



The effectiveness of isometric exercises on pain among geriatrics with arthritis at old age homes, Vishakapatnam, Andhra Pradesh

S Kanakalakshmi

Apollo College of Nursing, Jubilee Hills, Hyderabad, Telangana, India

Abstract

A Pre experimental one group pre – test and post – test study was undertaken to assess the effectiveness of Isometric Exercises on pain among Geriatrics with Arthritis at selected old age homes, Andhra Pradesh.

Isometric exercise is strength training in which the joint angle and muscle length do not change during contraction. It helps to reduce joint pain by contraction, which in turn helps take strain and pressure off the joints and thus accomplishes muscle strength without moving the joint itself.

200 Geriatrics with Arthritis were selected by using Non-probability purposive sampling technique from Mathru Sri old age home and Vanaprastha old age home, Visakhapatnam. The Purposive sampling technique was used to select the sample and 100 samples were selected from each old age home for this study with the help of a modified WOMAC osteoarthritis index. Data was collected by using modified WOMAC osteoarthritis index. Isometric Exercises were administered to the identified Geriatrics with Arthritis by the investigator.

After the administration of Isometric exercises, the findings revealed that there was significant difference in the pain score of geriatrics with arthritis between pre-test and post test. The mean pre-test score was reduced from 9.7 to 4.45 in the post-test. Standard deviation in pre-test and post test was 2.71 and 2.40 respectively. Since the calculated value is greater than the table value which is significant at $p < 0.05$, the study concludes that Isometric exercises are an effective means for reduction of pain among geriatrics with arthritis.

Keywords: isometric exercises, pain, geriatrics, arthritis, old age home

Introduction

Geriatrics is a specialty that focuses on health care of elderly people. It aims to promote health by preventing and treating disease and disabilities in older people. The elderly people may be affected by different kind of geriatric problem according to time geriatric physician, who specializes in the care of elderly. Rather, this decision is determined by the individual patient's needs, and the availability of a specialist [1].

Arthritis is the most common musculoskeletal condition affecting the quality of life of elderly people. A recent survey in India reported that the prevalence of Arthritis in elderly people more than 60 years of age was 32.6% in the rural population and 60.3% in the urban population. It is likely to become the eighth most important cause of disability in men and the fourth most important cause of disability in women according to the World Health Organization report on global burden of disease. Three major physical impairments, such as knee pain, stiffness, and decreased quadriceps strength are highly associated with Arthritis and are believed to contribute to physical disability and progression of the disease [2].

Prevalence of Arthritis increases drastically with age. Factors that put a person at higher risk of suffering from Arthritis include: getting older, being overweight or obese, doing repetitive work that puts extra stress on certain joints [3].

Increased ligament stiffness, decreased muscle strength, and alterations in muscle activation patterns are associated with aging and can adversely affect joint kinematics. Sub – optimal muscle activation patterns contribute to adverse

alterations in joint kinematics during movement. Chronic in emetic alterations can cause degenerative changes in the cartilage, particularly in older adults whose cartilage may no longer have the ability to adapt to load bearing. Activities such as squatting, stair climbing and kneeling may load the tibial - femoral cartilage surfaces in areas that cannot tolerate the load. Pain, perceived in stability and functional limitations are common downstream effects of this degenerative process [4].

Approximately 10 – 30% of people diagnosed with Osteoarthritis have pain severe enough to limit function and cause disability, and this percentage is increasing.⁴ Reduction of pain and disability is the main aim of any treatment approach in the management of Arthritis. Combination of treatment approaches including pharmacological and non – pharmacological methods are often preferred. The Osteoarthritis Research Society International (OARSI) recommended non – pharmacological methods including patient education programs, weight reduction, coping strategies, and exercise programs for treatment of Arthritis [2].

There are three types of basic therapeutic exercises: isotonic, isokinetic, and isometric exercises. Isometric Exercises are the most appropriate, easy to be understood and safely performed exercises at home because it requires no or minimal apparatus. Isometric exercise is a strength training in which the joint angle and muscle length do not change during contraction. It is done in supine position by placing a rolled up towel beneath the knee. The knee is straightened and contracted for five seconds and released which is done ten times on each side to strengthen the

quadriceps. Further, Isometric Exercise causes the least intra-articular inflammation, pressure, and bone destruction. Norden, Leventhal, and Schumacher (1994) reported that "Isometric exercises" are simple and inexpensive to perform and that they rapidly improve strength. Hence, the purpose of this study was to investigate whether isometric quadriceps exercise has a beneficial effect in patients with knee osteoarthritis [2].

