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A STUDY TO ASSESS THE EFFECTIVENESS OF ISOMETRIC EXERCISES ON KNEE PAIN AND FUNCTIONAL MOBILITY AMONG OLD AGE PEOPLE IN A SELECTED OLD AGE HOME AT COIMBATORE

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ABSTRACT

Background of the study: Knee pain is common in older population, particularly those aged 60 and above and can arise from various underlying factors. This condition can lead to limitations in movement, as well as a decline in muscle strength and endurance, ultimately impacting functional mobility. Researcher highlights those older adults frequently experience knee pain, which adversely affect their functional mobility. **Objectives:** To reduce knee pain and improve functional mobility among old age people. **Methods:** An experimental study was conducted in a selected old age home, Coimbatore, to assess the effectiveness of isometric exercises on knee pain and functional mobility. A total of 60 samples were selected, 30 experimental group and 30 control group by using simple random sampling technique by lottery method. In this study, knee pain score was measured through Numerical Pain Rating Scale and functional mobility by Modified Lower Extremity Functional Scale. Data were collected for both groups and the isometric exercises were demonstrated to the experimental group samples, they practiced the exercises daily for 20 minutes over a period of one month under the supervision of the investigator. Post-test data regarding knee pain and functional mobility were collected from both groups at the end of one month using the same assessment tool. The result showed that reduction in the mean value of Numerical pain rating scale score was from 4 to 2.8 and an increase in the mean value of Modified Lower Extremity Functional Scale score from 35.3 to 46.4 demonstrating a significant reduction in knee pain and improvement in functional mobility, respectively. **Major finding of the study:** The Calculated value of paired t' as follows: There was a significant difference between pre-test and post-test value of Numerical pain rating scale score of 8.33 and Modified Lower Extremity Functional Scale score of 14.6 was highly significant at $p < 0.05$ level, in experimental group indicating that the Isometric exercises was more effective among old age people. **The Calculated value of "z" as follows:** There was a significant difference between experimental and control group in post-test Numerical pain rating scale score of 3.82 and Modified Lower Extremity Functional Scale score of 5.708 was highly significant at $p < 0.05$ level indicating that the Isometric exercises was more effective among old age people. In association findings, there is calculated chi-square value for the functional mobility rating scale concerning years of knee pain exceeds 15.9 the tabulated value chi-square value at the 5% significance level 3.84, suggesting a significant association between the years of having knee pain and functional mobility among old age people. **Conclusion:** The study findings concluded that there was a reduced level of knee pain and improved functional mobility after the Isometric exercises.

KEYWORDS

Knee pain, Functional mobility and Old age people.

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INTRODUCTION

"If you don't make time for exercise, you'll probably have to make time for illness" -Robin, Sharma

Life is defined as living matter, characterized by specific attributes such as rapid responsiveness, growth, metabolism, the ability to perform work, and reproduction. Consequently, life can be viewed as a

continuous process of development. Research suggests that life may have originated approximately 4.1 billion years ago, and the concept of life can be examined from various perspectives. To date, it is understood that "life exists only on Earth" (Carl Sagan, 2024).

The precise length of the human lifespan remains uncertain and cannot be definitively stated. Aging induces significant changes within the body, particularly affecting the muscles and bones. This gradual process results in a decline in both physical and mental abilities. In addition to these biological transformations, aging is often linked to various life transitions, including retirement, relocation, and the loss of friends and partners. In older age, the cartilage in the bones, which serves as a shock absorber, diminishes in its lubricating properties, leading to stiffness and, consequently, knee pain and reduced functional mobility (Lawrence Kaplan, Peter W. Frank 2024).

In accordance with Indian tradition, families have historically been seen as a source of protection for old age people. However, contemporary urbanization and westernization have significantly impacted the fundamental structure of the family, potentially exacerbating issues faced by older individuals (Muhammad Amiri, 2018).

As India ages, the old age people have entry to the old age home to live healthy, dignified, and fulfilling lives. Old age is part of our life cycle. In old age physical and biological changes take place which lead to some musculoskeletal disorders and neurological disorders which result in change in life style. In all the countries the senior citizens have to face issues mainly, knee pain and back pain and it will impact on their life style (Rajesh, 2022).

According to Indian tradition, old age peoples traditionally held esteemed positions of power and status within the family structure. However, in contemporary society, many are experiencing a decline in activity, functional mobility, and overall health, leading to increased dependency and vulnerability in economic, physical, and psychological aspects. These changes have contributed to various socio-economic challenges. A significant issue encountered in human life is the transition from middle age to old age. Aging is an inevitable process, and while it cannot be reversed, it can be effectively managed and balanced through various means. It is important to acknowledge that old age comes with its own set of limitations and frailties (Simran Khurana, 2020).

The age range of 60 to 65 is traditionally regarded as the threshold for categorizing individuals as old age. Historically, older adults were often perceived as "little children," and as noted by Shakespeare, this phase of life is likened to a second "childhood," which rendered it socially permissible to exhibit disdain towards the elderly. In contrast, contemporary society demonstrates a greater sense of compassion and respect towards seniors, advocating for their dignified treatment.

Advanced age is often accompanied by various health challenges. Knee pain, in particular, is a distressing sensation that individuals may experience due to several factors, including excessive strain on the knee joint, obesity, inadequate sleep, stress, iliotibial band syndrome, inflammation of the knee joint, ligament injuries such as meniscus tears, knee twisting, and medical conditions like knee osteoarthritis, patellar instability, articular cartilage defects, and osteonecrosis of the knee. This condition is prevalent among old age people and can manifest as either acute or chronic pain, significantly impairing their functional mobility and impacting daily activities (Prashant Jakhmola 2022).

Functional mobility refers to the physiological capacity of individuals to navigate independently and safely through diverse situations, enabling them to perform essential activities or tasks and engage in daily routines at home (Ching Chuang *et al*, 2024).

Knee pain and limitations in mobility serve as significant indicators for the classification of knee pain and mobility disorders. The ICD-10 codes relevant to these conditions include 836.0, as noted by David S. Logerstedt *et al*, (2010).

Many old age people frequently report experiencing knee pain and functional immobility. Additionally, this demographic often expresses concerns regarding muscle weakness, joint stiffness, fatigue, and sleep disturbances. Engaging in regular exercise is crucial

for alleviating knee pain and enhancing daily functioning, as highlighted by (Anwar, 2014).

There are different types of therapeutic exercises that provide the body with specific benefits. Isometric exercises are considered most appropriate exercises. These are strength training exercises in which the joint angle and muscle length do not change during contraction (International Journal of Health Sciences, 2021).

The research study will emphasize that isometric exercises can alleviate knee pain frequently experienced by old age people. This therapeutic exercise regimen consists of a series of physical activities designed to completely eliminate pain and promote functional mobility. With a well-structured exercise program, individuals can strengthen the hamstring and calf muscles surrounding the knee, thereby enhancing overall fitness and improving or maintaining the well-being of older adults (T Brock Symons, 2005).

Some of the exercises that can be adopted are the following: - Straight leg raising (SLR) in supine position, in high sitting position and step- up and step-down exercises, wall slide exercises and Isometric Mini Squat exercise. Having done with enough exercise, one will be able to experience better functional mobility (Hyun-Seung Rhyu *et al*, 2015).

Isometric exercise is a non-pharmacological therapy in the treatment for knee pain. Here muscle contract producing force without any change in the muscle length and there is no joint movement (Ragab K. Elhaggar, 2017).

NEED FOR STUDY

Aging is a complex process that brings about changes in an individual's physical, psychological and social dimensions, ultimately impacting the functional mobility of older adults and potentially shortening their lifespan. A significant contributor to functional limitations and disability among this demographic is acute and chronic knee pain. This condition primarily arises from progressive and degenerative changes in the joints, particularly associated with knee osteoarthritis, leading to functional impairments. Approximately 50% of individuals over the age of 50 experience knee pain within a one-year timeframe. The emergence of new knee pain has been linked to a sustained decline in physical function among older adults residing in the community. Given the prevalence of knee pain and its strong correlation with future disability and dependence, timely intervention for pain-related functional limitations is crucial for promoting healthy aging in older adults suffering from chronic knee pain (Clin J. Pain, 2016).

The global prevalence of knee OA was 16·0% (95% CI, 14·3%−17·8%) in individuals aged 15 and over and was 22·9% (95% CI, 19·8%−26·1%) in individuals aged 40 and over, patient with both radiographic changes and knee pain symptoms is usually considered to be more severe (Aiyong Cui *et al*, 2020).

Ageing is an inherent, time-dependent physiological phenomenon that begins at conception. It results from the interplay of act and potency. The United Nations has made a significant observation regarding the global aging population, indicating that by 2050, the elderly will represent 32% of the population, an increase from the current 20%. Life expectancy is projected to rise, including in India. It is important to distinguish healthy aging from illness and poor health. Aging itself is not a disease but rather a transformative process that should be supported by healthy aging practices, which involve the maintenance of both physical and mental well-being to maximize individual capacity throughout life (India Ageing Report, 2023).

The World Health Organization estimates that from 2015 to 2050, the proportion of the global population aged over 60 is projected to rise from 12 percent to 22 percent. This trend reflects a significant acceleration in the aging of populations around the world. Furthermore, there has been a notable increase in human life expectancy. In India, the number of senior citizens has been consistently growing since 1961 (WHO 2022).

According to Heitkemper Lewis and E. Dirken (2018) describe biological aging as a multifactorial process influenced by genetics, oxidative stress, diet, and environmental factors. The global aging population has reached 77.1 million individuals aged

65 and older, constituting approximately 10% of the world's total population.

In India, however, the proportion of the aging population is significantly higher at 29.81%. Data from 21 major states indicate that Kerala has the highest percentage of elderly individuals, accounting for 16.5% of its population, followed by Tamil Nadu at 13.6%, Himachal Pradesh at 13.1%, Punjab at 12.6%, and Andhra Pradesh at 12.4% (Times of India, 2021).

The prevalence of arthritis and joint pain in adults aged 50 to 80 significantly contributes to increased disability. Notably, one-quarter of individuals over the age of 55 reported experiencing considerable knee pain within the past year. Approximately 1.5% of adults in this age group are affected, with the incidence rising among older populations. Painful knee osteoarthritis, which is linked to mild to moderate disability, impacts nearly 10% of adults over 55. This condition can restrict the range of motion and result in pain, stiffness, swelling, and weakness (National Poll on Healthy Aging, 2022).

Global estimates indicate that over 20% of individuals aged 60 and above experience some form of chronic knee pain. The management of pain is one of the most intricate aspects of human existence. Pain typically arises from injuries, trauma, or physical dysfunction. When the fascia, or soft tissue, becomes tense, it can lead to tightness and restriction in the spine and extremities, resulting in pulling and stretching that contributes to pain. Restoring normal joint mobility in both the spine and extremities can significantly reduce pain levels (Brunner and Suddarth's 2018).

Various forms of mild knee pain often respond positively to self-care strategies. Engaging in physical therapy and specific exercises can alleviate all types of knee discomfort, with exercise being the primary non-pharmacological approach that frequently enhances functional mobility. Isometric exercises, in particular, are a highly effective method for reducing pain and improving functional mobility among old age people (Anju Annie Alexander 2020).

A quasi-experimental study was carried out at MIOT Hospital and Devadoss Hospital in Madurai, Tamil Nadu, India, to evaluate the impact of isometric exercises and counselling on pain levels in patients suffering from knee osteoarthritis. The study involved a total of 200 participants, with 100 assigned to the experimental group and 100 to the control group. Demographic information and clinical profiles were documented for both groups. The self-administered WOMAC questionnaire was utilized to measure pain levels, with post-test evaluations conducted on Days 15, 30, 60, and 90. Data analysis was performed using SPSS version 16. The findings indicated that a 12-week program of isometric exercises and counseling significantly alleviated pain and stiffness while enhancing physical function. Consequently, it is recommended that isometric exercises and counseling be integrated into standard care practices within hospitals (Ponnu Kameswari *et al*, 2021).

The isometric exercises do not take much time, requires no special equipment except a comfortable place to do the exercises. It is the simplest techniques which is considered to be appropriate for the low socio-economic status and easily applicable for the old age people to reduce the joint pain and improve the functional mobility. Hence the researcher is interested to assess the effectiveness of isometric exercises on knee pain and functional mobility among old age people in a selected old age home.

STATEMENT OF THE PROBLEM

A Study to Assess the Effectiveness of Isometric Exercises on Knee Pain and Functional mobility among Old Age people in a selected old age Home at Coimbatore.

Objectives

To assess the level of knee pain and functional mobility among old age people in the experimental and control group.

To evaluate the effectiveness of isometric exercises on level of knee pain and functional mobility among old age people in experimental group.

To compare the level of knee pain and functional mobility among old age people between experimental group and control group.

To correlate between the level of knee pain and functional mobility among the old age people in experimental and control group.

To associate the level of knee pain and functional mobility among old age people with the selected demographic variables in experimental and control group.

OPERATIONAL DEFINITIONS

Assess It refers to the evaluation of knee pain and functional mobility of old age people by using standardized pain scale Numerical pain Rating Scale (NRS) and Modified Lower Extremity Functional Scale (MLEFS).

Effectiveness

In this study effectiveness refers to the extent to which the isometric exercise has brought the significant difference between the pretest and post-test level of knee pain and functional mobility among old age people which are measured by Numerical Rating Scale (NRS) and Modified Lower Extremity Functional Scale (MLEFS).

Isometric exercises

It refers to the different kinds of exercises to strengthen the muscles of lower extremity especially quadriceps muscle by giving straight leg raising exercises, step-up step-down exercises, wall slide exercise, isometric mini squat exercise which are practiced for 20 minutes twice a day for four weeks.

Knee pain

It is an unpleasant sensation felt in the knee that disturbed the daily activities of the old age people.

Functional mobility

It refers the ability to perform and carryout the daily activities including walking, lifting, standing, sitting, bathing, washing, stair climbing, getting out of bed, doing hobbies difficulty getting in or out of bathroom, squatting on floor, performing light and heavy activities, getting in and out of vehicle and evaluated by Modified Lower Extremity Functional Scale (MLFS).

Old age people

Old age people are with the age group of 60 -75 years with knee pain and functional immobility.

ASSUMPTION

Old age people are inevitable to suffer from knee pain.

