

Effect of Agility Ladder Drill Exercises on Knee Health Status Among Geriatric Patients with Osteoarthritis

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ABSTRACT

Osteoarthritis is the most serious clinical problem faced by elderly. This study investigated the effect of agility ladder drill exercise on knee health status among geriatric patients with osteoarthritis. The objectives were to assess the effect of agility ladder drill exercise on knee health status among geriatric patients with osteoarthritis, and to find the association between knee health status among geriatric patients with osteoarthritis and selected demographic variables in selected old age home in Thiruvananthapuram district. The study design adopted was quantitative pre-experimental one group pre-test post-test design. 30 samples, were selected by purposive sampling technique between 60-75 year and participated in ladder drill exercise for 6 weeks 3 days per week. WOMAC Osteoarthritic index was employed to determine level of knee health status at the end of third and sixth week. Independent t test and paired t test were computed to find the effectiveness. Findings revealed that there was a significant difference between pretest and post test (I and II) scores. The obtained t value in posttest 1vs posttest 2 is 13.38, is greater than table value is significant at 0.01 level. The results indicated in improvement in knee health status after agility ladder drill exercise and no association between knee health status and selected demographic variables. Thus it may be concluded that agility ladder drill exercise offers a more efficient way of improving knee health status among geriatric patients with osteoarthritis.

Keywords: Effect, Agility ladder drill exercise, Knee health status

CHAPTER I

INTRODUCTION

Background of the problem

“Aging is not lost youth but a new stage of opportunity and strength ”

-BETTY FRIEDAN

Osteoarthritis is one of the most prevalent condition resulting to disability particularly in elderly population. It is the most common articular disease of the developed world and a leading cause of chronic disability¹.

Evidence of osteoarthritis found in the fossil record was studied by paleopathologies, specialists in ancient disease and injury. Osteoarthritis has been reported in fossils of the large carnivorous dinosaur. Osteoarthritis is derived from Greek word part osteo, meaning of the bone, combined with arthritis means joint inflammation².

It is a chronic disorder of synovial joints characterized by progressive softening and disintegration of bone accompanied by new growth of cartilage and bone at the joint margins. Osteoarthritis is a type of joint disease that results from breakdown of joint cartilage and underlying bone. The most commonly involved joints are those near the ends of the fingers, at the base of the thumb, neck, lower back, knee, and hips. Joints on one side of the body are often more affected than those on the other. It is degeneration of joint cartilage and the underlying bone, most common from middle age onward. It causes pain and stiffness, especially in the hip, knee, and thumb joints¹. It is accompanied by systemic illness and although there may be local signs of inflammation³.

In worldwide an estimated 10% to 15% of all adults aged over 60 have some degree of OA, with prevalence higher among women than men. According to NCBI, Osteoarthritis is the second most common rheumatologic problem and it is the most frequent joint disease with a prevalence of 22% to 39% in India. OA is more common in women than men, but the prevalence increases dramatically with age. Nearly, 45% of women over the age of 65 years have symptoms while radiological evidence is found in 70% of those over 65 years. OA of the knee is a major cause of mobility impairment, particularly among females⁴

According to Solomon , As of 2012, osteoarthritis affected 52.5 million people in the United States, approximately 50% of whom were 65 years and older. It is estimated that 80% of the population have radiographic evidence of osteoarthritis by age 65, among them 60% will have symptoms. The rate of osteoarthritis in the United States is forecast to be 78 million (26%) adults by 2040³. In the United States, there were approximately 964,000 hospitalizations for osteoarthritis in 2011, a rate of 31 hospital stays per 10,000 population. With an aggregate cost of \$14.8 billion (\$15,400 per stay), it was the second-most expensive condition seen in U.S. hospital stays in 2011⁴.

According to wikipedia, The incidence rate of knee osteoarthritis in Kerala was found to be 28.7%. the associated factor were found to be female gender (31.6%). Obesity and sedentary work is the reason for high incidence rate in females⁵.

The risk factors of osteoarthritis are, aged over 50 years, excessive weight (BMI>23), genetic disorder such as deformed legs or knees, high impact of physical activity, rheumatoid arthritis or gout, knee injury, habitual floor activities such as kneeling, side knee bending and squatting, most common in athletes, family history, joint dysplasia and trauma⁶.

Primary OA caused by a history of previous joint injury with obesity, especially with respect to knees. Since the correlation with obesity has been observed not only for knees but also for non-weight bearing joints. The loss of body fat is more closely related to symptom relief than the loss of body weight, it has been suggested that there may be a metabolic link to body fat as opposed to just mechanical loading⁷

The risk factors increase in frequency with age. Cartilage does age showing diminished cellularity reduced proteoglycan concentration, loss of elasticity and decrease in breaking strength. Primary changes in cartilage matrix might weaken its structure and thus predispose to cartilage breakdown.

Genetical Inheritance has an important role in the development of OA. OA in large joints is often attributable to anatomical variations. Articular cartilage may be damaged by trauma or previous inflammatory disorders. Enzymes released by synovial cells and leucocytes can cause leaking of proteoglycans from the matrix. In most cases the precipitating cause of OA is increased with mechanical stress in some part of the articular surface⁶.

Changes in sex hormone levels may play a role in the development of osteoarthritis as it is more prevalent among post-menopausal women than among men of the same age. A study of mice found natural female

hormones to be protective while injections of the male hormone dihydrotestosterone ⁷

Secondary OA is a type of osteoarthritis is caused by other factors but the resulting pathology is the same as for primary osteoarthritis, Alkaptonuria, Congenital disorders of joints, Diabetes doubles the risk of having a joint replacement due to osteoarthritis and people with diabetes have joint replacements at a younger age than those without diabetes, Ehlers-Danlos Syndrome, Hemochromatosis and Wilson's disease, Inflammatory diseases (such as Perthes' disease), (Lyme disease), and all chronic forms of arthritis (e.g., costochondritis, gout, and rheumatoid arthritis). ⁸

In osteoarthritis a small amount of low-grade inflammation is observed, and mechanical abnormalities in the joints irritates surrounding soft tissues and can cause inflammation. OA is generally termed non-inflammatory to distinguish it from rheumatoid arthritis. Characteristic pathologic changes include erosion of articular cartilage, thickening of subchondral bone, and formation of osteophytes⁹.

Pain is the primary feature and is usually described as a deep aching in the joints. Weather changes and increased activity tend to increase in pain, rest usually provides relief. Decreased joint motion may be caused by the loss of articular cartilage and muscle spasms. And helps shortening of ligaments and osteophytes. Other manifestations are, joint enlargement, crepitus, limitation of joint movements, non-inflammatory joint effusion, morning stiffness for 1 hour, joint stiffness¹⁰.

Diagnosis is based on evaluation of the history and physical examination and the results of radiologic studies. Serologic and synovial fluid examinations are essentially normal. Arthroscopy is not necessary to diagnosis of OA, but it allows direct visualization of articular surfaces and detection of early disease. X ray film reveals narrowing of the joint space, osteophyte formation, and eburnation or sclerosis of subchondral bone¹⁰. A bone scan, computed tomography, magnetic resonance imaging may be useful to diagnose OA because of the sensitivity of these tests in detecting early joint changes.¹¹

No laboratory abnormalities or biomarkers have been identified that are specific diagnostic indicators of OA. The ESR is normal except in instances of acute synovitis. Other routine blood examinations, renal and liver function tests are useful for screening related conditions.¹²

Analgesics, nonsteroidal anti inflammatory drugs and intra articular corticosteroids are the main stays of pharmacologic treatment of OA. The OA patients must understand the importance of a balance of rest and activity. The affected joints should be rested during any periods of acute inflammation and maintained in a functional position with splints. Application of heat and cold may help reduce complaints of pain and stiffness, heat therapy including hot packs paraffin wax bath, used to relieve stiffness¹³. The surgical management such as joint debridement, realignment osteotomy, arthroplasty, joint replacement and arthrodesis¹⁴. The complications of surgical management are wound infection, thrombophlebitis, pulmonary embolism and mechanical failure.

If the person is over weight, a weight reduction program is a critical part of total treatment plan. Exercise is a fundamental part of management. Complementary and alternative therapies for symptom management. Acupuncture leads to improvements in pain relief, other therapies include yoga, low-level laser therapy, green-lipid mussel extract, shark cartilage, herbal supplements, magnets, copper bracelets, massage, meditation, reflexology etc¹⁵.

Leeches have been used since medieval times for medicinal purposes. Leeches are classified as medical device by the food and drug administration. Leech's saliva contains substance that have medicinal effect¹⁶.

Some of the exercises are used to relieve the pain and improving functions for OA patients, such as neck and back exercise, low impact activities, range of motion exercise, swimming and water therapy,

resistance exercise, golf and yoga. Agility ladder drill exercise helps to improve the agility and strengthen the joints that affected. Exercise are to improve the activity level and reduce pain¹¹. Benefits of exercise are well known and include reduced pain, increased strength and mobility, decreased fatigue, improved gait, reduction of cardiovascular risk, improved lipid management, increased bone mass and improved sense of well being¹⁷.