Review of Literature

Shahnawaz A and Ahmad A (2014) conducted an Experimental study on effect of isometric quadriceps exercises on muscles strength pain and function in knee Osteo arthritis out patients (N=42,21 per group; are range 40 – 65 years; 13 men and 29 women) with Osteo arthritis including Isometric Quadriceps, straight leg raising, and Isometric hip adduction exercise 5 days a week for 5 weeks, by random sampling method. These variables were measured using the Numerical Rating Pain Scale and reduced WOMAC index respectively. All the measurements were taken at baseline (week 0) and at the end of the trial at week 5. In between – group comparisons, the maximum isometric quadriceps strength, reduction in pain intensity, and improvement in function in the isometric exercise group at the end of the 5th week were significantly greater than those of the control group ($p < 0.05$). The 5-week isometric quadriceps exercise program showed beneficial effects on quadriceps muscle strength, pain, and functional disability in patients with osteoarthritis of the knee [2].

Gandhi R, Tsvetkov D, Dhottar H, Davey J R, Mahomed N N (2010) conducted a study investigated whether the conceptualization of hip and knee osteo arthritis pain implicit in the Western Ontario and Mc Master Universities Arthritis Index (WOMAC) and Medical Outcomes Study Short – Form 36 (SF-36) scales is complete, or whether the addition of another scale, such as the Short – Form Mc Gill Pain Questionnaire (MPQ-SF), provides a more complete characterization. Correlations between scales were calculated and linear regression modeling was used to determine the impact of mental health and catastrophizing on these three pain measures. A strong correlation between the WOMAC and SF-36 pain scales ($r = -0.70$) was found; however, both correlated only moderately with the MPQ – SF ($r = 0.36$ and $r = -0.36$, respectively). Linear regression modeling showed that the Pain Catastrophizing Scale significantly predicted a greater score on all three pain scales ($P < 0.05$) [8].

Sharma MK, Swami HM, Bhatia V, Verma A, Bhatia SPS, Kaur G (2009) conducted an Epidemiological study of correlates of Osteoarthritis in geriatric population of Uttaranchal, Chandigarh. Sampling was done in 9 sectors from households in the urban areas and from 7 villages in the rural areas by systematic random sampling technique. The data was collected by house to house survey on a pre-designed and pre – tested format. Osteo arthritis was considered if an elderly was suffering from pain / swelling / limitation of movement of larger joint or if one has already been diagnosed as having osteoarthritis or has been on treatment. In the present study, 362 elderly of more than 65 years were interviewed & assessed clinically. The examinations were conducted in 1882 houses comprising of 7937 persons. The study revealed that the majority (66.6%) of elderly belonged to age group 65 – 74 years, about 6.6% were aged > 85 years. The overall prevalence of Osteo

arthritis in elderly of Uttaranchal, Chandigarh was 56.6%; in rural areas it was 32.6% and in urban, it was 60.3%. ($p < 0.001$). Osteoarthritis was more in females as compared to males (70.1% Vs 41.6%) [9].

Need for the study

Traditionally, elderly people in India have lived within a multi-generational family. The vulnerability of older people has thus been heightened as a backlash of social change.⁴

A major chunk of the younger generation migrates to other cities and towns for livelihood, increasing the vulnerability of the old age who stay behind [5].

According to the Law, a "Senior Citizen" means any person being a citizen of India, who has attained the age of sixty years and above [6]. A report released by the United Nations Population Fund and Help Age India suggests that India had 90 million elderly persons in 2011, with the number expected to grow to 173 million by 2026. The 90 million seniors, 30 million are living alone, and 90 per cent work for livelihood. As per the data published by Help Age India in 2009, in India, there are 1,176 Old Age Homes (OAH's) in total. Kerala has the highest number of OAH's (182) whereas West Bengal stands at the second position with 164 OAH's, followed by Tamil Nadu (151), Maharashtra (133), Andhra Pradesh (114), Karnataka (91), and Gujarat (77) [5].

