

**A QUASI EXPERIMENTAL STUDY TO ASSESS THE  
EFFECTIVENESS OF ISOMETRIC EXERCISE ON  
FUNCTIONAL ABILITY AMONG SENIOR CITIZENS  
WITH OSTEOARTHRITIS AT LITTLE DROPS OLD  
AGE HOME IN CHENNAI.**

**By**

*Mrs. Aruna Judie*



*Dissertation submitted to*

**THE TAMIL NADU DR.M.G.R.MEDICAL UNIVERSITY  
CHENNAI**

*in partial fulfilment of requirement for*

**THE AWARD OF DEGREE OF  
MASTER OF SCIENCE IN MEDICAL – SURGICAL  
NURSING**

**APRIL-2012**

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## **CHAPTER-I INTRODUCTION**

*“In youth we run into difficulties, in old age difficulties run into us.*

*The only thing that comes to us without effort is old age.”*

-Josh Billings.

Aging has been defined as ‘a progressive decline in the physiological capacity leading to a decreased ability to adapt to stressors’. Aging is a natural process with the changes in the human body, mind, thought process and living pattern that declines in the functional capacity of the senior citizens and which reduces life span. Government of India adopted ‘National Policy on Older Persons’ in January, 1999. The policy provides broad guidelines to State Governments for taking action for welfare of older persons in a proactive manner by devising their own policies and plans of action. The policy defines ‘senior citizen’ as a person who is 60 years old or above. It strives to ensure well-being of senior citizens and improve quality of their lives through providing specific facilities, concessions, relief, services etc. and helping them cope with problems associated with old age.

Globally there are an estimated 605 million people aged 60years and above. From 1990 to 2025 the elderly population in Asia will raise from 50% of the world’s elderly to 58%.

According to 2001 census, the elderly population of India was 75.3 million that is 7.43% of the total population. The number of aged over 60years was 76 million and it is expected to rise to 137 million in 2021. India has thus

acquired the label of “Aging Nation with 7.7% of its population being more than 60 years old”.

According to *NSSO survey (2007-2008)*, The elderly population [aged 60 years and above] in India is, in rural 7.6% and in urban 7.2%. In Tamil Nadu elderly population age 60-69 years is 32.3 per 1000 and 70-84 years is 111.3 per 1000.

*Rajan (2006)* conducted a study in the rural area of Pondicherry and reported that there were 43% of elderly people having pain in the joint and joint stiffness. Majority of the senior citizen suffers from joint pain which restrains the functional ability like walking, climbing stairs up and down, sitting on the floor, chair and squatting position in Indian toilet.

Primary osteoarthritis is almost a disease of elderly population, recent advances show that it represents a dynamic process which involves uncoupling of balance between cartilage degeneration and regeneration. Osteoarthritis was earlier described as a disease of wear and tear, a degenerative disorder but, it usually presents as joint pain with structure changes, bony enlargement and deformity. Osteoarthritis the most common type of joint disease which is a leading cause for disability. More than 75% of those over age 70 have radiologically detectable changes consistent with osteoarthritis.

*World Health Organization report [1999]* Identified osteoarthritis as the 8<sup>th</sup> leading cause of non fatal burden in the world, accounting for 2.6% of total years lost due to disability.

*Saloni Tanna [2004]* says that, worldwide estimates indicate that 9.6% of men and 18% of women aged 60 years have symptomatic osteoarthritis. Osteoarthritis is a major cause of impaired mobility and it is the highest-ranking disease among the musculoskeletal diseases and contributes to approximately 50% of the disease burden in this disease group

More than 50% of people aged 65 and over have evidence of osteoarthritis .An epidemiological study conducted in India about osteoarthritis in geriatric population says that, the prevalence of osteoarthritis among elderly was 56.6%. Community survey data in rural and urban areas of India shows the prevalence of osteoarthritis to be in the range of 17 to 60.6%. The prevalence of osteoarthritis amongst elderly in rural areas of Amritsar was 60.6% while it was 17% amongst the elderly of rural areas of (Maharashtra) In Aligarh the prevalence of osteoarthritis was 30.2%

Patients with osteoarthritis have joint pain that is worsens with weight bearing and activity and improve with rest. As osteoarthritis progresses pain will be present. The goal of osteoarthritis treatment includes pain reduction and improvement of functional ability.

Exercise is beneficial for osteoarthritis. Strong leg muscle support the knee and absorbs shock before it gets to the knee. Exercising the quadriceps muscle increases the circulation in the knee joint and stimulates the biochemical changes in the knee joint fluid improving its lubricating properties. It also improves the range of motion of the knee.

*Richard Sandusky [2000]* says; that patients with osteoarthritis who are treated with a regimen that combines manual therapy with supervised exercises have improved function and less reported pain and stiffness than patients who are not treated with a physical therapy. Isometric exercises can be an effective treatment for knee joint pain by keeping joints flexible, increasing muscle strength and improve functional ability in patients with osteoarthritis.

Although exercise is recommended for anyone, osteoarthritis exercises are intended to maintain and build muscle strength without aggravating the already tender areas of the body in those suffering from the disease. Physiotherapy involves a safe, gradual program designed to increase mobility while at the same time reducing pain. Osteoarthritis physical therapy can be extremely beneficial and with increased endurance and the build-up of muscle tissue, activities that were once impossible can become a reality for many people.

Regular physical activity is crucial when dealing with arthritis as it will help to increase both muscle and bone strength while increasing flexibility and decreasing fatigue, another common symptom of osteoarthritis. Both isotonic and isometrics are considered to be strengthening exercises and they are recommended for people with osteoarthritis as they're designed to work with the various muscle groups but without stressing the joints.

Isometric exercise, in which muscles are tensed for a period without actually moving them, can be performed without actually bending a painful joint. As muscles are exercised against resistance, their size and power will increase.



*Mohamed Shakoor [2010]* conducted a study in Bangladesh among 64 patients of osteoarthritis of the knee joints to observe the effects of isometric quadriceps muscle strengthening exercise plus non-steroidal anti-inflammatory drugs (NSAIDs) on osteoarthritis of knee joints. Another 75 patients were treated with NSAIDs as control group. They were assessed by visual analogue scale, WOMAC scale. In comparison, more improvement was found in the exercise group. This study suggests that isometric quadriceps muscle strengthening exercise has its beneficial role to reduce symptoms in osteoarthritis knee.

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

Osteoarthritis is called degenerative joint disease or degenerative arthritis, osteoarthritis (OA) is the most common chronic condition of the joints, and approximately 30-40% of people above 65 years in India are affected with it. In osteoarthritis, there is a breakdown in the cartilage covering the ends of bones where they meet to form a joint and allow movement. As the cartilage wears away, the bones become exposed and rub against each other. The deterioration of cartilage also affects the shape and makeup of the joint so that it no longer functions smoothly. Patient may notice a limp when they walk, or they may have trouble going up and down stairs because those movements put additional stress on the joint.

Symptoms of osteoarthritis vary, depending on which joints are affected and how severely they are affected. However, the most common symptoms are joint stiffness, particularly in the early morning or after resting, and joint pain. The most commonly affected joints are the lower back, hips, knees and feet. When those joints are affected patients may have difficulty with such activities as walking, climbing stairs and lifting objects.

Other commonly affected joints are the neck and fingers, including the thumb base. When finger and hand joints are affected, osteoarthritis can make it difficult to grasp and hold objects, such as a pencil, or to do delicate tasks, such as needlework.

Exercise can help to achieve a variety of goals in patients with osteoarthritis. Ultimately we want to reduce pain, improve function, and prevent disability, all with the ultimate goal of improving quality of life, which can be achieved through exercise programs, and there are multiple goals for an appropriate exercise program,. They are, muscle strengthening, improving flexibility and joint motion, improving aerobic functioning and weight loss.

### **NEED FOR THE STUDY:**

*“Old age is the most unexpected of all the things that can happen to a man”.*

*- Leon Trotsky*

Aging is an inevitable process' and cannot be avoided, yet we can live happy, healthy and productive lives and the period of ill health can be squeezed into the shortest possible time before we leave the world. Maintaining physical and mental capabilities as long as possible is called successful aging. The population of the senior citizen has been increasing over the years, as per the UNESCO estimation, globally the number aged 60+ is likely to increase to 590 million in 2025. About 8% of the total population is 60 years. There has been a remarkable increase in the growth of the elderly population .In India 5.3% of males and 4.8% females are aged more than 65 years. Old age cannot be healed or prevented. However much can be done by the health workers in helping the elderly to lead a normal life which is

necessary for them to perform their activities of daily living[ADL] smoothly. The commonest obstacle for elderly to carry out ADL is the joint pain and decreased mobility. Worldwide osteoarthritis is the most common articular disease of people aged 65 years and older, it represent major cause of disability in the United States.

*Curropin [2003]* states that osteoarthritis is the most commonly occurring musculoskeletal disease of the elderly affecting more than 25% of the population older than 60 years of age. The simple greater risk factor for the development of osteoarthritis is age. An exercise is a safe and effective therapy for patients with osteoarthritis. It reduces pain, increases flexibility and strength and prevents de conditioning, includes stretching to improve flexibility, strengthening to prevent contractures

A high morbidity of osteoarthritis among elders needs strengthening of geriatric health care services both community based and hospital based. A programme for elderly needs to be developed to provide facilities in the form of early diagnosis, counseling, diet control, correction of anemia, regular exercise and physiotherapy in addition to treatment.

Lifestyle modification, particularly exercise and weight reduction, is a core component of the management of osteoarthritis (OA) A program of physical therapy should emphasize the importance of strengthening all muscles that cross the given joint affected by OA. Most research focuses on quadriceps strengthening in knee OA. Also important are stretching exercises, which increase range of motion.. Certain studies also indicate that a home exercise program for patients with osteoarthritis of the knee provides an important benefit.

*Dr.Gail .D and collaborators [2000]* at Brooke Army Medical Centre tested exercise's effects on symptoms of knee osteoarthritis., and published the study that focused on 83 patients who received either physical therapy exercises or ultrasound therapy two sessions a week for four weeks. Step-ups are one .of the exercises that the participants did during their sessions. The participants who exercised during the sessions reported improvements in functioning, increases in walking distance and less pain and stiffness than participants who did not exercise.

Isometric exercise serves as a useful therapy when painful joints limit movement. The primary goals of the therapy are to relive pain and maintain function. Initial approaches include education regarding nature of disorder progress and treatment. The main aim of treatment rest on the motivation of the senior citizen to undergo exercise regularly and to follow instruction to lead a happy life. Counselling the senior citizen and the role of exercise need to be emphasized.

*Robert J.Golden et al., [2003]* Conducted a home based isometric exercise program for rehabilitation of knee arthritis for 500 patients in Maryland, who had knee arthritis and they found that the three basic therapeutic exercises like, isotonic, isokinetic and isometric are useful for osteoarthritis patients and of these three, isometric exercise is the most appropriate for home maintenance because it requires no or minimal apparatus and it is easy to learn .Further isometric exercises cause the least intra articular inflammation ,pressure and bone distraction than other type of exercise.

*Raj Marks [2010]* conducted an experimental study on the effectiveness of isometric exercises for 30 elderly people with knee osteoarthritis for 6 weeks, three times a week using standardized protocol. The same isometric exercise was carried out for 13 weeks at home. The result showed that there was 40% increase in physical mobility. The findings of the study revealed that the isometric exercises reduce the knee joint pain.

Most of the elderly are neglected by their loved ones and they are suffering from depression and self care deficit and their functional ability decreases. They need to be motivated to do exercise which will prevent physical disability.

One of the researcher's relatives [elderly] had osteoarthritis and became bedridden due to lack of knowledge in management and prevention of disability, and also during her visit to elderly homes for social services she found the similar disability with many senior citizens. This inspired the researcher to do the study on the effectiveness of isometric exercise for elderly people with osteoarthritis and she felt the need for disability prevention and improving their quality of life.

## **STATEMENT OF THE PROBLEM**

A study to assess the effectiveness of isometric exercise on functional ability among senior citizens with osteoarthritis in Little Drops Old Age Home in Chennai.

## **OBJECTIVES OF THE STUDY:**

- 1) To assess the level of functional ability of the senior citizen with osteoarthritis before and after isometric exercises in both experimental and control group.
- 2) To determine the effectiveness of isometric exercises on functional ability among experimental group.
- 3) To compare the effectiveness of isometric exercise on the functional ability between experimental and control group.
- 4) To find out the association between level of functional ability of senior citizens with osteoarthritis and selected demographic variables.

## **OPERATIONAL DEFINITION:**

### ***1. Effectiveness***

Effectiveness' refers to the impact of isometric exercises on the functional ability which is given for 15 minutes, two times a day to the senior citizens with osteoarthritis.

### ***2. Isometric Exercises***

Isometric exercises is, in which muscle contract without changing in length so that the joint does not move .In this study it encompass the quadriceps exercise, straight leg raise sitting, straight-leg raise lying and muscle stretch.

### ***3. Functional Ability***

It is defined as the ability of the senior citizens to perform their work which is measured by Modified Stanford Western Ontario-Mc Master index scale [WOMAC Scale].

### ***4. Senior citizens***

Refers to the old people who are between 60 to 80 years of age and who are in the selected old age home.

### ***5. Osteoarthritis***

Osteoarthritis is a chronic and non-systemic disorder of the joints, a low-grade inflammation of the joints because of the degeneration of articular cartilage or the wearing out of the cartilage that covers or cushions the joints

## **HYPOTHESIS:**

***H-1:*** There is a significant difference in level of functional ability between experimental group and control group after the interventions.

***H-2:*** There is a significant association between post test level of functional ability senior citizens with osteoarthritis and selected demographic variables.

## **ASSUMPTION:**

- 1) The knowledge about management of osteoarthritis is limited among elderly. This lack of knowledge leads to functional disability among senior citizens.

- 2) The geriatric care can be focused on prevention of disability osteoarthritis in elderly focusing on mobility and exercise.
- 3) The quality of life of elderly can be improved by improving functional ability.