Knee pain will lead to functional immobility.

Isometric exercises will help to improve the old age people to do their daily activities without any struggle.

HYPOTHESIS

H1- There will be a significant difference in the level of knee pain and functional mobility among old age people who perform the isometric exercises than who do not perform the isometric exercise.

H2-There will be a significant correlation between the knee pain and functional mobility among old age people.

H3- There will be a significant association between post-test level of knee pain and functional mobility among old age people with the selected demographic variables.

Delimitation

The study is delimited to

The individual aged between 60-75years.

The research study is delimited to selected old age home at Coimbatore.

Data collection period is one month.

The sample size is 60.

Projected outcomes

The research study findings will allow to recognize the effectiveness of isometric exercises on knee pain among old age people.

This study will help to improve the functional mobility of the old age people.

Conceptual frame work

A conceptual frame work illustrates the expected relationship between variables (Bas Swaen and Tegan, 2022). It provides outline the key concepts variables and relationship between them. It describes investigator ideas in the form of flow chart, mind map, concept map, and it may be explained in written or visual presentation.

Conceptual frame work is a well-organized structure which deals with the important data for making and analysing decision and for accountability purposes and express real information in minimum words.

In this study, the researcher adopted Lewin's field theory (Lewine's change model, 1947) as a basis for the conceptual frame work. According to this theory if a change occurs in one part of the system, it affects the whole system The theory has field and force concepts. There are two forces driving forces and restraining force. Lewin's says that due to some external and internal factor some disturbance occurs in the balance of forces and change would stabilize and bring those forces to the desired equilibrium.

This model consists of three phases as follows:

Input (unfreezing phase or planning phase)

Transformation (changing phase or action phase)

Output (refreezing phase or result)

Input or planning phase

It is the first phase in this model. Based on this theory input can be a matter, energy or information from the field, again we can say that, there is a process of planning the change, for that diagnosing the problem, gathering the data, analysis the situation, and planning. In this research study inputs include collection of demographic data of an old age people, assessment of knee pain by using numerical pain rating scale (NRS) and assessment of functional mobility by using Modified Extremity Functional Scale (MLFS) among old age people both experimental and control group.

Tranformation or action phase

As per, Lewin's theory mainly focus on the role of change, for that theorist convince the people to adopt the change and overcome the difficulties for changing and recognize the driving force and restraining force for that change. During this process allow the input to be changed for that implement the activities or intervention. According to the research problem applying the action and gradually changes are taking place. In this study the researcher provides isometric exercises to experimental group to reduce the knee pain and to improve the functional mobility among old age people, control group receive routine care.

As per Lewin's theory, changes which happened during this phase is measurable and observable, that considered as output which should be changed from input phase, that is changed the behaviour and attained the objectives. Changes which happened during this process is measurable and considered as output. In the present study output refers to the comparison of pretest and post-test level of pain and functional mobility in experimental group and control group among old age people. It may be effective or ineffective. In this study output refers to level of significant difference in the level of knee pain and functional mobility.

Feedback

The theorist Lewin's says that after successful changes utilization of output should be practiced again and evaluate the new behaviour or change, after applying the planned change and reinforce, if required. In this study the effectiveness of isometric exercises is considered as the significance difference measured by the researcher through the pre-test and post -test analysis. If there is no significant changes the feedback will return as input and the process will continue, which is not included in the study.

REVIEW OF LITERATURE

The literature review constitutes a critical phase in the research process. It serves as a comprehensive summary of existing knowledge regarding a specific phenomenon. The primary objective of a literature review is to inform readers about the research that has previously been conducted and the established knowledge and concepts related to a particular research topic.

Literature review is a difficult task, but it is essential if the research process is to be successful. It helps the researcher to gain deeper insight which serves as a base for the investigation, justify the reason for replication of the study, through a route on the feasibility of the study with an expectation to establish a broad, comprehensive scientific knowledge. (Sreevani Rentala, 2019).

Nursing research may be considered as a continuing process in which knowledge gained from earlier studies is an integral part of research in general. The literature selected for this study was discussed under the following section.

Section A: Literature related to knee pain

Section B: Literature related to functional mobility

Section C: Literature related to isometric exercises

Section A: Literature related to knee pain

A Mixed-method study was conducted with chronic Musculo skeletal pain among elderly in rural Tamil Nadu. This study was done in 55 field practice villages of the Rural Health Training Centre (RHTC) of the department of community medicine SMVMCH Puducherry. An Exploratory Mixed-Method study design, where a qualitative phase (in-depth interviews [IDI]) followed the quantitative phase (Survey). A representative sample of 850 respondents was selected by two-stage cluster sampling. A trained investigator did a house-to-house visit and interviewed selected elderly respondents by using predesigned and pretested questionnaire. The intensity of chronic pain was measured using the Functional Rating Scale and Numeric Rating Scale. The manual content analysis was done for qualitative data. Multiple logistic regression was performed on quantitative data. Most common site for chronic pain was knee joint (64.5%) followed by a low backache (21.7%). Most of the older people with chronic pain had mild-to-moderate and tolerable pain. Among the 850 respondents, 384 individuals, representing 45.2%, were male, while the remaining 466 individuals, accounting for 54.8%, were female. The average age of the respondents was 66.99 years (±7.01), with male respondents having an average age of 67.85 years (±7.08) and female respondents averaging 66.29 years (±6.89). So that the prevalence of chronic pain among the elderly was found high (Kirubakaran, Amol R Dongre, 2019).

A randomized controlled trails study was conducted in google scholar, Pub med and PEDro from 2010 to 2019 to evaluate the effectiveness of multimodal physiotherapy management in knee osteoarthritis. 100 articles were retrieved using the key words, like-knee pain, OA, TENS, exercise, and physiotherapy management but only 10 articles were selected for the study. For this review study, information collected by using (PRISMA)-Preferred Reporting Items for Systematic Reviews and Meta-Analyses. All articles were experimental, with 9 studies including pre-interventional and post interventional assessments and this study with long-term treatment evaluation (1 month, 3 months and 1 year) follow-up of results established in most of the articles, both physiotherapy modalities and exercise. There is high quality scoring ≥5 (5/10) statically significant reduction in the knee pain and 30.4m walk-time was seen in all 3 groups. However, substantial enhancement in quadriceps strength was observed exclusively in groups one and two. The exercise groups demonstrated notable improvements in pain, functionality, and disability when compared to the non-exercise group. These findings indicate that exercise serves as an effective method for alleviating knee pain and enhancing function without any adverse effects. (Sharik Shamsi, 2020).

A descriptive cross-sectional study was conducted in adult population of Jazan region of Saudi Arabi to evaluate the knee pain and its influence on quality of life and physical function. A total of 480 adults aged over 40 years were recruited from governmental primary health care centers in the Jazan region, all of whom were experiencing knee pain and knee osteoarthritis. The researcher employed stratified random sampling to select participants from the Jazan region using online questionnaires. The findings revealed a mean score of 40.05 with a standard deviation of 9.75. The study indicated that pain was reported by 77.8% of participants, with 12.4% experiencing continuous pain and 6.5% reporting the most severe pain intensity. Additionally, 11% of the individuals were unable to engage in any activities. Results show a statistically significant relationship between pain intensity and sex, age, and BMI and, between age and knee function. Regression analysis showed significant association with sex and age. Pain occurs four times more frequently in females, leading to impaired physical function and a diminished quality of life (Zenat Khired *et al*, 2023).

A Community based Cross-Sectional Study was conducted in community residents of Chuncheon to assess the prevalence of knee pain and its Influence on quality of life (QOL) and physical function among 504 Korean elderly population aged above 50 years. Data were collected by questionnaire and Self-reported quality of life (QOL) and physical function were assessed using the Western Ontario and McMaster Universities Osteoarthritis (WOMAC)

Index and Short Form 12 (SF-12). Performance-based lower extremity function was assessed using the test standing balance, usual walk and chair stands. Individuals experiencing knee pain demonstrated significantly lower physical performance scores in comparison to those without knee pain, particularly among females. Furthermore, the incidence of knee pain is notably high, affecting 32.2% of men and 58.0% of women within this elderly community in Korea. The research indicated that 10.3%, 9.1% and 26.8% of participants reported pain in the right, left, or both knees, respectively. Elderly individuals suffering from knee pain tend to have a diminished quality of life. Therefore, prioritizing the prevention and early intervention of knee pain in older adults should be a critical focus for public health initiatives. (Je Kim *et al*, 2011).

A community-based cross-sectional study was conducted in resident of rural Ballabgarh, Haryana. to assess the prevalence of knee osteoarthritis, its determinants, and impact on the quality of life in elderly person. A total of 500 samples were randomly selected from the elderly population. A trained investigator employed a semi-structured interview schedule to conduct face-to-face interviews, perform clinical examinations of the knee based on the criteria established by the American College of Rheumatology, and assess quality of life using the WHOQOL-BREF instrument. Among the 454 elderly participants recruited, two-thirds were found to have knee osteoarthritis (292 individuals, representing 64.3%), with a notable family history of knee pain (odds ratio 2.66, P value 0.005). The prevalence of knee osteoarthritis in this rural population of Ballabgarh, Haryana, is significantly high at 64.3% (confidence interval 59.7-68.7) (Abhishek Jaiswal *et al*, 2021).

A cross-sectional survey study was conducted in UK to assess the brief screening tool for knee pain in primary care, for these 8995 individuals registered with three general practices in North Staffordshire, UK. The questionnaire utilized a Knee Pain Screening Tool (KNEST) to evaluate all forms of knee pain, including both chronic and non-chronic types, among individuals aged 50 years and older. The screening questions were designed to determine the 12-month period prevalence of knee pain. The researcher employed the Knee Pain Screening Tool (KNEST) alongside demographic inquiries, and for participants who reported experiencing knee pain, the Western Ontario McMaster Universities Osteoarthritis Index (WOMAC) was administered. The findings indicated that 33% of individuals with knee pain sought consultation from a physician, while 56% of those with chronic and severe knee pain experienced disability due to pain. The 12-month period prevalence of all knee pain was found to be 46.8% (95% confidence interval [CI] 45.6%, 48.0%). The prevalence rates for non-chronic knee pain (defined as pain lasting less than 3 months) and chronic knee pain (pain persisting for more than 3 months) were 21.5% (95% CI 20.5%, 22.5%) and 25.3% (95% CI 24.3%, 26.4%), respectively. Additionally, it was estimated that 6% of the older population experienced non-chronic but severe knee pain or disability (C. Jinks *et al*, 2003).

Section B: Literature related to functional mobility

A randomized controlled trail study was conducted in Miraj medical center to evaluate the effectiveness of the exercises on balance and functional mobility of elderly person with knee pain. The researcher employed simple random sampling techniques to select a total of 36 male and female participants aged between 60 and 70 years. To evaluate the pre- and post-exercise effects, the Visual Analogue Scale (VAS), Berg Balance Scale (BBS), and Time Up and Go test were utilized. The subjects were randomly assigned to two groups, each consisting of 18 individuals. Over a period of four weeks, with sessions held three times a week, Group A demonstrated a significant enhancement in balance and functional mobility compared to Group B, yielding a, which is less So, the p-value=0.000<05The findings indicate that Otago exercises are more effective than Dual Task Net Step Exercises in improving balance and functional mobility among community-dwelling elderly individuals with knee issues. The analysis of the sample revealed that exercise positively impacts functional mobility in older adults, with demographic data indicating a higher number of

females than males, an age range of 60 to 70 years and a mean age of 66.1 ± 4.2 (Raymol Dagani *et al*, 2021).

A randomized control study was conducted at Max Rehab physiotherapy department to evaluate the effects of retro-walking on Pain, functional disability and performance in knee osteoarthritis. effects of combined retro-walking and conventional therapy on pin, functional disability and performance in knee osteoarthritis involving 36 patients who met the inclusion criteria. These patients were randomly assigned to two groups using a random number allocation method. The experimental group underwent retro-walking in conjunction with conventional therapy, with each session lasting 30 minutes, three times a week for a duration of six weeks. In contrast, the control group received only conventional therapy for 30 minutes, consisting of one set of 10 repetitions, twice a week for 1.5 months. Pre-assessment and post-assessment were conducted using the Numeric Pain Rating Scale (NPRS), the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), and the Timed Up and Go (TUG) test. The data were analyzed using SPSS version 21. The results indicated that the experimental group experienced a significant reduction in pain intensity and functional disability compared to the control group, with a p-value of 0.000. Additionally, the experimental group demonstrated improvement in the TUG test, also with a p-value of 0.000. And there is significant greater decrease in pain intensity level and functional disability than control group i.e., (Mean changes, 4.66 versus 3.28; p=0.000) and (Mean changes,15.67 versus 10.11; p=0.000) (Saira Shabbir *et al*, 2022).

A prospective blinded Multicentre screening and therapeutic study was conducted to assess the therapeutic Study of 2854 Patients from June 2013 to June 2014 at 3 centers to screen patients >55 years with knee OA to evaluate quality of life, functional disability, and limitation of functions and to compare the effectiveness of hip and leg strengthening exercise programs in these patients. Functional disability was assessed by Western Ontario and McMaster's Universities OA index (WOMAC), Friedman, and Wyman Scores; locomotor function was assessed by walking status, Visual Analog Scale (VAS), and 30-second timed chair stand tests; and quality of life was assessed by Short Form-36. Out of 2854 patients screened, 2054 (72%) were diagnosed with osteoarthritis (OA), with a male-to-female ratio of 1.9:1, and an average age of 63 years, accompanied by a standard deviation of 8. From the 2054 patients, 226 were randomly chosen for the therapeutic study. In the remaining cohort of 1828 patients, the baseline 10-meter walk test (10MWT) recorded an average speed of 0.3 m/s, while the mean scores for the SF-36 Physical Component Score (PCS) and Mental Component Score (MCS) were 31.3 and 34.2, respectively. After three months, 79% of patients reported significant improvements in various measures, including VAS, WOMAC, Friedman-Wyman Scores, 10MWT, and timed chair test, particularly among those who engaged in lifestyle modifications and exercise (P = .04). The Short Form-36 scores also showed improvement, with mean PCS rising to 43.6 and MCS to 54.2. At the three-month mark, 274 patients (15%) expressed dissatisfaction, with 26% of these individuals having undergone arthroscopic procedures and 74% having received arthroplasty. Additionally, isolated hip and leg strengthening exercise programs yielded similar enhancements in knee pain, functional ability, and overall quality of life (Nishit Palo *et al*, 2015).

