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"A study to assess the effectiveness of isometric Exercises on Pain Among Patients Diagnosed With osteoarthritis at selected Hospital At Vadnagar Gujarat

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ABSTRACT
A study to Assess the Effectiveness of Isometric exercises on pain among patients diagnosed with osteoarthritis in selected hospital, Vadnagar, Gujarat. It was conducted for partial fulfillment of the requirement for the Degree Of Master of Science in Nursing, under The Hemachandracharya North Gujarat University,Patan,Gujarat,

OBJECTIVES

1. To assess thepre test and post testlevel of painamong patients diagnosed with osteoarthritis in both experimental and control group .
2. Toevaluatetheeffectivenessof isometric exercisesonpainamongpatients diagnosed with osteoarthritis in experimental group and their selected demographic variables.
3. Tofindouttheassociationbetweenposttestlevel ofpain in experimental group and their selected demographic variables.
4. To find out the association betweenpost test level ofpain in control group and their selected demographic variables

HYPOTHESES

❖ **H1**: Therewill besignificant differencebetween thepretest and post test level of pain in the experimental group

❖ **H2** : There will significant difference between the post test level of pain between the experimental and control group.

❖ **H3**:Therewillbeasignificantassociationbetweenposttestlevelofpainin experimental group and their selected demographic variables.

❖ **H4**:Therewillbeasignificantassociationbetweenposttestlevelofpainin control group and their selected demographic variables

ThestudymadeuseoftheQuantitativeapproach ,Quasi-experimental pretest and post test controlgroupbytheresearcher. The Convenient sampling technique was used to select 60 samples.ot of 60 samples ,30 samples were randomly assigned in to experimental group and 30 samples were in to control group. Demonstration and re- demonstration of isometric exercises was done to the samples in experimental group .Visual Analogue Pain Scale, wasusedto assessthelevelofpainamongnewly diagnosedpatients with osteoarthritis before and after intervention. Thedata was collected ,organized and were analyzedbyusingdescriptiveandinferentialstatistics.

MAJORFINDINGSOFTHESTUDY

❖ Majorityofthepatients inexperimentalgroup 16(53.35%) are at theage between 60-65 years and in control group 25(83.3%) patients are at the age between60-65 years .

❖ Majority of the patientsinexperimental group 24(80%) arefemales and in controlgroup24(80%) patients are females.

❖ Majorityofthepatientsinexperimentalgroup 17(56.7%)arecollegiateand incontrolgroup 12(40%) patients are collegiate .

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❖ Majority of the patientsin experimental group 28(93%) are employed, 2 (6.6%)areunemployed and incontrolgroup 21(70%) patients are employed.

❖ Majority of the patients in experimental group 22(73.3%) are earning 10,001- 15,001 andincontrolgroup 20(66.7%) patients areearning 10,001-15,000 .

❖ Majority ofthe patients inexperimentalgroup 11(36.7%) are sufferingfrom illness for 8 months andincontrolgroup 15(50%)patients are sufferingfrom illness for2 months.

❖ Majorityofthe patients inexperimentalgroup21(70%) havebilateral knee jointpain and incontrolgroup 17(56.7%) patients havebilateralknee joint pain .

❖ Majorityofthepatients inexperimentalgroup 25(83.3%) have jointpain duringactivities andin controlgroup17(56.7%) patients havejointpain duringactivities.

❖ Majority of thepatients in experimental group 25(83.3%) havenotreatment andincontrol group 25(83%) patients have no treatment. In experimental group duringpretest9 (30%) samples have moderatepain, 21(70%) samples have severepain. During post test 24(80%) samples have mild pain , 6(20%) samples havemoderate pain .

❖ Thepretest mean score ofpain in experimentalgroupis6.7 [SD0.59]and the posttest meanscore is2.53 [SD 0.82],(t value 26.104) .The study findings revealedthat,in experimental group the post test meanscore of pain andis lowerthanthepre test mean score of pain .

❖ Thepost test meanscore ofpaininExperimental group is 2.53 [SD0.82](t value 20.18). The post testmeanscore ofpainincontrolgroupis 6.93[SD 0.87](t value 20.18). The studyfindings revealed that the post test mean score of pain in experimental group who received isometric exercises is lower than the control group.

❖ Thestudyfindingsrevealedthatthereisnosignificantassociationbetweenpost test level of painin experimentalgroup and controlgroup with their selected demographicvariablessuchas age ,sex, education, occupation ,family income, duration of illness ,perception of knee pain, frequency of knee painand any treatment.