### **LIMITATIONS:**

- 1) The study is limited to a period of 6 weeks.
- 2) The sampling size is limited to 60 senior citizens.
- 3) Study is done in the selected old age home.

### **PROJECTED OUTCOME:**

The projected outcome of the study is that, the elderly people will have

- 1) Improved knowledge about management of osteoarthritis,
- 2) Increased functional ability and
- 3) Better quality of life on the utilization of isometric exercises.

### **HUMAN RIGHTS PROTECTION:**

- The pilot study and the main study were conducted after getting the approval from the ethical committee.
- Permission was obtained from manager of Little Drops Old Age Home.
- The purpose and other details of the study were explained to the study subjects and consent was obtained from them.



## **CONCEPTUAL FRAME WORK**

### **MODIFIED KATHERINE KOLCABA'S THEORY OF COMFORT [2007]**

The conceptual frame work for the present study is based on a Dr.Katherine Kolckaba's "**Theory of comfort**"

The model postulates that the comfort is a patient outcome: the effects of comfort intervention are measurable.

### **HEALTH CARE NEEDS**

Kolckaba defines health care needs as needs for comfort, arising from stressful health situation that cannot be met by recipients' traditional support system.

In this study it refers to joint pain, joint stiffness, and difficulty in performing daily activities.

### **NURSING INTERVENTIONS**

Comforting measures are defined as comforting interventions. Isometric exercise designed to address specific comfort needs of recipient including physical, social, psychological and even mental. Isometric exercise given two times for 15 minutes daily for 4weeks.

### **INTERVENING VARIABLES**

Intervening variables in the study are age, sex, marital status, family H/O osteoarthritis. Duration of pain, food pattern, co-morbid condition. Diagnosing osteoarthritis.

## **COMFORT**

Comfort is defined as a state that is experimental by recipients of comfort measures. It is immediate and holistic experience of being strengthened through having the needs met for three types of comfort.

## **RELIEF**

The state of a recipient who has had a specific need met.

## **EASE**

The state of calm or contentment.

## **TRANSCENDENCE**

The state in which an individual rises above his or her problems or pain.

## **HEALTH SEEKING BEHAVIOR**

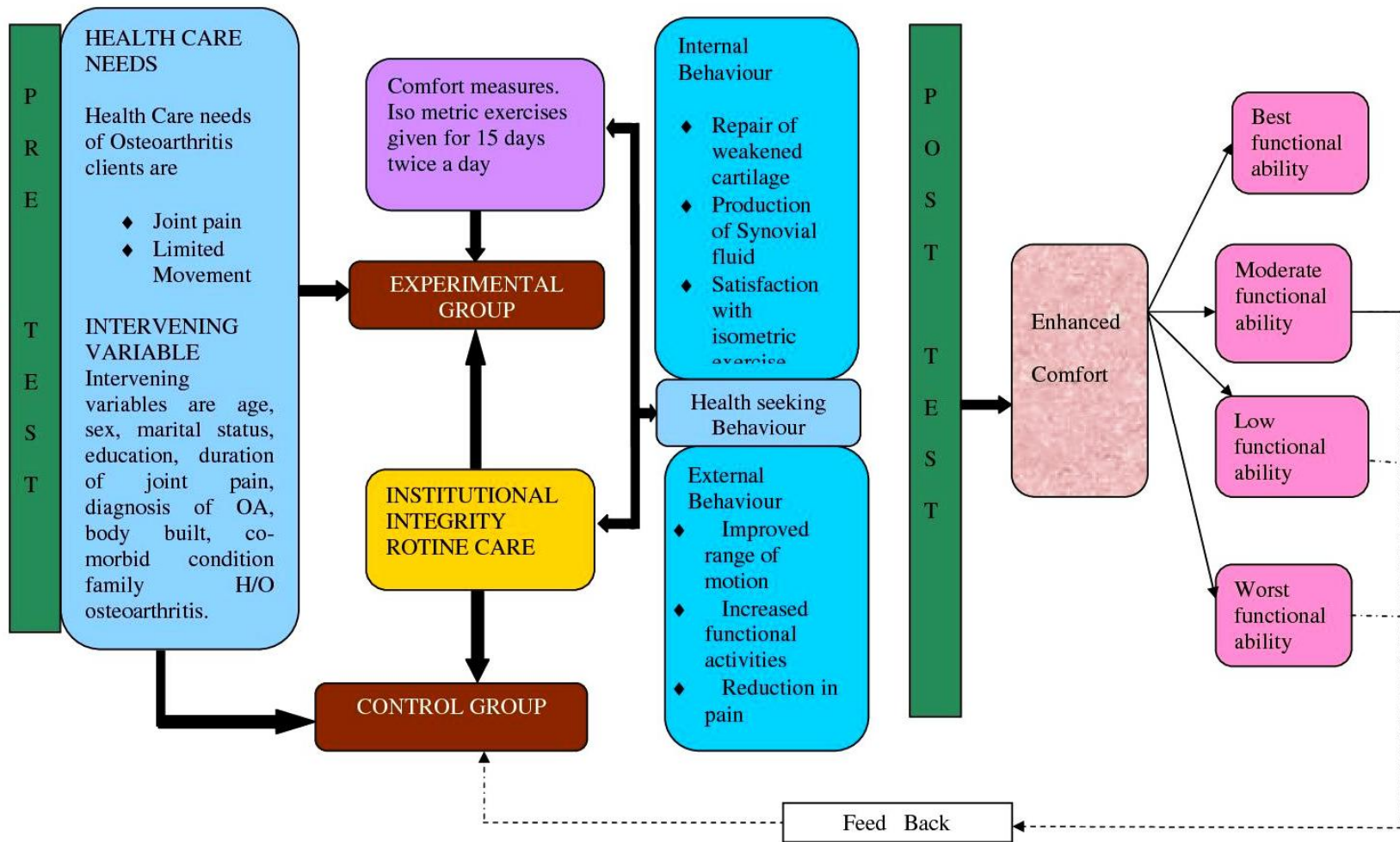
Internal or external behavior in which the patient engages in activities that facilitates health.

## **INTERNAL BEHAVIOR**

- 1) Repair of weakened cartilage
- 2) Production of Synovial fluid
- 3) Psychological factor-level of satisfaction with isometric exercise

## **EXTERNAL BEHAVIOR**

- 1) Improved range of motion
- 2) Increased functional activities because of the reduction in pain level



**FIG-1: CONCEPTUAL FRAME WORK BASED ON MODIFIED CATHERINE KOLCABA'S THEORY OF COMFORT (2007)**

## **CHAPTER-II REVIEW OF LITERATURE**

### **INTRODUCTION**

Review of literature is an important step in the development of a research project. The written literature review provides the reader with a background for understanding what has already been learnt in a topic and illuminates what is significant in the new study (*Polit & Hungler*).

The investigator has done an extensive review of literature on studies done previously related to osteoarthritis.

*This chapter is divided into two parts:*

**Part-A : Review of Related Literature**

Part-A is divided into two sections as follows.

Section-1: Literature and studies related to osteoarthritis

Section-2: Literature and studies related to other therapies and Isometric exercise for osteoarthritis

### **PART-A**

*Section 1: Literature and studies related to osteoarthritis:*

Osteoarthritis is the most common form of arthritis which largely affects the elderly. Osteoarthritis has been known in several terms like; degenerative arthritis, degenerative joint disease, arthrosis, , hypertrophic arthritis or 'wear and tear'.

Osteoarthritis is a chronic and non-systemic disorder of the joints, a low-grade inflammation of the joints because of the degeneration of articular cartilage or the wearing out of the cartilage that covers or cushions the joints. It equally affects both women and men and the incidence rate increases as age increases. Women are more prone to serious arthritis than men particularly in the hands and knees.

Osteoarthritis is a chronic degenerative disorder of multifactorial etiology characterized by loss of articular cartilage, hypertrophy of bone at the margin subchondral sclerosis and range of biochemical and morphological alterations of the synovial membrane and joint capsule. It commonly affects the hands, feet, spine and large weight bearing joints such as the hips and knees.

### ***Studies related to causes and risk factors for osteoarthritis***

Often the cause of osteoarthritis is unknown. It is mainly related to aging. Other factors that can predispose a person to get Osteoarthritis are family history, obesity, participation in sports and joint trauma are factors of osteoarthritis

***Kenneth C.Kaluman [2010]*** in his article about “Risk factors for and possible causes of Osteoarthritis”, states that Osteoarthritis was previously thought to be a normal consequence of aging; thereby it is termed as degenerative joint disease. Now it is realized that Osteoarthritis results from a complex integrity, genetics, local inflammation, mechanical forces and cellular and biochemical processes.

**Brenda Goodman [2008]** conducted a large, population based study in North Carolina and found that the lifetime risk of knee osteoarthritis is greater than the life time risk of diabetes. The results of their study suggest that 1 in 2 people will develop osteoarthritis in a knee before they reach the age of 85, was 45.5 percent.

**Cooper C. et al., [2007]** explored individual risk factor for hip osteoarthritis in a population case control study performed for total of 611 patients (210 men and women 401) listed for hip replacement because of hip osteoarthritis. Information about risk factor was obtained by a questionnaire and a short physical examination and the result reveals that obesity and hip injury are important risk factors for hip osteoarthritis. There were a negative association between cigarette smoking and osteoarthritis among men and a week positive association with prolonged regular sporting activity.

**Dr.Davis T. Felson and Dr.Mc Alindon [2000]** Boston conducted an observational study and found that the weight with Body Mass Index of 30 kg/m<sup>2</sup> or greater have high prevalence of knee osteoarthritis. Further more in persons with osteoarthritis, being overweight increases the risk for radiographic progression. Most of the studies finding suggest that the increased risk for osteoarthritis of the knee among overweight persons is stronger in women than men.

Epidemiological studies have demonstrated that participation in certain competitive sports increases the risk for osteoarthritis. Sports activities that appear to increase the risk for osteoarthritis include those that demand high-intensity, acute, direct joint impact and as a result of contact with other participants playing surfaces or equipment.

### ***Studies related to symptoms of Osteoarthritis***

The symptoms of osteoarthritis usually appear in middle age. Almost every one has some symptoms by age 70. However, these symptoms may be minor. Before age 55, osteoarthritis occurs equally in men and women. After age 55, it is more common in women.

Osteoarthritis of the knee and hip joints causes the most difficulty for the elderly because it significantly affects their ability to conduct their normal activities of daily living, such as walking, cooking, bathing, and dressing, using the toilets and performing household chores. Joints can become painful, stiff and swollen. The resulting pain causes limited motion- reduced physical capacity. Increases disability results when the affected joints are exercised less and the elderly begin to lose muscle tone, leading to reduced strength.

***Helmick .C et al., [2008]*** in their study stated that, people who suffer from osteoarthritis will often experience pain when they undergo weight-bearing activities like, walking, standing or constant mobility which is opposite to what patients of rheumatoid arthritis experience. In Osteoarthritis patients pain is aggravated when joints or muscles are used, and when patients rest and relax pain will be relieved.

***Mayo [2009]*** in his study stated that majority of patients with osteoarthritis complain of severe pain, especially moving. Patients also experience stiffness, tenderness and a 'grating sensation' in the affected joint.

### ***Studies related to complication of osteoarthritis***

***Donna Murquharb. et al., [2008]*** in their epidemiological studies investigated the effect of physical activity on the knee joints, found out that Osteoarthritis is the most common joint disorder affecting the elderly. In particular, radiographic knee osteoarthritis affects at least 30% of people aged over 60 years and is major cause of functional disability.

***Centers for Disease Control and Prevention [2001]*** data explain that osteoarthritis of the knee is 1 of 5 leading causes of disability among non-institutionalized adults. About 80% of patients with Osteoarthritis have some degree of movement limitations and 25% cannot perform major activities of daily living (ADL'S), 11% of adults with knee Osteoarthritis need help with personal care and 14% require help with routine needs.

***Dr.Leena Sharma and Dr.James [2006]*** Stanford University of Medicine, California says that the impact of osteoarthritis on disability is substantial. For example, the risk of disability (walking or climbing stairs) due to osteoarthritis of the knee is greater than that due to any other medical condition in elderly persons.

***S.Lamb. J et al., [2000]*** did a cross sectional analysis on 769 older women with physical disability. Mobility was measured using timed performance tests. The result showed the prevalence of knee pain was 53%, one third of women with pain reported it to be severe. In women who had severe pain, activity like walking increased the risk of disability more than inactivity. In old women with recent knee pain, a high pain severity score, obesity and activity are important factors that increase the risk of mobility limitation.



## SECTION 2

### ***Literature and studies related to other therapies and isometric exercise for osteoarthritis:***

Osteoarthritis is a chronic degenerative disorder of multifactorial etiology characterized by loss of articular cartilage, hypertrophy of bone at the margin subchondral sclerosis and range of biochemical and morphological alterations of the synovial membrane and joint capsule. It commonly affects the hands, feet, spine and large weight bearing joints such as the hips and knees.

Typical clinical symptoms are pain, particularly after prolonged activity and weight bearing whereas stiffness is experienced after inactivity.

***Brandt [2000]*** states that, the goals of management of patients with osteoarthritis are to control pain and swelling, minimize disability, improve the quality of life and educate the patient about his or her role in the management team.

Apparently one third of persons 60 to 94 years of age have osteoarthritis of the knee that typically limits ambulation and the ability to climb stairs and stand comfortably. Acetaminophen and non-steroidal anti inflammatory (NSAID) are also used to treat osteoarthritis which not only minimize pain but also reduces inflammation around the affected joints.

***Stephen Barrett [2006]*** in his study suggests that glucosamine may stimulate production of cartilage building proteins. Other research suggests that chondroitin may inhibit production of cartilage destroying enzymes and fight inflammation too.

