically significant difference in the score of osteoarthritic index after implementation of mustard plaster application and this proved to be an effective alternative therapy and non pharmacological therapy to reduction of osteoarthritic index.

## **IMPLICATIONS**

The investigator has drawn the following implications from the study which is vital concern to the field of Nursing Practice, Nursing Education, Nursing Administration and Nursing Research.

### **Implications for Nursing Practice**

- The nursing personnel should develop an in depth knowledge and skill on mustard plaster application.
- Mustard plaster application can be practiced as one of the nursing intervention as it has been proved to reduce the osteoarthritic index among elderly group.
- Nurses use holistic nursing interventions as a mustard plaster application, such intervention are cost effective, economical, non invasive and non pharmacological compliments to medical care.
- Implementation of evidence based approach in treatment of osteoarthritis problem as an effective strategy.

### **Implications for Nursing Education**

- The nurse educators need to be equipped with adequate knowledge regarding alternative therapy like mustard plaster application.
- The nurse educators should provide the knowledge of students with adequate exposure for practice of mustard plaster application.
- The nurse educators should strengthen the curriculum for nurses to excel them in knowledge and skill in areas of alternative therapies.

- The nurse educators Conduct workshops or conferences for students regarding the use of complementary and alternative therapy like mustard plaster application in day today life.
- The educational institutions must provide opportunities for nursing students create opportunity for learning mustard plaster application and its benefits.

### **Implications for Nursing Administration**

- Nursing administration should organize in-service education program on mustard plaster application for the nurses to reduction and improvement of osteoarthritis index.
- Nursing administrators should plan for mustard plaster application in geriatric ward patients to reduction of osteoarthritic index.
- Nursing administration can strengthen role of the nurses in initiating and provide motivation to the elderly to implementing mustard plaster application as a non pharmacological intervention for reduction of osteoarthritic index.

### **Implications for Nursing Research**

- Nursing researcher should disseminate the findings of research through conferences, seminars, and publication in nursing journals.
- Nursing researcher should motivate to conduct more studies to know the effectiveness of mustard plaster application.
- Encourage the utilization of mustard plaster application in the clinical and community settings.

### **RECOMMENDATIONS**

- The study can be conducted with larger population in different setting for better generalization.
- Evaluative study can be done to assess the self mustard plaster application on osteoarthritic index among elderly women.
- A comparative study can be under taken for effectiveness along with other therapies.

- The same study can be conducted on osteoarthritis patients with the age group of 40-60 and above.
- Evaluative study can be done to assess the mustard plaster application on back pain and shoulder pain.
- The study can be under taken mustard plaster for chest congestions in pediatrics and adults.

**LIMITATIONS:**

- ❖ Initially the investigator had difficulty in finding the osteoarthritis elderly.
- ❖ As there were limited studies on mustard plaster application, the investigator had difficulty in obtaining related review of literature.
- ❖ Generalization is not possible.

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## APPENDIX - A

### LETTER SEEKING EXPERTS OPINION FOR CONTENT VALIDITY

From

D. Radha  
M.sc (N) I year,  
Vignesh Nursing College,  
Tiruvannamalai.

To

Respected Sir/ Madam,

Sub: Requisition for expert opinion for content validity- Reg

\*\*\*\*\*

I am a first year M.sc (Nursing) student studying in Vignesh Nursing College, Manalurpet Road, Tiruvannamalai, under “The Tamil Nadu Dr M.G.R Medical University.”

I would like to conduct **“A Study to Assess the Effectiveness of Mustard Plaster Application on osteoarthritic index among Elderly in Selected Community Area, Tiruvannamalai”**.

Here with I am sending the developed tool for content validity for your opinion and possible suggestions, I would be most obliged if you can do the needful and return it to the undersigned.

Thanking you,

Yours faithfully

Mrs.D.Radha

Enclosure:

1. Research proposal
2. Research tool and scoring key
3. Certificate for content validity
1. Self-addressed envelop

## APPENDIX – B



# VIGNESH NURSING COLLEGE

No 131, Manalurpet Road, Kizhanaikarai, Tiruvannamalai - 606 603.