A study was conducted to assess the efficacy of Kinesthesia, Balance, agility exercise and Independent Strength Training exercise to improve the function among patients with osteoarthritis by school of Human performance and Leisure sciences, Barry University, Miami FL USA, A study was conducted with 20 subjects who were randomly assigned in to two equal groups for assessing the knee health status. Kinesthesia, Balance and Agility exercises and Strength Training exercises were done for a period of 8 weeks, 3 days per week. Self -reported physical function was measured every two weeks. The results shows Kinesthesia, Balance and Agility exercise appear to improve function and stability among persons with knee osteoarthritis¹⁸.

A study was conducted to compare the effect of agility and perturbation training with conventional exercises and conventional exercise alone in improving functional status in physically active individuals with knee osteoarthritis; by Department of Orthopedics Physiotherapy, Shree B G college of physiotherapy, Anand, India; study was conducted with 60 physically active subjects with knee osteoarthritis and were randomly assigned in to two equal groups. Then group A was allotted for agility and perturbation training and group B for conventional exercise for a period of 6 weeks. Post test was conducted by using WOMAC osteoarthritis index. According to the result of study, agility and perturbation exercises significantly improved the functional status of osteoarthritis subjects as compared with the control group¹⁹.

Need and significance of the study

OA is refers to a clinical syndrome of joint pain accompanied by varying degrees of functional limitation and reduced quality of life. It is the most common form of arthritis, and one of leading cause of pain and disability¹⁴.

OA is the single most common cause of disability in older adults.. An estimated 10% to 15% of all adults aged over 60 have degree of OA, with prevalence higher among women than men. The prevalence of OA increasing due to the population aging and an increase in related factors such as obesity. According to U N, by 2050 the aged over 60, will estimate of 15% will have symptomatic.

As a part of global burden of disease 2010 study, a systematic review reported that the global age standardized prevalence of knee osteoarthritis was 3.8%¹⁵, According to WHO an estimated 10% to 15% of all adults aged over 60 have some degree of OA, with prevalence higher among women than men. According to D Xing , OA is a common disease with rising prevalence, which results in cause of disability among the older people. In epidemiology, half of the world's population aged 65 years or older has OA. Which is the most prevalent disorder of articulating joints in humans.

An epidemiological study was conducted to assess of prevalence of knee osteoarthritis in India and related factors, found that the prevalence of OA knees increased with increase in body mass index (BMI). Knee OA prevalence was significantly ($P = 0.007$) low in underweight people (28%) as compared to normal weight and obese participants (33%). Prevalence was found to be highest in people who are overweight and/or obese. The prevalence was highest among the age group of 60 and above and lowest in people in the age group of 40–50 years ($P = 0.001$). The prevalence of knee OA was highest in participants who are unemployed. Although statistically significant ($P = 0.0001$), a cause–effect relationship cannot be derived.

This is so because the unemployed group may include people who were retired. In such cases, the OA may have been due to age rather than being unemployed. Prevalence was lowest among participants who worked as daily wage workers/laborers (22.2%). Prevalence was highest in participants who have a sedentary lifestyle followed by participants with a physically demanding lifestyle and active lifestyle. This difference was statistically significant ($P = 0.001$) showing that the prevalence of OA was lowest in participants who had a fairly active physical activity level. Since the study recorded the current level of physical activity, it may be possible of having OA that may be more due to age rather than lifestyle¹⁵.

Depending on the severity if the OA, it affects people differently. Most of the time the wearing of joints occurs very gradually over the course of many years. Mild cases are relatively able to be managed and constitute only a minor nuisance while living day to day. Researchers have long known that quality of life can be significantly affected in people who have been diagnosed with OA. Quality of life refers to the ability to perform daily tasks, including work and home responsibilities. It also refers to the general satisfaction of daily living¹⁶

Agility ladder drill are an excellent way to improve foot speed, agility, coordination and overall quickness. Speed ladder drills are about quality and form rather than producing overload. It is better to start the session after a warm up. It is a non-pharmacological intervention in which the subjects will perform 5 minutes of warm up, 30 minutes of ladder drill exercise followed by 5 minutes of cooling exercise, thrice in a week for 6 weeks.

I have selected this study, as it is a leading cause of mortality, morbidity and disability. During my clinical posting also I had found many patients with knee OA who were striving for life. And they often commented that they are suffering from intermittent pain and spending large amount of money every month for their treatment. This stuck me and I was motivated to take up this study.

From the supportive studies it is evident that, agility ladder drill exercise is effective in improving the bone stability and it will help to reduce the severity of OA. And while comparing the cost of various medical and surgical measures to treat OA, the agility ladder drill exercise is cost effective. So I found it is beneficial to demonstrate agility ladder drill exercise to those geriatric patients who are suffering from OA.

Statement of problem

A study to assess the effectiveness of agility ladder drill exercise on knee health status among geriatric patients with osteoarthritis in selected old age homes in Thiruvananthapuram district.

Purpose of the study

Osteoarthritis and lack of exercise is a common problem in old ages. Agility ladder drill exercise is very effective exercise for improving the knee health status of patients with osteoarthritis. Hence the researcher selected this topic to assess the effect of ladder drill exercise on knee health status among geriatric patients with osteoarthritis.

Objectives of the study

- To assess the effect of agility ladder drill exercise on knee health status among geriatric patients with osteoarthritis in selected old age homes in Thiruvananthapuram District.
- To find the association between knee health status among geriatric patients with osteoarthritis and selected demographic variables in selected old age homes in Thiruvananthapuram.

Operational definition

Effect : In this study the effect refers to the outcome obtained as a result of agility ladder drill exercise on knee health status of old ages with osteoarthritis and it is measured by modified WOMAC (The Western

Ontario and McMaster Universities) osteoarthritis index.

Agility ladder drill exercise : It is a non-pharmacological intervention in which the subjects will perform 5 minutes of warm up, 30 minutes of ladder drill exercise followed by 5 minutes of cooling exercise, thrice in a week for 6 weeks.

Knee health status : Knee health status refers to the stability and functional status of knee joint. In this study old ages with osteoarthritis have score between 25-74 in WOMAC osteoarthritis index.

Geriatric Patient with osteoarthritis: In these study geriatric patients (60-75years) with osteoarthritis refers to the subjects with progressive non inflammatory disorder of synovial joints and whose score is between 25-74 in WOMAC osteoarthritis index.

Hypothesis

H1: There is a significant difference in the level of knee health status among geriatric patients with osteoarthritis before and after agility ladder drill exercise.

H2: There is a significant association between the level of knee health status among geriatric patients with osteoarthritis and selected demographic variables

Conceptual frame work

Conceptual framework is a theoretical structure of assumptions, principles, and rules that holds together the ideas comprising a broad concept¹⁶

The present study aims to evaluate the effect of agility ladder drill exercise on knee health status among geriatric patients with osteoarthritis. The current study is conceptualized by utilizing the goal attainment theory, established by Imogene king

The goal attainment theory encompasses concepts of perception, goal setting, action, interaction and transaction with a special emphasis on interpersonal systems. It is based on holism, or one total human being interacting with another total human being in a specific situation. The elements of Goal Attainment theory focuses on interpersonal system and the interactions, communications and transactions between two individuals, the nurse and the patient. The essence of theory is that the nurse and patient come together and make transactions- they set goals and work to achieve the goal they set. King emphasized that with a purpose they perceive, judge, act and react upon each other. At the end of communication, goal will be set and with this transactions are made. According to her, nursing's focus is on care of the patient and its goal is to help the patient maintain their health, so they can function in their roles

Perception

It refers to a process of organizing, interpreting and transforming information from sense data and memory that gives meaning to one's experience, represents ones image of reality and influence ones behavior¹⁷. In this study, the researcher felt the need of an intervention to improve knee health status among geriatric patients with osteoarthritis.

Goal Setting

In this theory, mutual goal setting is established as the independent variable¹⁸. In this study the independent variable is the agility ladder drill exercises which are manipulated to create change on knee health status among geriatric patients with osteoarthritis.

Action

It refers to the sequence of behaviors involving mental and physical action¹⁹. In the current study, the action is intended to assess the effectiveness of agility ladder drill exercises on knee health status among geriatric patients in old age home.

Reaction

It is considered as included in the sequence of behaviors described in action²⁰. In this study, the knee health status was assessed using WOMAC osteoarthritic index among the group

Interaction

It refers to the act of two or more persons in mutual presence; a sequence of verbal and nonverbal behaviors that are goal oriented²¹. In the present study, interaction denotes the agility ladder drill exercise provided to the group for 6 weeks, three sessions per week .