Most types of Arthritis are chronic. That means they can go on for a long period of time [6]. Arthritis can attack joints in almost any part of the body. Some types of Arthritis cause changes we can see and feel - swelling, warmth, and redness in your joints. In some kinds, the pain and swelling last only a short time, but are very uncomfortable. Other types of Arthritis might be less painful, but still slowly cause damage to your joints.⁸ In India, around 15 percent of the total population are affected by this disease which totals to about 180 million people. According to 2007 European union survey it was found that 22 per cent of the population had experienced the problem of Rheumatism and arthritis [7].

Osteoarthritis (OA) is the most common type of Arthritis in older people. The CDC combined data from the National Health Interview Survey (NHIS) years 2010-2012. Sample Adult core components to estimate average annual Arthritis prevalence in the civilian, non – institutionalized US adult population aged 18 years or older. Overall, 22.7% (52.5 million) of adults reported doctor – diagnosed arthritis, with significantly higher age – adjusted prevalence in women (23.9%) than in men (18.6%). Arthritis prevalence increases with age. By the year 2040, an estimated 78 million (26% of the projected total adult population) adults aged 18 years and older will have doctor-diagnosed arthritis. Functional limitations in common daily activities are common among adults with arthritis; 40% report it is "very difficult" or they "cannot do" at least important daily functional activities [6].

Objectives

1. To assess the level of pain, stiffness, physical function among Geriatrics with Arthritis.
2. To assess the effectiveness of Isometric exercises on pain among Geriatrics with Arthritis.
3. To find out the association between post – test level of pain with selected demographic variables among Geriatrics with Arthritis.

Materials and methods

Geriatric residing at Mathru Sri old age home and Vanaprastha old age home, Vishakapatnam. The Purposive sampling technique used for select the sample and 100 sample were selected from each old age home for this study with help of modified WOMAC osteoarthritis index. Inclusion criteria are the once having knee pain with risk and newly diagnosed, willing to participate in the study and Exclusive once are bed ridden, undergone lower extremities orthopedic surgery. The questionnaire had two sections. Section – A consists demographic variables consists of age, sex, suffering with any other illness other than Arthiritis, how do they visit doctors for Arthiritis, are they using prescribed medication for the disease other than Arthiritis, are they using any treatment for Arthiritis. Section – B Screening modifies WOMAC Osteo arthiritis index scale consists of 24 item divided into three subscales. Pain (5items): during walking, using stairs, in bed, sitting or lying, and standing. Stiffness (2 items): after first waking and later in the day. Physical Function (17 items): stair use, rising from sitting, standing, bending, walking, getting in / out of a car, shopping, putting on / taking off socks, rising from bed, lying in bed, getting in / out of bath, sitting, getting on / off toilet, heavy domestic duties, light, domestic duties. The score System is summed for items in each subscale, with possible ranges as Pain = 0 – 20, Stiffness = 0 – 8, Physical function = 0 – 68. While the activities response in each category according to the degree of difficulty: 0 = None, 1 =Mild, 2=Moderate3=Severe, 4=Extremely. The

sequence of phase of the study was: On the first day the details of the study and need for the study were explained to the Geriatric with Arthritis and a written informed consent was obtained. The information was collected as per the demographic proforma.

1. Pre-test level of pain was assessed by using modified WOMAC osteo arthritis index.
2. Intervention was administered using Isometric exercises for 10 – 15 minutes a day for 4 weeks
3. Post – test level of pain was assessed by modified WOMAC osteo arthritis index.

Statistical Analysis

Data Analysis and interpretation were done based on the objectives of the study by using descriptive and inferential statistics with help of Statistical Package for Social Science (SPSS). Frequency and percentage distribution was used to analyze the demographic variables. Mean and standard deviation was used to analyze the levels of pain among Geriatrics with Arthritis. Inferential statistics use for Paired t’’ test was used to analyse differences between the pre – test and post – test levels of pain among Geriatrics with Arthritis and Chi –square test was used to analyse the association between the post – test levels of pain with the selected demographic variables among Geriatrics with Arthritis.