Recognized by Indian Nursing Council, NewDelhi & Tamil Nadu Nurses & Midwives Council, Chennai

Affiliated to The Tamil Nadu Dr.M.G.R. Medical University, Chennai

### LETTER SEEKING AND GRANTING PERMISSION FOR DATA COLLECTION

Date: 17.11.2018

To

Village Administrative Officer  
Tiruvannamalai Block,  
Tiruvannamalai.

Madam/Sir,

Sub: Requesting to grant permission for data collection- Reg.

\*\*\*\*\*

Mrs. D. Radha is a bonafide student of our college studying in M.Sc (Nursing) programme. As a partial fulfilment of the University requirement for the award of M.Sc (Nursing) degree, she needs to conduct research project.

Her chosen research project is as follows "A Study to Assess the Effectiveness of Mustard Plaster Application on Osteoarthritic Index among Elderly in Selected Community Area, Tiruvannamalai".

She will adhere to the social norms and practices of community people during her period of data collection. Permission may kindly be granted to her for conduction of the study at selected community setting.

Further details of the proposed project will be furnished by the student personally. Confidentiality will be ensured in the research project.

Thanking you

Yours faithfully

*[Signature]*  
PRINCIPAL,  
Vignesh Nursing College  
Kizhanaikarai,  
Tiruvannamalai - 606 603

Phone : 04175 - 235410  
Fax : 04175 - 235410

E-mail : vnc\_tvmalai@yahoo.co.in  
Website : www.vigneshgroupofcolleges.com

**APPENDIX – C****GRANTING PERMISSION LETTER FOR DATA COLLECTION**

TO

The Principal,  
Vignesh Nursing College,  
Tiruvannamalai

Madam

Sub: Permission for Conducting Study – Reg.


Ref: Your Letter dated 17.11.2018.

\*\*\*\*\*

With reference to your above letter, we are happy to permit Mrs. D. Radha , M.Sc., Nursing 2<sup>nd</sup> year student to conduct pilot and main research study topic “A Study to Assess the Effectiveness of Mustard Plaster Application on Osteoarthritic Index among Elderly in Selected Community Area, Tiruvannamalai”. In our community area (Tiruvannamalai Block) during the month of December 2018 under the following condition.

**Terms and Conditions**

- A. The candidate should strictly follow the social norms and practices of community people.
- B. Information collected is kept strictly confidential.

*done faithfully*  
  
17/12/19  
**HEAD QUARTERS DEPUTY TAHSELDAR**  
**TALUK OFFICE**  
**THIRUVANNAMALAI**  
**K. SEETHARAMAN**  
**9487334175**

## APPENDIX – D

### LIST OF EXPERTS FOR CONTENT VALIDITY

#### MEDICAL EXPERTS

**1. Dr. Mrs. R.Nagarani**

Professor & HOD  
Department of community medicine  
Govt. Tiruvannamalai medical college  
Tiruvannamalai.

**2. Dr. Chandra Mohan, M.S. Ortho**

Assistent professor  
Govt. Tiruvannamalai Medical college and hospital  
Tiruvannamalai

#### NURSING EXPERTS:

**1. Mrs. Manonmani**

Professor  
Omayal Achi College of Nursing  
Head of community health nursing department  
Tiruvallur.

**2. Mrs. Kamini charles**

Vice Principal  
Gokulam Collrge of Nursing  
Head of community health nursing department  
Selam.

**3. Mrs. Nanthini**

Associate Professor  
Mother Theresa College of Nursing  
Head of Community health nursing department  
Puducherry.

**4. Mrs. Gandhi Mathi**

Vice Principal  
Sri Narayani College of Nursing  
Head of Community health nursing department  
Vellore.

**5. Mrs. T. Shanthi Sujatha**

Associate Professor  
RVS College of Nursing  
Head of Community health nursing department  
Coimbatore.

**6. Mrs. S. Abirami**

Associate Professor  
Rajalakshmi college of nursing  
Head of Community health nursing department  
Chennai.