***Juliana Khowong M.D [2005]*** says that historically glucosamine was first used in Europe in the 1960s in injectable form for the treatment of

osteoarthritis .Since then, studies in both Europe and the US have substantiated its benefits in the treatment of OA. In clinical studies, glucosamine has been shown to stimulate proteoglycan synthesis, incorporate into the glycosaminoglycan chains of cartilage and decrease the activity of degradative enzymes. As opposed to traditional NSAIDs, glucosamine and chondroitin have been shown to safely delay the progression of osteoarthritis both structurally and symptomatically over the short and long term. Randomized clinical trials have shown radiographic evidence of reduction of knee joint space narrowing over three years in patients treated with glucosamine vs. placebo

*Abdul Kalam Azad et al.,[2011]* conducted a study on role of muscle strengthening exercise on osteoarthritis of the knee joint was conducted among 106 patients with osteoarthritis knee. Both male and female were included. They were divided into two groups. Group A were treated with NSAID plus exercise, group B were treated with NSAID only. The study duration was six weeks. The improvement was assessed with WOMAC Scoring System. The group A who received NSAID plus exercise improved more significantly (P=0.001) than those who received NSAID only. The study finding shows that quadriceps muscle strengthening exercise is effective in the patients with osteoarthritis knee.

*Juliana Khowong M.D* New York-Presbyterian Hospital, NY [2005] in his survey of 3,000 people with osteoarthritis, who used yoga to improve their health, found that 98% of the participants claimed yoga to be beneficial to them.

A well known Indian journal in human physiology published a study that showed a marked improvement in the hand strength of rheumatoid arthritis sufferers who practice yoga. Finally, a recent pilot study conducted by rheumatologists at the University Of Pennsylvania School Of Medicine, concluded that yoga may provide a feasible treatment option in the reduction of pain and disability caused by osteoarthritis of the knee.

***Dr. Wang [2009]*** conducted a study to determine the effectiveness of Taichi exercises for pain reduction in knee osteoarthritis in elderly over 65 years of age in Tuft University China received Taichi exercise –( a traditional style of Chinese martial arts that features slow rhythmic movements to reduce mental relaxation and enhance balance, strength, flexibility and self efficacy) over 12 weeks period. Taichi exhibited a significant decrease in knee pain compared with those in the control group. Taichi is a mind body approach that appears to be an applicable treatment for older adults with knee osteoarthritis

***Berman BM et al., [2004]*** conducted a randomized controlled study to determine the efficacy of acupuncture for reducing pain and dysfunction of osteoarthritis patients. 570 patients with osteoarthritis of knee in Maryland, US are selected for the study 23 true acupuncture sessions over 26 weeks were conducted. The result shows that acupuncture seems to provide improvement in function and pain relief as an adjunctive therapy for osteoarthritis of the knee when compared with sham acupuncture and educating control group.

### ***Isometric exercise for osteoarthritis***

**Strengthening exercise:** Strengthening exercises include isometric exercise (pushing or pulling against static resistance) Isometric training builds muscle strength while burning fat helps maintain bone density. Some experts encourage patients to emphasize strengthening leg muscles as a first treatment step before using pain relievers.

Once osteoarthritis has been diagnosed patients should reduce shock to the affected joints. Joints require motion to stay healthy. Long periods of inactivity cause the arthritic joints to stiffen and the adjoining tissue to atrophy.

Exercise helps to reduce stiffness and increase flexibility. Exercise improves feelings of well being and reduces stress, helps to reduce the emotional burden of pain. Exercise plan should focus on strengthening the muscle around the joint; reduce the stress, improve, flexibility recovery and range of motion. Regular exercise can improve the health and prevent diseases and disabilities, to improve mood and relieve depression too in the older people.

Isometric exercise serves a particularly useful function when painful joints limit movement. Maximal contraction held for 3 to 6 seconds with 20 seconds rest in between and performed three times per week has been shown to increase muscular strength without damaging the joints with osteoarthritis.

***Harvey Simon [2006]*** recommended that stretching exercise helps improve range of motion which makes it easier to perform activities that

require flexibility. Stretching exercises include static stretching, as well as practices such as yoga or Taichi. Performing stretching exercises at least twice a week is useful for improving functional ability.

*Sheila. C et al., [1998]* conducted a randomized trial to assess the effect of a home based exercise programme, designed to improve quadriceps strength, on knee pain and disability. 191 men and women with knee pain aged 40–80 were recruited from the community and are randomized to exercise .The exercise group performed strengthening exercises daily for six months. Result shows that WOMAC pain score reduced by 22.5% in the exercise group and by 6.2% in the control group. Physical function scores reduced by 17.4% in the exercise group and were unchanged in controls ( $p < 0.05$ ). They found out that a simple programme of home quadriceps exercises can significantly improve self reported knee pain and function.

*Carol Eustice [2008]* says that, Resistance exercise can improve muscle strength and physical function in people with knee osteoarthritis. Resistance exercise is any exercise where muscles contract against an external resistance by an object that forces the muscles to contract. Researchers in Sydney, Australia, reviewed 18 previous studies that assessed the effectiveness of resistance exercise on knee osteoarthritis. There were 2,832 people enrolled in the studies which utilized resistance machines, free weights, isometric exercise, and elastic bands. Resistance exercise improved muscle strength and self-reported pain and physical function in participants from a majority of the 18 studies.

The goal of resistance exercise is to strengthen muscle groups around affected joints, stabilize and protect affected joints, and improve mechanics of the joints to reduce stress on the joints

**Henrik.R et al., [1998]** did a randomized control trail to assess the effectiveness of general physical programme on patients with severe knee osteoarthritis. 25 patients (3 men, 22 women) received general physical training in groups twice a week for 3 months. The result showed that isokinetic quadriceps strength improved 20% in the affected leg, isometric strength improved 21%. Pain had decreased to 2.0 point, and walking speed had increased. Frequency of crepitus decreased on least affected leg. They found out that the general physical training appears to be beneficial to patients with osteoarthritis of the knee.

**Shanawaz Anwar et al., [2011]** conducted a randomized controlled trial to evaluate the effectiveness of electromyography biofeedback as an add-on therapy with isometric exercise on quadriceps strengthening in patients with osteoarthritis of knee. Thirty three, 10 men and 23 women, patients with osteoarthritis of knee participated in the study. The biofeedback group received electromyography biofeedback-guided isometric exercise programme for 5 days a week for 5 weeks, whereas the control group received an exercise programme only.. The result showed that the electromyographic biofeedback to a 5-week isometric exercise program appeared to increase quadriceps muscle strength, compared to the exercise program alone for people with knee osteoarthritis.

*Kocaman et al., [2008]* conducted an experimental study to compare the effects of isometric exercises and electrical stimulation in the treatment of knee osteoarthritis among 30 older adults. The results showed that the electrical stimulation was found to be as efficient as the exercise treatment for knee osteoarthritis, in quadriceps muscle weakness and atrophy prevention. The findings suggest that electrical stimulation treatment could be used alone or in combination with exercise treatment in clinical setting and isometric exercises as a home programme

*National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS) [2007]* sponsored a randomized classification study to show that isometric strengthening is beneficial in managing osteoarthritis of the knee. This study examined the effectiveness of a portable isometric exercise device for home use that guides the user through an exercise protocol by means of various forms of feedback.

They randomly assigned study participants meeting eligibility criteria to the exercise device group, and control group. This type of exercise can decrease joint-related pain and stiffness while increasing strength and functional measures. They concluded that, individuals exercising with the device achieved better outcomes in pain, stiffness, strength, and functional measures than the control group.

## **CHAPTER-III RESEARCH METHODOLOGY**

Research methodology involves systematic procedure in which the researcher starts from initial identification of problem to its final conclusion. The role of methodology consists of procedures and techniques for conduction study. [Polit Hungler 2004]

This chapter includes research approach, research design, variables, setting, population, samples and sample technique, description of research instrument, validity and reliability of the tool, pilot study, data procedure and data analysis procedure.

### **RESEARCH APPROACH**

The research approach chosen for this study was a quantitative approach. It is a study designed to explore the dimension of a phenomenon or to develop or define hypothesis and about the relationship between phenomena [Polit,1999].

### **RESEARCH DESIGN**

Research design is the overall plan for obtaining an answer, to the research question for testing the research hypothesis.[Polit and Hungler 1999]

A quasi experimental pre-test, post test ,control group design was chosen for this study to assess the effectiveness of isometric exercise on functional ability among senior citizen with osteoarthritis.



<b>Group</b>	<b>Pre test</b>	<b>Intervention</b>	<b>Post test</b>
Experimental group	O1	X	O2
Control group	O1	.....	O2

**Key**

O1 - Pre test assessment of functional ability among senior citizen before giving isometric exercises.

X - Intervention isometric exercises.

O2 - Post test assessment of functional ability after giving isometric exercises.

In pre test – post test experimental design the dependent variables in experimental and control group are measured .Intervention is given to only experimental group.

**VARIABLES OF THE STUDY**

***Independent Variables***

Isometric exercises includes quadriceps (thigh muscle) exercises, straight leg raise (sitting) straight leg raise (lying) and muscle stretch.

***Dependent Variables***

The functional ability of the senior citizens with osteoarthritis is the dependant variable.

## **RESEARCH SETTING**

Research setting is the entire physical condition and location in which data collection takes place in the study.[Polit and Beck 2004]

The study was conducted in Little Drops Old People Home. In which there are two shelter blocks. Here senior citizens age between 60 to 80 years, healthy as well as sick and those who are abandoned by their family are staying. This home is run by a Public Charitable Trust. Mr.E.S.Paul is the Founder and Managing Trustee. This home is situated in Paraniputhur near Porur, Chennai. Totally there are 250 senior citizens are in these blocks. In shelter -1 Gowri block there are 120 senior citizens and there are 130 senior citizens in shelter-2 Vikram block .Here they provide food, shelter, clothes and medicines. They neither have facility nor suitable person to give exercise to the senior citizens.

## **POPULATION**

Population is, the entire population in which the researcher is interested and would like to generalize the results of the study. [Polit and Beck 2004]

The senior citizens age from 60 to 80 years with osteoarthritis were selected as the population for this study.

## **SAMPLE**

Sample constitute of subset of total population.

In this study the eligible subjects who met the inclusive criteria were selected from Little Drops Old Age Home.

## **SAMPLE SIZE**

30 samples are assigned to the experimental group and 30 are assigned to the control group.

## **SAMPLING TECHNIQUE**

Sampling technique refers to the process of selecting a portion of the population to represent the entire population [Polit and Hungler, 1999]

Non probability convenient sampling technique was used to select the sample.

## **CRITERIA FOR SAMPLE SELECTION**

### ***Inclusion Criteria***

Senior citizens who are;

- 1) Between 60-80 years residing in the selected old age home
- 2) Able to understand English or Tamil
- 3) Willing to participate in the study

### ***Exclusion Criteria***

Senior citizens who are;

- 1) Mentally challenged
- 2) Physically challenged-Polio, paraplegic and hemiplegic
- 3) Bedridden
- 4) With fracture or external or internal fixation of pins or screws

- 5) Underwent surgery for osteoarthritis
- 6) Not following any other alternative therapy like yoga, aerobic exercise, etc.
- 7) With acute pain.

## **DESCRIPTION OF THE TOOL**

Data collection instrument was divided into two sections.

Section-1 : Demographic data

Section-2 : Questionnaire with 30 questions to assess the level of functional ability of the senior citizens with osteoarthritis

### ***Section-1***

Consists of questions to elicit demographic data such as age, sex, marital status, education, duration of joint pain, diagnosis of osteoarthritis, body built, co-morbid condition, history of injury, and family history of osteoarthritis.

### ***Section-2***

Consists of questionnaire, with 30 questions based on the Stanford Western Ontario-Mc Master University index scale (WOMAC). Modified Pune Version (Centre of Rheumatology Diseases [(CRD)Yang 2007] of .Osteoarthritis index scale developed by Nicholas Bellamy (1994) consisting of 3 components was designed to measure dysfunction and pain associated with osteoarthritis of the lower extremities by assessing 30 functional

activities. 5 questions related to pain, 2 questions to stiffness and 23 questions related to physical function activities.

The WOMAC is proved to be a valid, reliable and sensitive instrument for the detection of clinically important changes in Health Status following a variety of intervention (Non Pharmacologic, Surgical, Physiotherapy etc.)

WOMAC was used in its visual analogue scale (VAS) format.

***WOMAC score***

‘0’ - for no difficulty

‘1’ - slight

‘2’ - moderate

‘3’ - severe

‘4’ - extreme

WOMAC consists of 30 questions divided into 3 components

I component – 1-5 osteoarthritis pain

II component – 6-7 osteoarthritis stiffness

III component – 8-30 for physical function

## **SCORE INTERPRETATION**

### ***WOMAC score***

For each question the score is,

‘0’ - for no difficulty

‘1’ – slight

‘2’ – moderate

‘3’ – severe

‘4’ - extreme

### ***Scoring***

91-120 – worst functional ability

61-90 – low functional ability

31-60 – moderate functional ability

0-30 – best functional ability

## **TESTING OF THE TOOL**

### ***Validity of the tool***

Modified WOMAC scale tool was shown to three experts for content validity. The experts are orthopedic surgeon, two nursing professors. Minor modification regarding rearrangement of question were made in the tool and was finalized and used for the main study.

### ***Reliability of the tool***

Reliability is the degree of consistency or dependability with which instrument measures the attribute is designed to measure.[Polit and Hungler,1999]

The method adopted for testing reliability of the tool was test retest method. Correlation coefficient is obtained between two scores and reliability was checked. The reliability score was good.[0.88] which shows that the tool is highly reliable.

### **PILOT STUDY**

Pilot study was conducted in Little Drops old age home at Chennai from 7-3-11 to 21-3-11.Initially permission was obtained from the Managing Trustee Mr.E.M.Paul to conduct pilot study. 6 senior citizens who met the inclusion criteria were selected by using purposive sampling method and they were assessed for effectiveness of isometric exercise on functional ability.

### **PILOT STUDY RESULTS**

Based on the results of the pilot study the following changes were made,

- 1) In the demographic data 2 variables like duration of joint pain and family history of osteoarthritis were added.
- 2) In the section 2; In the 3<sup>rd</sup> compartment (Difficulty in performing daily activities) 6 items were added.