Section– A

Distribution of Geriatrics with Arthritis According to Demographic Variables

Table 1: Frequency and Percentage Distribution of Geriatrics with Arthritis According to Demographic Variables

| S. No | Demographic Variables | | % | |
|-------|--|-----------------------|-----|--------|
| 1 | Age | 60-64 years | 52 | 26% |
| | | 65-69 years | 86 | 43% |
| | | 70 years and above | 62 | 31% |
| 2 | Sex | Male | 96 | 48% |
| | | Female | 104 | 52% |
| 3 | Are you using any treatment for arthritis | Yes | 118 | 59% |
| | | No | 82 | 41% |
| 4 | How often do you visit doctor for arthrites | Once a month | 2 | 1% |
| | | Once in 6months | 34 | 17% |
| | | Once in a year | 46 | 23% |
| | | Whenever you are sick | 118 | 59% |
| 5 | Are you using any prescribed medications for the disease other than arthrites" | Yes | 130 | 65% |
| | | No | 70 | 35.00% |
| 6 | Are you suffering with any other illness other than arthritis? | Medications | 74 | 37% |
| | | Home remedy | 86 | 43% |
| | | Exercises | 40 | 20% |

From the table 1 it is evident that majority 86 (43%) of the Geriatrics with Arthritis were of 65 - 69 years of age group, 62 (13%) were of 70 year and above of age group and 52(26%) were of 60 - 64years of age group. Regarding sex out of 200Geriatrics with Arthritis, exactly half were females 104 (52%) and remaining were males 96 (48%). Treatment of arthritis most of them 118 (59%) are taking treatment and 82 (41%) are not taking treatment. Elderly people who have Arthritis visit the doctor whenever fall in sick (118 (59%)), once in a year 46 (23 %) and very least is once in a month 2 (1%). This table revealed that 130 (65 %) are using prescribed medication for the disease other than arthritis and 70 (35%) not using prescribed medication. The elderly people are using other than illness by home remedy 86 (43%), medications 74 (37 %) and exercise 40 (20%).

Section– B

Pre-test and Post test level of Pain among Geriatrics with Arthritis

Table 2: Frequency and percentage of distribution of Geriatrics with Arthritis according to level of pain in pre-test and post test

| Level of pain | Pre - Test | | Post test | |
|---------------|------------|-------|-----------|-------|
| | f | % | f | % |
| No pain | 0 | 0.0% | 0 | 0.0% |
| Mild pain | 28 | 28.0% | 91 | 91.0% |
| Moderate pain | 64 | 64.0% | 9 | 9.0% |
| Severe pain | 8 | 8.0% | 0 | 0.0% |

From above table 1.2, it is evident that out of 100 Geriatrics with Arthritis one 28% was having mild pain level in pre-test whereas 91% in post - test had reduced pain from moderate to mild, geriatrics 64% were having moderate pain level in pre-test whereas it reduced to 9% with moderate pain in post - test.

Table 3: Frequency and Percentage Distribution of Geriatrics with Arthritis According to Level of Stiffness in Pre- test and Post test

| Level of stiffness | n =100, n =100 | | | |
|--------------------|----------------|-------|-----------|-------|
| | Pre test | | Post test | |
| | f | % | f | % |
| No Stiffness | 0 | 0.0% | 20 | 20.0% |
| Mild Stiffness | 52 | 52.0% | 62 | 62.0% |
| Moderate Stiffness | 30 | 30.0% | 18 | 18.0% |
| Severe Stiffness | 18 | 18.0% | 0 | 0.0% |

The above table 1.3 present that Geriatrics with Arthritis, 52% were suffering with mild stiffness in pre-test whereas 62% were found with mild stiffness in post - test from moderate level in the post test. 30 % were found with moderate stiffness in the pre-test and 18% were found in the post test. In the pre-test, geriatrics suffering with severe stiffness level were 18 % where as in the post test none were found.

These differences indicate that Isometric Exercises were effective in reducing stiffness among Geriatrics with Arthritis.