## APPENDEX - E

### CERTIFICATE FOR ENGLISH EDITING

#### TO WHOM SO EVER IT MAY CONCERN

This is to certify that the dissertation work "A STUDY TO ASSESS THE EFFECTIVENESS OF MUSTARD PLASTER APPLICATION ON OSTEOARTHRITIS INDEX AMONG ELDERLY IN SELECTED COMMUNITY AREA, TIRUVANNAMALAI." done by Mrs. D. Radha, II year, M.Sc. (Nursing), student of Vignesh Nursing College, Tiruvannamalai, is edited for English language appropriateness.

Seal with date

  
K. GOVINDARAJ, M.A., M.Phil., B.Ed., Ph.D.,  
Head of the Department  
PG & Research Department of English,  
Shanmuga Industries Arts & Science College,  
Thiruvannamalai - 606 603.

**APPENDIX-F****CERTIFICATE FOR TAMIL EDITING  
TO WHOM SO EVER CONCERN**

This is to certify that the dissertation work “A STUDY TO ASSESS THE EFFECTIVENESS OF MUSTARD PLASTER APPLICATION ON OSTEOARTHRITIS INDEX AMONG ELDERLY IN SELECTED COMMUNITY AREA, TIRUVANNAMALAI.” done by Mrs. D. Radha, II year, M.Sc. (Nursing), student of Vignesh Nursing College, Tiruvannamalai, is edited for Tamil language appropriateness.

Seal with date

  
Signature

**Dr. N.PRABU**  
M.A.(Tam) M.A.(Lingu) M.Ed., M.Phil., Ph.D.  
Assistant Professor  
P.G. & Research Department of Tamil  
Shanmuga Industries Arts and Science Colleg  
Tiruvannamalai-606 603.



## APPENDIX - G

### INFORMED CONSENT

Greetings,

I Mrs. D. Radha M.sc (Nursing) II year student of Vignesh Nursing College, Tiruvannamalai, has been conducting **“A study to assess the effectiveness of mustard plaster application on osteoarthritic index among elderly in selected community area, Tiruvannamalai”** for the partial fulfillment of the requirement for the degree of the M.sc Nursing under the Tamilnadu Dr. M.G.R Medical University, Chennai.

As a part of research work, I need to collect a data from client with Osteoarthritis. In connection with the same, I seek your valuable support and kind co-operation to complete the work related to my research work in time. Further I assure you the information provided by you will be kept confidential and will not be disclosed to any one at any stage. Your precious support is solicited.

Thank you

## APPENDIX - G

### ஒப்புதல் படிவம்

வணக்கம்,

தே.ராதா ஆகிய நான் கீழ் அனைக்கரையில் உள்ள விக்னேஷ் செவிலியர் கல்லூரியில் முதுகலை பட்டப்படிப்பு பயின்று வருகிறேன். என் படிப்பின் ஒரு பகுதியாக வயதானவர்களின் கீழ்வாதம் குறியீட்டு பற்றிய கேள்விகளை வடிவமைத்துள்ளேன்.

தயவு செய்து நீங்கள் என்னுடன் ஒத்துழைக்குமாறு வேண்டிக்கொள்கிறேன். நான் உங்களிடமிருந்து பெற்ற தகவல்களை எக்காரணத்தைக் கொண்டும் வெளியிட மாட்டேன் என்று உறுதியளிக்கிறேன்.

நன்றி

## APPENDIX-H

### INFORMED CONSENT REQUISITION FORM

I understand that I am being asked to participate in a research study conducted by Mrs. D. Radha, M.Sc (Nursing) Student of Vignesh Nursing College, Tiruvannamalai. This research study will assess the **“A study to assess the effectiveness of mustard plaster application on osteoarthritic index among elderly in selected community area, Tiruvannamalai”**. If I agree to participate in the study I will be interviewed the interview may be recorded and will take place in privacy. No identifying information will be included when the interview is transcribed. I understand that there are no risks associated with this study.