Transaction

It represent a life situation in which perceiver and thing perceived are encountered in which person enters the situation as an active participant and each is changed in the process of these experience²². In the study, the improvement in knee health status was reassessed using WOMAC osteoarthritic index

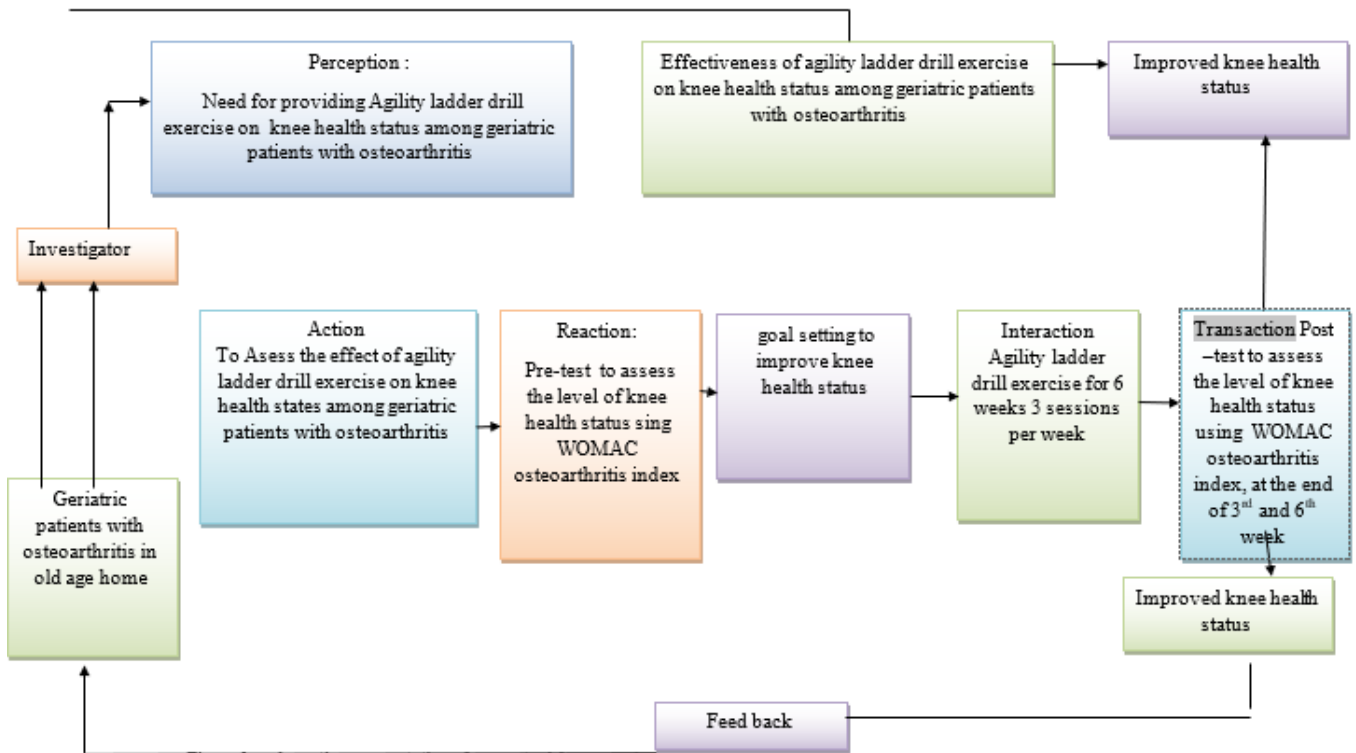


Figure 1 : schematic representation of conceptual frame work

CHAPTER 2

Review of literature

Introduction

A literature review is a description of the literature relevant to a particular field or topic. It was given an overview of what has been said, who the key writer's are, what are the prevailing theories and hypothesis, what questions are being asked, and what methods and methodologies are appropriate and useful²³.

A literature review critically analyses the information gathered by identifying gaps in current knowledge, by showing limitations of theories and points of view, by formulating areas for further research²⁴

This chapter deals with the review of literature, to obtain scientific material relevant to the study.

Literature review related to the present study is categorized under the following headings:

- Studies related to prevalence of osteoarthritis
- Studies related to effect of exercise on knee health status among osteoarthritis
- Studies related to agility ladder drill exercise on knee health status

Study related to prevalence of osteoarthritis

A cohort study was conducted to assess the prevalence of knee osteoarthritis in the elderly the Framingham osteoarthritis by David T Felson . Physical examination and radiographic assessment done for the selection of subject. Kellgren and Lawrance test was used to grade the subjects. The results shows OA that was increased with age (27%) and high prevalence in women than men (34%). The study conducted that the prevalence of knee OA increases with age throughout the elderly years²⁵.

A cross-sectional study was conducted to assess the prevalence of knee osteoarthritis patients in Mysore city, Karnataka by M S Radha and M R Gangadhar by the department of studies in Anthropology, university of Mysore. 150 subjects were selected by WOMAC and ESR criteria and analysis done by SPSS window 16.0. The result shows that the prevalence of OA increases with age, men are affected more frequently among <45 years²⁶.

A cohort study was conducted to assess the high prevalence of knee OA, pain and functional limitations in female soccer players 12 year after anterior cruciate ligament injury by Lobmandar L S et.al. The 103 subjects were selected using questionnaire and radiography. The results shows that a very high prevalence of radiographic knee osteoarthritis and functional limitations was observed in young women²⁷.

Studies related to effect of exercise on knee health status of osteoarthritis

A cohort study to assess the physical activity levels and functional program in the osteoarthritis initiative by Dorothy D Dumlop et.al., The 2589 study subjects selected by longitudinal follow up data. Prospective annual functional performance was assessed for 2 years using two years using timed 20 meter walk test. And the results shows that increasing physical activity levels had a significant graded relation ship to functional performance²⁸.

A randomised clinical trial related to the effect of walking exercise therapy on knee osteoarthritis by Parisa Nejati et.al. Total 56 subjects with knee osteoarthritis were assigned in to two random groups. The patients in exercise group received exercise for knee muscles in combination with NSAID_s and 10 sessions acupuncture and physiotherapy modalities. Non-exercise group received similar treatments except exercise program. The changes in patient pain and functional status were evaluated by visual analogue scale, knee and osteoarthritis outcome score questionnaire. The results showed that the patients with knee osteoarthritis in knee osteoarthritis in exercise group had significant improvement in pain, disability and speed after treatment follow up. It was concluded that non-aerobic exercise for muscles around knee can

augment the effect of other therapeutic interventions like medical therapy, acupuncture and modalities for knee osteoarthritis²⁹.

A study was conducted to examine the effect of exercise on knee joints with osteoarthritis by Judith G Bouch et.al. Total 34 subjects selected. Subjects were randomized in to 2 group the minimal treatment group and the exercise group. The exercise group participated in a 1 hour exercise session, 3 times a week. The Arthritis Impact Measurement Scale (AIMS), were used to measure health status, and VAS for pain assessment used before and after intervention. The results showed that pain level declined in experimental group and the minimum treatment group showed improvement on the AIMS³⁰.

Studies related to agility ladder drill exercise on knee health status

A study was conducted to determine the efficacy of Kinesthesia, Balance, agility exercise and Independent Strength Training exercise to improve the function among patients with osteoarthritis by school of Human performance and Leisure sciences, Barry University, Miami FL USA, 20 samples were randomly assigned in to two equal groups. Kinesthesia, Balance and Agility exercises or Strength Training exercises group for a period of 8 weeks, 3 days per week. Self-reported physical function was measured every two weeks. 59% ($p=0.02$) of patient's physical function improved with Kinesthesia, Balance and Agility exercises. And 40% ($p=0.02$) of patient's physical function improved with strength training exercise for 8 weeks. In conclusion Kinesthesia, Balance and Agility exercise appear to improve function and stability among persons with knee osteoarthritis³¹.

A study was conducted to compare the effect of agility and perturbation training with conventional exercises and conventional exercise alone in improving functional status in physically active individuals with knee osteoarthritis, by Department of Orthopedics Physiotherapy, Shree B G college of physiotherapy, Anand, India. The study was conducted with 60 physically active subjects with knee osteoarthritis and were randomly assigned in to two equal groups. Then group A was allotted for agility and perturbation training and group B for conventional exercise for a period of 6 weeks. Post test was conducted by using WOMAC osteoarthritis index. According to the result of study, agility and perturbation exercises significantly improved the functional status of osteoarthritis subjects as compared with the control group³².

A quasi experimental study was conducted to assess the effect of agility exercises on knee health status among patients with osteoarthritis by Sree Chithira Thirunal Institute of Medical Science .50 samples were selected and randomly assigned in 2 equal group over a period of two months, 3 days per week for eight weeks the knee health status assessed with WOMAC osteoarthritic index. Statistical analysis shows that there was significant improvement in knee related health status among experimental group subjects($p<0.001$). The results suggest that agility exercises can be included along with conventional exercise programme in patients with knee osteoarthritis. The study concluded that majority of patients in the control group had no improvement in knee health status, the observed difference in the knee health status score was statistically significant at p value <0.001 ³³.

A study was conducted to compare the plyometric training and ladder drill training on sprinting speed, vertical explosive power and agility by Department of physical education and sports Tamilnadu. A total 36 football players were selected. The pre-test and post-test randomized control group design was used. The plyometric training and ladder training was provided thrice in a week for 8 week. ANCOVA and scheffe's test used to evaluate the effect. The results shows that the plyometric training group was better improved on sprinting speed and vertical explosive power of football players, ladder training group was better improved on agility performance of football players due to the effect of training³⁴.

A study was conducted to assess the effect ladder and Speed, Agility, Quickness training on speed and agility among sports club badminton players by, Kamaraj University. Subjects were selected by randomization which include 30 men sports club badminton players. The period of training was 8 weeks in a schedule of weekly 3 days for alternate days. The data analysed by Covariance and Scheffe's post hoc test at 0.05 level. Based on the result it was concluded that the ladder drill and SAQ training were significantly improved the speed and agility among sports club badminton players³⁵.