## **DATA COLLECTION PROCEDURE**

Data collection was done from 4-6-2011 to 15-7-2011, Monday to Saturday from 8am to 4pm. The researcher went to the old age home and selected the samples by using non probability convenient sampling technique. For experimental group the researcher selected 30 samples out of 35 who were diagnosed to have osteoarthritis from shelter-1 [Gowri block] as per inclusion criteria and for control group selected 30 samples out of 33 who were having osteoarthritis from [Vikram block]. Each person was explained about the purpose of the study and written consent was obtained. After establishing the rapport pre test was conducted by using semi structured questionnaire. Everyday six persons were interviewed and their level of functional ability was assessed.

The senior citizens in the experimental group were divided into five groups and the isometric exercises given to each person for 15 minutes, and in the afternoon the same procedure was performed by the participants and was supervised by the researcher. The intervention was given for 15 days the post test was conducted for both the groups on the final day of the intervention.

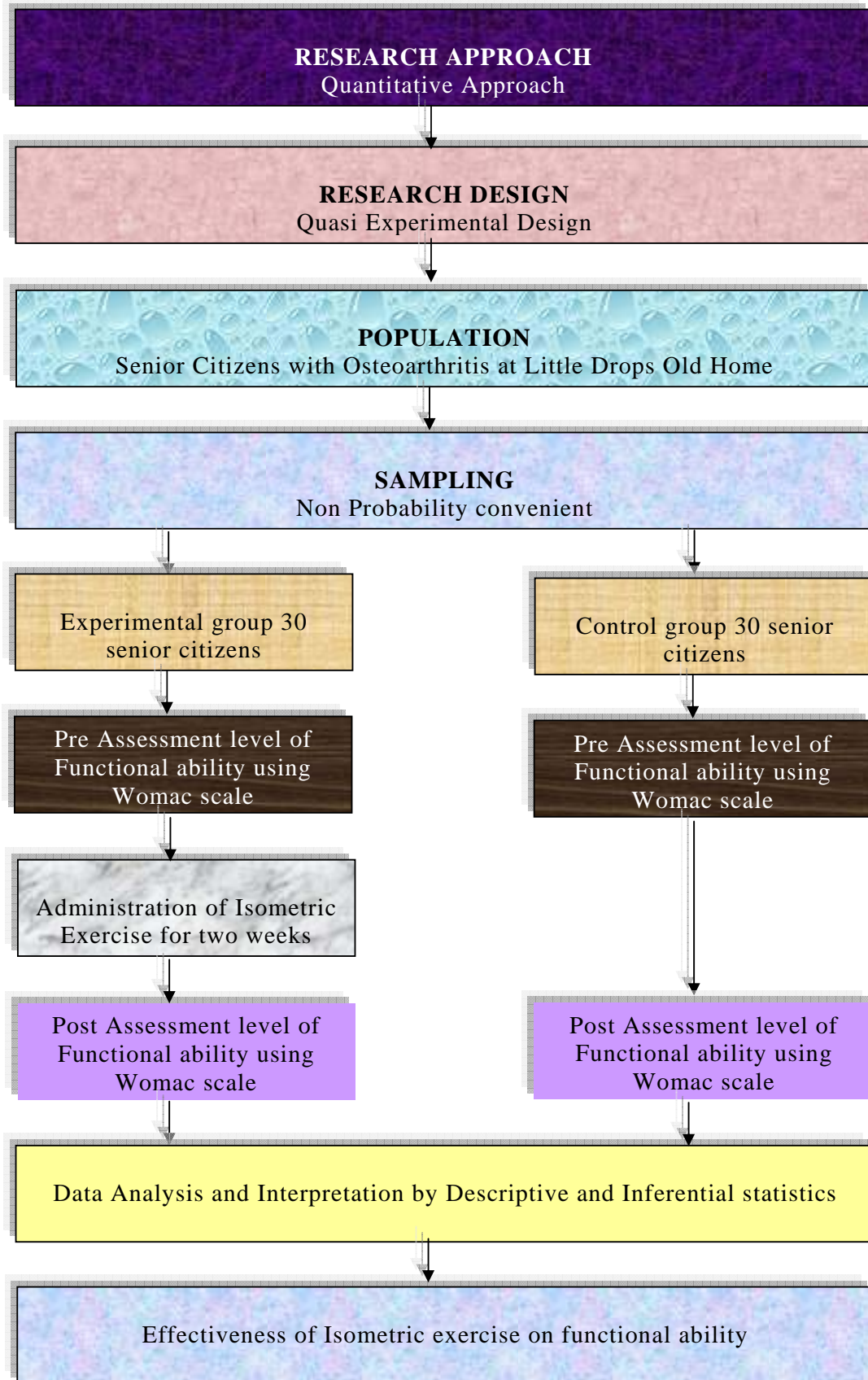


## PLAN FOR DATA ANALYSIS

### *Quasi Experimental Study Design*

<b>S.NO</b>	<b>OBJECTIVE</b>	<b>STATISTICAL PROCEDURE</b>	<b>STATISTICAL METHOD</b>
1.	To assess the level of functional ability in experimental and control group	Descriptive statistics	Frequency, Percentage distribution, mean & standard deviation.
2.	To analyze the difference between the pre and post test in the experimental and control group.  To determine the effectiveness of isometric exercise on functional ability between experimental and control group.	Inferential statistics	In Paired 't' test,  Independent 't' test
3.	To associate the level of functional ability and the demographic variables in experimental and control group	Inferential statistics	Chi-square

**FIG-2: SCHEMATIC REPRESENTATION OF RESEARCH STUDY**



## **CHAPTER – IV**

### **DATA ANALYSIS AND INTERPRETATION OF FINDINGS**

This chapter deals with the data analysis and interpretation to assess the effectiveness of isometric exercises on functional ability to senior citizens with osteo arthritis.

Descriptive and inferential statistics were used for the analysis of the data. According to the study objectives the interpretation has been tabulated and organized as follows:

#### **ORGANIZATION OF DATA**

**Section-A** : Description of demographic variables of senior citizens in the experimental and control group.

**Section-B** : Assessment of pre and post test level of functional ability among senior citizens in the experimental and control group.

**Section-C** : Comparison of effectiveness of isometric exercise on functional ability among senior citizens in the experimental group with the control group.

**Section-D** : Association of post test level of functional ability among senior citizens with their selected demographic variables in the experimental group.

## SECTION A

**TABLE-1: Frequency and percentage distribution of demographic variables of senior citizens in the experimental and control group.**

*N* = (30 + 30)

S. No	Demographic Variables	Experimental Group		Control Group	
		No.	%	No.	%
1.	Age				
	60 - 65 years	10	33.33	9	30.00
	66 - 70 years	7	23.33	12	40.00
	71 - 75 years	9	30.00	7	23.33
	76 - 80 years	4	13.34	2	6.67
2.	Sex				
	Male	8	26.67	10	33.33
	Female	22	73.33	20	66.67
3.	Marital Status				
	Single	2	6.67	2	6.67
	Married	9	30.00	8	26.67
	Widow	17	56.67	11	36.67
	Widower	1	3.33	4	13.33
	Separated	1	3.33	5	16.67
4.	Education				
	Illiterate	15	50.00	5	16.67
	Primary	10	33.34	16	53.33
	High School	4	13.33	9	30.00
	College	1	3.33	0	0.00
5.	Duration of joint pain				
	Less than one year	6	20.00	4	13.33
	One to two years	14	46.67	16	53.33
	More than two years	10	33.33	10	33.33

S. No	Demographic Variables	Experimental Group		Control Group	
		No.	%	No.	%
6.	Diagnosis of osteoarthritis				
	Right Knee	2	6.67	7	23.33
	Left Knee	15	50.00	14	46.67
	Both the knees	13	43.33	9	30.00
7	Body built				
	Thin	5	16.66	5	16.67
	Normal	20	66.67	19	63.33
	Obese	5	16.67	6	20.00
8.	Food pattern				
	Vegetarian	5	16.67	12	40.00
	Non vegetarian	25	83.33	18	60.00
9.	Co-morbid condition				
	DM	4	13.33	7	23.33
	CAD	3	10.00	2	6.67
	HT	12	40.00	13	43.33
	TB/COPD	4	13.33	3	10.00
	Nil	7	23.34	5	16.67
10.	Family history of osteoarthritis				
	Yes	4	13.33	7	23.33
	No	26	86.67	23	76.67

The table 1 shows the frequency and percentage distribution of demographic variables of the senior citizens in the experimental and control group.

With respect to age, majority 10(33.33) were in the age group of 60 – 65 years in the experimental group and whereas in the control group majority 12(40%) were in the age group of 66 – 70 years.

Considering the sex of the senior citizens in the experimental group, majority 22(73.33%) were female and in the control group majority 20(66.67%) were female.

Regarding the marital status of the senior citizens in the experimental group, majority 17(56.67%) were widow and in the control group, majority 11(36.67%) were widow.

With respect to education of the senior citizens in the experimental group, majority 15(50%) were illiterates and in the control group, majority 16(53.33%) had primary education.

Considering the duration of joint pain in the experimental group, majority 14(46.67%) has been experiencing joint pain for one to two years and in the control group majority 16(53.33%) has been experiencing joint pain for one to two years.

Regarding the diagnosis of osteoarthritis in the experimental group, majority 15(50%) were diagnosed for osteoarthritis on the left knee and in the control group majority 14(46.67%) were diagnosed for osteoarthritis on the left knee.

With respect to body built in the experimental group, majority 20(66.67%) of senior citizen's body built was normal and in the control group, majority 19(63.33%) body built was normal.

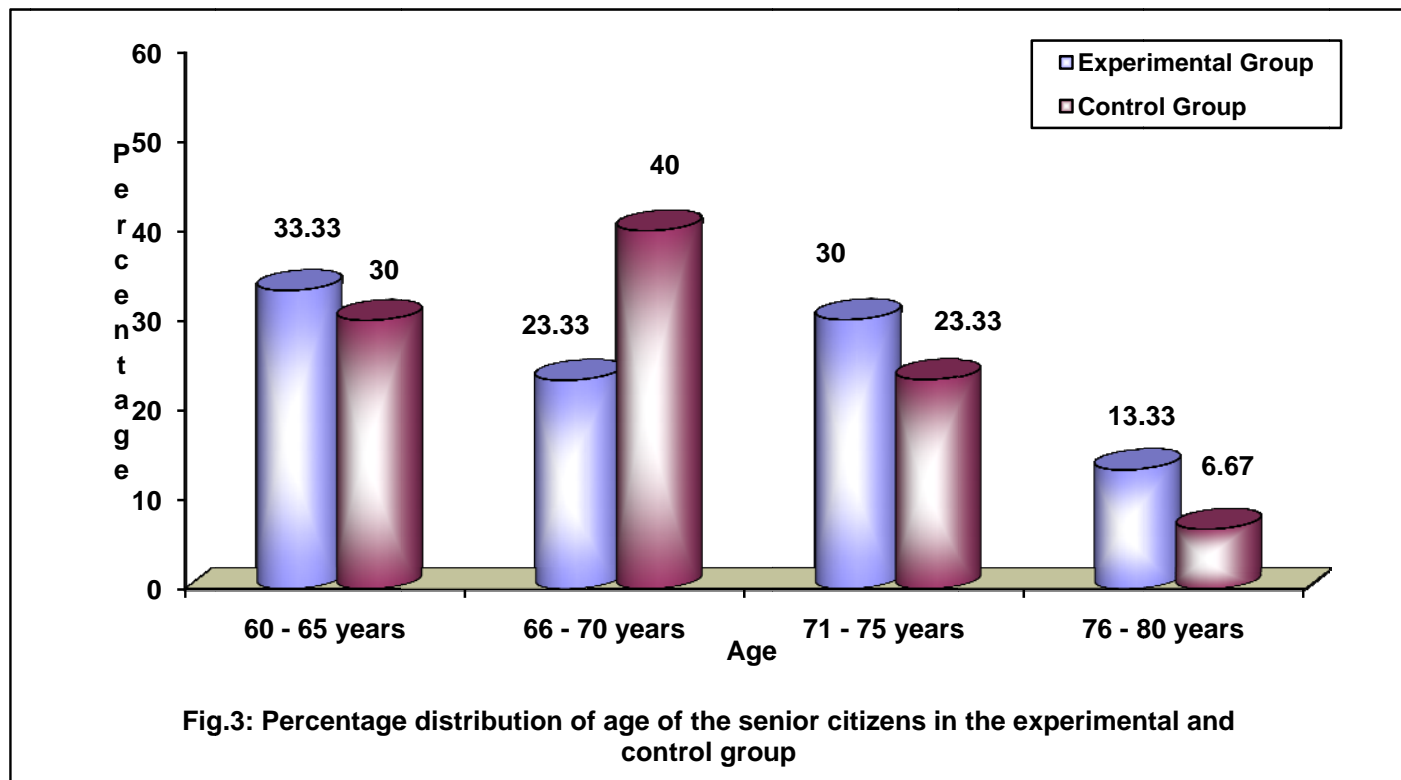
Considering the food pattern of the senior citizens in the experimental group, majority 25(83.33%) were non vegetarian and in the control group, majority 18(60%) were non vegetarian.

With regard to co-morbid condition of the senior citizens in the experimental group, majority 12(40%) had hypertension and in the control group 13(43.33%) had hypertension.

Regarding the history of any injury or accident experienced by the senior citizens in the experimental group, majority 17(56.67%) had not experienced any accident or injury and in the control group majority 14(46.67%) had experienced injury.