I realize that benefit of the Mustard Plaster Applications and from this study may help either me or other people in the future. I realized that my participation in this study is entirely voluntary, and I may withdraw from the study at any time I wish. If I decide to discontinue my participation of this study, I will continue to be treated in the usual customary fashion.

I understand that all study data will be kept confidential. However, this information may be used in nursing publication or presentation. If I need to, I can contact Mrs.D.Radha, M.Sc Nursing II year student of Vignesh Nursing College Tiruvannamalai, at any time during the study.

The study has been explained to me. I have read and understood this consent form, all of my questions have been answered, and I agree to participate. I understand that I will be given a copy of this signed consent form.

-----  
Signature of participant

-----  
Date:

-----  
Signature of investigator

-----  
Date:

## APPENDIX – H

## முன் அறிவிப்பு ஒப்பந்த படிவம்

விக்னேஷ் செவிலியர் கல்லூரியின் சார்பில் முதுகலை பட்டப்படிப்பு பயிலும் தே.ராதா அவர்களால் நடத்தப்பெறும் இந்த ஆய்வில் என்னை பங்கேற்க கேட்டுக்கொண்டதை நான் ஏற்றுக்கொள்கிறேன். இந்த ஆய்வுக்கு நான் ஒப்புக்கொண்டால் அதனை தொடர்ந்து உள்ள brCEKiwfëš நான் பங்கேற்க வேண்டும் என்றும், என்னிடம் நடத்தும் இந்த ஆய்வு முடிவுகள் அனைத்தும் பதிவு செய்து பாதுகாக்கப்படும் என்பதை நான் அறிவேன். நான் எவரின்/யாருடைய கட்டாயத்தின் பெயரிலோ அல்லது வற்புறுத்தலின் பெயரிலோ ஆய்வில் பங்குகொள்ளவில்லை என்பதையும் தேவைப்பட்டால் நான் ஆய்விலிருந்து விலகிக்கொள்ளும் பட்சத்திலும் எப்போதும் பிறரை போலவே நடத்தப்படுவேன் என்பதை அறிவேன்.

என்னைப்பற்றிய அனைத்து தகவல்களும் ரகசியமாக பாதுகாக்கப்படும் என்பதையும் தேவைப்படும்போது ஆய்வின் முடிவுகள் செவிலியர் சார்ந்த பத்திரிக்கைகளிலும், கருத்தரங்குகளிலும் வெளியிட முழு சம்மதம் அளிக்கிறேன். இந்த ஆய்வினை பற்றிய முழு விளக்கமும் எனக்கு அளிக்கப்படுகிறது. அதனை நான் முற்றிலுமாக புரிந்துகொண்டு ஆய்வில் பங்குகொள்ள சம்மதம் அளிக்கிறேன்.

இந்த ஆய்வில் தேவைப்படும்போது எப்போது வேண்டுமானாலும் தே.ராதா அவர்களை விக்னேஷ் செவிலியர் கல்லூரியில் தொடர்புகொள்ளலாம் என்பதை அறிவேன்.

பங்குகொள்பவரின்/பாதுகாவலரின் கையொப்பம் தேதி :

ஆராய்ச்சியாளரின் கையொப்பம் தேதி :

**APPENDIX – I**  
**SECTION A – DEMOGRAPHIC VARIABLES**

Sample No

- 1. AGE**
  - e) 60 - 65 Yrs
  - f) 66 – 70 Yrs
  - g) 71 - 75 Yrs
  - h) Above 75 Yrs
- 2. EDUCATIONAL STATUS**
  - e) Non literate
  - f) Primary/middle school
  - g) High school/Higher secondary
  - h) Graduate/above
- 3. WORKING PATTERN**
  - d) Sedentary worker
  - e) Moderate worker
  - f) Heavy worker
- 4. MARITAL STATUS**
  - e) Married
  - f) Single
  - g) Divorced
  - h) Widow
- 5. DIETARY PATTERN**
  - d) Vegetarian
  - e) Non vegetarian
  - f) Lacto ova vegetarian
- 6. FAMILY INCOME PER MONTH**
  - e) Below Rs.5,000
  - f) Rs.5,001-10,000
  - g) RS.10,001-20,000
  - h) Above Rs. 20,000
- 7. BODY MASS INDEX**
  - g) <18.50 Underweight
  - h) 18.50-24.99 Normal range