A experimental design study was conducted in physiotherapy department of data Meghe College of physiotherapy Wanadongri Nagpur to evaluate the effect of Traditional exercise and Functional task training on pain strength and functional mobility in knee arthritis. The chosen sample comprises individuals aged between 45 and 65 years, with a total of 20 patients participating in this study. Pain was evaluated using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) scale, while functional mobility was assessed through the Timed Up and Go (TUG) test, stair climb test and the Berg Balance Scale (BBS). The findings of this study indicated a slight difference between the two groups; the Functional Task Training (FTT) group demonstrated a 35% improvement in strength, compared to a 33%

improvement in the Training Exercises (TE) group (Subrat Samal *et al*, 2021).

Section C: Literature related to isometric exercises

A Randomized controlled trial comparing knee joint position flexion versus extension study was conducted in istanbul private Ekotom Medical Center to assess the effectiveness of isometric quadriceps exercises for patients with knee osteoarthritis. A total of 30 patients diagnosed with osteoarthritis (age range 45 to 70 years) were randomly assigned to two groups based on the method of performing quadriceps isometric exercises. Group 1 consisted of 14 patients performing exercises in knee extension, while group 2 included 15 patients performing exercises in knee flexion. All participants underwent a comprehensive physical therapy program. The exercise regimen was conducted six days per week over a period of four weeks. Pain levels were measured using a 10cm Visual Analog Scale (VAS) both at rest and during activity. Additionally, pain, joint stiffness, and physical function were evaluated using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC). Statistically significant differences were observed in the VAS and WOMAC scores between the two groups ($p < 0.05$). When the groups were compared in terms of change values, a significant difference was found in the WOMAC stiffness score in the group I ($p < 0.05$). Therefore, isometric exercises can be utilized to alleviate knee pain and enhance functional mobility (Alaattin Sengul, 2022).

A randomized control trial study was conducted in a selected old age home in Delhi to evaluate the effectiveness of isometric exercises on pain perception of elderly with osteoarthritis. This randomized control study done with 50 elderly people, in that 25 experiment and 25control group and non-probability purposive sampling techniques is used for this study. The researcher employed a structured interview method alongside a numerical pain scale to evaluate the subjects. The experimental group engaged in isometric exercises for 20 minutes daily over the course of one week, while the control group received only standard care. Pain levels were measured one week following the intervention. The experimental group that underwent the treatment exhibited a reduction in the mean post-intervention pain score of 3.56, in contrast to the control group's score of 5.96. The standard deviation of the pain score in the control group after one week was 1.0149, which is lower than the mean post-intervention pain score of 1.279 observed in the experimental group. The t-value calculated was 2.87, exceeding the table t-value of 2.02 at a significance level of 0.05. These findings indicate a reduction in pain following the isometric exercises and an enhancement in muscle strength (Tincy Varghese *et al*, 2019).

A quasi-experimental study was conducted in selected old age homes in Kanpur, Uttar Pradesh to evaluate the effect of isometric exercises for senior citizens having osteoarthritis A sample size of 100 was chosen, and a self-structured questionnaire was employed to evaluate functional ability. The intervention was administered solely to the experimental group. The post-test comparison of functional ability between the two groups yielded a statistically significant difference, with a value of -13.015 at the $p<0.001$ level. The findings of the study indicate that isometric exercises can enhance the functional ability of senior citizens (Shivani Negi, 2019).

A quasi-experimental study was conducted in old age people in Trichy to evaluate the effect of isometric exercises on knee pain and functional mobility in this study, a total of 60 samples were selected, with pain evaluated using a numerical pain rating scale and functional mobility assessed through the WOMAC scale. Non-probability purposive sampling techniques were employed. The intervention was administered to the experimental group over a period of 15 days, twice daily, resulting in a positive correlation ($r = 0.887$) regarding knee pain in individuals with osteoarthritis within the experimental group. This indicates a highly significant improvement in both pain reduction and functional ability. The implementation of isometric exercises proved effective in alleviating knee pain. Following the intervention, a notable reduction in knee pain was observed, along with an enhancement

in functional mobility among elderly individuals. This study demonstrates that the intervention led to a significant decrease in knee pain and an improvement in functional mobility (Juli Arokyamary, 2018).A quasi-experimental control study was conducted in selected old age home Bangalore to evaluate the effectiveness of isometric exercises on knee joint pain among elderly in old age home A sample of 60 elderly individuals experiencing knee joint pain was selected using a convenient sampling technique, and the data were assessed using a numerical pain scale. The paired 't' value obtained was 16.4, with a significant p-value of 0.05. The study demonstrated that there was a reduction in pain following the implementation of isometric exercises (Divya S, 2019).

A quasi-experimental study was conducted in MIOT Devdas Hospital, Madurai to evaluate effectiveness of isometric exercises and counselling on pain with knee osteoarthritis. Data was gathered from a sample of 200 individuals and evaluated using the WOMAC questionnaire. The sample was divided into two groups: 100 participants were assigned to the interventional group, while the remaining 100 were designated for the routine care group. Following counseling, isometric exercises were demonstrated to the patients, and the investigator encouraged them to perform these exercises at home three times daily for a duration of 12 weeks. A record sheet was provided for participants to log their exercise activities and assessments. The findings indicated that the mean pain score decreased from 16.32 in the pretest to 13.51 in the post-test IV, resulting in a mean difference of 2.81 after the intervention. The calculated F ratio was 868.14, with a significance level of $p < 0.001$. This demonstrates a statistically significant reduction in pain, and the results suggest that the home-based exercise program enhanced bodily function, improved quality of life, and alleviated knee pain (Ponnu Kameswari *et al*, 2021).

A randomized controlled trial was carried out involving outpatients (N=42, with 21 participants in each group; ages ranging from 40 to 65 years; comprising 13 men and 29 women) diagnosed with knee osteoarthritis. The purpose of the study was to assess the impact of isometric quadriceps exercises on muscle strength, pain levels, and functional ability in individuals suffering from knee osteoarthritis. The experimental group engaged in a regimen of isometric exercises, which included isometric quadriceps, straight leg raises, and isometric hip adduction exercises, performed five days a week over a period of five weeks. The total sample size was 42, with participants aged between 40 and 65 years. In contrast, the control group received standard care. The study's variables were evaluated using a numerical rating scale, while muscle strength and functional performance were measured using the WOMAC scale. The findings indicated a significant improvement in muscle strength and function among patients with knee osteoarthritis following the five-week isometric exercise program (Shahnawaz, Anwer and Ahmad Alghadir, 2014).

A quasi-experimental design study was conduct the effect of quadriceps isometric exercise on reducing pain in elderly communities with knee osteoarthritis, The sample was obtained through a consecutive sampling method, comprising 30 elderly individuals, with 15 participants assigned to each of the intervention and control groups. The intervention group underwent quadriceps isometric exercises for several weeks, with sessions held twice weekly, while the control group received educational information. Statistical analyses were conducted using paired sample T-tests and independent T-tests. The findings revealed that the average pain score in the pre-intervention phase was 6.2, which decreased to 5.2 post-intervention, yielding a p-value of less than 0.05. Conversely, the average pain score for the control group prior to education was 7.28, which increased to 8.03 following the educational intervention, also with a p-value of less than 0.05. The independent T-test comparing the intervention and control groups indicated a p-value of 0.039, which is below the 0.05 threshold and there is exists a statistically significant difference in pain intensity reduction between the quadriceps isometric exercise intervention group and the control group among elderly patients (Dr Rochan *et al*, 2024).

An experimental research design was conducted in kollam effect of isometric exercises on pain

perception, functional mobility and anxiety of old age people with osteoarthritis. The study sample comprised 60 elderly individuals residing in Gandhibhavan Pattanapuram and Bishop Jerome Abhaayakendram, both located in Kollam. A purposive sampling method was employed for participant selection. The research utilized several instruments, including a Pain Intensity Scale, a Functional Mobility assessment, an Anxiety Rating Scale, and a Demographic Proforma. Participants in the treatment group engaged in therapy sessions lasting 30 minutes each day for a duration of 21 consecutive days, while the control group was simply observed. A pre-test was conducted prior to the initiation of therapy, followed by a post-test after the completion of the 21-day period. The results indicated a significant difference in the mean pain scores between the experimental group (m = 6.4) and the control group (m = 7.0). Additionally, the functional mobility of the experimental group showed a notable improvement (m = 12.3) compared to the control group (m = 7.4), and the anxiety levels in the experimental group decreased (m = 9.6) in contrast to the control group (m = 24.8). Furthermore, a significant association was found between functional mobility and weight (p = 0.04), as well as between anxiety levels and education (p = 0.030). The findings suggest that isometric exercises are effective in enhancing the quality of life for clients suffering from osteoarthritis (Prof. Archana Devi S).

RESEARCH METHODLOGY

As per the research methodology outlined by Polit and Hungler, it involves the examination of methods for acquiring, organizing and analyzing data. This approach systematically addresses problems and delineates a general framework for structuring the processes necessary to collect valid and reliable data for investigative purposes.

The present chapter contain research approach, research designs, setting population, sample size, sampling techniques, sample selection criteria, of the study sample selection criteria, variables, sample size, sample techniques, development and description of the tool, content validity, reliability, pilot study, data collection method and plan for data analysis. This study was done to assess the effectiveness of isometric exercises on knee pain and functional mobility among old age people in selected old age home at Coimbatore.

Research approach

In this study the researcher adopted Quantitative research approach

Research design

Research design is the plan structure and strategy of investigation conceived so as to obtain answers to research questions and to control variance (kerlinger 1973).

Research design adopted in this study was - experimental research design-randomized pre-test post-test control group design. The researcher has taken two groups, i.e., experimental group and control group.

Experimental group: O_1 X O_2

Control group : O_3 - O_4

O_1: pre-test assessment of knee pain and functional mobility in experimental group

O_2: post-test assessment of knee pain and functional mobility in experimental group

X- Intervention (Isometric exercises)

O_3: pre-test assessment of knee pain and functional mobility in control group

O_4: post-test assessment of knee pain and functional mobility in control group

Setting of the study

Setting of the study refers to the physical location and the condition in which data collection takes place in the study (Polit and Beck, 2015).

The study was conducted in selected old age home in Coimbatore, St. Joseph old age home which was located in Podanur around 18km from K.G College of Nursing and pilot study was conducted at Ozanam old age home which was located in Saravanampatti around 3km from KG College of Nursing, Saravanampatti, Coimbatore.

St. Joseph old age home and Ozanam old age home are an authorized service oriented old age home. There are equipped with adequate facilities which can accommodate a population 100-450 old age people. Homes are running by the trust member.

Variables

Variables are the concept with different level of abstraction that are consciously defined to promote their measurement and manipulations within the study (Polit and Beck, 2015).

Dependent variables: - knee pain and functional mobility

Independent variables: - Isometric exercises

Influencing variables: - Age, gender, educational status, dietary pattern, daily physical activity, marital status, any systemic illness, years of having knee pain, location of pain types of pervious treatment, previous occupation, activity inducing pain.

Population

It is the total number of people who met the criteria that the researcher has established for a study from whom subject will be selected and with whom the finding will be generalized (Polit Hungler, 1999).

Total population refers to the entire resident population of the old age home, which comprises 350 individuals.

The target population is the entire population in which the researcher is interest to generalize the research finding. The target population were 100 old age people with 60 -75 years.

Accessible population who is accessible under the inclusion and exclusion criteria of the research study. In which 60 old age people were accessible population those who met the inclusion and exclusion criteria.

Sample size: The researcher was adopted simple random sampling technique by lottery method. Totally 60 samples were selected and divided into experimental group (30) and control group (30) based on inclusion and exclusion criteria.

Sample size determination

Sample size was determined by using Sample determination formula Sample size (n) = 4pq/L2

P = probability of successes rate = 0.8 (80%)

q=1-p

q = 1- 0.8

q = 0.2

L=Allowable error/margin error = 0.1 (10%)

n = 4x0.8x0.2/0.1x0.1

n = 0.64/0.01

n = 64

Therefore, the sample size is 60 i.e., experimental group is 30 and control group is 30.

Sampling technique

Sampling is the process of selecting subject which is representative population, events or other elements with which to conduct a study (Polit and Hungler, 2004).

The researcher had adopted simple random sampling technique by lottery method. Totally 60 samples was selected and divided into Experimental group (30) and Control group (30) based on inclusion and exclusion criteria.

Criteria for sample selection

Inclusion criteria

Old age people those who are,

Aged group between 60 to75years

Belong to both gender

Having bilateral or unilateral knee pain

Willing to participate in the study

Able to follow the instruction

Having numerical pain rating scale score between mild (1-3) to, moderate (4-6)

Exclusion criteria

Old age people,

Who had knee fracture, knee dislocation, rheumatoid arthritis

Who had undergone Orthopaedic surgery within one year

Unable to sit alone and do exercises.

With the score of 0-20 and 61-80 in Modified lower extremity functional scale (MLEFS)

DESCRIPTION OF TOOLS

The tool consists of three sections:

Section A: demographic variables

It consists of demographic information such as age, gender, educational status, marital status, hobbies, physical activity, dietary habits, any systemic illness,years of having knee pain, location of pain, use of analgesic for pain, types of previous treatment, previous occupation, activity inducing pain, BMI.

Section B: numerical pain rating scale (NRS)

NRS is a standardized tool used to assess the categories of pain such as no pain, mild, moderate,

severe. It is 10point numerical scale (0-10) with 0-representing as one extreme "no pain" and 10 representing as one extreme worst pain" or "severe pain".

SECTION C: MODIFIED LOWER EXTREMITY FUNCTIONAL SCALE

Included with score calculations of lower extremity functional scale. Modified Lower Extremity Functional Scale (M LEFS) is designed to quantify a sample functional mobility. There are 20 items. All items were scored from 0 to 4 and each score is calculated as the sum of the items

Interpretation of scores

Modified lower extremity functional scale (MLEFS) =SUM (20 activities score)

Minium score: 0

Maximum score: 80

The lower the score the greater functional immobility.

Content validity

Content validity refers to the degree to which an instrument has an appropriate sample of items for the construct being measured and adequately covers the construct domain (Polit and Beck, 2009).