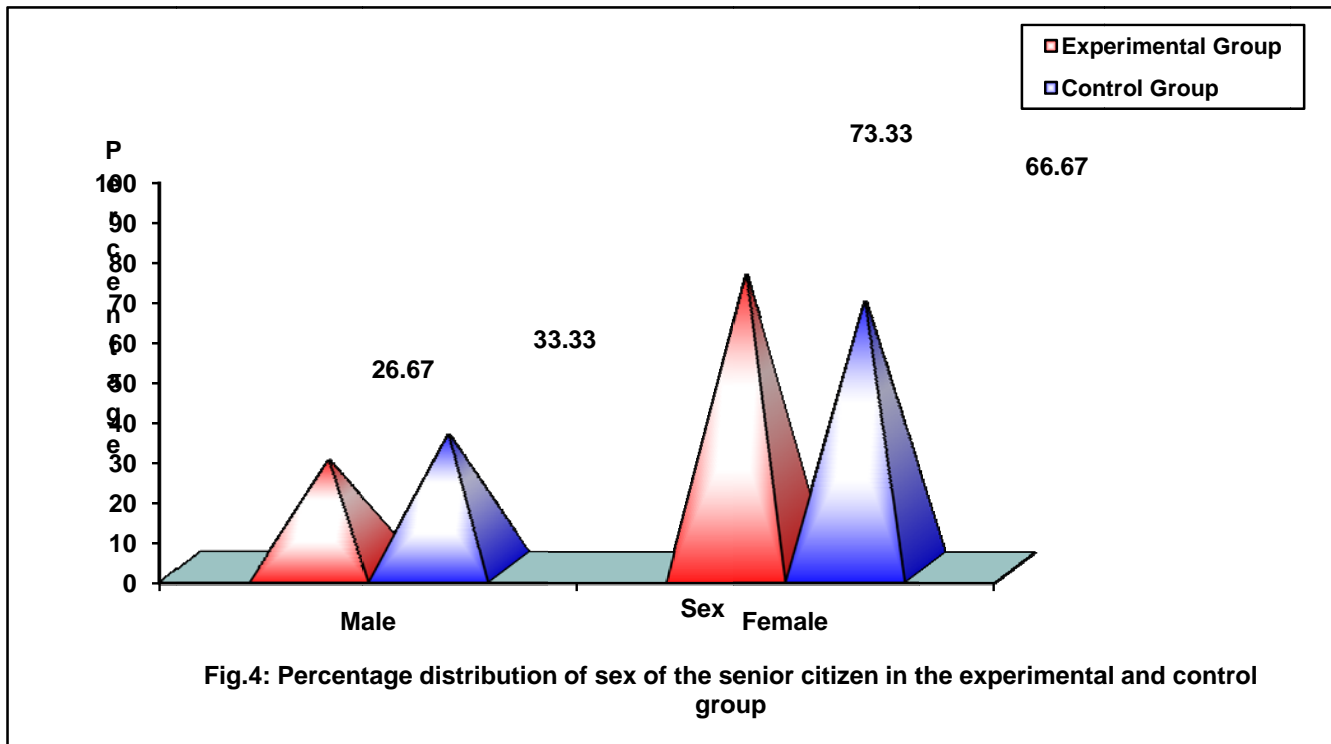
With respect to family history of osteoarthritis in the experimental group, majority 26(86.67%) had no family history of osteoarthritis and in the control group, majority 23(76.67%) had no family history of osteoarthritis.

*Fig .3: Percentage distribution of age of the senior citizens in the experimental and control group*

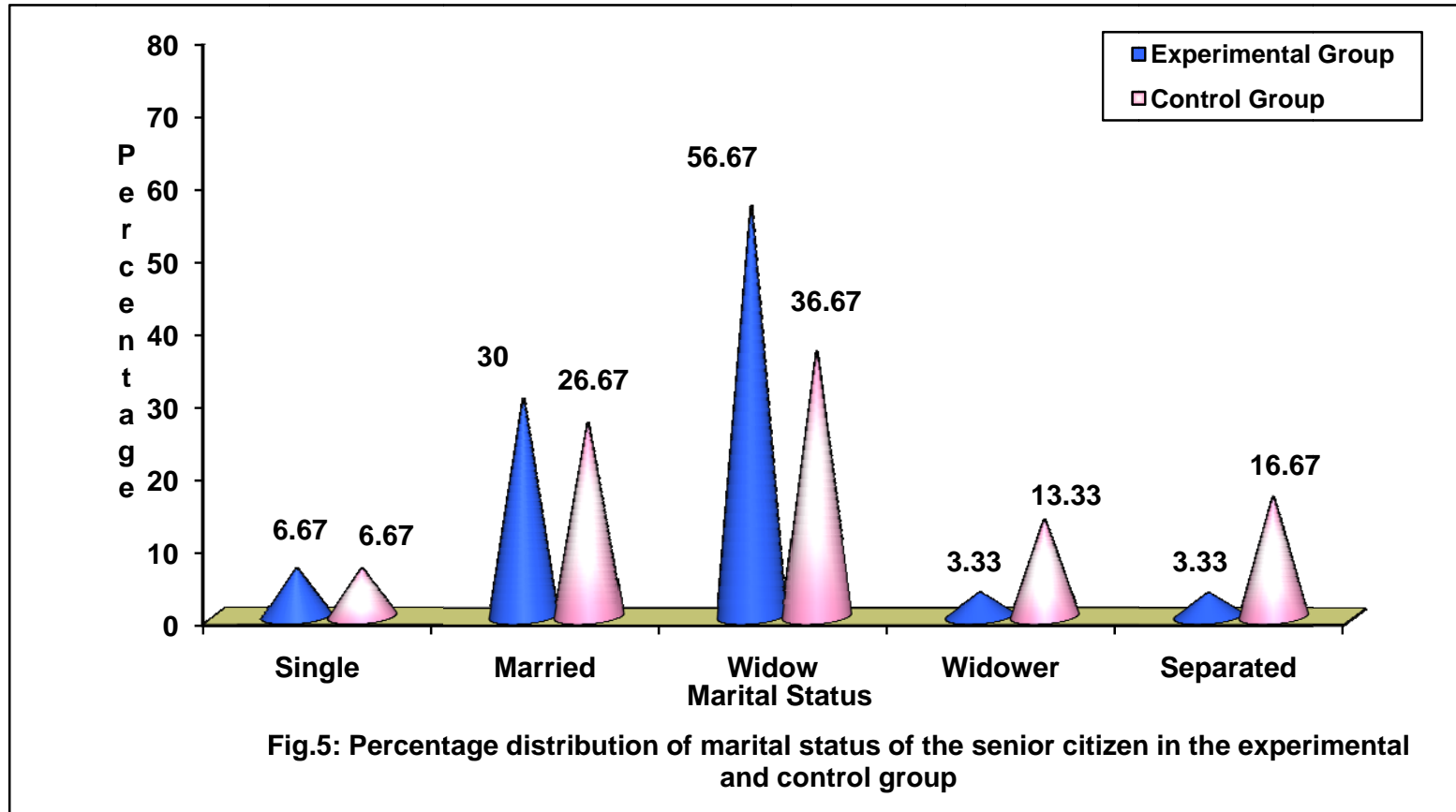




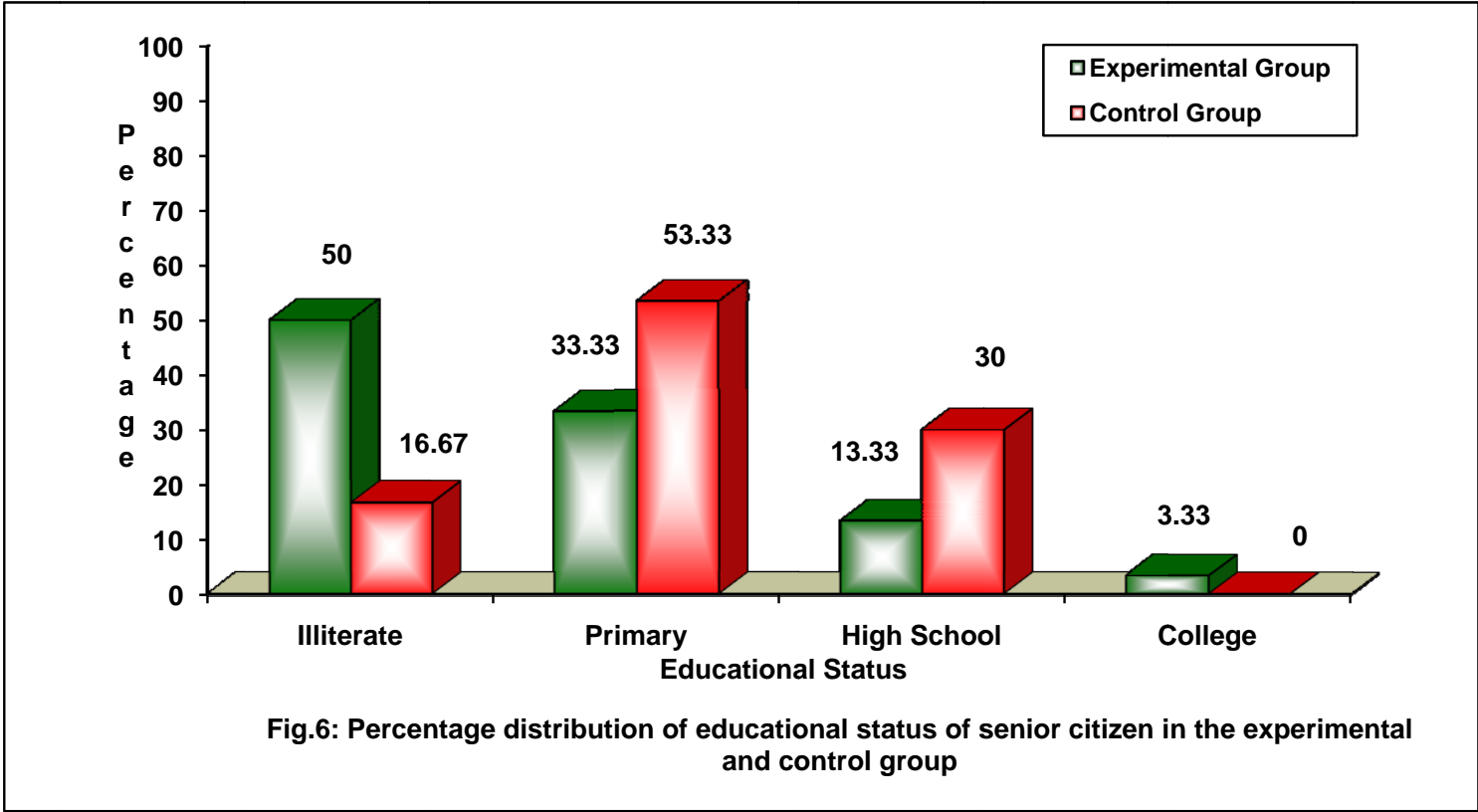
*Fig.4: Percentage distribution of sex of the senior citizen in the experimental and control group*



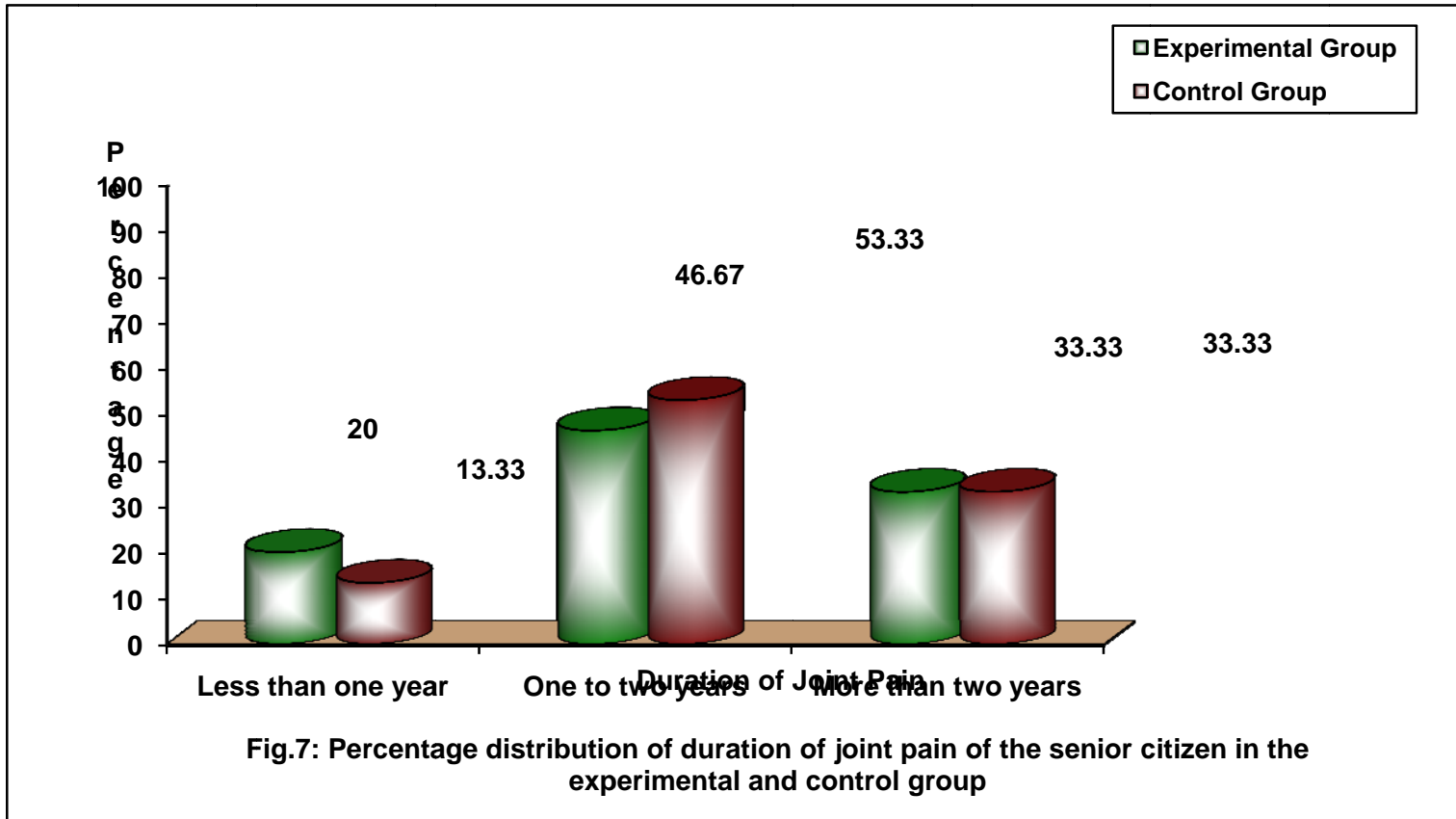
*Fig.5: Percentage distribution of marital status of the senior citizen in the experimental and control group*