Table 4: Frequency and Percentage Distribution of Geriatrics with Arthritis According to Level of Physical Functions Difficulty in Pre-test and Post test

| Level of Difficulty in Physical Functions | n =100, n =100 | | | |
|---|----------------|-------|-----------|-------|
| | Pre test | | Post test | |
| | f | % | f | % |
| No physical difficulty | 0 | 0.0% | 0 | 0.0% |
| Mild physical difficulty | 13 | 13.0% | 88 | 88.0% |
| Moderate physical difficulty | 75 | 75.0% | 12 | 12.0% |
| Severe physical difficulty | 12 | 12.0% | 0 | 0.0% |

From the above table 1.4 reveals that, 13% were having mild physical function difficulty in pre-test whereas it increased to 88 % in post - test reducing from moderate to mild physical difficulty, 76 % were having moderate physical function difficulty in pre-test whereas it reduced to 12 % in post - test.

These differences indicate that Isometric exercises were effective in improving the level of physical activities among Geriatrics with Arthritis.

Table 5: Test of Significance Showing Difference between Mean and Standard Deviation of Pre and Post Test Level of Pain

| Level of pain | Mean | Standard deviation | df | 't' value | Table value | Significance |
|---------------|--------|--------------------|----|-----------|-------------|--------------|
| Pre-test | 9.5500 | 2.39686 | 99 | 53.074 | 1.984 | S* |
| Post test | 4.2900 | 2.09518 | | | | |

Note: S- Significant at P<0.05 level of significance

H 01: There will be no significant difference between pre and post-test level of pain among geriatrics with Arthritis.

The above table revealed that regarding pain, the pre-test mean was 9.5 with 2.39 SD and post - test mean was 4.29 with 2.09 SD. The calculated t'' value was 53.074 which

was greater than the value 1.984 at 99df with 0.05 level of significance. It shows that there was significant difference (p<0.05) in pre -test and post - test pain scores.

Hence null hypotheses H 01 is rejected which indicates that Isometric exercises were effective in reducing the level of pain among Geriatric with Arthritis.

Table 6: Test of Significance Showing Difference between Mean and Standard Deviation of Pre and Post Test Level of stiffness

| Level of stiffness | Mean | Standard deviation | df | 't' value | Table value | Significance |
|--------------------|--------|--------------------|----|-----------|-------------|--------------|
| Pre-test | 3.7100 | 1.60991 | 99 | 66.406 | 1.984 | S* |
| Post test | 1.8000 | 1.47710 | | | | |

Note: S- Significant at P<0.05 level of significance

Regarding stiffness, the pre - test mean was 3.71 with 1.60 SD and post - test mean was 1.80 with 1.47 SD. The calculated t'' value was 66.406, which was greater than the table value 1.984 at 99 df with 0.05 level of significance which showed that there was significant difference (p<0.05) in pre -test and post- test stiffness scores.

Table 7: Test of Significance Showing Difference between Mean and Standard Deviation of Pre and Post Test Level of physical function difficulty

| Level of physical function difficulty | Mean | Standard deviation | df | 't' value | Table value | Significance |
|---------------------------------------|---------|--------------------|----|-----------|-------------|--------------|
| Pre-test | 29.1300 | 9.67832 | 99 | 109.000 | 1.984 | S* |
| Post test | 12.7800 | 8.95283 | | | | |

Note: S- Significant at P<0.05 level of significance

With regard to physical function difficulty, the pre - test mean was 29.13 with 9.67 SD and post - test mean was 13.78 with 8.95 SD. The calculated t'' value was 109.00 which was greater than the table value 1.984 at 99df with 0.05 level of significance. It showed that there was significant difference (p<0.05) in pre-test and post test physical function difficulty scores.

Hence it is concluded that after practicing Isometric Exercises in Geriatrics with Arthritis level of the pain, stiffness and physical function difficulty has been decreased. The positive result gives a clear indication of effectiveness of Isometric Exercises on reduction of pain, stiffness and physical function difficulty.