To ensure the research study and to get the content validity the objectives, inclusion and exclusion criteria, the prepared data tool, was submitted to seven experts and obtained suggestions from five expert in medical surgical nursing department, one physiotherapist and physician. They were evaluated the validity of the study instrument. Modifications were made in demographic variables and functional mobility scale as per expert opinion and incorporated in the final preparation of the tool.

Reliability

Reliability is the degree of consistency and accuracy with which an instrument measures the attribute for which it is designed to measure (Sreevani Rentala, 2019).

The reliability of the modified lower extremity functional scale was assessed by using split half techniques, rh =0.98 its showed significance and so that the data tool was found to be reliable.

PILOT STUDY

Pilot study is the study carried out at the end of the planning phase of research. It is often developed on similar lines to the proposed study, using similar subjects setting, data collections tool, and same intervention procedures and data analysis techniques. And also, to determine the feasibility, practicability availability and examine the validity, reliability (Sreevani Rentala, 2019).

To test the feasibility, relevance and practicability of the research study, pilot study was conducted in Ozanam old age home in saravanampatty near sambarani Kuttai, Coimbatore. A written permission has taken from the director of the old age home and for pilot study five sample selected with knee pain along with the age of 60 and above 60 years old in the same manner of the original study. The study was conducted for a period of 2 weeks and the tool was found to be feasible and convenient, changes are applied in tool and proceeded with the main study proceeded with the main study.

METHOD OF DATA COLLECTION

Data collection was done within the given period of four weeks. A written permission was obtained from the concerned authority to conduct the study in St. joseph's old age home, Coimbatore. The researcher introduced herself and explain about the purpose of the study to the samples and reassure the confidentiality. A written consent was obtained from them individually. Then the researcher randomly selected 60 samples (30 for experimental group and 30 for control group) based on the inclusion and exclusion criteria with the help of simple random sampling techniques by lottery method. The research was used a structured interview method to collect demographic data. Those who are participated in the research study, their knee pain assessed by Numerical Pain Rating Scale (NRS) and the level of functional mobility assessed by using Modified Lower Extremity Functional Scale (MLFS). The pre-test was conducted both experimental and control group and assessed the knee pain and functional mobility.

The researcher divided the group into two and before starting the intervention warm up them by using

simple breathing exercises and followed by the researcher demonstrated the isometric exercises to the each of the experimental group and make them to perform and ensure them to do the exercises for 20 minutes twice a day for about four weeks. At the end of the 4th week the researcher conducted post-test by using the same tool.

In the control group sample demographic data, pre-test level of the knee pain and level of functional mobility collected as like experimental group. The control group received only routine care. The post test was conducted by using same tools in both experimental group and control group. The control group data was collected first to avoid contamination of samples. At the end of data collection, the isometric exercises are taught to control group sample also.

PLAN FOR DATA COLLECTION

Data analysed on the basis of objectives and testing of hypothesis by using descriptive and inferential statistics.

The demographic variables were analyzed by using frequency distribution.

The significant difference between the pre-test and post test score of knee pain and functional mobility of old age people in experimental group were analyzed by using paired 't' test.

Comparison of post test scores of knee pain and functional mobility between experimental and control groups were analyzed by using an 'z' test.

Correlation of knee pain and functional mobility were analyzed by using correlation coefficient.

Association of findings with the selected demographic variables were calculated by using chi-square test.

Descriptive statistics

Frequency and percentage distribution were used to analyze demographic variables, to assess the degree of pain and functional mobility.

Mean and standard deviation were used to determine the difference in degree of knee pain and functional mobility.

Inferential statistics

Paired 't' and 'z' test was used to determine the significant difference in degree of knee pain and functional mobility between the experimental and control group.

Chi-square test was used to associate the demographic variables with pain and functional mobility.

DATA ANALYSIS AND INTERPRETATION

Data analysis and interpretation of data is the most important part of any research process. It involves the process of organizing and synthesizing the data and systematically applying the statistical and logical techniques to describe and summarise and compare the data (Suresh K Sharma, 2023).

This chapter focuses on the analysis and interpretation of data gathered from 60 old age people experiencing knee pain and functional immobility. The objective of this chapter is to summarize the collected data, interpret the findings and compare the research variables to identify their relationships, which can be subjected to statistical testing. The data obtained were analyzed using both descriptive and inferential statistical methods.

The study finding is tabulated as follow:

Table No.1: Distribution of demographic variables among old age people with knee pain and functional mobility in experimental group and control group.

Table No.2: Distribution level of knee pain using NRS in experimental group and control group.

Table No.3: Distribution the level of functional mobility using MLEFS score in experimental group and control group.

Table No.4: Mean and Standard deviation of Numerical pain rating scale (NRS) and Modified Lower Extremity Functional Scale (MLEFS) score in experimental and control group.

Table No.5: Comparison of pre-test and post-test level of numerical pain rating scale score among old age people in experimental group.

Table No.6: comparison of pre- test and post -test level of functional mobility score among old age people in experimental group.

Table No.7: Comparison of post-test level of knee pain among old age people in experimental and control group.
Table No.8: Comparison of post - test level of functional mobility among old age people in experimental group and control group.
Table No.9: Correlation coefficient between post-test score of numerical pain rating scale score and modified lower extremity functional scale score among old age people in experimental group.
Table No.10: Association between post-test level of numerical rating scale score among old age people with selected demographic variables in experimental group.
Table No.11: Association between the post-test level of modified lower extremity functional scale score among old age people with selected demographic variables in experimental group.
Table No.12: Association between the post- test level of numerical pain rating scale (NRS) score among old age people with selected demographic variables in control group.
Table No.13: Association between the post- test level of modified lower extremity functional scale (MLEFS) score among old age people with selected demographic variables in control groups.
Table No.14: Association between pre-test level of numerical pain rating scale score among old age people with selected demographic variables in experimental group.
Table No.15: Association between the pre-test level of modified lower extremity functional scale score among old age people with selected demographic variables in experimental group.
The above table shows that,
With regard to age of old age people in experimental group, 4(13%) of them were between 60 and 65 years, 12(40%) of them were between 66 and 70 years, 14(47%) of them were between 71 and 75 years. In the control group, 5(17%) of them were between 60 and 65 years, 10(33%) of them were between 66 and 70 years, 15(50%) of them were between 71 and 75 years.
Regarding gender of old age people in experimental group, 11(37%) of them were males and 19(63%) were females. In the control group 18(60%) of them were males and 12(40%) of them were females.
Regarding educational status of old age people in experimental group, 5(17%) of them were illiterate, 7(23%) of them were primary school (1-5), 8(27%) of them were (middle school (6-8), 9(30%) of them were high school (9-10), 1(3%) of them were higher secondary school (11-12), and none of them from graduate. In the control group, 7(23%) of them were illiterate, 5(17%) of them primary school (1-5), 9(30%) of them were (middle school (6-8), 8(27%) of them were high school (9-10), 1(3%) of them were higher secondary school (11-12) and none of them from graduate.
Regarding marital status of old age people in experimental group, 9(30%) of them were single, 3(10%) of them were divorced, 9(30%) of them were widow, 9(30%) of them were separated. In the control group, 5(17%) of them were single, 2(7%) of them were divorced, 10(33%) of them were widow, 13(43%) of them were separated.
Regarding hobbies of old age people in experimental group, 5(17%) of them were reading 2(7%) of them were gardening 8(27%) of them were watching television, 5(17%) of them were listening music 10(33%) of them were others. In the control group, 3(10%) of them were reading, 5(17%) of them were gardening, 10(33%) of them were watching television, 1(3%) of them were listening music and 11(37%) of them were others.
Regarding physical activity of old age people in experimental group, none of them doing any jogging and exercises 11(37%) of them were walking, 19(63%) of them were none category (not doing any physical activity). In control group, none of them doing jogging, 2(7%) of them doing exercises, 10(33%) of them doing walking and 18(60%) of them are not doing any physical activity.
Regarding dietary habits of old age people in experimental group, 11(37%) of them were vegetarian, 19(63%) of them were non vegetarian. In control group 16(53%) of them were vegetarian and 14(47%) of them were non vegetarian.
Regarding any systemic illness of old age people in experimental group 20(67%) of them were ‘yes ‘category and 10(37%) of them were ‘no’ category.

In this 'yes' group, 15(50%) of them were with diabetic mellitus, 4(13%) of them were with hypertension,1 (3%) of them were with coronary artery disease. In control groups, 19(63%) of them were 'yes' category and 11(37%) of them were 'no' group. In this yes category, 10(37%) of them were with diabetic mellitus and 9(30%) of them were with hypertension.

Regarding years of having knee pain of old age people in experimental group, 9(30%) of them were 0 -1years 9(30%) of them were 1 -2 years and 12(40%) of them were more than two years. In control group, 11(37%) of them were 0-1years, 9(30%) of them were 1-2 years and 10(33%) of them were more than two years.

Regarding location of pain of old age people in experimental group, 12(40%) of them were affected left knee 13(43%) of them were affected in right knee and 5(17%) of them were affected in both knees. In control group, 13 (43%) of them were affected in left knee, 12(40%) of them were affected in right knee and 5 (17%) of them were affected in both knees.

Regarding use of analgesic for pain of old age people in experimental group,16(53%) of them were used analgesic for pain and 14(47%) of them not using any analgesic for pain. In the control group 13(43%) were used analgesic for pain and 17(57%) were not used any analgesic for pain.

Regarding types of previous treatment of old age people in experimental group, 4(13%) of them were with ayurveda treatment, 17(57%) of them were with allopathy, 2(7%) of them were with homeopathy, 7(23%) of them were with any other treatment. In the control group, 3(10%) of them were with ayurveda, 18(60%) of them were with allopathy 1(3%) of them were with homeopathy and 8(27%) of them with any other.

Regarding previous occupation of an old age people in experiment group, 6(20%) of them were with private employee, 2(7%) of them were with Government employee, 10(33%) of them were with self-employee and 12 (40%) of them were with any other occupation. In the control group 7(23%) of them were private employee,1(3%) of them Government employee, 9(30%) of them were self-employee and 13(43%) of them were any other occupation.

Regarding an activity inducing pain of an old age people in the experimental group, 9(30%) of them were with standing 5(17%) of them were with sitting, 8(27%) of them were with walking and 8(27%) of them were with at rest. In the control group, 13(43%) of them were with standing, 4(13%) 0f them were with sitting,8(27%) of them were with walking and 5(17%) of them were with at rest.

Regarding BMI of old age people in experimental group,5(17%) of them were underweight<18.5, 20(67%) of them were normal weight 18.5-24.9, 4(13%) of them were over-weight 25-39.9, 1(3%) 0f them were obesity. In the control group, 2(7) of them were under weight, 18.5,23 9(76%) of them were normal weight 18.5-24.9, 5(17) of them were over-weight 25-39.9 and none of them in obesity>40 in experimental and control group.

The above table shows that,

Regarding pre-test level of knee pain of an old age people in experimental, 11(37%) had mild knee pain and 19(63%) had moderate pain. In post-test 25(83%) had mild knee pain and 5(17%) had moderate knee pain, So, pain level has been effectively reduced in post -test as compared to pre-test among old age people with knee pain in experimental group.

Regarding pre-test level of knee pain in control group, 11(37%) of them had mild pain,19(63%) of them had moderate knee pain. In the post- test 10(33%) of them had mild pain, 20(67%) of them had moderate pain. Finally, there was no marked changes in knee pain level in pre-test and post-test of an old age people in the control group.

The above table shows that,

Regarding pre-test level of functional mobility of an old age people in experimental group 25(83%) had moderate difficulty and 5(17%) had mild difficulty. In post-test 4(13%) had moderate difficulty and 26(87%) had mild difficulty, so, functional immobility has been effectively reduced in post-test as compared to pre-test among old age people with knee pain in experimental group.

Regarding pre-test level of functional mobility of an old age people in control group 21(70%) had

moderate difficulty and 9(30%) had mild difficulty. In post- test 19(63%) had moderate difficulty and 11(37%) had mild difficulty, finally there was no marked changes in functional mobility level in pre-test and post-test of an old age people in the control group.

The above table shows that,

Regarding mean score of numerical pain rating scale, in experimental group there is decreased in post test score than pre-test score was 4 with SD 1.4, post-test mean was 2.8 with SD 0.9. The pre-test mean value of numerical pain rating scale in the control group was 4 with SD 1.43, and post -test mean was 3.96 with SD 1.4 respectively.

The pre-test mean value of modified lower extremity functional scale in the experimental group was 35.3with SD 6.5, post-test mean was 46.4 with SD 7.5. The pre- test mean value of modified lower extremity functional scale in the control group was 34.56 with SD 8.8, post -test mean was 34.43 with SD 8.7 respectively.

The above table shows that,

In comparison of pre-test and post test score of knee pain using numerical pain rating scale in experimental group, the pre- test mean value was 4 with SD 1.4 and post-test mean was 2.8 with SD 0.9 and calculated t value was 8.33. The calculated 't' value is greater than tabulated value of t=1.96 at the 5% level of significance, so the null hypothesis is rejected. There is a significant difference between pre-test and post-test level of knee pain among old age people in experimental group. Hence the researcher concluded that the isometric exercises is effective in reducing knee pain.

The above table shows,

In comparison of pre - test and post test score of functional mobility by using modified lower extremity functional scale was 35.3 with SD 1.57 and post-test mean was 47.5 with SD 1.30 and calculated value t value was 14.6. The calculated 't' value is greater than tabulated value of' t=1.96 at 5% level of significance, so, null hypothesis is rejected. There is a significant difference between pre- test and post-test level of functional mobility among old age people in experimental group.

Hence the researcher concluded that the isometric exercises is effective in increasing the functional mobility of old age people.

The above table shows that, comparison of post -test level of Numerical pain rating scale score among old age people between the experimental and control group.

While comparing the post- test Numerical pain rating scale score between experimental and control group, mean in experimental group was 2.8 with SD 0.9 and mean in control group was 3.96 with SD 1.4 and calculated 'z' value is 3.82. The calculated 'z' value is greater than tabulated value of 'z' at 5% of level of significance.

Hence the Ho is rejected. There is a significant difference between post- test level of knee pain among old age people in experimental and control group.

The above table shows that, the comparison of post-test level of functional mobility score among old age people between the experimental and control group.