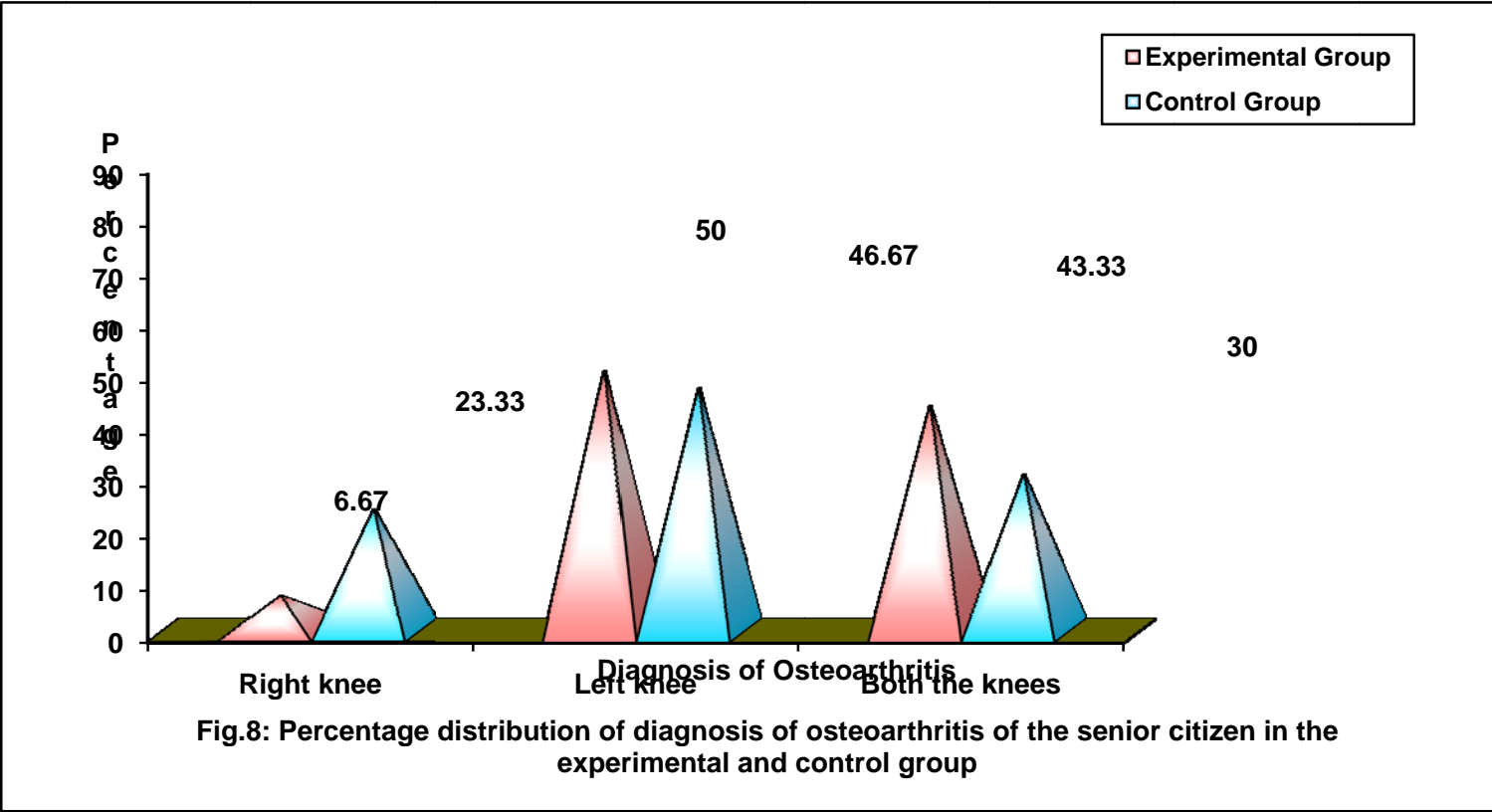
*Fig.6: Percentage distribution of educational status of senior citizen in the experimental and control group*



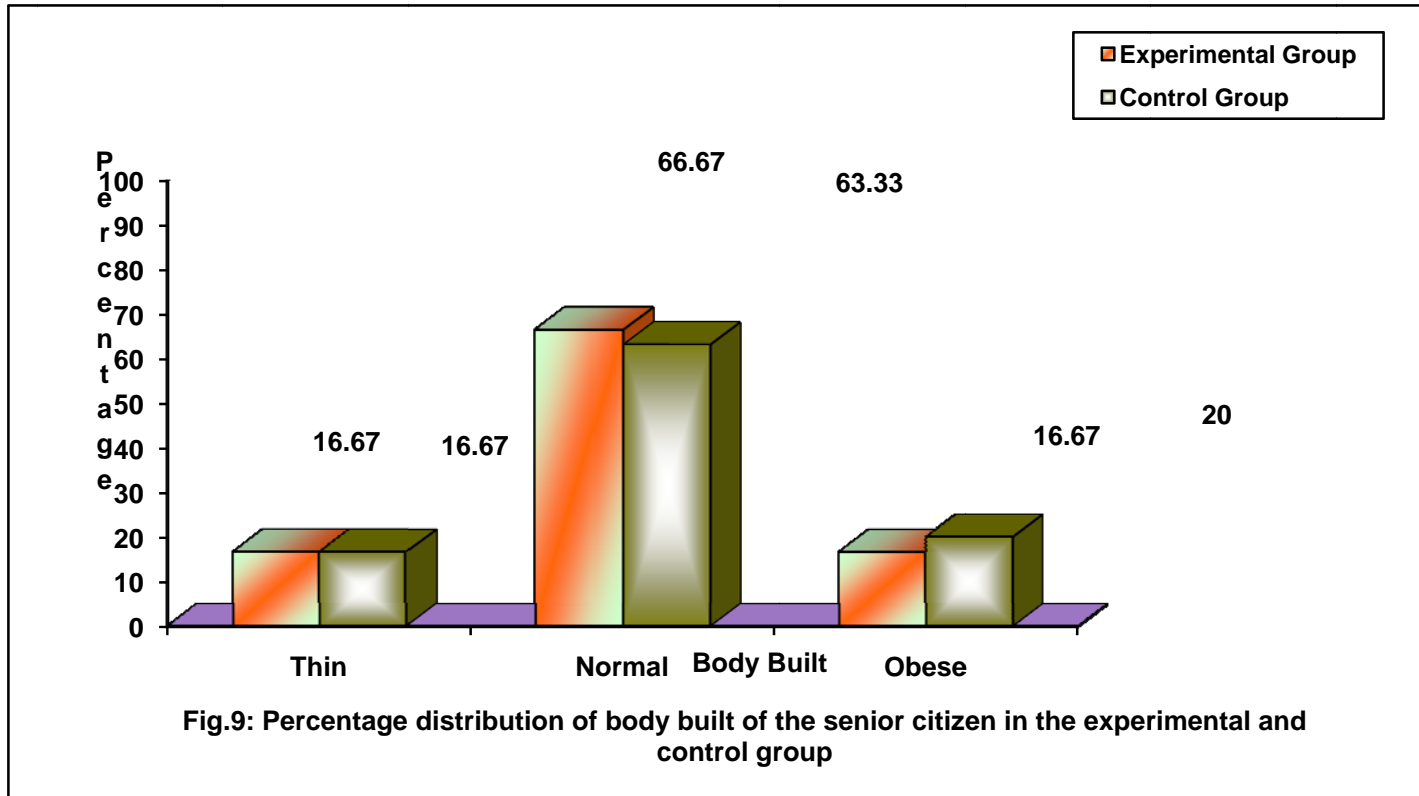
*Fig.7: Percentage distribution of duration of joint pain of the senior citizen in the experimental and control group*



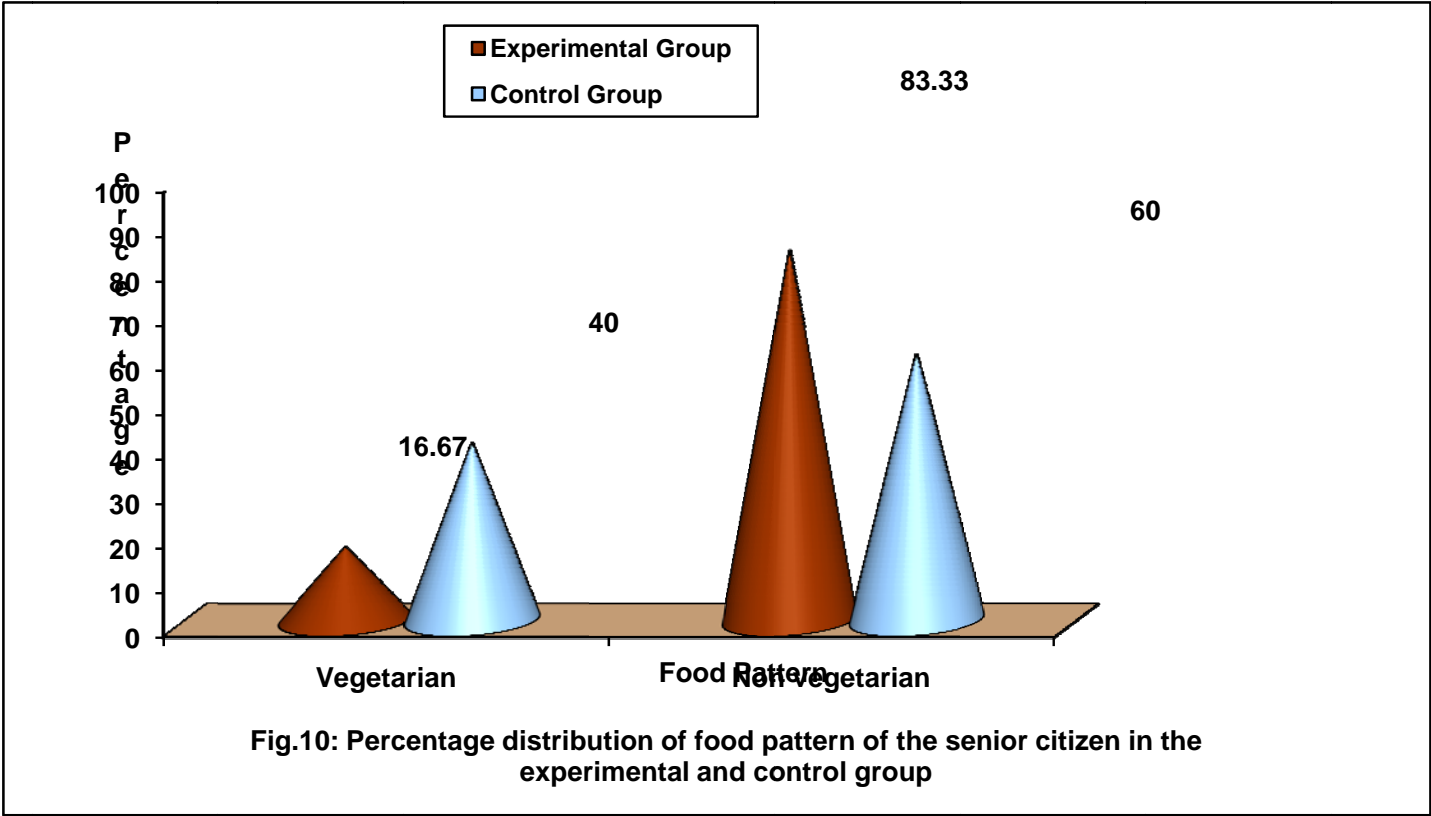
*Fig.8: Percentage distribution of diagnosis of osteoarthritis of the senior citizen in the experimental and control group*



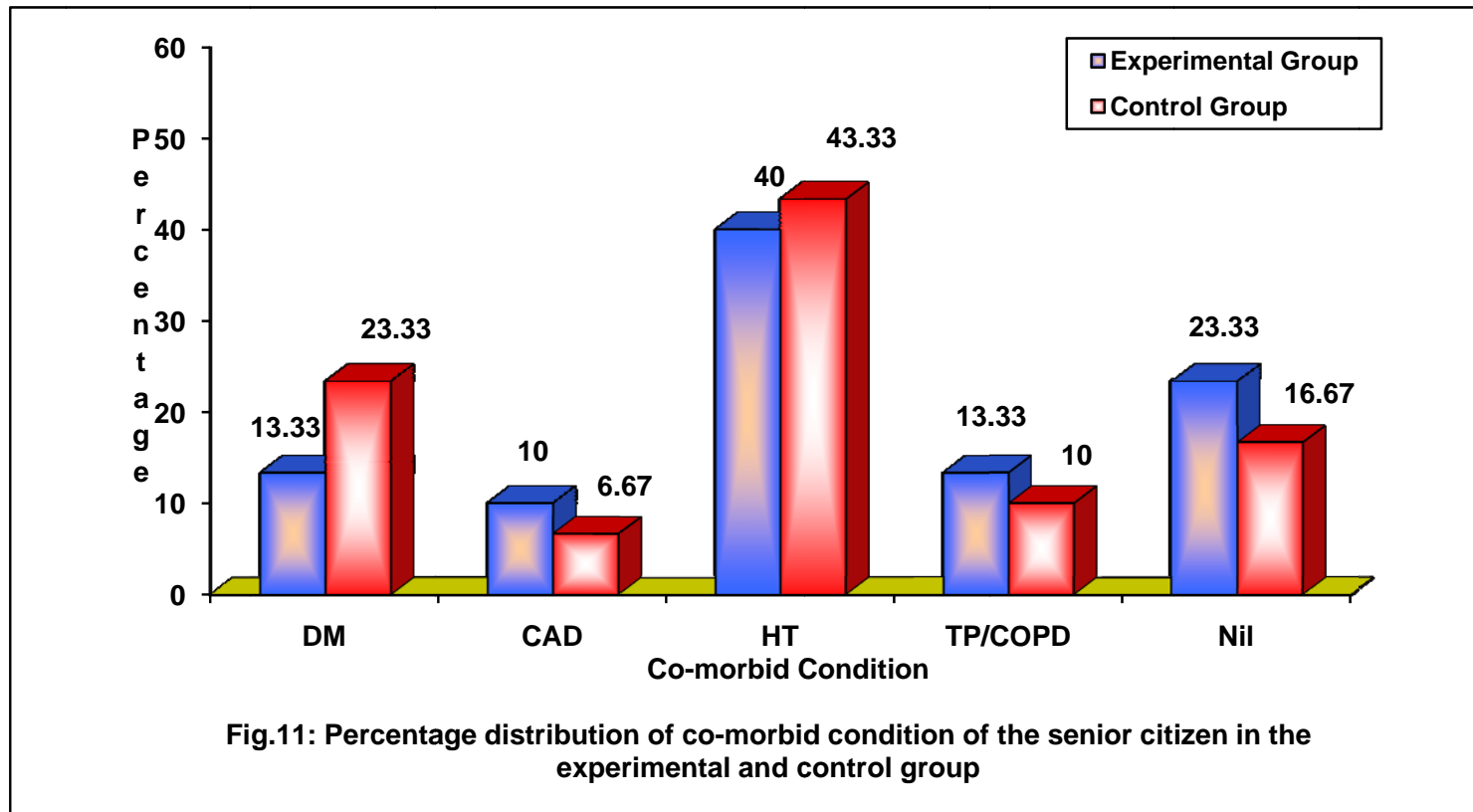
*Fig.9: Percentage distribution of body built of the senior citizen int eh experimental and control group*