A study was conducted to assess the effect of ladder drill weight training and iron yoga on agility, speed, flexibility and vital capacity among college badminton players by Graydon L Gains, Fourty male subject were selected randomly. ANCOVA was used for statistics. The result concluded that the ladder drill, weight training and iron yoga had significantly improved the agility, speed and flexibility and vital capacity among college badminton players³⁶.

A study was conducted to assess the effect of speed, agility, quickness training method on power performance in soccer players. 100 study subject were selected randomly and they divided in to two groups consisting of 50 subjects.. Two way ANOVA was used to find out the results. The study was concluded that there was concluded in power performance of soccer players due to the influence of SAQ training³⁷.

SUMMARY

This chapter presented a literature review which provided a strong base for the study. The literature was viewed under three headings and this enabled the researcher to have an in- depth understanding and insight into the problem under study, preparing tool, designing the conceptual framework, collecting the data and planning the analysis.

CHAPTER 3

RESEARCH METHODOLOGY

Introduction

Research methodology is a way to systematically solve the research problem. It may be understood as a science of studying how research is done scientifically. It is a collective term for the structured process of conducting research³⁸.

This chapter deals with the method for the present study includes, research approach, research design, variables, population, sample and sampling technique, sampling criteria, development and description of tool, content validity of the tool, reliability of the tool, pilot study, data collection process and plan for data analysis. On the whole, it gives a general pattern for gathering and processing research data

Research approach

Research approach involves the description of the plan to investigate the phenomenon under study in a structured, unstructured or a combination of the two methods³⁹.

Quantitative approach involves the generation of data in quantitative form which can be subjected to rigorous quantitative analysis in a formal and rigid fashion⁴⁰.

In this study, in order to accomplish the main objective of determining the effect of agility ladder drill exercise on knee health status among geriatric patients with osteoarthritis, quantitative approach was adopted.

Research design

Research design can be defined as a blue print to conduct a research study, which involves the description of research approach, study setting, sampling size, sampling technique, tools and method of data collection and analysis to answer a specific research question or for testing research hypothesis⁴¹.

Pre experimental one group pre-test post-test group design was adopted for this study.

O₁ X O₂ X O₃

O₁ - Pre-test for the group

X - Administration of agility ladder drill exercise to the samples

O₂ - Post-test 1 after 3 weeks

O₃ - Post-test 2 after 6 weeks

Variables

Chinn and Kramer stated that variables are concepts at different level of abstraction that are concisely defined to promote their measurement or manipulation within study⁴².

Independent variable

An independent variable is a stimulus or activity that is manipulated or varied by the researcher to create the effect on the dependent variable⁴³.

In this study the independent variable is the agility ladder drill exercise.

Dependent variable

A dependent variable is the outcome or response due to the effect of the independent variable, which researcher wants to predict or explain⁴⁴

In this study the dependent variables are knee health status of geriatric patients with osteoarthritis.

Demographic variables

Demographic variables are the characteristics and attributes of the study subjects⁴⁵.

In this study the demographic variables are the age, sex, educational qualification, history of occupation, marital status, habitual history and family income.

Intervention

Agility ladder drill exercise is the intervention for the study. The selected samples were assigned to study subjects. The researcher was introduce herself to the participants and objectives of the study was explained to them and their consent obtained. The subjects was explained about WOMAC osteoarthritic index.ie,Using 24 parameters under 3 headings as joint pain,joint stiffness and difficulty in performing daily activities;For each question 5 responses with scoring 0-4. Total score is 96; according to this the data was collected from the participants . Then the researcher asked them to perform 5 minutes of warming up exercise (walking), followed by 30 minutes of ladder drill exercises (include running through ladder by placing one foot in each square, touching both foot in each square, performing drill following straddling, sideways ladder step). Each steps was repeated for 15 times, and one foot is standing on floor for 10 seconds, followed by 5 minutes of cooling exercises (stretching of calf, hamstring and quadriceps muscles).This exercises was continued thrice in a week for 6 weeks. The post-test was conducted at the end of third and sixth week by using WOMAC osteoarthritis index

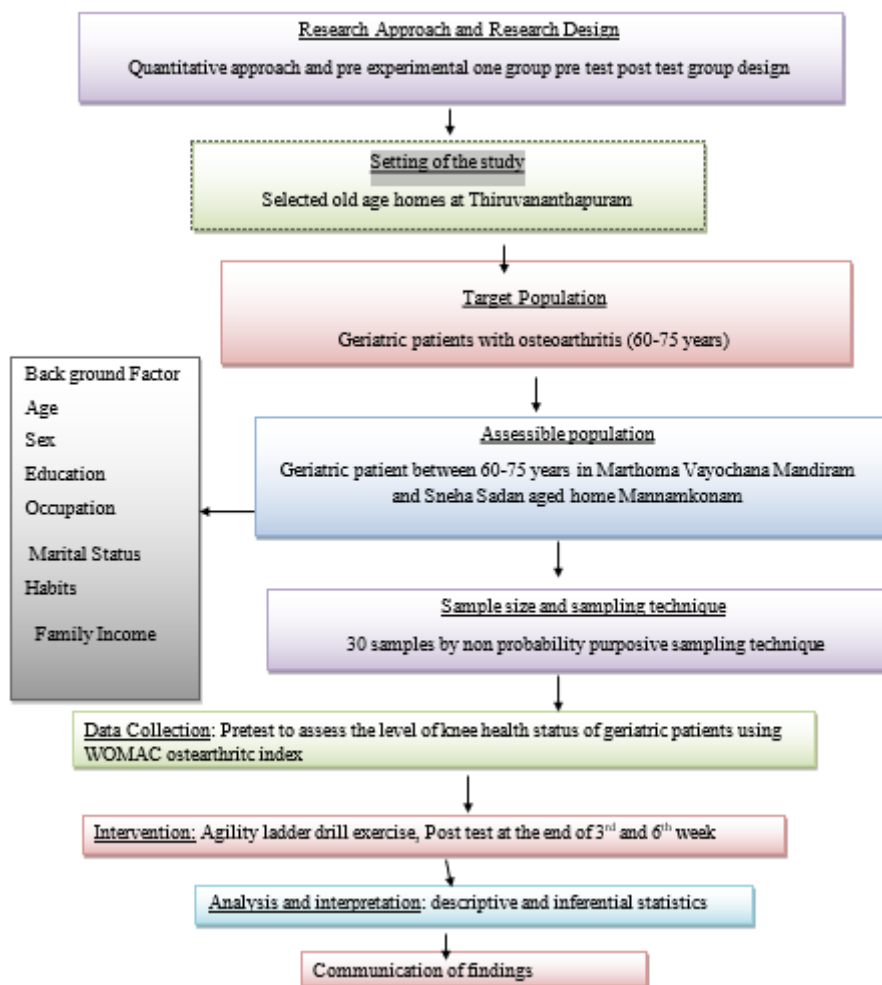


fig2 :Diagrammatic Representation of study

Setting of the study

Research study setting is the location in which the research is conducted and it could be natural, partially controlled or highly controlled⁴⁶.

Setting of the present study was Marthoma Vayochana Mandiram, Charupara, Kattakada and Snehasadanam aged home Mannamkonam Kattakada in Thiruvananthapuram district. The Marthoma Vayochana Mandiram for the aged is a non- profit charitable institution located at Charupara Kattakada. It is one of the most meaningful humanitarian initiatives of the Malankara Marthoma Sapha, Thiruvananthapuram-Kollam Diocese providing care for 30 inmates. The Snehasadam aged home is a Roman Catholic congregation providing a homely ambience for the elderly. It is located at Mannamkonam, Kattakada. The old age home has fifty inmates are present.

Population

A population is the entire aggregation of cases in which a researcher is interested⁴⁷.

In this study the population consisted of all geriatric patients with osteoarthritis whose score is between 25-74 in modified WOMAC osteoarthritis index and age group between 60-75 years in selected old age homes during data collection period.

Sample and sampling technique

Sample

A sample is a subject of a population selected to participate in a research study⁴⁷In the present study sample

consists of 30 geriatric patients with osteoarthritis from Snehasadanam old age home at Mannamkonam.

Sampling technique

Sampling is the process of selecting cases to represent an entire population so that inferences about the population can be made⁴⁸. In the present study, sample was selected by purposive sampling technique which is a type of non probability sampling technique.

Inclusion criteria

Inclusion criteria give researchers a set of inclusive standards to screen potential participants⁴⁹

In this study inclusion criteria are, osteoarthritis patients who are,

- geriatric patients with osteoarthritis who scored between 24-74 in WOMAC osteoarthritis index
- willing to participate in this study
- not engaged in regular exercise program
- available during data collection period

Exclusion criteria

Exclusion criteria are used to determine whether a person should participate in a research study or whether an individual study should be excluded in a systematic review⁴⁸

In this study the exclusion criteria are, osteoarthritis patients who are,

- chronically ill
- have the previous history of knee surgery or major trauma over the knee joint
- mentally ill

Tool / instrument

Tools are the device used to collect data⁵¹. By reviewing the literature and by consulting and discussing with experts, the tools were prepared. The tool consisted of

Section A- demographic profile

Section B- clinical profile

Section C- Modified WOMAC Osteoarthritis index

Section D- Ladder with 10 yard length

Section E- Armless chair

Section F- Stop watch

Development / selection of tool

The various steps were adopted in the development of the tool. Review of literature and discussion with experts was done to collect adequate content for the tool the review of literature and after discussion with the guide and experts.