While comparing the post -test functional mobility score between the experimental and control group, mean in experimental group was 46.4 with SD 7.5and mean in control group was 34.43 with SD 3.96 and calculated 'z' value is 5.708. The calculated value of 'z' is greater than tabulated value of 'z'1.96 at the 5% level of significance.

Hence the null hypothesis is rejected. There is a significant difference between post -test level of functional mobility among old age people in experimental and control group.

The above table shows that,

Correlation between post-test scores of numerical pain rating scale and modified lower extremity functional scale scores among old age people in experimental group.

Here, the correlation coefficient value was 0.12, so that the researcher revealed that, there is a positive correlation between numerical pain rating scale scores and modified lower extremity functional scale score in experimental group.

The above table shows that, the calculated value of chi-square is lesser than the tabulated value of chi-square (3.84) at 5%level of significance there was no association between the post test score of numerical

pain rating scale and demographic variable of old age people with knee pain.

The calculated value of chi-square of numerical pain rating scale score with age is less than the tabulated value of chi-square at 5% level of significance. Therefore, it shows that there was no association between age and knee pain among old age people.

The calculated value of chi-square of numerical pain rating scale score with gender is less than the tabulated value of chi-square at 5% level of significance. Therefore, it shows that there was no association between gender and knee pain among old age people.

The calculated value of chi-square with educational status is less than the tabulated value of chi-square at 5% level of significance. Therefore, it shows that there was no association between educational status and knee pain among old age people.

The calculated value of chi-square of numerical pain rating scale with marital status is less than the tabulated value of chi-square at 5% level of significance. Therefore, it shows that there was no association between marital status and knee pain among old age people.

The calculated value of chi-square of numerical pain rating scale with hobbies is less than the tabulated value of chi-square at 5% level of significance. Therefore, it shows that there was no association between hobbies and knee pain among old age people.

The calculated value of chi-square of numerical pain rating scale with years of having knee pain is less than the tabulated value of chi-square at 5% level of significance. Therefore, it shows that there was no association between years of having knee pain and knee pain among old age people.

The calculated value of chi-square of numerical pain rating scale with location of pain is less than the tabulated value of chi-square at 5% level of significance. Therefore, it shows that there was no association between location of pain and knee pain among old age people.

The above table shows that,

The calculated value of chi-square is lesser than the tabulated value of chi-square (3.84) at 5% of level of significance, there is no association between the post-test level of modified lower extremity functional scale score with demographic variable of an old age people.

The calculated value of chi-square of modified lower extremity functional scale with age is less than the tabulated value of chi-square at 5% level of significance. Therefore, it shows that there is no association between age and functional mobility among old age people.

The calculated value of chi-square of modified lower extremity functional scale with gender is less than the tabulated value of chi-square at 5% level of significance. Therefore, it shows that there is no association between gender and functional mobility among old age people

The calculated value of chi-square of modified lower extremity functional scale with educational status is less than the tabulated value of chisquare at 5% level of significance. Therefore, it shows that there is no association between educational status and functional mobility among old age people.

The calculated value of chi-square of modified lower extremity functional scale with marital status is less than the tabulated value of chi-square at 5% level of significance. Therefore, it shows that there is no association between marital status and functional mobility among old age people.

The calculated value of chi-square of modified lower extremity functional scale with hobbies is less than the tabulated value of chi-square at 5% level of significance. Therefore, it shows that there is no association between hobbies and functional mobility among old age people.

The calculated value of chi-square of modified lower extremity functional scale with years of having knee pain is less than the tabulated value of chi-square at 5% level of significance. Therefore, it shows that there is no association between years of having knee pain and functional mobility among old age people.

The calculated value of chi-square of modified lower extremity functional scale with pain in which knee joint is less than the tabulated value of chi-square at 5% level of significance. Therefore, it shows that there is no association between pain in which knee joint and functional mobility.

The above table shows that,

The calculated value of chi-square is greater than the tabulated value of chi-square (3.84) at 5% of level of significance, there is an association between the post test score of numerical pain rating scale and demographic variable of years of having knee pain among old age people.

The calculated value of chi-square is lesser than the tabulated value of chi-square (3.84) at 5% of level of significance, there is no association between the post test score of numerical pain rating scale with demographic variables of an old age people.

The calculated value of chi-square of numerical pain rating scale with age is less than the tabulated value of chi-square at 5%level of significance. Therefore, it revealed that there is no association between the age and knee pain among old age people.

The calculated value of chi-square of numerical pain rating scale with gender is less than the tabulated value of chi-square at 5%level of significance. Therefore, it revealed that there is no association between the gender and knee pain among old age people.

The calculated value of chi-square of numerical pain rating scale with educational status is less than the tabulated value of chi-square at 5%level of significance. Therefore, it revealed that there is no association between the educational status and knee pain among old age people.

The calculated value of chi-square of numerical pain rating scale with marital status is less than the tabulated value of chi-square at 5%level of significance. Therefore, it revealed that there is no association between the marital status and knee pain among old age people

The calculated value of chi-square of numerical pain rating scale with hobbies is less than the tabulated value of chi-square at 5%level of significance. Therefore, it revealed that there is no association between the hobbies and knee pain among old age people

The calculated value of chi-square of numerical pain rating scale with years of having knee pain is greater than the tabulated value of chi-square at 5%level of significance. Therefore, it revealed that there is association between the years of having knee pain and knee pain among old age people

The calculated value of chi-square of numerical pain rating scale with location of pain is less than the tabulated value of chi-square at 5%level of significance. Therefore, it revealed that there is no association between pain in which knee joint and knee pain among old age people.

The above table shows that,

The calculated value of chi-square is greater than the tabulated value of chi-square (3.84) at 5% level of significance, there is association between the post test score modified lower extremity functional scale score and demographic variable with years of having knee pain.

The calculated value of chi-square is lesser than the tabulated value of chi-square (3.84) at 5% level of significance, there is no association between the post test score of modified lower extremity functional scale of old age people with selected demographic variables.

The calculated value of chi-square of modified lower extremity functional scale with age is less than the tabulated value of chi-square at 5%level of significance. Therefore, it revealed that there is no association between the age and functional mobility among old age people.

The calculated value of chi-square of modified lower extremity functional scale with gender is less than the tabulated value of chi-square at 5%level of significance. Therefore, it revealed that there is no association between the gender and functional mobility among old age people.

The calculated value of chi-square of modified lower extremity functional scale with educational status is less than the tabulated value of chi-square at 5%level of significance. Therefore, it revealed that there is no association between the educational status and functional mobility among old age people.

The calculated value of chi-square of modified lower extremity functional scale with marital status is less than the tabulated value of chi-square at 5%level of significance. Therefore, it revealed that there is no association between the marital status and functional mobility among old age people.

The calculated value of chi-square of modified lower extremity functional scale with hobbies is less than the tabulated value of chi-square at 5%level of

significance. Therefore, it revealed that there is no association between the hobbies and functional mobility among old age people.

The calculated value of chi-square of modified lower extremity functional scale with years of having knee pain is greater than the tabulated value of chi-square at 5%level of significance. Therefore, it revealed that there is association between the years of having knee pain and functional mobility among old age people.

The calculated value of chi-square of modified lower extremity functional scale with pain in which knee joint is less than the tabulated value of chi-square at 5%level of significance. Therefore, it revealed that there is no association between pain in which knee joint and functional mobility among old age people.

The above table shows that,

The calculated value of chi-square of numerical pain rating scale with age is less than the tabulated value of chi-square at 5%level of significance. Therefore, it revealed that there is no association between the age and knee pain among old age people.

The calculated value of chi-square of numerical pain rating scale with gender is less than the tabulated value of chi-square at 5%level of significance. Therefore, it revealed that there is no association between the gender and knee pain among old age people.

The calculated value of chi-square of numerical pain rating scale with educational status is less than the tabulated value of chi-square at 5%level of significance. Therefore, it revealed that there is no association between the educational status and knee pain among old age people.

The calculated value of chi-square of numerical pain rating scale with marital status is less than the tabulated value of chi-square at 5%level of significance. Therefore, it revealed that there is no association between the marital status and knee pain among old age people.

The calculated value of chi-square of numerical pain rating scale with hobbies is less than the tabulated value of chi-square at 5%level of significance. Therefore, it revealed that there is no association between the hobbies and knee pain among old age people.

The calculated value of chi-square of numerical pain rating scale with years of having knee pain is greater than the tabulated value of chi-square at 5%level of significance. Therefore, it revealed that there is association between the years of having knee pain and knee pain among old age people.

The calculated value of chi-square of numerical pain rating scale with Location of pain is less than the tabulated value of chi-square at 5%level of significance. Therefore, it revealed that there is no association between location of pain and knee pain among old age people.

The above table shows that,

The calculated value of chi-square of functional mobility rating scale with age is less than the tabulated value of chi-square at 5%level of significance. Therefore, it revealed that there was no association between the age and functional mobility among old age people.

The calculated value of chi-square of functional mobility rating scale with gender is less than the tabulated value of chi-square at 5%level of significance. Therefore, it revealed that there was no association between the gender and functional mobility among old age people.

The calculated value of chi-square of functional mobility rating scale with educational status is less than the tabulated value of chi-square at 5%level of significance. Therefore, it revealed that there was no association between the educational status and functional mobility among old age people.

The calculated value of chi-square of functional mobility rating scale with marital status is less than the tabulated value of chi-square at 5%level of significance. Therefore, it revealed that there was no association between the marital status and functional mobility among old age people

The calculated value of chi-square of functional mobility rating scale with hobbies is less than the tabulated value of chi-square at 5%level of significance. Therefore, it revealed that there was no association between the hobbies and functional mobility among old age people.

The calculated value of chi-square of functional mobility rating scale with years of having knee pain is greater than the tabulated value of chi-square at

5%level of significance. Therefore, it revealed that there was association between the years of having knee pain and functional mobility among old age people.

The calculated value of chi-square of functional mobility rating scale with location of pain is less than the tabulated value of chi-square at 5%level of significance. Therefore, it revealed that there was no association between location of pain and functional mobility among old age people.

RESULTS AND DISCUSSION

This chapter deals with discussion of the results obtained from the statistical analysis The purpose of the was to assess the effectiveness of isometric exercises on knee pain and functional mobility among old age people.

The result was based on statistical analysis. Data was collected with the help of numerical pain rating scale and modified lower extremity functional scale. Independent 't' test was used to compared the post-test score of pain and functional mobility among old age people between the experimental and control group. Paired 't' test was used to compare pre-test and post-test scores of knee pain and functional mobility among old age people in experimental group. Correlation coefficient test was used to correlate the knee pain and functional mobility among old age people in experimental and control group. Chi-square test was used to determine the association between knee pain and functional mobility with selected demographic variables. The result of the study are discussed consistent with the stated objectives.

To assess the level of knee pain and functional mobility among old age people in experimental and control group.

The knee pain was assessed by using numerical pain rating scale and functional mobility was assessed by modified lower extremity functional scale.

Table No.2 denotes, the level of knee pain in pre-test 11(37%) of them had mild pain,19 (63%) of them had moderate pain in experimental group. In the post -test 25(83%) of them had mild pain and 5(17%) of them had moderate pain, thus the level of pain has been effectively reduced in post- test as compared to pre-test among old age people in experimental group. The level of knee pain, in pre-test 11(37%) of them had mild pain, 19(63%) of them had moderate pain in the control group. In the post- test 10(33%) of them had mild pain and 20(67%) of them had moderate pain Thus there was no marked change in the level of knee pain in pre-test and post-test among old age people in the control group.

The findings of a study conducted to evaluate the effectiveness of isometric exercises on pain levels and functional performance in individuals with osteoarthritis residing in selected old age homes in Punjab were consistent with those of a quasi-experimental design. The researcher employed a purposive sampling method to select a total of 60 participants, divided equally into an experimental group and a control group, with 30 individuals in each. Data were collected using the numerical pain rating scale and the modified Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) for both groups, with observations made through pre- and post-test interviews. The results indicated that the mean pain level in the experimental group post-test was 4.90 ± 1.647, while the control group reported a mean of 5.77 ± 1.501. These results were statistically analyzed using an unpaired 't' test, yielding a t-value of 2.130 and a p-value of 0.037*, which is significant at the $p<0.05$ level. This demonstrates that isometric exercises were effective in alleviating pain (Manbir Kaur and Akash Preet Kaur, 2021).

The Table No.3, denotes with the pre-test mean value of numerical pain rating scale in the experimental group was 4 with SD 1.4, post-test mean was 2.8 with SD 0.9 and the pre-test mean value of numerical pain rating scale in the control group was 4 with SD 1.43 and post- test mean was 3.96 with SD 1.4. The pre-test mean value of modified lower extremity functional scale in the in the experimental group was 35.3 with SD 6.5, post-test mean was 46.4 with SD 7.5and the pre-test mean value of modified lower extremity functional scale in the control group was 34.56 with SD 8.8, post -test mean was 34.43 with SD 8.7 respectively

A research study was conducted utilizing a one-group pre-test post-test design to evaluate the impact of isometric exercises on the perception of knee pain and functional immobility in elderly individuals suffering from knee osteoarthritis at a selected old age home in the southern region of Gujarat. The investigator selected a sample of 60 participants using a non-probability purposive sampling method. Knee pain was measured using a numerical pain rating scale, and participants engaged in isometric exercises over a period of 21 days. The mean pain score prior to the intervention was recorded at 6.45, while the post-intervention mean score decreased to 4.016. The findings indicate a reduction in knee pain among the elderly participants as a result of the isometric exercises. Additionally, the mean score for functional immobility was 55.06 before the intervention, which decreased to 33.8 following the isometric exercise regimen, demonstrating a significant improvement in functional mobility among the elderly participants. (Ms. Ravina Mannani and Mrs. Poonnam Patel, 2023

To evaluate the effectiveness of isometric exercises on in knee pain and functional mobility among old age people in the experimental group

Table No.7 denotes that comparison of pre-test and post-test knee pain using numerical pain rating scale (NRS) among old age people in experimental group. The pre- test mean value of knee pain by using numerical scale was 4 with SD 1.4 and post- test mean was2.8 with SD 0.9 and calculated ‘t’ value was 8.33. The calculated ‘t’ value is greater than tabulated value of ‘t’ =1.96 at 5 % level of significance, so the null hypothesis is rejected. There is a significance difference between the pre-test and post-test level of knee pain among old age people in experimental group.