*Fig.10: Percentage distribution of food pattern of the senior citizen in the experimental and control group*

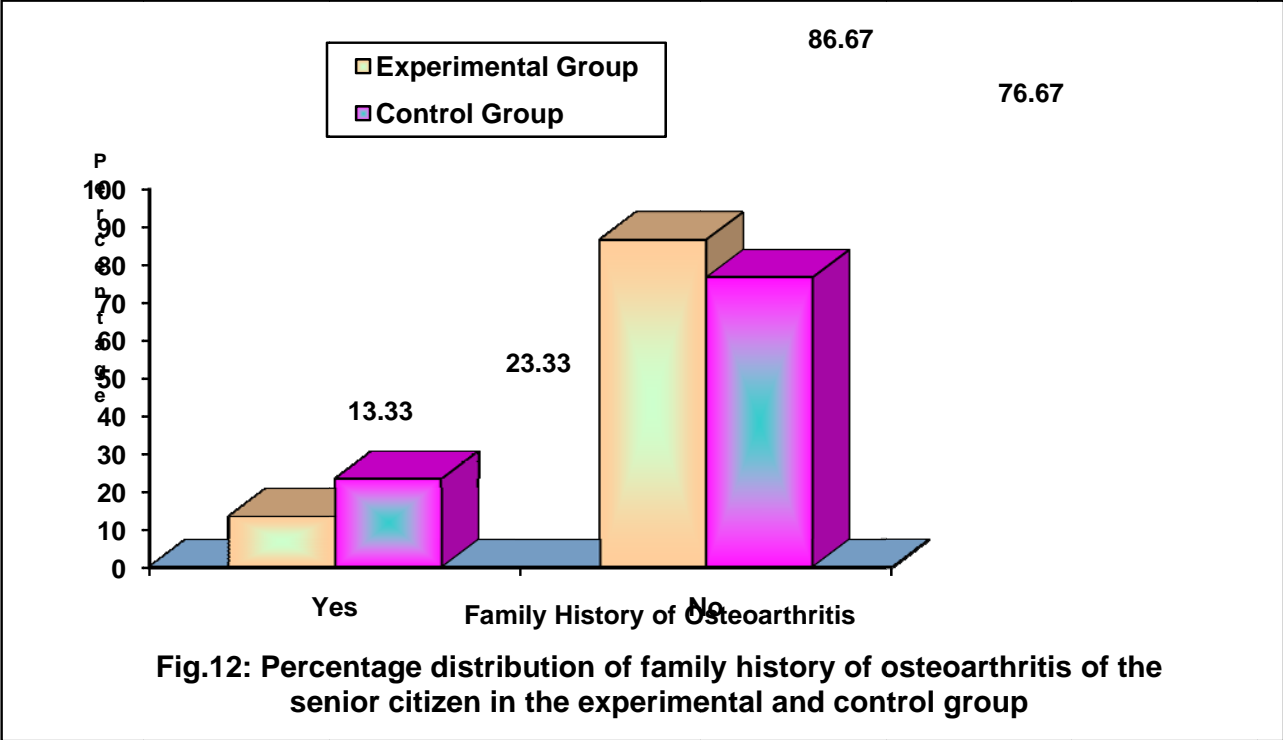


*Fig.11: Percentage distribution of Co-morbid condition of the senior citizen in the experimental and control group*





*Fig.12: Percentage distribution of family history of osteoarthritis of the senior citizen in the experimental and control group*



**SECTION B:**

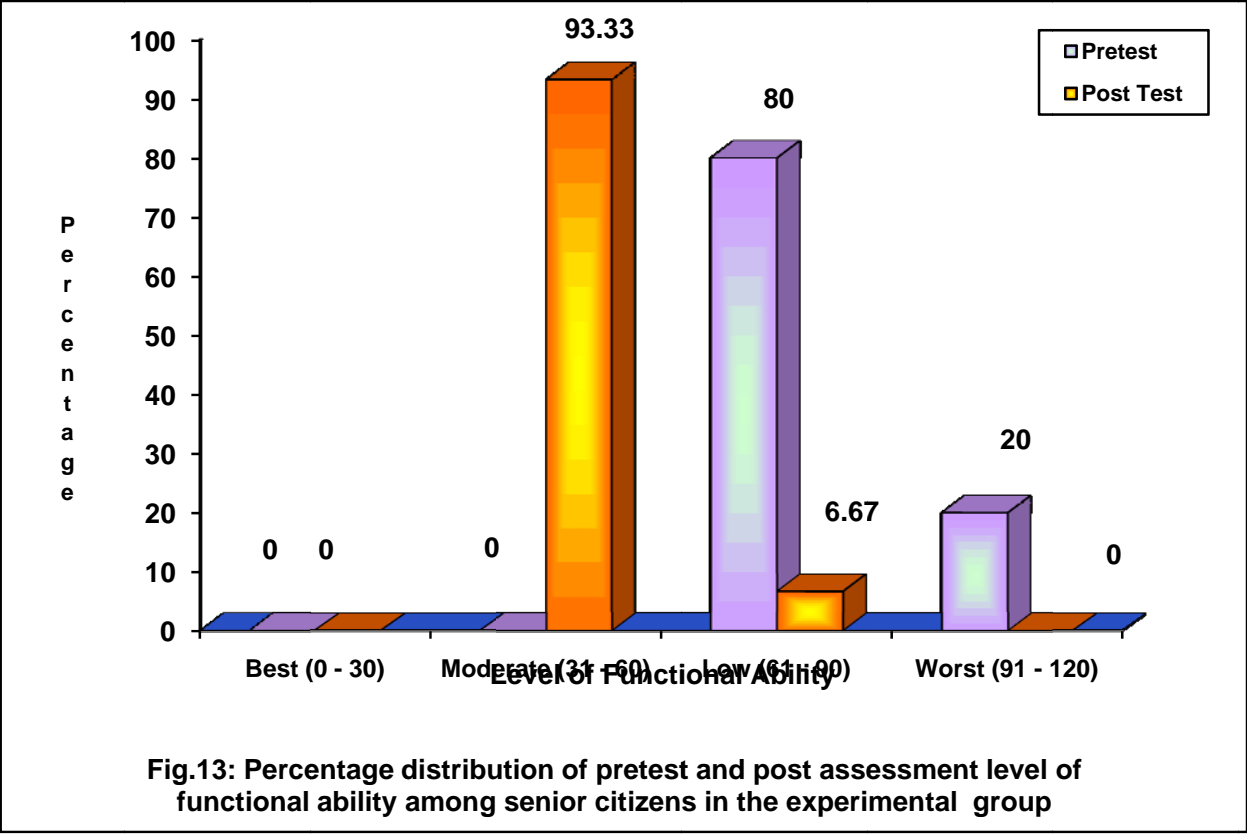
***Table-2: Frequency and percentage distribution of pre test and post test level of functional ability in the experimental group.***

N = 30

<i>Functional Ability</i>		<i>Pre test</i>	<i>Post test</i>
Best (0-30)	No.	0	0
	%	0	0
Moderate (31-60)	No.	0	28
	%	0	93.33
Low (61-90)	No.	24	2
	%	80.0	6.67
Worst (91-120)	No.	6	0
	%	20	0

The table 2 depicts that in the pre test majority of the senior citizens 24(80%) had low level of functional ability and in the post test majority 28(93.33%) had moderate level of functional ability in the experimental group.

*Fig.13: Percentage distribution of pretest and post assessment level of functional ability among senior citizens in the experimental group*



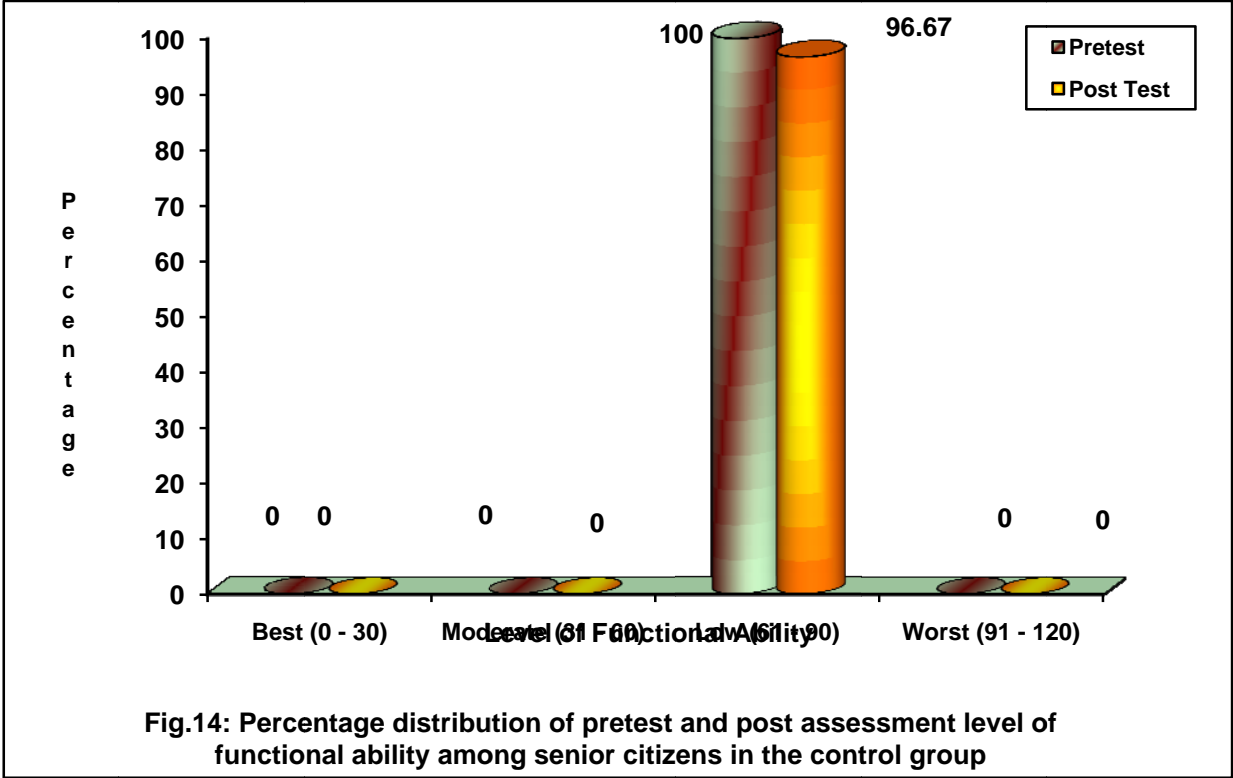
**Table-3: Frequency and percentage distribution of pre test and post test level of functional ability in the control group.**

*n* = 30

<i>Functional Ability</i>		<i>Pre test</i>	<i>Post test</i>
Best (0-30)	No.	0	0
	%	0	0
Moderate (31-60)	No.	0	0
	%	0	0
Low (61-90)	No.	30	29
	%	100.00	96.67
Worst (91-120)	No.	0	1
	%	0	3.33

The table 3 depicts that in the pre-test almost all of the senior citizens 30(100%) had low level of functional ability and in the post test majority 29(96.67%) had low level of functional ability in the control group.

*Fig.14: Percentage distribution of pretest and post assessment level of fuctional ability among senior citizens in the control group*



## SECTION-C:

**Table-4: Comparison of pre test and post test level of functional ability scores in the experimental group.**

*n = 30*

Functional Ability	Mean	S.D	't' value
Pre test	83.07	7.39	30.722***
Post Test	48.17	7.67	p = 0.000, (S)

\*\*\*p<0.001, S – Significant

The table 4 shows that in the experimental group, the pre test mean score was 83.07 with S.D 7.39 and the post test mean score was 48.17 with S.D 7.67. The calculated 't' value of 30.722 was statistically highly significant at p<0.001 level which clearly shows that there is a significant increase in the level of functional ability among senior citizens before and after giving the isometric exercise in the experimental group.

**Table-5: Comparison of pre test and post test level of functional ability scores in the control group.**

*n* = 30

<b>Functional Ability</b>	<b>Mean</b>	<b>S.D</b>	<b>'t' value</b>
Pre test	71.87	5.01	1.764
Post Test	70.67	6.45	p = 0.088, (N.S)

N.S – Not Significant

The table 5 shows that in the control group, the pre test mean score was 71.87 with S.D 5.01 and the post test mean score was 70.67 with S.D 6.45. The calculated 't' value of 1.764 was not statistically significant which clearly shows that there is no difference between the pre-test and post test assessment of functional ability among senior citizens in the control group.