- i) 25.00-29.99 Pre obese
- j) 30.00-34.99 Obese class-I
- k) 35.00-39.00 Obese class-II
- l) >40.00 Obese class-III

**8. DURATION OF PAIN**

- e) 1 year
- f) 2 years
- g) 3 years
- h) 4 years and Above

**9. PRESENCE OF OTHER DISEASES PRESENCE**

- g) Hypertension
- h) Diabetes mellitus
- i) HT/ DM
- j) HT/DM/Heart disease
- k) Hyperthyroidism
- l) No other diseases

**gpupT - m****jdpegu; tptuk;****1. taJ Mz;Lfspy;**

m) 60 – 65

M) 66 – 70

,) 71 – 75

&lt;) 75 Mz;Lf;Fk; Nky;

**2. fy;tpj; jFjp**

m) fy;tp mwptpy;yhjtu;

M) Muk;gf; fy;tp / eLepiyf; fy;tp

,) cau;epiyf; fy;tp / Nky;epiyf; fy;tp

&lt;) gl;lg; gbg;G

**3. gzp tptuk;**

m) Nyrhd Ntiy

M) kpjkhd Ntiy

,) mjpf Ntiy

**4. jpUkz jFjp**

m) jpUkzkhdtu;

M) jpUkzkhfhjtu;

,) tpthfuj;J Mdtu;

&lt;) tpjit

**5. czT Kiw**

m) irtk;

M) mirtk;

**6. FLk;g khj tUkhdk; &ghapy;**

m) Fiwe;jJ &amp;.5000

- M) &.5001 – 10000
- ,) &.10001 – 20000
- <) &.20001-f;F Nky;

**7. cly; epiw FwaPI;L**

- m) Fiwe;jJ 18.50
- M) 18.50 – 29.99
- ,) 25.00 – 29.99
- <) 30.00 – 34.99
- c) 35.00 – 34.99
- C) 40-f;F Nky;

**8. vj;jid fhyq;fshf typ cs;sJ**

- m) 1 tUlK;
- M) 2 tUlK;
- ,) 3 tUlK;;
- <) 4 tUlJ;jpw;Fk; Nky;

**9. cly; Neha;fs;**

- m) ,uj;j nfhjpg;G
- M) ePupopT Neha;
- ,) ,uj;j nfhjpg;G / ePupopT Neha;;
- <) ,uj;j nfhjpg;G / ePupopT Neha; / ,Uja Neha;
- c) ijuha;L
- C) ,y;iy



**SECTION – B**

Sample No.....Section.....Date.....

**MODIFIED WOMAC INDEX SCALE**

<b>S.No</b>	<b>Questions</b>	<b>None (0)</b>	<b>Mild (1)</b>	<b>Moderate (2)</b>	<b>Severe(3)</b>	<b>Extreme(4)</b>
<b>PAIN</b>						
1	Walking					
2	Stair climbing					
3	Nocturnal					
4	Rest					
5	Weight bearing					
<b>STIFFNESS</b>						
6	Morning stiffness					
7	Stiffness occurring later in the day					
<b>PHYSICAL FUNCTION</b>						
8	Rising from sitting					
9	Standing					
10	Bending to floor					
11	Walking on flat surface					
12	Descending stairs					
13	Ascending stairs					
14	Getting in/out of vehicles. Eg. - Two wheeler - Bus - Auto					
15	Going shopping - Petti shop - Big shop					
16	Wearing cheppals					
17	Lying in bed					

S.No	Questions	None (0)	Mild (1)	Moderate (2)	Severe(3)	Extreme(4)
18	Wearing cloths					
19	Rising from bed					
20	Getting in / out of bath					
21	Sitting - Floor - Chair					
22	Getting in/off toilet - Western - Indian					
23	Heavy domestic duties					
24	Light domestic duties					

The osteoarthritic index is rated and interpreted under following classification.