Table No.8: states that comparison of pre-test and post-test of functional mobility using modified lower extremity functional scale among old age people in experimental group. The pre- test mean value of functional mobility using modified lower extremity functional mobility scale was 35.3 with SD 6.5 and post-test mean was 46.4 with SD 7.5 and calculated ‘t’ value was 14.6. The calculated ‘t' value is greater than tabulated value of ‘t’= 1.96 at 5% level of significance. So the null hypothesis is rejected. There is a significance difference between the pre-test and post-test level of functional mobility among old age people in experimental group.

The findings of the study were consistent with the experimental research design conducted at the St. Thomas Old Age Home in Poonamalla, which aimed to evaluate the effectiveness of isometric exercises on enhancing functional performance among older adults. The researcher selected a sample of 60 participants using a simple random sampling technique through a lottery method. Functional performance was measured using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) scale. In the pre-test, 2 participants (3.33%) exhibited a very severe level of functional performance, 7 participants (11.66%) demonstrated a moderate level, and 51 participants (85%) were classified as having a severe level of functional performance. In the post-test, 36 participants (60%) showed a slight level of functional performance, while 24 participants (40%) maintained a moderate level. The intervention involved administering isometric exercises twice daily for a duration of 30 minutes over four weeks. Following this period, the post-test was conducted using the same WOMAC scale to assess functional performance. The collected data were analyzed using both descriptive and inferential statistics. The results indicated that isometric exercises are highly effective in improving functional performance, with a significant enhancement observed in older adults suffering from osteoarthritis, as evidenced by a lower post-test mean value compared to the pre-test. The pre-test mean was 54.1 with a standard deviation of 10.48, while the post-test mean was 46.2 with a standard deviation of 8.55. The calculated paired 't' value was 12.95, which was found to be statistically significant. These findings underscore the effectiveness of isometric exercises in significantly improving the functional performance of older adults with osteoarthritis. (T. Mary Menolin, R. Surykaran, 2018).

To compare the level of knee pain and functional mobility among old age people between the experimental and control group

Table 4.4.1, states that the comparison of post-test level of numerical pain rating scale score (NRS) among old age people between the experimental and control group. During the comparison the post- test numerical pain rating scale score between the experimental and control group, mean value of experimental group was 2.8 with SD 0.9 and mean in control group was 3.96 with SD 1.4 and calculated 'Z' value is 3.82, the calculated value of 'Z' is greater than tabulated value of 'Z' at 5% level of significance. Hence null hypothesis is rejected. There is a significance of difference between post-test level of knee pain among old age people in experimental and control group.

Table No.8, states that the comparison of post-test level of modified lower extremity functional scale (MLEFS) score among old age people between the experimental and control group. The researcher comparing the post-test modified lower extremity functional scale score between the experimental and control group, mean in experimental group was 46.4 with SD 7.5 and mean in control group was 34.43 with SD8.7 and calculated 'Z' value is 5.708, the calculated value of 'Z' is greater than tabulated value of 'Z'=1.96 at 5%level of significance. Hence, the null hypothesis is rejected. There is a significant difference between post-test level of lower extremity function among old age people in experimental and control group.

A study finding similar to randomized control trial research design was conducted in the Physiotherapy Departments of Nnamdi Azikiwe University Teaching Hospital, to assess the Effects of Isometric strengthening exercises on pain and disability among patient with knee osteoarthritis A total of 40 subjects, nine (22.5%) males and 31 (75.5%) females, were randomly assigned into exercise end of the six weeks, isometric strengthening exercises showed a significant effect on pain intensity, range of motion, and functional ability among subjects with knee osteoarthritis Paired sample t-test was used to compare post-test and pre-test scores for each parameter (AROM/PROM, NPRS, and WOMAC) in each of the two groups. Independent samples t-test was used to compare the mean scores of the baseline and post-test scores of the two groups, at a significant level of $p = 0.05$. Independent sample t-test outcome at six weeks (exercise and control groups) showed significant reduction of pain intensity (NPRS = 0.000), increased range of motion (AROM = 0.000, PROM = 0.003), as well as improvement in function (WOMAC = 0.000) at a significant level of $p < 0.05$. Conclusion At the end of the six weeks, isometric strengthening exercises showed a significant effect on pain intensity, range of motion, and functional ability among subjects with k.

To associate the level of knee pain and functional mobility among old age with the selected demographic variables in experimental and control group

Chi-square test was used to identify the association between the selected demographic variables and level of knee pain and functional mobility among old age people. Table No.10, states that there is no association between the age, gender, educational status, marital status, hobbies, pain in which joint and there is association between the years of having knee pain here, the calculated chi-square value is (15.5) is greater than the tabulated value of chi-square at 5%of loss of significance (3.84) by using numerical pain rating scale score in experimental group.

Table No.11 states that there is no association between the sex educational status, marital status, hobbies, location of pain and there is association between the age, the calculated value of chi-square (3.2) is greater than the tabulated value of (3.84) and there is association between the years of having knee pain and modified lower extremity functional mobility, (the tabulated value is(15.9) is greater than the tabulated value of chi-square value (3.84)) at 5% of level of significance in experimental group.

Table No.12 denotes that there is no association between age, gender, educational status, marital status, hobbies, years of having knee pain and pain in which knee joint and modified lower extremity functional scale score in post- test in experimental group. Table No.13 denotes that there is no

association between age, gender, educational status, marital status, hobbies, years of having knee pain, pain in which knee joint in post-test level of modified lower extremity functional scale score in experimental group. The Table No.14 denotes that there is no association between age, gender, educational status, marital status, hobbies, years of having knee pain, pain in which knee joint and numerical pain rating scale score in experimental group. Table No.15 states that Correlation between pre-test scores of numerical pain rating scale (NRS) and modified lower extremity functional scale (LEFS) scores among old age people with knee pain and functional mobility in experimental group.

Here, the correlation value was 0.12, so that the researcher revealed that, there is a positive correlation between numerical pain rating scale (NRS) scores and modified lower extremity functional scale (MLEFS) experimental group.

A study finding were to conducted a randomized controlled trial was conducted to evaluate the effectiveness of isometric strengthening exercises on pain and disability in patients suffering from knee osteoarthritis. The study involved a total of 40 participants, comprising nine males (22.5%) and 31 females (77.5%), who were randomly assigned to either an exercise group or a control group. The functional abilities of both groups were assessed using the Numerical Pain Rating Scale (NPRS), a universal goniometer and the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) scale. The experimental group underwent a six-week intervention consisting of three sessions per week, each lasting 50 minutes. Statistical analysis using paired t-tests revealed significant improvements in the exercise group across all measured parameters (NPRS, AROM, PROM, and WOMAC) with p-values of 0.000, while the control group exhibited no significant changes. Furthermore, the independent sample t-test results at the six-week mark indicated a notable reduction in pain intensity (NPRS = 0.000), an increase in range of motion (AROM = 0.000, PROM = 0.003), and enhanced functional ability (WOMAC = 0.000), all at a significance level of $p < 0.05$. Thus, the six-week intervention demonstrated a significant positive impact on pain intensity, range of motion, and functional ability among the participants (Chinelo N. Onwunzo *et al*, 2021).

Numerical pain rating scale (NRS)

S.No	Score	Interpretation of scores
1	0	No pain
2	1-3	Mild pain
3	4-6	Moderate pain
4	7-9	Severe pain
5	10	Worst pain

Interpretation of scores

S.No	Scores	Interpretation
1	0	Extreme difficulty
2	01 - 20	Severe difficulty
3	21 - 40	Moderate difficulty
4	41 - 60	Mild difficulty
5	61 - 80	No difficulty

Table No.1: Distribution of demographic variables among old age people with knee pain and functional mobility in experimental group and control group, n= 30 +30

S.No	Demographic variables	Experimental group (n=30)		Control Group (n=30)	
		Number	%	Number	%
Age					
1	61 – 65 years	4	13	5	17
2	66 -70 years	12	40	10	33
3	71 -75 years	14	47	15	50
Gender					
4	Male	11	37	18	60
5	Female	19	63	12	40
Marital status					
6	Single	9	30	5	17
7	Divorced	3	10	2	7
8	Widow	9	30	10	33
9	Separated	9	30	13	43
Hobbies					
10	Reading	5	17	3	10
11	Gardening	2	7	5	17
12	Watching Television	8	27	10	33
13	Listening music	5	17	1	3
14	Others	10	33	11	37
Physical activity					
15	Jogging	-	-	2	-
16	Exercises	-	-	10	7
17	Walking	11	37	18	33
18	None	19	63	2	60
Dietary habits					
19	Vegetarian	11	37	16	53
20	Non-vegetarian	19	63	14	47
Any systemic illness					
21	Yes	20	67	19	63
22	No	10	37	11	37
23	If yes reason / Diabetic mellitus	15	13	10	33
24	Hypertension	4	13	9	30
25	Coronary artery disease	1	7	-	-
Years of having knee pain					
26	0 -1 years	9	30	11	37
27	1 – 2 years	9	30	9	30
28	More than two years	12	40	10	33
Location of pain					
29	Left	12	40	13	43

30	Right	13	43	12	40
31	Both	5	17	5	17
Use of analgesic for pain					
32	Yes	16	53	13	43
33	No	14	47	17	57
Types of previous treatment					
34	Ayurveda	4	13	3	10
35	Allopathy	17	57	18	60
36	Homeopathy	2	7	1	3
37	Any other	7	23	8	27
Previous occupation					
38	Private employee	6	20	7	23
39	Government employee	2	7	1	3
40	Self- employee	10	33	9	30
41	Any other	12	40	13	43
Activity inducing pain					
42	Standing	9	30	13	43
43	Sitting	5	17	4	13
44	Walking	8	27	8	27
45	At rest	8	27	5	17
BMI					
46	Underweight<18.5	5	17	2	7
47	Normal weight 18.5 - 24.9	20	67	23	76
48	Over-weight 25 - 39.9	4	13	5	17
49	Obesity >40	1	3	-	-

Table No.2: Distribution of the level of knee pain using NRS in experimental group and control group

S.No	Level of Knee pain	Experimental group (30)				Control group (30)			
		Pre-test		Post-test		Pre-test		Post-test	
		No	%	No	%	No	%	No	%
1	Mild	11	37	25	83	11	37	10	33
2	Moderate	19	63	5	17	19	63	20	67

Table No.3: Distribution the level of functional mobility by using MLEFS score in experimental group and control group

S.No	Level of Functional mobility	Experimental group				Control group			
		Pre-test		Post test		Pre-test		Post test	
		No	%	No	%	No	%	No	%
1	Extreme difficulty (0)	-	-	-	-	-	-	-	-
2	Severe (1-20)	-	-	-	-	-	-	-	-
3	Moderate difficulty (21-40)	25	83	4	13	21	70	19	63
4	Mild difficulty (41-60)	5	17	26	87	9	30	11	37
5	No difficulty (61-80)	-	-	-	-	-	-	-	-

Table No.4: Mean and standard deviation of numerical pain rating scale and modified lower extremity functional scale scores in experimental and control group n = 30+30

Scales	Level of knee pain and functional mobility score	Experimental group		Control group	
		Mean	SD	Mean	SD
NRS Score	Pre-test	4	1.4	4	1.43
	Post-test	2.8	0.9	3.96	1.4
MLEFS Score	Pre-test	35.3	6.5	34.56	8.8
	Post-test	46.4	7.5	34.43	8.7

Table No.5: Comparison of pre-test and post -test level of Numerical pain rating scale score among old age people in the experimental group n = 30

S.No	Level of knee pain	Experimental group		Calculated 't' value	Tabulated 't' value at 5% level of significance
		Mean	SD		
1	Pre-test	4	1.4	8.33	1.96
2	Post-test	2.8	0.9		

Table No.6: Comparison of pre-test and post-test level of functional mobility score among old age people in experiment group n = 30

S.No	Level of functional mobility score	Experimental group		Calculated 't' value	Tabulated 't' value at 5% level of significance
		Mean	SD		
1	Pre-test	35.3	6.5	14.6	1.96
2	Post-test	46.4	7.5		

Table No.7: Comparison of post- test level of knee pain among old age people between the experimental and control group n= 30+30

S.No	Group	Mean	SD	Calculated 'z' value	Tabulated 'z' value at 5% level of significance
1	Experimental group	2.8	0.9	3.82	1.96
2	Control group	3.96	1.4		

Table No.8: Comparison of post-test level of functional mobility among old age people between the experimental and control group n= 30+30

S.No	Group	Mean	SD	Calculated 'z' value	Tabulated 'z' value at 5% level of significance
1	Experimental Group	46.4	7.5	5.708	1.96
2	Control Group	34.43	8.7		

Table No.9: Correlation coefficient between post- test scores of numerical pain rating scale (NRS) and modified lower extremity functional scale (LEFS) scores among old age people in experimental group n = 30

S.No	Variables	Experimental group		Correlation coefficient Value
		Mean	SD	
1	NRS	2.8	0.9	0.12
2	MLEFS	46.4	7.5	

Table No.10: Association between post-test level of numerical pain rating scale score among old age people with selected demographic variables in experimental group n=30

S.No	Demographic variables	Experimental group NRS score		Calculated value of chi square	Tabulated value of chi-square at 5% level of significance
		Below Mean	Above Mean		
Age				0.016 NS	3.84
1	1.Below 70 years	6	10		
2	2.Above 70 years	4	10		
Gender				0.64 NS	
3	Male	5	6		
4	Female	5	14		
Educational status				1.8 NS	
5	1.Illiterate	5	15		
6	2.litterate	5	5		
Marital status				0.62 NS	
7	Married	5	7		
8	Unmarried /widow	5	13		
Hobbies				2.5 NS	
9	Reading/T. V/Music	4	14		
10	Gardening /others	6	6		
Years of having knee pain				0.62 NS	
11	Below 2 years	5	13		
12	Above 2 years	5	7		
Location of pain				0.69 NS	
13	Right/Left knee	7	18		
14	Both	3	2		

(S)- Significant - (NS) not significant

Table No.11: Association between post-test level of modified lower extremity functional scale score among old age people with selected demographic variables in experimental group n= 30