Content validity

Content validity is the extend to which the elements within a measurement procedure are relevant and representative of the construct that they will be used to measure⁴⁹

To ensure the content validity of the tool it was submitted to 5 experts in the field of medical surgical nursing, an orthosurgeon, a physiotherapist, and a statistician. Mrs. Rajam (associate professor CSI College of nursing karakonam), Mrs. Ajithajyothi. S. T.(Associate professor C S I college of nursing karakonam), Mrs. R. Mercy Russelin Prapha (Associate professor NIMS college of nursing Neyyattinkara), Mrs. Sherlin. V. (Associate professor CSI college of nursing karakonam), Mrs. Sreedevi. R.P. (Assistant professor SI-MET college of nursing Kasargod), Dr. Ashok (Ortho surgeon, Saraswathy hospital, Parassala), Mr. Kency Sam (physiotherapist, Saraswathy hospital Parassala) and Anto Paulin Brinto (Assistant professor and bio-statician, Scott Christian college, Nagarcoil). The experts were

selected on the basis of clinical expertise and on the problem being studied. They were requested to give their opinion on the accuracy, appropriateness and relevance of item in the tool.

Pilot study

A pilot study is a small scale experiment or set of observations undertaken to decide how and whether to launch a full-scale project. It is usually executed as planned for the intended study⁵⁰.

The pilot study was carried out at Marthoma Vayochana Mandiram Kattakada from 04/01/2017 to 14/02/2017 to determine the feasibility of the study.

Formal permission was obtained from the concerned authorities. The researcher selected 3 oldages with osteoarthritis from Vayochana mandiram kattakada, who fulfilled the inclusion criteria for the study by using non-probability sampling technique. After a brief introduction the purpose of the study was explained and obtained consent from the subjects. Pre-test was conducted for the group to assess their functional task performance using WOMAC Osteoarthritic index. After the pretest, agility ladder drill were provided for 6 weeks, 3 sessions per week. Post test was done at the end of third and sixth week respectively. Analysis of the data was done using descriptive and inferential statistics. The subjects were comfortable and cooperated well during the study and there were no modification. The study was found feasible and practicable.

Data collection process

Prior written permission was obtained from the authorities of Vayochana Mandiram Kattakada, and snehasadan kiliyoor. Non probability purposive sampling technique was used to select thirty samples that satisfied the inclusion criteria. Before the commencement of the program, the investigator introduced herself to the participants and briefed on the purpose and intension of the research study. Samples were selected from the old age homes after obtaining informed consent.

The pre-test was conducted on 27/02/2017 using modified WOMAC osteoarthritic index to assess their functional task performance. From the next day the group experienced agility ladder drill exercise for 6 weeks, 3 sessions per week. Each session began with warm up exercise for 5 minutes followed by the agility ladder drill exercise by 30 minutes it includes running through ladder by placing one foot in each square, touching both foot in each square, performing drill following straddling, side ways ladder step. Each steps will be repeated for 15 times, and one foot is standing on floor for 10 seconds, followed by 5 minutes of cooling exercise. Post test was conducted at the end of third and sixth week of experiment.

Plan for data analysis

Data analysis is the systematic organization and synthesis of research data and and, in quantitative studies, the testing of hypothesis using those data.⁵¹

The data planned to be analyzed on the basis of objectives and hypothesis by descriptive and inferential statistics.

Descriptive statistics

Descriptive statistics is used to organize and summarize data to draw meaningful interpretation⁵².

Frequency and percentage distribution were used to study the demographic such as age, sex, education, occupation, marital status, history of habits and family income per month

Inferential statistics

Inferential statistics are concerned with populations and use sample data to make an inference about the population or to test the hypothesis considered at the beginning of the research study⁵³.

't' test was used to assess the effectiveness of agility ladder drill exercise in osteoarthritic old ages

Summary

In this chapter research approach, research design, variables, population, sample and sampling technique, sampling criteria, development and description of tool, content validity of the tool, pilot study, data collection process and plan for data analysis were discussed

CHAPTER 4

Introduction

Data analysis and interpretation of data is the most important phase of the research process, which involves the computation of the certain measures along with searching for patterns of relationship that exists among data groups. Analysis is the process of organizing and synthesizing the data so as to answer research questions and test hypothesis⁵⁴.

This chapter deals with analysis and interpretation of collected data to determine the effect of agility ladder drill exercise on knee health status among geriatric patients with osteoarthritis. Hence in order to interpret the data in an intelligible form, the collected data was compiled, analyzed and interpreted in the light of the objectives and hypotheses of the study using descriptive and inferential statistics.

Organization of findings

The obtained data is organized and analyzed under the following headings

Section 1: socio demographic variables

Section 2: clinical background

Section 3: effect of agility ladder drill exercise on knee health status

Section 4: association between the knee health status and selected socio demographic variables

Section 5: association between the knee health status and clinical variables

Section 1: socio demographic variables

This section deals with the demographic variables of geriatric patients with osteoarthritis. It includes age, sex, educational qualification, history of occupation, marital status, habitual history, family income. Demographic variables of sample are explained in frequency and percentage distribution.

Table 1: Frequency and percentage distribution of samples according to age (n=30)

Age	Frequency	Percentage
60-65 years	7	23.3
66-75 years	12	40.0
71-75 years	11	36.7

Table 1 shows that majority of the samples 12(40.0%) were in the age group of 66-70 years, and 7(23.3%) were in the age group of 60-65 years .

Table 2 Frequency and percentage distribution of samples according to gender (n =30)

Gender	Frequency	Percentage
Male	22	73
Female	8	26.7

Table 2 shows that in group 22 (73.3%) of the samples were male and 8 (26.7%) of the samples were female.

Table 3
Frequency and percentage distribution of samples according to educational qualification
(n=30)

Educational qualification	Frequency (f)	Percent(%)
Primary	12	40.0
Secondary	4	13.4
Higher secondary	10	33.3
Graduation or above	4	13.3

Table 3 shows that majority 12(40.0%) of samples were completed their primary education only and 10 (33.3%) of samples were completed higher secondary education and only 4 (13.4%) were completed secondary education and graduation and above.

Table 4 Frequency and percentage distribution of samples according to history of occupation
(n=30)

History of Occupation	Frequency(f)	Percentage(%)
sedentary work	14	46.7
Moderate work	8	26.7
Heavy work	8	26.6

Table 4 shows that the majority 14 (46.7%) of samples were sedentary workers and 8 (26.7%) of samples were moderate and heavy workers.

Table 5
Frequency and percentage distribution of the sample according to marital status
(n = 30)

Marital status_	Frequency (f)	Percentage (%)
Single	3	10.0
Widow/Widower	4	13.3
Married	23	76.7

Table 5 shows that the group majority 23 (76.7%) of samples were married and 3 (10%) samples were single

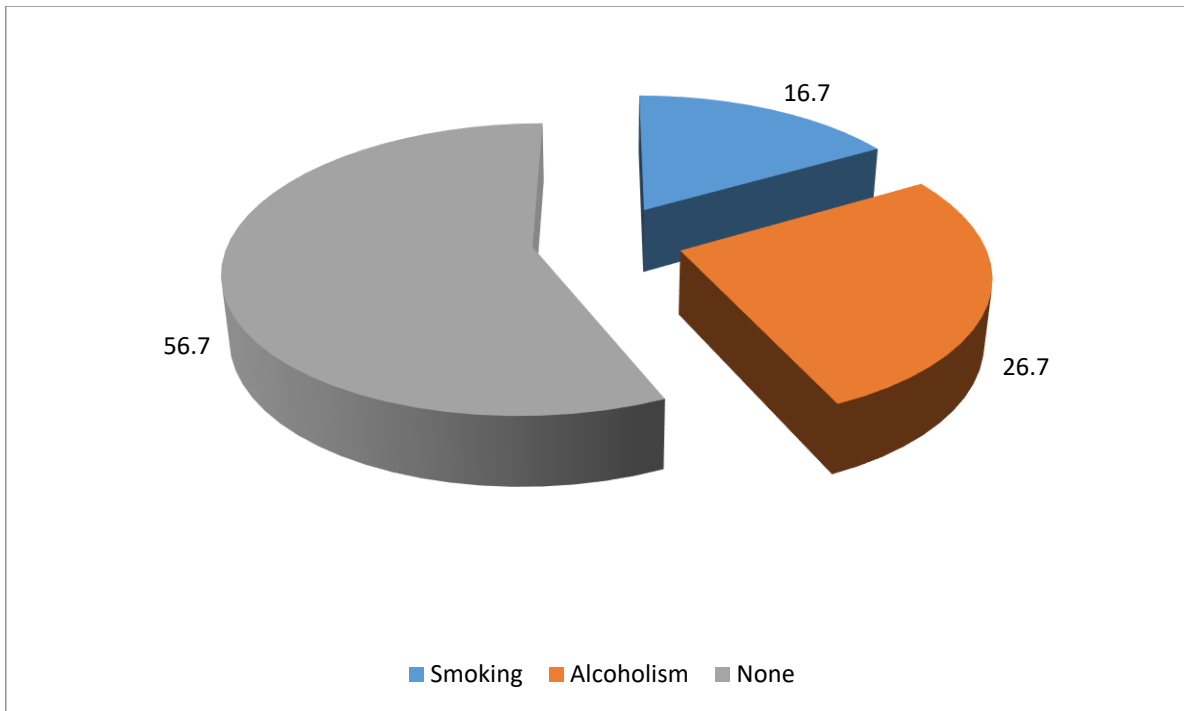


Figure 3: Frequency and percentage distribution of the sample according to habitual history

Figure 3 shows that in the group majority 17 (56.7%) of samples were not having any bad habits, and 8 (26.7%) of samples were had the history of alcoholism and 5 (16.7%) of samples were had the history of smoking.