## SECTION-D

**Table-6 : Comparison of post test level of functional ability scores between the experimental and control group.**

$N = (30 + 30)$

Post Test	Mean	S.D	Unpaired 't' value
Experimental Group	48.17	7.67	-13.015
Control Group	70.67	6.45	p = 0.000, (S)

\*\*\*p<0.001, S – Not Significant

The table 6 shows that in the experimental group, the post test mean score was 48.17 with S.D 7.67 and in the control group the post test mean score was 70.67 with S.D 6.45. The calculated 't' value of -13.015 was statistically highly significant at p<0.001 level.

This clearly shows that the isometric exercise had significant effect by improving the level of functional ability among senior citizens in the experimental group than the control group.



## SECTION-E

**Table-7: Association of post test level of functional ability with the demographic variables in the experimental group.**

*n* = 30

S. No	Demographic Variables	Moderate (31 – 60)		Low (61 – 90)		Chi-Square Value
		No.	%	No.	%	
1.	Age					$\chi^2 = 5.000$ d.f = 3 p = 0.172 N.S
	60 - 65 years	10	33.3	0	0	
	66 - 70 years	7	23.3	0	0	
	71 - 75 years	7	23.3	2	6.7	
	76 - 80 years	4	13.3	0	0	
2.	Sex					$\chi^2 = 0.779$ d.f = 1 p = 0.377 N.S
	Male	8	26.7	0	0	
	Female	20	66.7	2	6.7	
3.	Marital Status					$\chi^2 = 1.639$ d.f = 4 p = 0.802 N.S
	Single	2	6.7	0	0	
	Married	9	30.0	0	0	
	Widow	15	50.0	2	6.7	
	Widower	1	3.3	0	0	
	Separated	1	3.3	0	0	
4.	Education					$\chi^2 = 2.946$ d.f = 3 p = 0.400 N.S
	Illiterate	14	46.7	1	3.3	
	Primary	10	33.3	0	0	
	High School	3	10.0	1	3.3	

S. No	Demographic Variables	Moderate (31 – 60)		Low (61 – 90)		Chi-Square Value
		No.	%	No.	%	
	College	1	3.3	0	0	
5.	Duration of joint pain					$\chi^2 = 4.286$ d.f = 2 p = 0.117 N.S
	Less than one year	6	20.0	0	0	
	One to two years	14	46.7	0	0	
	More than two years	8	26.7	2	6.7	
6.	Diagnosis of osteoarthritis in					$\chi^2 = 2.802$ d.f = 2 p = 0.246 N.S
	Right Knee	2	6.7	0	0	
	Left Knee	15	50.0	0	0	
	Both the knees	11	36.7	2	6.7	
7.	Body built					$\chi^2 = 10.714$ d.f = 2 p = 0.005 S***
	Thin	5	16.7	0	0	
	Normal	20	66.7	0	0	
	Obese	3	10.0	2	6.7	
8.	Food pattern					$\chi^2 = 1.714$ d.f = 1 p = 0.190 N.S
	Vegetarian	4	13.3	1	3.3	
	Non vegetarian	24	80.0	1	3.3	
9.	Co-morbid condition					$\chi^2 = 3.214$ d.f = 4 p = 0.523 N.S
	DM	3	10.0	1	3.3	
	CAD	3	10.0	0	0	
	HT	11	36.7	1	3.3	

S. No	Demographic Variables	Moderate (31 – 60)		Low (61 – 90)		Chi-Square Value
		No.	%	No.	%	
	TB/COPD	4	13.3	0	0	
	Nil	7	23.3	0	0	
10.	Family history of osteoarthritis					$\chi^2 = 0.330$
	Yes	4	13.3	0	0	d.f = 1
	No	24	80.0	2	6.7	p = 0.566 N.S

\*\*\*p<0.001, S – Significant, N.S – Not Significant

The table 7 shows that in the demographic variable, the body built had shown statistically high significant association with the level of functional ability among senior citizens at p<0.001 level .None of the other demographic variables had not shown any statistically significant association with the level of functional ability among senior citizens in the experimental group.

## **CHAPTER-V DISCUSSION**

Osteoarthritis is the most common type of arthritis and the major cause of chronic musculoskeletal pain and immobility and disability in the elderly.

The main objective of this study is to discuss the effectiveness of isometric exercise on functional ability among senior citizens with osteoarthritis of the knee based on the review of literature.

Thirty senior citizens were selected for each experimental and control group. Pretest was conducted for both groups by using semi structured questionnaire. Isometric exercise was given for the experimental group for fifteen days. At the end of the intervention post test was conducted for both the groups.

### **DESCRIPTION OF POPULATIONS**

The sample comprise of 60 senior citizens,30 in experimental group and 30 in the control group. Majority of the senior citizens in experimental group were aged between 60 to 65 years, in control group between 66 to 70 years.

Most of the senior citizens in experimental groups were widows, about 50% in experimental group were illiterate and 53.3% were in primary school level.

In both the group approximately 53% have osteoarthritis more than one year,and about 66.67% were in normal body built.

## **DISCUSSION IS BASED ON THE OBJECTIVES**

*The first objective of the present study was to assess the functional ability of the senior citizen with osteoarthritis before isometric exercises in the experimental and control group.*

The table 2 depicts that in the pre-test majority of the senior citizens 24(80%) had low level of functional ability and in the post test majority 28(93.33%) had moderate level of functional ability in the experimental group. The table 3 depicts that in the pre-test almost all of the senior citizens 30(100%) had low level of functional ability and in the post test majority 29(96.67%) had low level of functional ability in the control group.

These findings are similar to the study conducted by **JunIwamote et al.**, [2011] to asses the functional ability of 60 elderly people with Osteoarthritis from Maryland University Hospital which concludes that the osteoarthritis of the knee is the most common type of arthritis and the major cause of chronic musculo skeletal pain which leads to functional disability in elderly.

*The second objective was to determine effectiveness of isometric exercises on functional ability among experimental group.*

Post test was conducted at the end of the intervention schedule, The table 4 shows that in the experimental group, the pre-test mean score was 83.07 with S.D 7.39 and the post test mean score was 48.17 with S.D 7.67. The calculated 't' value of 30.722 was statistically highly significant at  $p < 0.001$  level which clearly shows that there is a significant increase in the level of functional ability among senior citizens before and after giving the isometric exercise in the experimental group.

These findings are similar to the study of **DR. Kunio Takaoke [2003]** he conducted a study in Japan among 17 osteoarthritis knee patients. They were given isometric quadriceps exercise for 8 weeks. The result of the study showed that isometric exercise was clinically effective. Pain relief was observed within 4 weeks. Pain score decreased from 3.9 to 2.3. The study also analyzed the corresponding changes in joint fluid.

***The third objective was to compare the effectiveness of isometric exercise on functional ability between experimental and control group.***

The table 6 shows that in the experimental group, the post test mean score was 48.17 with S.D 7.67 and in the control group the post test mean score was 70.67 with S.D 6.45. The calculated 't' value of -13.015 was statistically highly significant at  $p < 0.001$  level. This clearly shows that the isometric exercise had significant effect by improving the level of functional ability among senior citizens in the experimental group than the control group.

Hence the research hypothesis is accepted, which states that there is significant difference in the level of functional ability between experimental group and control group.

These findings were supported by an analysis study conducted by **C.H.Nvanden [2000]** regarding the effects of isometric exercise regimen on pain and physical functioning in 64 patients above 60 years with active knee osteoarthritis were assigned to an isometric exercise program for 14 days, 5 times a week. It was concluded that a

short term intensive exercise program in knee osteoarthritis is more effective in improving the muscle strength and functional activity.

***The fourth objective was to find out the association between functional ability of senior citizens with osteoarthritis and selected demographic variables***

Table 7 shows that the only demographic variable body built had shown statistically high significant association with the level of functional ability among senior citizens at  $p < 0.001$  level and the other demographic variables had not shown any statistically significant association with the level of functional ability among senior citizens in the experimental group.

Hence the research hypothesis stated that there is a significant association between the post test level of function ability of senior citizens with osteoarthritis and selected demographic variables is accepted.

For this analysis similar study was conducted by a team of researchers from CDC [2010] in Atlanta and the University of North Carolina among 3000 participants in North Carolina with knee osteoarthritis. Researchers estimated that the races, sex and education level has no effect on the risk of getting arthritis in the knee but risk escalated significantly with increasing body weight. Those who become obese had the risk of knee osteoarthritis than those who were normal weight.

## CHAPTER-VI

### SUMMARY, IMPLICATIONS AND RECOMMENDATIONS

#### SUMMARY OF THE STUDY

This study was a quasi experimental study to evaluate the effectiveness of isometric exercise for senior citizens suffering from osteoarthritis.

A self structured questionnaire was used to assess level of functional ability of the senior citizens before teaching isometric exercise. The exercise schedule was conducted only to the senior citizens in the experimental group. The statistical analysis showed that the experimental group scored more score than the control group in the post test. When comparing the pre test with post test value there was increase in the functional ability in the experimental group than control group. The calculated 't' value was statistically highly significant at  $p < 0.001$  level which clearly shows that there is significant difference in the functional ability among senior citizens before and after giving isometric exercise in the experimental group.

#### *Major findings of the study were*

(1) With respect to age, majority 10(33.33) were in the age group of 60 – 65 years in the experimental group and whereas in the control group majority 12(40%) were in the age group of 66 – 70 years.

Regarding the marital status of the senior citizens in the experimental group, majority 17(56.67%) were widow and in the control group, majority 11(36.67%) were widow.



Considering the duration of joint pain in the experimental group, majority 14(46.67%) has been experiencing joint pain for one to two years and in the control group majority 16(53.33%) has been experiencing joint pain for one to two years.

Regarding the diagnosis of osteoarthritis in the experimental group, majority 15(50%) were diagnosed for osteoarthritis on the left knee and in the control group majority 14(46.67%) were diagnosed for osteoarthritis on the left knee.

With respect to body built in the experimental group, majority 20(66.67%) of senior citizen's body built was normal and in the control group, majority 19(63.33%) body built was normal.

With respect to family history of osteoarthritis in the experimental group, majority 26(86.67%) had no family history of osteoarthritis and in the control group, majority 23(76.67%) had no family history of osteoarthritis.

(2) In the pre test majority of the senior citizens 24(80%) had low level of functional ability and in the post test majority 28(93.33%) had moderate level of functional ability in the experimental group.

(3) In the experimental group, the pre test mean score was 83.07 with S.D 7.39 and the post test mean score was 48.17 with S.D 7.67. The calculated 't' value of 30.722 was statistically highly significant at  $p < 0.001$  level which clearly shows that there is a significant increase in the level of functional ability among senior citizens before and after giving the isometric exercise in the experimental group

(4) The post test level of functional ability between the two groups were calculated and the calculated' value of -13.015 was statistically highly significant at  $p < 0.001$  level. This clearly shows that the isometric exercise had significant effect by improving the level of functional ability among senior citizens in the experimental group than the control group.

(5) The demographic variable body built had shown statistically high significant association with the level of functional ability among senior citizens at  $p < 0.001$  level and the other demographic variables had not shown any statistically significant association with the level of functional ability among senior citizens in the experimental group.

## **CONCLUSION**

The study concludes that the isometric exercises had significant effect by improving the level of functional ability among senior citizens in the experimental group than the control group. As by concluding that the hypothesis stated is accepted.

## **IMPLICATIONS**

The findings of the study have practical application in the field of nursing. The implication of the study could be discussed in four areas namely:

Nursing practice, nursing administration, nursing education and nursing research.

## **IMPLICATIONS FOR NURSING PRACTICE**

The findings of the study will help the nurse in the following ways:

- 1) Early identification of the risk factors and prevention of osteoarthritis in elderly patients.
- 2) Encouraging the senior citizens to follow proper diet and exercise program and to improve their functional ability.
- 3) CNE programmes can be conducted regarding physical changes in geriatric patients how to manage patients with physical disability.

## **IMPLICATIONS FOR NURSING ADMINISTRATION;**

- 1) It helps to provide critical thinking regarding osteoarthritis and its management.
- 2) These findings help the administration to arrange continuing education programme for nurses regarding osteoarthritis in elderly its complication and its management.
- 3) It can motivate the administration to conduct awareness programmes about osteoarthritis and physical disability among elderly population in the community.
- 4) Nurse administrator can arrange seminars and workshops to educate the learners and staff nurses regarding the importance of geriatric care.
- 5) Screening programmes can be arranged in the community for identifying the vulnerable group for osteoarthritis.

## **IMPLICATIONS FOR NURSING EDUCATION**

- 1) This study helps the nursing students to acquire knowledge regarding assessment of elderly patients functional ability and helps them in performing their ADL
- 2) This study enhances the student to think comprehensively in planning the intervention in preventing complication of osteoarthritis.
- 3) This study helps the nurse educator to plan classes to teach the student about geriatric care.
- 4) In the curriculum, the geriatric care especially the prevention of disability and management of geriatric patients problems can be included.

## **IMPLICATIONS FOR NURSING RESEARCH**

- 1) This study motivates nursing personnel to do further studies related to this field.
- 2) This study paves way for further study on other therapies to improve functional ability in patients with osteoarthritis.
- 3) This study will help the researcher to formulate new methods to prevent complication in senior citizens due to osteoarthritis.

## **RECOMMENDATIONS FOR FUTURE STUDY**

The following recommendations were made by the researcher after the study.

- 1) A similar study can be conducted on a larger scale to generalize the study findings.
- 2) An explorative study can be done at various settings like in hospitals or in ortho clinics to identify factors influencing osteoarthritis among elderly people.
- 3) A similar study can be conducted to find out the effectiveness of other therapies like yoga and muscle relaxation technique.
- 4) A comparative study can be done between aerobic exercise and isometric exercise for osteoarthritis.
- 5) A study can be conducted to evaluate the knowledge and attitude of nurses regarding isometric exercises for osteoarthritis.

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