S.No	Demographic variables	Experimental group MLEFS score		Calculated value of chi square	Tabulated value of chi-square at 5% of significance
		Below Mean	Above Mean		
Age				0.03 NS	3.84
1	Below 70 years	5	11		
2	Above 70 years	8	6		
Gender				0.031 NS	
3	Male	5	6		
4	Female	8	11		
Educational status				0.27 NS	
5	Illiterate	8	12		
6	litterate	5	5		
Marital status				0.62 NS	
7	Married	6	6		

8	Unmarried /widow	7	11		
Hobbies				0.27 NS	
9	Reading/T. V/Music	9	9		
10	Gardening /others	4	8		
Years of having knee pain				0.02 NS	
11	Below 2 years	8	10		
12	Above 2 years	5	7		
Pain in which knee joint				0.10 NS	
13	1.Right/Left knee	10	15		
14	2.Both	3	2		

(S) - Significant – (NS) Not significant

Table No.12: Association between post-test level of numerical pain scale score among old age people with selected demographic variables in control group n = 30

S.No	Demographic Variables	Control group NRS scores		Calculated value of chi-square	Tabulated value of chi-square at 5% level of significance
		Below Mean	Above Mean		
Age				0.43 NS	3.84
1	Below 70 years	5	11		
2	Above 70 years	6	8		
Gender				0.30 NS	
3	Male	5	6		
4	Female	6	13		
Educational status				2.05 NS	
5	Illiterate	5	15		
6	litterate	6	4		
Marital status				0.26 NS	
7	Married	5	7		
8	Unmarried /widow	6	12		
Hobbies				2.16 NS	
9	Reading/T. V/Music	9	9		
10	Gardening /others	2	10		
Years of having knee pain				15.5 S	
11	Below 2 years	1	17		
12	Above 2 years	10	2		
Pain in which knee joint				0.12 NS	
13	Right/Left knee	9	16		
14	Both	2	3		

(S) - Significant – (NS) Not significant

Table No.13: Association between post -test level of modified lower extremity functional scale score among old age people with selected demographic variables in control group n = 30

S.No	Demographic Variables	Control group MLEFS scores		Calculated value of chi-square	Tabulated value of chi-square at 5% level of significance
		Below Mean	Above Mean		
Age				0.15 NS	3.84
1	Below 70 years	8	8		
2	Above 70 years	8	6		
Gender				0.43 NS	
3	Male	5	6		
4	Female	11	8		
Educational status				0.01 NS	
5	Illiterate	10	10		
6	litterate	6	4		
Marital status				0.089 NS	
7	Married	6	6		
8	Unmarried /widow	10	8		
Hobbies				1.09 NS	
9	Reading/T. V/Music	11	7		
10	Gardening /others	5	7		
Years of having knee pain				13.39 S	
11	Below 2 years	15	3		
12	Above 2 years	1	11		
Location of pain				0.04 NS	
13	Right/Left knee	14	11		
14	Both	2	3		

(s) significant - (NS) not significant

Table No.14: Association between pre-test level of numerical pain scale score among old age people with selected demographic variables in experiment group n = 30

S.No	Demographic Variables	NRS scores		Calculated value of chi-square	Tabulated value of chi-square at 5% level of significance
		Below Mean	Above Mean		
Age				0.43 NS	3.84
1	Below 70 years	5	11		
2	Above 70 years	6	8		
Gender				0.30 NS	
3	Male	5	6		
4	Female	6	13		
Educational status				2.05 NS	
5	Illiterate	5	15		
6	litterate	6	4		
Marital status				0.26	

7	Married	5	7	NS	
8	Unmarried /widow	6	12		
Hobbies				2.16 NS	
9	Reading/T. V/Music	9	9		
10	Gardening /others	2	10		
Years of having knee pain				15.5 S	
11	Below 2 years	1	17		
12	Above 2 years	10	2		
Location of pain				0.12 NS	
13	Right/Left knee	9	16		
14	Both	2	3		

(S) significant - (NS) not significant

Table No.15: Association between pre-test level of functional mobility score among old age with selected demographic variables in experimental group n =30

S.No	Demographic Variables	MLEFS scores		Calculated value of chi-square	Tabulated value of chi-square at 5% level of significance
		Below Mean	Above Mean		
Age				3.2 NS	3.84
1	Below 70 years	12	4		
2	Above 70 years	5	9		
Gender				0.31 NS	
3	Male	6	5		
4	Female	11	8		
Educational status				0.62 NS	
5	Illiterate	8	8		
6	litterate	9	5		
Marital status				0.02 NS	
7	Married	7	5		
8	Unmarried /widow	10	8		
Hobbies				0.023 NS	
9	1.Reading/T. V/Music	10	8		
10	2.Gardening /others	7	5		
Years of having knee pain				15.9 S	
11	Below 2 years	16	2		
12	Above 2 years	1	11		
Pain in which knee joint				0.43 NS	
13	Right/Left knee	13	12		
14	Both	4	1		

(S) significant - (NS) not significant

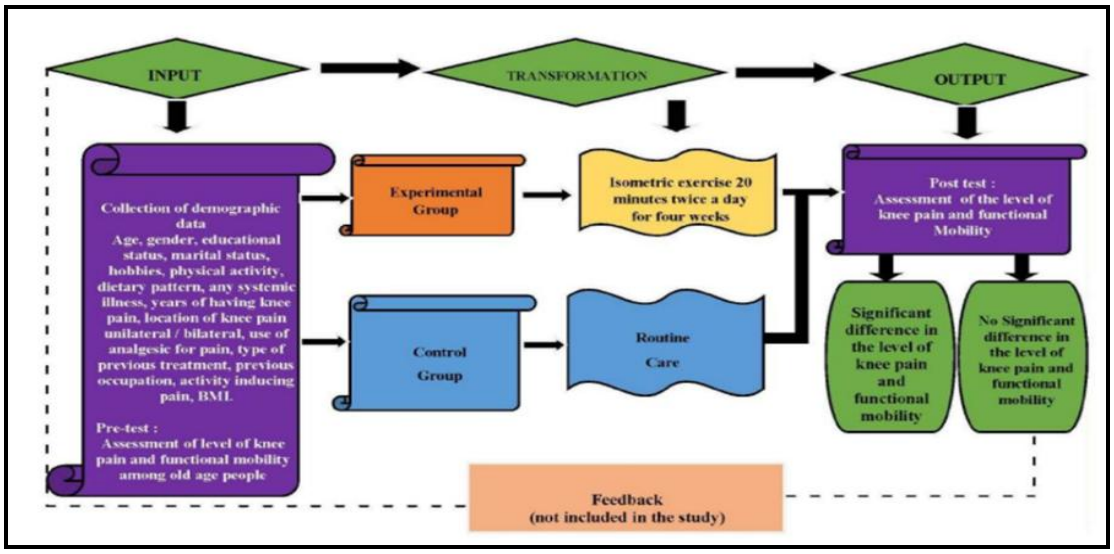


Figure No.1: Conceptual frame work based on Lewin's Field Theory, 1951

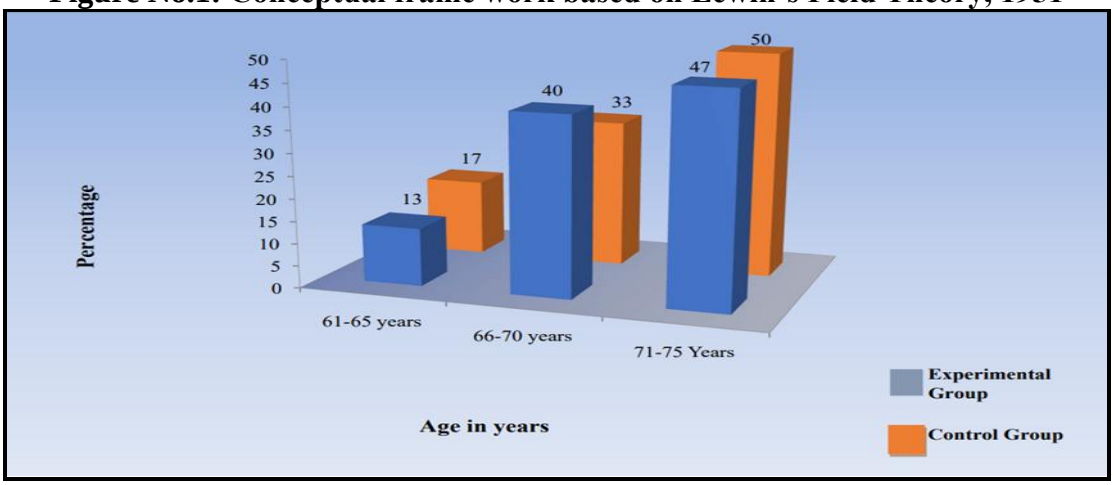


Figure No.2: Distribution of demographic variables with regard to age people in experimental and control group

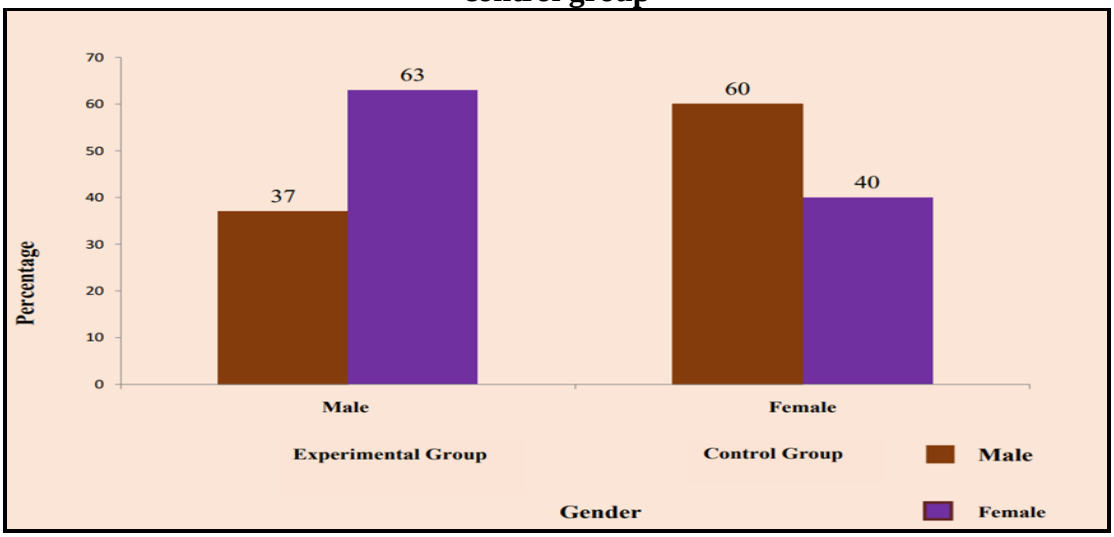


Figure No.3: Distribution of demographic variables with regard to gender of old age people in experimental and control group

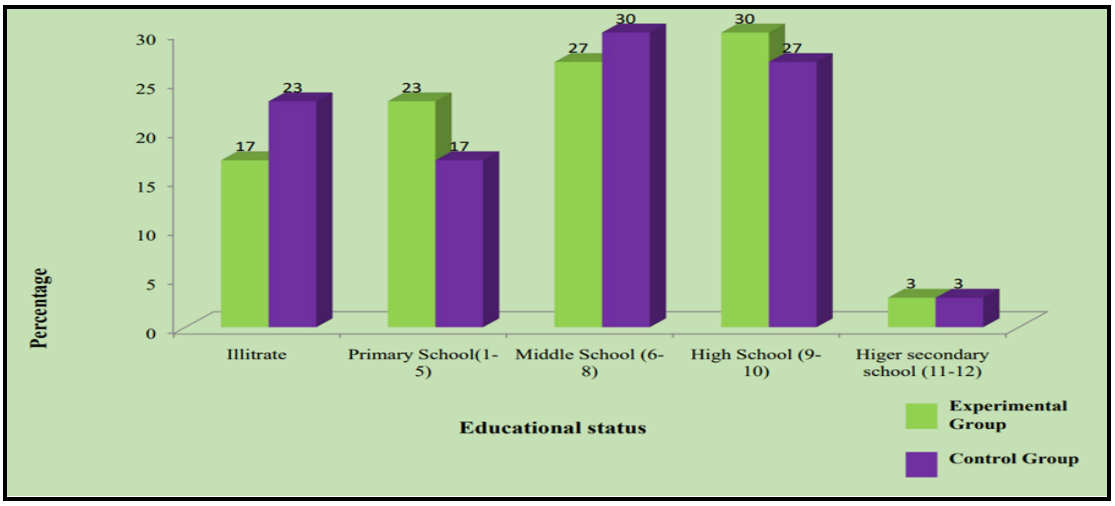


Figure No.4: Distribution of demographic variables with regard to educational status of old age people in experimental and control group

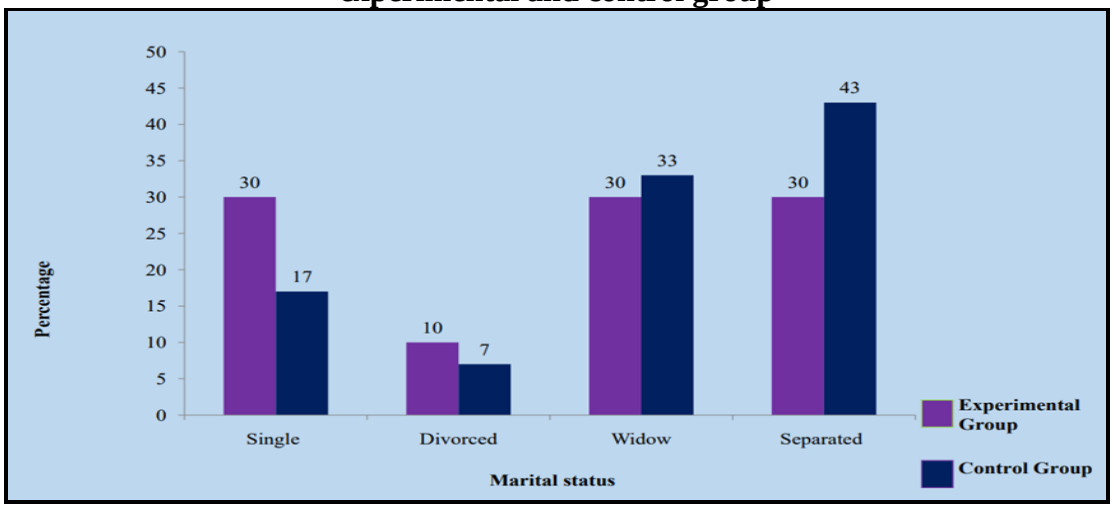


Figure No.5: Distribution of demographic variables with regard to marital status of old age people in experimental and control group