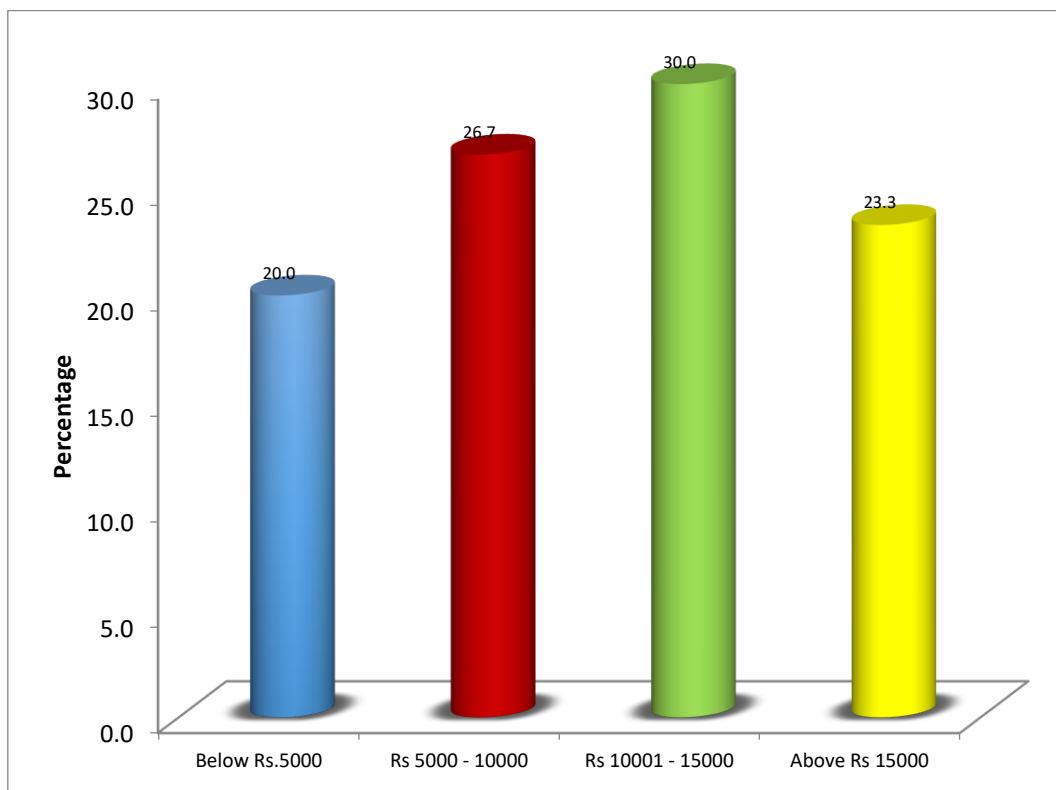


Figure 4: Frequency and percentage distribution of the samples according to family income per month

Figure 4 shows that in the group 9 (30%) of samples had the family income in between Rs. 10001-15000, and only 6 (20%) were had the family income below 5000.

Section 2: Clinical Background

This section deals with the clinical background of the geriatric patients with osteoarthritis. It include duration of knee pain, body mass index and history of other physical illness

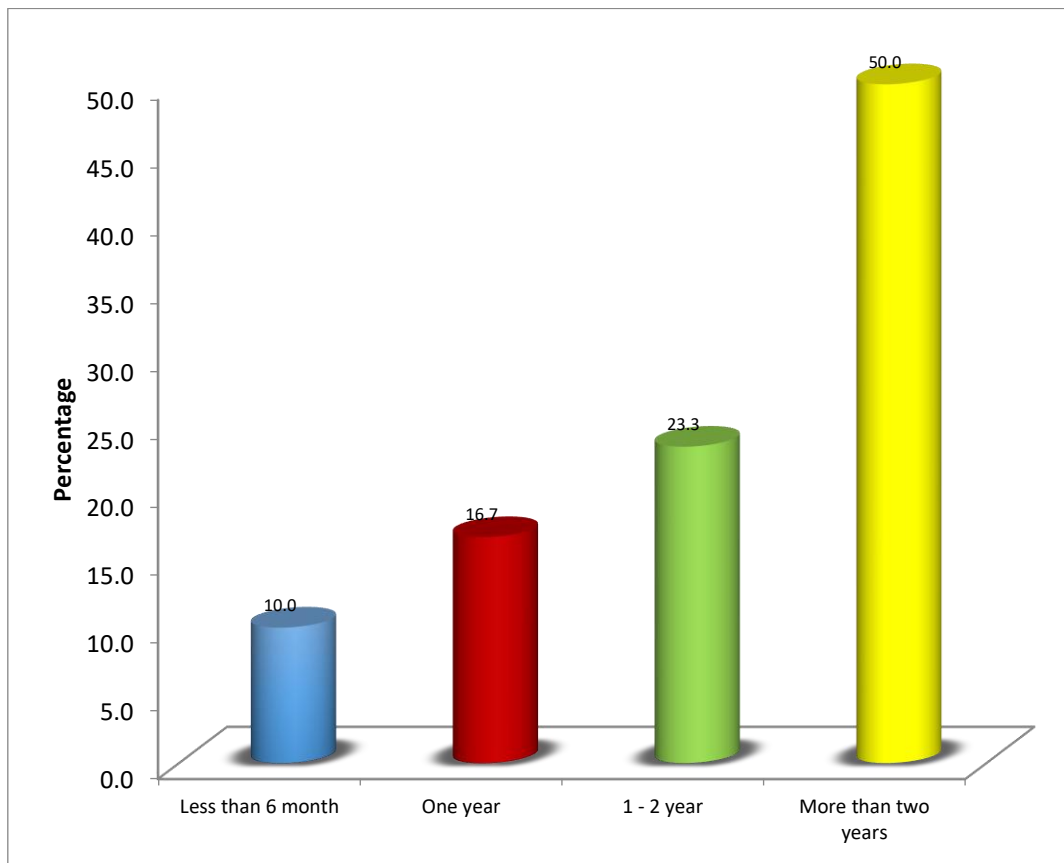


Figure 5 : Frequency and percentage distribution of the samples according to duration of knee pain

Figure 8 shows that in the group 15 (50%) of samples were had the duration of knee pain was more than two years and only 3(10%) of samples were had only less than 6 month duration.

Table 6
Frequency and percentage distribution of the samples according to the body mass index (n=30)

Body mass index	Frequency (f)	Percentage(%)
Under nourished	6	20.0
Normal	7	23.3
Overweight	14	46.7
Obesity	3	10,0

Table 6 shows that in the group 14 (46.7%) of samples were had overweight, and only 3 (10%) of samples were had obesity for the geriatric patients