S.NO	SCORE	LEVEL OF INDEX
1	0	None
2	01-24	Mild
3	25-48	Moderate
4	49-72	Severe
5	73-96	Extreme

## gphpT – M

thpir vz;..... gphpT..... Njpp.....

jpUj;jg;gl;l Nthkf; FwpaPl;L msT

t.vz;	Nfs;tpfs;	,y;iY	Nyrhd	kpjkhd	fLikhnd	kpfTk; fLikhnd
<b>Typ</b>						
1.	elf;Fk; nghOJ					
2.	khhgbfspy; VWk;NghJ					
3.	,uT Neuq;fspy;					
4.	Xa;T Neu;jjpy;					
5.	vil jhq;ff;\$ba					
<b>tpiwg;G jd;ik</b>						
6.	fhiyapy; tpiwg;G jd;ik					
7.	gfy; nghOJ tpiwg;G jd;ik					
<b>cly; nray;ghL</b>						
8.	cl;fhh;e;J ,Ue;J vOk;NghJ					
9.	epw;Fk;NghJ					
10.	jiuapy; FdpAk;nghOJ					
11.	rkkhd jiuapy; elf;Fk;nghOJ					
12.	khhgb ,wq;Fk;nghOJ					
13.	khhgb VWk;nghOJ					
14.	thfdq;fspy; VWk;nghOJk; ,wq;Fk; nghOJk; (v.fh)					

	- ,Urf;fu thfdk; -NgUe;J -MI;NIh					
15.	nghUI;fs; thq;f nry;Yk;NghJ -ngl;b fil -nghpa fil					
16.	fhyzpf; mzpAk;NghJ					
17.	gLf;ifapy; gLj;jpUf;Fk;NghJ					
18.	Jzpfis mzpAk;NghJ					
19.	gLf;ifapy; ,Ue;J vOk;NghJ					
20.	Fspay; miwapy; my;yJ ntspNa nry;Yk;NghJ					
21.	cl;fhh;e;J ,Uj;jy; -jiu -ehh;fhyp					
22.	fopg;giwf;Fs; -Nkw;fj;jpa fopg;giw -,e;jpa fopg;giw					
23.	fdkhd tPl;L Ntiyfs; (flikfs;)					
24.	Nyrhd tPl;L Ntiyfs; (flikfs;)					

**Kf;fpa Nfhy;:**

<b>t.vz;</b>	<b>kjpg;ngz;</b>	<b>FwpaPl;L msT</b>
1	0	,y;iy
2	1-24	Nyrhd
3	25-48	kpjkhd

4	49-72	fLikahd
5	73-96	kpftk; fLikahd

## APPENDIX – J

### CODING FOR DATA COLLECTION

<b>SECTION A – DEMOGRAPHIC VARIABLES</b>	<b>CODE NO.</b>
<b>1. AGE</b>	
a) 60 -65	1
b) 66 -70	2
c) 71 -75	3
d) Above 75	4
<b>2. EDUCATIONAL STATUS</b>	
a) Non literate	1
b) Primary/middle school	2
c) High school/Higher secondary	3
d) Graduate/above	4
<b>3. WORKING PATTERN</b>	
a) Sedentary worker	1
b) Moderate worker	2
c) Heavy worker	3
<b>4. MARITAL STATUS</b>	
a) Married	1
b) Single	2
c) Divorced	3
d) Widow	4
<b>5. DIETARY PATTERN</b>	
a) Vegetarian	1
b) Non vegetarian	2