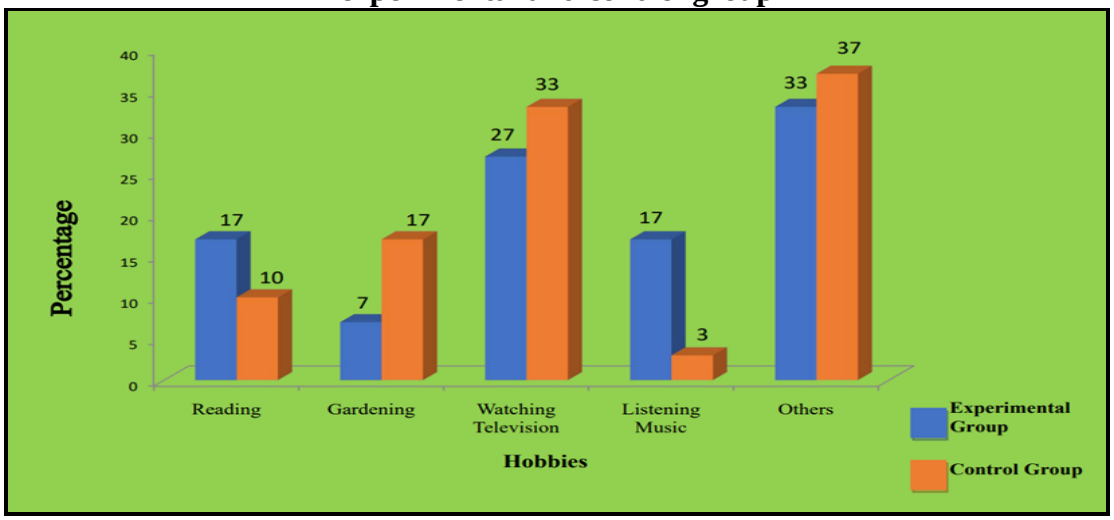


Figure No.6: Distribution of demographic variables with regard to hobbies old age people in experimental and control group

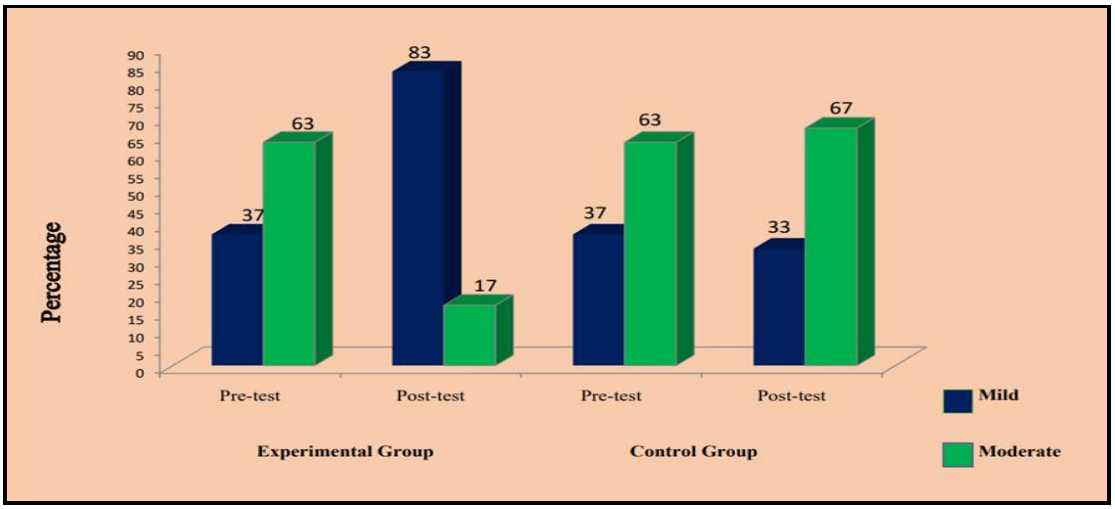


Figure No.7: Distribution of level of knee pain in experimental and control group

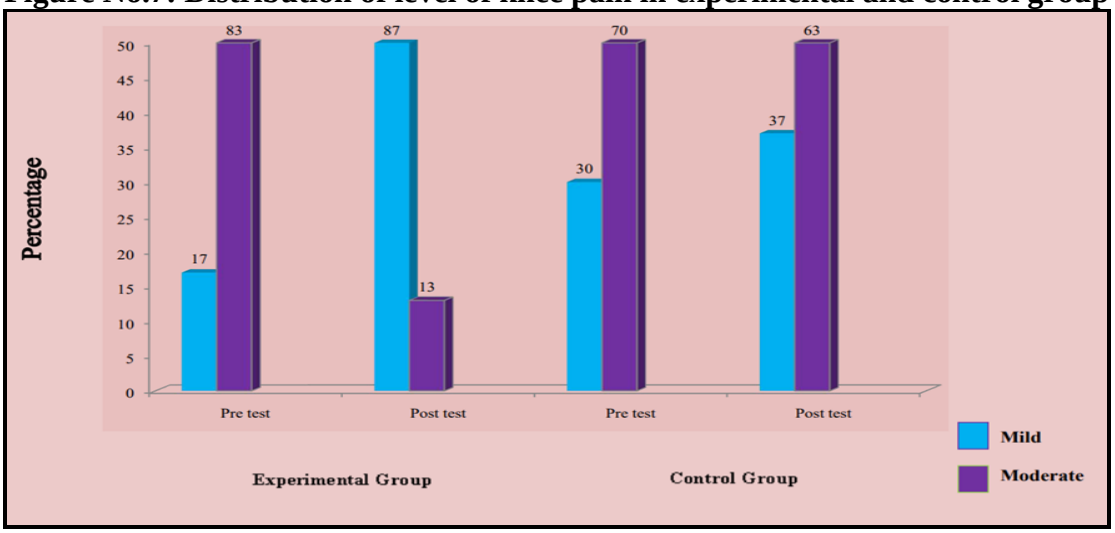


Figure No.8: Distribution of level of functional mobility in experimental and control group

CONCLUSION

The present research study was done to assess the effectiveness of isometric exercise for the reduction of on knee pain and improve the functional mobility. Based on the statistical findings it was evident that these exercises can reduce the knee pain and improve the functional mobility among old age people Therefore it is very essential as a part of our comprehensive nursing care and it will help them to meet and do their daily activity without any difficult. Finally, researcher found that isometric exercises are very effective and it was very important to provide the quality of nursing care which helps to meet the needs of the elderly with knee pain.

SUMMARY RECOMMENDATION LIMITATIONS AND NURSING IMPLICATION

SUMMARY

A summary of a study is a comprehensive statement that briefly explains the main points of the study. The heart of the research project lies in reporting the finding of the study. The aim of the study was to assess the effectiveness of isometric exercises on knee pain and functional mobility among old age people. The objectives of the study were formulated according to the need of the study. This chapter provides a brief statement of research project. A great significance of this chapter lies in the finding of the study and includes a conclusion that has been drawn from the research findings, namely

recommendation limitations and suggestion for the study and implication for the nursing practice.

The conceptual frame work adopted for the study was based on the Lewin's field theory. The most relevant review of literature has given a full support for this research study. Throughout the study, the good expertise guidance helped the researcher to select data collection tools and research design. The study was conducted in St. Joseph's old age home Podanur Coimbatore. The population of the study was the old age people between 60 and 75 years with knee pain and functional immobility. The research tool used for this data collections was done by using interview method, knee pain assessment was done by using Numerical Pain Rating Scale (NRS) and functional mobility assessed by using Modified Lower Extremity Functional Scale (MLEFS) The content validity of tool was obtained from various experts in the Department of Medical Surgical Nursing, Orthopaedics, Physiotherapist, through whom this research tool was found to be reliable.

Research ethics was maintained throughout the study and for the data collection consent was obtained from each subject with knee pain and functional mobility. The collected information kept confidential. Pilot study was conducted in Ozanam old age home at seravanampatty near sambranikuttayii, Coimbatore, for a period of two weeks with 10 sample with knee pain. pilot study result was satisfied and according to experts' opinion from the content validity the researcher had made some modification in the tool and proceeded with the main study. The main study was done for a period of 4 weeks at St. Joseph's old age Home at Podanur Coimbatore. The researcher explained the purpose of the study to subjects and got consent from each subject and selected 60 sample by lottery method and divided them 30 in experimental group and 30 in control group. The demographic variables and other information were collected by the structured interview method. In pretest and post- test, the researcher used numerical rating scale (NRS) to assess the knee pain and to assess the functional mobility by modified lower extremity functional scale (MEFS) the day -one the researcher selected experimental group and control group and pain assessment was done by interview with numerical pain rating scale score and in the same way subject functional mobility was assessed by modified lower extremity functional scale.

The second day the researcher demonstrated the isometric exercises like straight leg raising in supine position and in high sitting position, side lying position, step up and stepdown exercises, wall slide exercises and isometric Mini squat exercises. The researcher divided the population into three groups and demonstrated the exercises to each group and in turn a demonstration was done by them. They performed the exercises 20 minutes twice a day. Day 2 to day 21 day the isometric exercises were given to experimental group, day 22 post -test pain assessment was done by numerical pain rating scale and functional mobility by using modified lower extremity functional scale. Post-test was done for control group also and day 22 isometric exercises given to control group also.

The data were analysed by using descriptive and inferential statistics. The distribution of demographic variables among old age people with knee pain was tabulated by using frequency distribution and the effectiveness of isometric exercises analysed comparisons between the pre-test and post test score of numerical pain rating scale and modified lower extremity functional scale by using paired 't' test was conducted and comparison between the pre-test and post test score of numerical pain rating scale and modified lower extremity functional scale were analysed by 'z' test and this value are statistically significant at 5%level. By using chi-square analysis, association between the post- test and pre-test score of numerical pain rating scale and modified lower extremity functional scale with the selected demographic variables was conducted. The result showed that there is no association between numerical pain rating scale and modified lower extremity functional scale however, demographic variables like years of having knee pain in old age people with knee pain in both experimental group and control group. The result showed that isometric exercise is an effective intervention for to reducing the knee pain and improvement of functional mobility.

The main conclusion of this present study on isometric exercises is effective in reducing the level of pain and there is significant difference between the post-test level of pain among old age people in experimental group and control group. Subject became aware and found themselves comfortable and also expressed their satisfaction. The finding of the study encourages nursing personnel to practice this intervention as the part of their nursing action in their clinical settings. And the research report that focuses on nursing implication usually includes suggestion for nursing practice, nursing education, nursing administration, and nursing research.

RECOMMENDATIONS

The study can be done on a larger sample so that finding can be stable and generalized

A longitudinal study can be done by using post -test after one month, six months, and one year to assess the effectiveness of isometric exercises

The isometric exercises are one of the non-pharmacological interventions that nurses and other health workers can be practiced at home and rehabilitation centre to reduce pain and for the improvement of functional mobility.

LIMITATIONS

The limitations of this study exist time interval for the study is limited.

The researcher could not see the long -term effect of the isometric exercises.

NURSING IMPLICATIONS OF THE STUDY

Some of the implication from the present study in various area of nursing are follow

NURSING PRACTICE

As a nursing professional, one can implement isometric exercises to deliver holistic and comprehensive care to patients, addressing not only knee pain but also enhancing functional mobility.

Elderly individuals old age people often exhibit reluctance in engaging in daily activities; therefore, clinical nurses can instruct them in performing isometric exercises as part of their daily routine, thereby improving their functional mobility.

The findings of this study will assist medical-surgical nurses in recognizing the significance of isometric exercises in alleviating knee pain and encouraging old age patients experiencing discomfort to engage in such rehabilitative therapies.

In clinical practice, nurses can accurately assess pain levels using a numerical pain rating scale, while the modified lower extremity functional scale can be employed to evaluate functional mobility.

Furthermore, medical-surgical nurses can organize and facilitate in-service educational programs, incorporating video-assisted instruction on isometric exercises for managing knee pain and enhancing overall functional mobility.

NURSING EDUCATIONS

It is essential for learners to understand the significance of non-pharmacological interventions, particularly in addressing knee pain and functional immobility in the old age people.

It is important to motivate student nurses and educators to effectively implement research-based practices in nursing education and services, particularly in the care of old age people and their functional mobility.

The teaching and learning process plays a crucial role; therefore, it is necessary to enhance knowledge and apply relevant research on isometric exercises for managing knee pain and improving functional mobility in older adults.

The nursing curriculum should emphasize the care of old age people with various disabilities, including knee pain and functional mobility, while providing practical training in isometric exercises.

To enhance knowledge and practice regarding isometric exercises, periodic seminars, role-playing activities, symposiums, demonstrations, and group discussions should be organized and conducted.

NURSING ADMINISTRATION

The public health nurse should be involved in the formulation of protocols, the establishment of health policies, and the creation of standing orders pertaining to health education programs and strategies that incorporate isometric exercises as a

complementary therapy for knee pain and functional immobility.

The nurse administrator can promote research initiatives among nurses focusing on various complementary techniques.

Additionally, the nurse administrator can facilitate opportunities for nurses to participate in training programs cantered on isometric exercises.

Within nursing administration, this research study can be integrated into training programs to educate, guide, motivate, and direct staff in providing nursing care for elderly individuals experiencing knee pain.

NURSING RESEARCH

Nurse researchers have the potential to promote future investigations into the efficacy of isometric exercises for alleviating knee pain in the elderly population.

The findings of this study can serve as foundational data for subsequent research, allowing for the exploration of this topic across various disciplines.

This study suggests that further research should be conducted to examine these interventions from multiple perspectives regarding pain management in older adults.

Given the advancements in technology and the influence of globalization, research-based practices in nursing care are crucial, particularly in addressing the needs of elderly individuals suffering from knee pain. Therefore, the results of this study regarding the effectiveness of isometric exercises are invaluable for guiding future research endeavors.

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CONFLICT OF INTEREST

We declare that we have no conflict of interest.

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