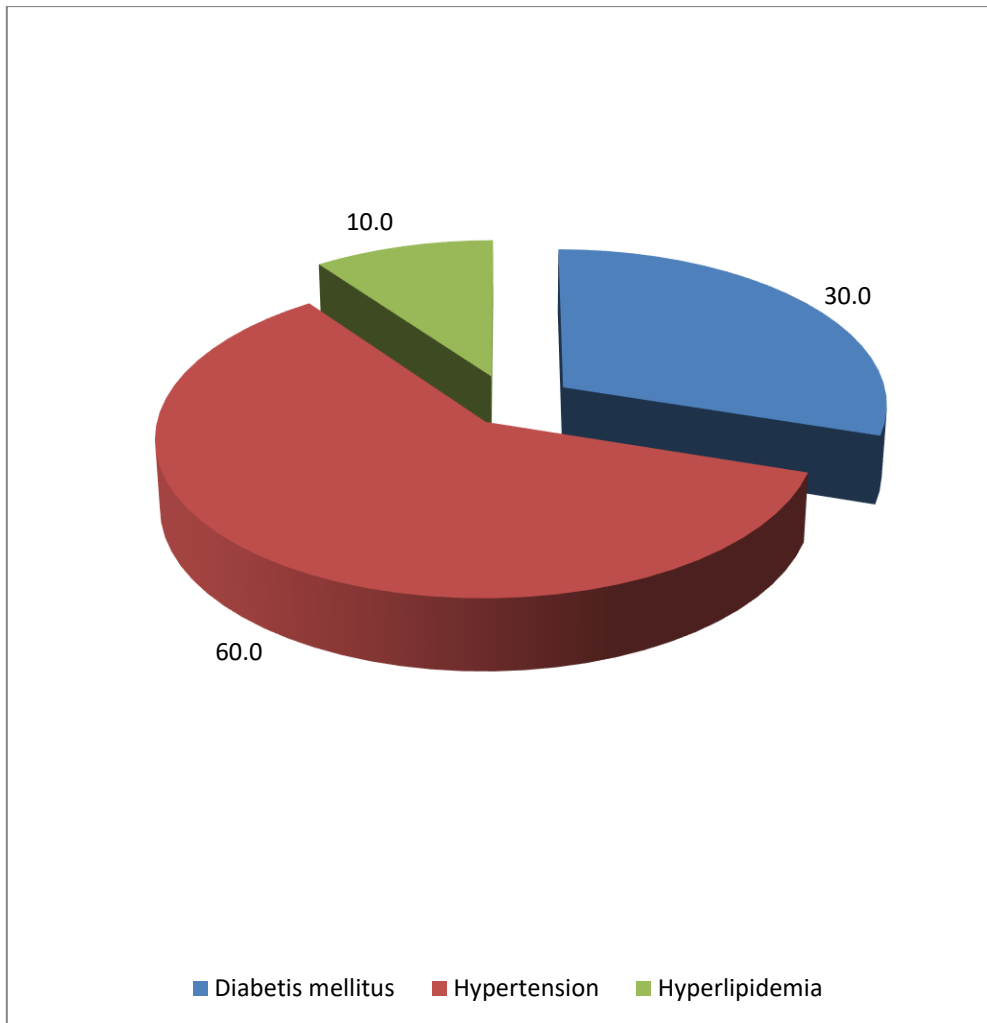


Figure 6: Frequency and percentage distribution of the samples according to the history of other physical illness

Figure 6 shows that in the group 18 (60%) of samples were had the history of hypertension 9 (30%) of samples were had diabetic mellitus and only 3 (10%) of samples were had the history of hyperlipidemia.

Section 3: Effect of Agility Ladder Drill Exercise on KneeHealthStatus

This section deals with the effect of agility ladder drill exercise on knee health Status among geriatric patients with osteoarthritis.

Table 7 Frequency and distribution of the samples according to knee health status (n =30)

Knee health	Pretest		Post test1		Posttest 2	
	f	%	f	%	f	%
Mild	0	0.0	0	0.0	3	10.0
Moderate	7	23.3	15	50.0	26	86.7
Severe	23	76.7	15	50.0	1	3.3

Table 7 shows that in the group, after the posttest 1 mild knee health status was 0 (0.0%), moderate 15 (50.0%) and severe 15 (50.0%), and after posttest 2 mild knee status was 3(10.0%), moderate 26

(86.7%) , and severe 1 (3.3%). This shows that there is an effect on ladder drill exercise on knee health status of geriatric patients with osteoarthritis.

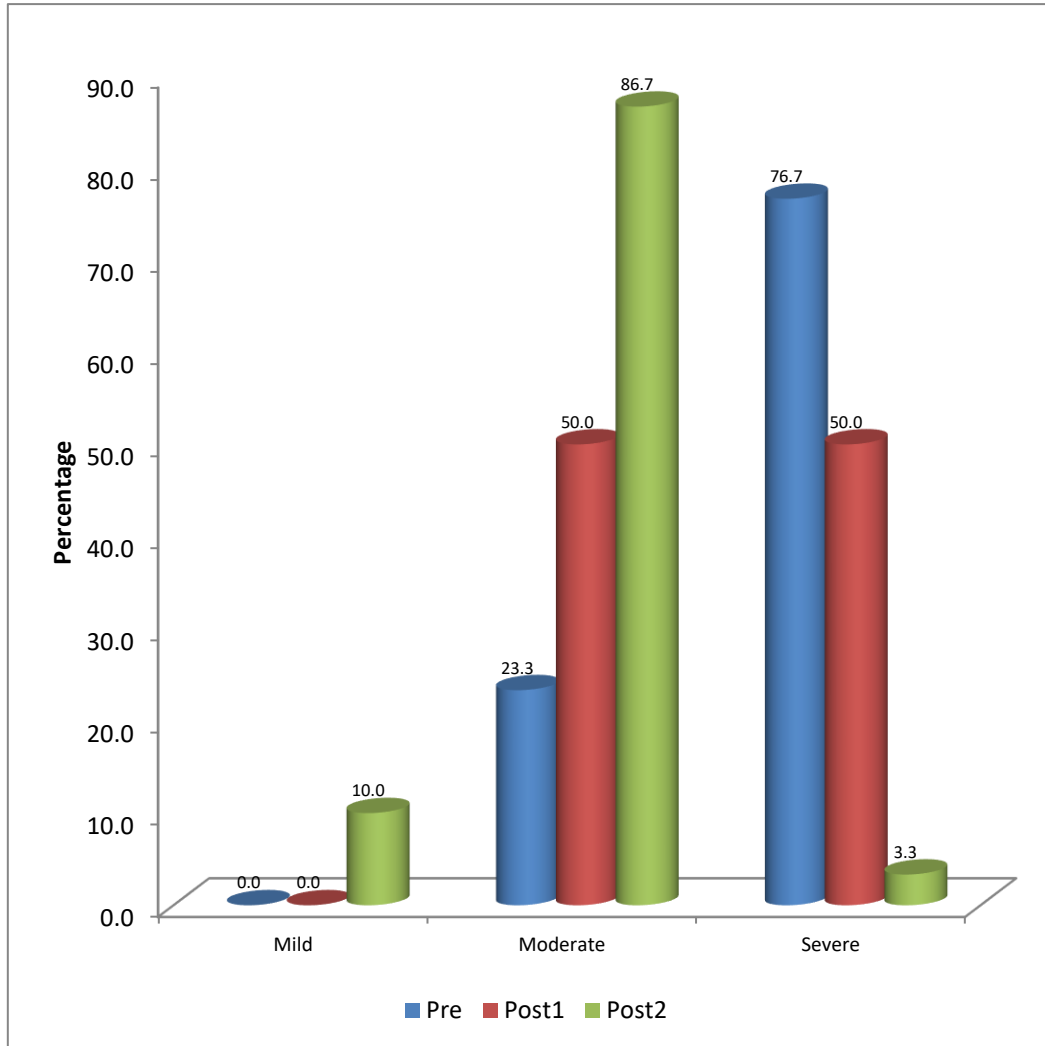


Fig 7 : Effect of agility ladder drill exercise on knee health status

Figure 7 shows that after the posttest 1 mild knee health status was 0 (0.0%), moderate 15 (50.0%) and severe 15 (50.0%) , and after posttest 2 mild knee status was 3(10.0%), moderate 26 (86.7%) , and severe 1 (3.3%). This shows that there is an effect on ladder drill exercise on knee health status of geriatric patients with osteoarthritis

Table 8 Frequency and distribution of the samples according to effect of agility ladder drill exercise on knee pain

				(n=30)			
Knee pain	Mean	SD	N	Group	Meandifference	Paired t'	P
Pre	57.4	10.4	30	Pre Vs Post 1	9.6	12.98**	0.000
Post1	47.8	11.2	30	Pre Vs Post 2	24.5	20.53**	0.000
Post2	32.9	7.1	30	post1Vs post2	14.9	13.38**	0.000

** : - Significant at 0.01 level

Table 8 shows that in the group the obtained t value in pretest vs posttest 1 is 12.98 is greater than table value and significant at 0.01 level; and the obtained t value in pretest vs posttest 2 is 20.53 is greater than table value is significant at 0.01 level; and the obtained t value in posttest 1 vs posttest 2 is 13.38 is greater than table value is significant at 0.01 level. And this shows that the agility ladder drill exercise is effective for geriatric patients with osteoarthritis.

Section 4: association between the knee health status and demographic variables

(n=30)

Variable	f	%	P	f	%	P
Age						
<=70 years	6	31.6	13	68.4	1.97	0.161
71 - 75 years	1	9.1	10	90.9		
Gender						
Male	6	27.3	16	72.7	0.72	0.398
Female	1	12.5	7	87.5		
Educational qualification						
Primary/Secondary	3	18.8	13	81.3	0.4	0.526
Higher secondary or above	4	28.6	10	71.4		
History of occupation						
Sedentary work	4	28.6	10	71.4	0.4	0.526
Moderate/Heavy work	3	18.8	13	81.3		
Marital status						
Single/Widow/Widower	1	14.3	6	85.7	0.42	0.518
Married	6	26.1	17	73.9		
Habitual history						
Yes	5	38.5	8	61.5	2.93	0.087
No	2	11.8	15	88.		
Family income						
Below Rs.10000	3	21.4	11	78.6	0.05	0.818
Above Rs 10000	4	25.0	12	75.0		

Table 9 shows the chi square values of intensity of knee health status and selected demographic variables. It revealed from the table the obtained chi square value was not significant. And it shows there was no association between intensity of knee health status of osteoarthritic patients and selected demographic variables.