- c) Lacto ova vegetarian 3
- 6. FAMILY INCOME PER MONTH**
- a) Below Rs.5,000 1
- b) Rs.5,001-10,000 2
- c) RS.10,001-20,000 3
- d) Above Rs. 20,000 4
- 7. BODY MASS INDEX**
- a) <18.50 Underweight 1
- b) 18.50-24.99 Normal range 2
- c) 25.00-29.99 Pre obese 3
- d) 30.00-34.99 Obese class-I 4
- e) 35.00-39.00 Obese class-II 5
- f) >40.00 Obese class-III 6
- 8. DURATION OF PAIN**
- a) 1year 1
- b) 2years 2
- c) 3years 3
- d) 4 years and Above 4
- 9. PRESENCE OF OTHER DISEASES PRESENCE**
- a) Hypertension 1
- b) Diabetes mellitus 2
- c) HT/ DM 3
- d) HT/DM/Heart disease 4
- e) Hyperthyroidism 5
- f) No other diseases 6



**SCORING KEY FOR OSTEOARTHRITIC INDEX**

<b>Items</b>	<b>None</b>	<b>Mild</b>	<b>Moderate</b>	<b>Severe</b>	<b>Extreme</b>
Osteoarthritic Index	0	1	2	3	4

**SCORING KEY FOR OSTEOARTHRITIC INDEX**

The Osteoarthritic index is consisting of 1-96 scores.

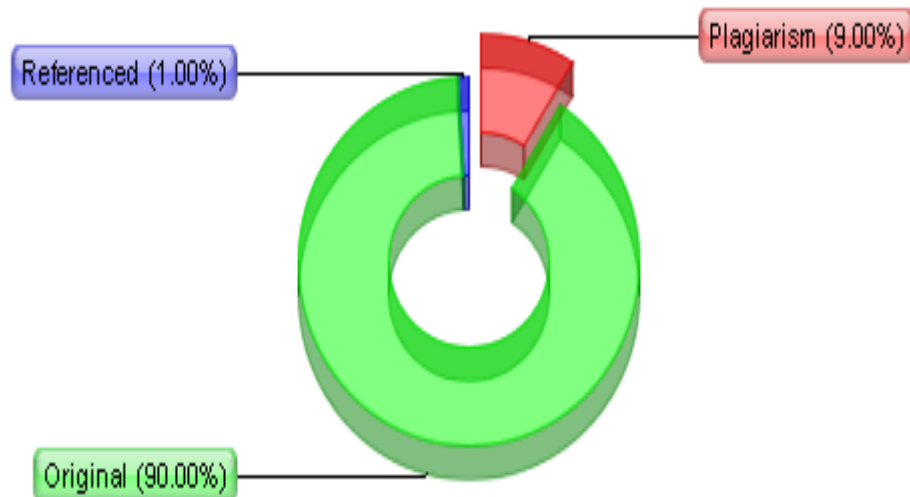
<b>S.NO</b>	<b>SCORE</b>	<b>LEVEL OF INDEX</b>
1	0	None
2	01-24	Mild
3	25-48	Moderate
4	49-72	Severe
5	73-96	Extreme



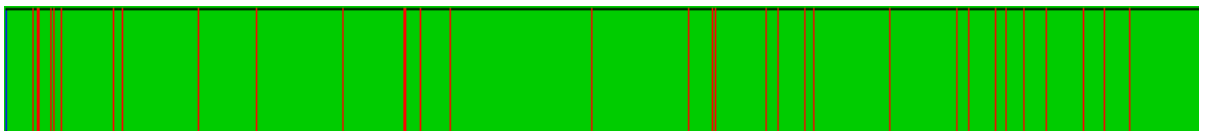
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## CERTIFICATE

This is to certify that this dissertation work titled **“A STUDY TO ASSESS THE EFFECTIVENESS OF MUSTARD PLASTER APPLICATION ON OSTEOARTHRITIC INDEX AMONG ELEDRLY IN SELECTED SETTING, TIRUVANNAMALAI”** of **Mrs. D. RADHA** with registration number **301728001** for the award of **MASTER OF SCIENCE IN NURSING** in the branch of **COMMUNITY HEALTH NURSING**. I personally verified the plagiarism detector.com website for the purpose of plagiarism Check. I found that the uploaded thesis file contains from introduction to conclusion pages and result shows **9%** percentage of plagiarism in the dissertation.