Table 8: Association between Post - test Pain scores of Geriatrics with Arthritis with Demographic Variables

| Demographic variable | Df | chi square value | Table value | Significance |
|---|----|------------------|-------------|--------------|
| Age | 2 | 1.755 | 5.991 | S* |
| Sex | 1 | 1.381 | 3.841 | NS |
| History of diseases suffering from other than arthritis | 1 | 1.442 | 3.841 | NS |
| Frequency of visits to Doctor | 3 | 3.214 | 7.815 | NS |
| Medications using for other than Arthritis | 1 | 0.710 | 3.841 | NS |
| Type of treatment taking for Arthritis | 2 | 7.484 | 5.991 | S* |

Note: S- Significant at P< 0.05 level of significance

H 02: There will be no significant association between the post-test levels of pain with the selected demographic variables among the geriatrics with arthritis.

The above table revealed that there is a significant association between post - test pain level of Geriatrics with Arthritis with sex, history of diseases suffering from other than arthritis, frequency of visits to doctor and medications using for other than arthritis where the obtained chi square values were no significant at 0.05 level of significance. Hence H 02 is accepted.

Table 9: Association between Post test Stiffness Scores of Geriatrics with Arthritis with Demographic Variable

| Demographic variable | df | chi square value | Table value | Significance |
|---|----|------------------|-------------|--------------|
| Age | 4 | 4.370 | 9.488 | NS |
| Sex | 2 | 0.928 | 5.991 | NS |
| History of diseases suffering from other than arthritis | 2 | 7.521 | 3.841 | S* |
| Frequency of visits to Doctor | 6 | 8.838 | 12.592 | NS |
| Medications using for other than Arthritis | 2 | 8.359 | 5.991 | S* |
| Type of treatment taking for Arthritis | 4 | 6.737 | 9.488 | NS |

Note: S- Significant at P<0.05 NS- Not significant

The above table revealed that there is significant association between post test stiffness levels of Geriatrics with Arthritis with age, sex, frequency of visits to doctor and type of treatment taking for arthritis where the obtained chi square values were significant at 0.05 level of significance.

Table 10: Association between Post - test Physical Function Difficulty Scores of Geriatrics with Arthritis with Selected Demographic Variables

| Demographic variable | df | chi square value | Table value | Significance |
|---|----|------------------|-------------|--------------|
| Age | 2 | 8.039 | 5.991 | S* |
| Sex | 1 | 1.904 | 3.841 | NS |
| History of diseases suffering from other than arthritis | 1 | 1.443 | 3.841 | NS |
| Frequency of visits to Doctor | 3 | 6.563 | 7.815 | NS |
| Medications using for other than Arthritis | 1 | 2.015 | 3.841 | NS |
| Type of treatment taking for Arthritis | 2 | 5.199 | 5.991 | NS |

Note: N- significant at P<0.05 NS- Not significant

The above table revealed that there is significant association between post - test physical function difficulty levels of Geriatrics with Arthritis with only age where the chi square values were significant at 0.05 level of significance.

Hence null hypotheses H 02 is rejected which indicates that Isometric exercises were effective in.

Discussion

Limitations

The study is limited to: Small number of samples, short period of time (30days), if it was done for more days there would have been much reduction in pain levels and only two old age homes were included in the study.

Nursing Practice

Isometric exercises are one of the techniques to reduce pain among geriatrics with arthritis. Integration into nursing practice, especially in the community setting it provide sample opportunity for the student nurses to interact with geriatrics where primary prevention plays a major part. Implementations of daily Isometric exercises will enable the Geriatrics to maintain health and prevent disability.

Nursing Administration

Nursing administrators believe in the worth and dignity of man. Nursing Administrator share responsibility for them multifaceted delivery of health care and are committed to maintain standards of excellence in facilitating an environment for the provision of nursing care. Conducting In – service education programs in the community settings enabling them to identify Geriatrics with Arthritis and thus provide exercises to limit pain and disability.

Nursing Research

is to provide empirical evidence to support nursing practice. Nursing research also contributes to the empirical body of knowledge, criteria necessary for professional status. In this study, reduction of pain among geriatrics with Arthritis is highlighted by the regular practice of Isometric exercises.

Recommendations

Based on the findings of the present study the recommendations are offered for future that a similar study can be conducted on a large sample, any age group as per the related exercises. Further research can be conducted by using other non – pharmacological measures like hot applications and isotonic exercises.

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