Section 5: Association between the knee health status and clinical variables

Table 10 : Frequency and percentage distribution according to clinical variables

(n=30)

Clinical variables		Moderate		Severe		X ²	P
f	%	f	%	f	%		
Duration of kneePain							
Less than 2 years		4	26.7	11	73.3	0.19	0.666
More than two years		3	20.0	12	80.0		

BMI						
Under nourished/Normal	2	15.4	11	84.6	0.81	0.368
Over weight/Obesity	5	29.4	12	70.6		
History of other physical illness						
Diabetis mellitus/Hyperlipidemia	2	16.7	10	83.3	0.5	0.481
Hypertension	5	7.8	13	72.2		

Table 10 shows the chi square values of intensity of knee health status and selected clinical variables. It revealed from the table the obtained chi square value was no significant. And it shows there was no association between intensity of knee health status of osteoarthritic patients and selected clinical variables.

CHAPTER 5 RESULTS

Introduction

Results are the answers to research questions, obtained through an analysis of the collected data. The aim of the study was to assess the effect of agility ladder drill exercise on knee health status among geriatric patients with osteoarthritis. Data collection and analysis were carried out based on the objectives and hypothesis of the study. This chapter deals with the objectives, hypothesis and results of the study.

Objectives of the study

- To assess the effect of agility ladder drill exercise on knee health status among geriatric patients with osteoarthritis in selected old age homes in Thiruvananthapuram District.
- To find the association between knee health status among geriatric patients with osteoarthritis and selected demographic variables in selected old age homes in Thiruvananthapuram.

Hypothesis

The following hypothesis were tested at 0.01 level of significance.

- There is a significant difference in the level of knee health status among geriatric patients with osteoarthritis before and after agility ladder drill exercise.
- There is a significant association between the level of knee health status among geriatric patients with osteoarthritis and selected demographic variables

Results

The results of the study are discussed under the following headings

- Description of sample characteristics
- Effect of agility ladder drill exercise on knee health status among geriatric patients with osteoarthritis
- Association between knee health status and selected variables
- Association between knee health status and clinical variables

Sample characteristics

- Most of the samples were in the age group of 66-70 years(40.0%)
- Majority of the samples are males(73.3%)
- Majority of the samples were under went primary education (40.0%)
- Most of the samples were doing sedentary work(46.7%)
- Majority of the samples were married(76.7%)
- Majority of the samples were not having any habitual history such as smoking and alcoholism(56.7%)

- Most of the samples were having the income between Rs 10001-15000(30.0%)

Effect of agility ladder drill exercises on knee health status among geriatric patients with osteoarthritis
Paired 't' test was done to find out the effect of agility ladder drill exercises on knee health status among geriatric patients with osteoarthritis. In the group, there was a significant difference between pre- test and post- test level of knee health status . The obtained 't' value was statistically significant at 0.01 level.

Association between knee health status and variables

Chi square test and analysis of variance was computed to find out the association between knee health status and selected demographic variables. There was no significant association between knee health status and selected demographic variables

Association between knee health status and clinical variables

Chi square test is used to find out the association between knee health status and clinical variables. There were no significant association between the knee health status and selected clinical variables.

CHAPTER 6

DISCUSSION, SUMMARY AND CONCLUSION

This chapter presents the discussion, summary and conclusion, nursing implications, limitation and recommendations for future research. The conclusions and recommendations should be based off of the results of data analysis and must be directly related to the purpose of the study.

Discussion

Discussion helps to interpret and describe the significance of the findings in light of what was already known about the research problem being investigated. The present study was intended to assess the effect of agility ladder drill exercise on knee health status among geriatric patients with osteoarthritis. The study findings were discussed in terms of objectives and hypotheses formulated.

Sample characteristics

In this study majority of the samples belongs to the age group in between 66-70 years and least number of samples in between 60-65 years old. And most of the samples are males (73.3%). In this study majority of samples were underwent primary education (40%) and doing sedentary work (46%) . Most of the samples are married (76.7%) and not having any habitual history (56.7%). Majority of the samples have the family income in between Rs. 10001-15000. And regarding the clinical back ground 50% of samples having knee pain more than two years. Regarding the body mass index 46.7% of samples are in overweight and 10% of samples were obese.

The first objective of study was, To assess the effect of agility ladder drill exercise on knee health status among geriatric patients with osteoarthritis in selected old age homes in Thiruvananthapuram District.

From this study by used the paired t test , in that, the pre-test Vs post-test1 mean score is 12.98, pre-test Vs post-test 2 mean score is 20.53. and post-test 1 Vs post-test 2 mean score is 13.38 respectively. It reveals that the knee health status is improved after providing agility ladder drill exercise. The obtained t value was statistically significant at 0.01 level. This shows the effectiveness of agility ladder drill exercise on knee health status among geriatric patients had a positive impact on the level of knee health status. Thus the research hypothesis H1 is accepted.

The second objective is to find the association between knee health status among geriatric patients with osteoarthritis and selected demographic variables in selected old age homes in Thiruvananthapuram.

Independent 't' test and analysis of variance was used to find the association between the knee health status and selected demographic variables. In this study there was no significant association between knee health status among geriatric patients with osteoarthritis and demographic variables such as age, sex, occupation (previous) and history of habits. Hence the research hypothesis H2 is rejected.

A study was conducted to assess the effect ladder and Speed, Agility, Quickness training on speed and agility among sports club badminton players by, Kamaraj University. Subjects were selected by randomization which include 30 men sports club badminton players. The period of training was 8 weeks in a schedule of weekly 3 days for alternate days. The data analysed by Covariance and Scheffe's post hoc test at 0.05 level. Based on the result it was concluded that the ladder drill and SAQ training were significantly improved the speed and agility among sports club badminton players.

Summary

The main purpose of the study was to assess the effect of agility ladder drill exercise on knee health status among geriatric patients with osteoarthritis . Quantitative research approach was used in the study and the research design was pre-experimental one group pre-test post test group design. The objectives of the study to assess the effect of agility ladder drill exercise on knee health status among geriatric patients with osteoarthritis in selected old age homes in Thiruvananthapuram district. And to find the association between knee health status among geriatric patients with osteoarthritis and selected demographic variables in selected old age homes in Thiruvananthapuram district.

The conceptual frame work based on king's goal attainment theory. An extensive review of related literature for this study was done by the investigator, which helped to develop conceptual framework and tool. The literature reviews also helped in determining the effectiveness of intervention and plan the analysis

The population of the study was 30 geriatric patients with osteoarthritis in selected old age home at Thiruvananthapuram district. Purposive sampling which is the type of non-probability sampling technique was used in this study. Modified WOMAC osteoarthritic index used to assess the knee health status of the samples.

To ensure the content validity, the tool was given to experts. After the pretest agility ladder drill exercise were given to the samples for six weeks three days per week. Post test was done at the end of third and sixth week

The data gathered were analyzed and interpreted based on the objectives. Descriptive and inferential statistics were used to analyze the data.

The findings of the study shows that there is significant improvement in knee health status of geriatric patients after the intervention.

A study was conducted to examine the effect of exercise on knee joints with osteoarthritis by Judith G Bouch et.al. Total 34 subjects selected. Subjects were randomized in to 2 group the minimal treatment group and the exercise group. The exercise group participated in a 1 hour exercise session, 3 times a week. The Arthritis Impact Measurement Scale (AIMS), were used to measure health status, and VAS for pain assessment used before and after intervention. The results showed that pain level declined in experimental group and the minimum treatment group showed improvement on the AIMS

Conclusion

The findings of the study showed that in the post test there was a significant improvement in knee health status of geriatric patients with osteoarthritis. Hence it is revealed that the agility ladder drill exercise is effective for the improvement of knee health status among geriatric patients.

Nursing implications

The findings of the present study have implication in the field of nursing education, nursing service, nursing administration and nursing research.

Nursing education

- Conduct seminars and workshops for students and nursing personnels regarding the effect of agility ladder drill exercise
- The nursing curriculum should also provide opportunity to plan and conduct health education regarding agility ladder drill exercise
- Effective teaching material and demonstration should be used to express the content area clearly

Nursing service

- Community health nurse can impart the knowledge regarding agility ladder drill exercise to old ages
- Nurses working in the hospitals and students during their clinical posting will be able to demonstrate agility ladder drill exercise to the patients and relatives

Nursing administration

- Administrators should take provision for in-service education program regarding ladder drill exercise
- The nurse administrators can develop an institutional protocols for the rehabilitation of old ages.
- The nurse administrators encourage to provide health education to the old ages because it is cost effective one

Nursing research

- By conducting research and formulating new theories researchers can improve the knowledge, skill, and attitude of nurses and ultimately can improve the status and standard of nursing profession
- Disseminate the findings of research through seminars, workshops and publish in nursing journals
- Findings of the study help to expand the body of professional knowledge upon which further research can be conducted
- The study will be valuable reference for further researcher.

Limitations

- The sample size was relatively small and hence the generalization of the study could be done with caution.
- The study was limited only to those who were able to speak Malayalam
- Subjects were selected only from two old age homes in Thiruvananthapuram district.

Recommendations

- A similar study can be under taken with a larger sample size to generalize the findings
- A similar study could be conducted in different settings
- A study can be done to assess the knowledge on agility ladder drill exercise among old ages
- Replication of the study can be conducted with different in schedule and more than three times per week

Summary

This chapter deals with discussion, summary, conclusion, implication, limitation and recommendations. And it was found that administration of agility ladder drill exercise was effective in improving knee health status among geriatric patients with osteoarthritis.

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