RECOMMENDATIONS

Thefollowingrecommendationsaremadebasedonthe findingsofthestudy:

❖ Asimilar studycanbedonewithlargesamples.

❖ A similar studycanbedonetoassessthequalityoflifeamongpatients withosteoarthritis.

❖ Acomparative study can be done to assess the effects of isometric quadriceps exercise and isometric quadriceps exercise along with ultrasound in patients with osteoarthritis of knee.

❖ A similar study can be conducted with post test after one month, six month and one year interval to evaluate the practice of samples.

❖ Mass media can be used to popularize the importance of exercises amongpatientswithosteoarthritis.

CONCLUSION

Osteoarthritis is a progressive degenerative disease that affects the joint cartilage, subchondral bone, synovial and joint capsule .pain is the dominant symptom of osteoarthritis .pain along with the joint stiffness, instability,swelling and muscle weakness leads to physical and physiological disability and impaired quality of life .Nurse is a key person for providing care to patients .As for this research is concerned, the intervention study proved that there is a significant reduction of pain among patients with osteoarthritis.The followingconclusions are drawn from the findings of study .The result of this study reveals that the effectiveness of isometric exercises can help to reduce the pain . Thus thepractice of isometric exercises in physical therapy for patients with osteoarthritis should be encouraged to individual and society ,throughprogramme and mass media or health education program to lead a healthy life. The isometric exercises formstheeffectivenonpharmacologicalinterventiontoreducepainandimprove functional mobility among osteoarthritis patientsand also it is proved to be the best non invasive with no side effects are reported. The findings of this study agree with the findings of previous clinical study, regarding isometric exercises technique

I. INTRODUCTION

Arthritis,GoOn;GetOut'uhHere;we've,Gotthe victory

-DeborahYoung

1.1 BACKGROUNDOFTHESTUDY

Arthritis is an umbrella term that refers to over 100 different diseases thatcause joint inflammation. The condition includes pain, decreased range of

motion, loss of muscle strength, impaired ambulation, muscle atrophy, de- conditioning, and synovial thickening (hardening of the fluid surrounding a joint) The two most prevalent types of identified arthritis are rheumatoid arthritis, and osteoarthritis.. Osteoarthritis (OA) is a progressive degenerative disease that affects the joint cartilage, sub chondral bone, synovial and joint capsule. The knees followed by hips, are the most commonly affected weight bearing joints. It hasamultifactorialetiologyandaffectsaround60%ofindividualsagedover 50 years. Osteoarthritis affects 9% of men and 18% of women over 65 years old andisresponsibleforhighlevelsofabsenteeism andretirementduetodisability**(Davis et al).**

Americans 65 years of age or older represent an expanding proportionof united states populationandtheir numbers will increase rapidly as the baby- boom generation ages. Although the majority of older people in the U.S are healthy and physically active, others suffer with chronic illnesses and require some assistance (family, friends and public support systems) to manage their everyday lives. Approximately one quarterofallpatientsseenbyprimary carephysicianspresentwithmusculoskeletalconditionsandamongthoseage 65yearsandolder,themostprevalentarticulardiseaseisosteoarthritis .Addressingthehealthneedsofthisrapidly expandingpopulationisanationalpriority.

In 2007, 7.8% of Australians had osteoarthritis and this is projected to increase to 11% by 2050 dueto population ageing and rising obesity rates. Osteoarthritisisamajorcauseofchronicpainanddisabilityinthe olderpopulation. Theetiologyofosteoarthritis isrelatedtorepetitivemechanical loads and age. Recent studies have separated the etiological factors into three main sub-groups: sex, anatomy, and body mass. somefactorssuchasage, gender,andinheritanceareimmutable,butothersaremodifiable.Obesity ,weakness ,jointlaxityandalteredbiomechanicsaresomeriskfactors potentiallyamenabletononpharmacologicalmeasures.

Gender also influences the prevalence andincidenceof osteoarthritis . Isolated hand and knee osteoarthritis are common in women, whereas the incidenceofhipdiseaseismoreinmen. Prospective ,longitudinalstudieshaveexaminedtherelationship between body weight and osteoarthritis. Data from **Framinghamknee osteoarthritisStudy**, that followed1,420 personsformorethan30years indicate that overweight men and women are high risk in developingsymptomaticandradiographicosteoarthritis thanthoselessobese. **Felson andcolleagues**alsoreportedthattheweightreductionreducespain, furthersupportingtherelationshipbetweenobesityand osteoarthritis. **Slemenda a**nd colleagues reported that the reduced strength relative to bodyweightmayplayroleindevelopmentofosteoarthritis. Thesedatasuggest that interventions designed to strengthen the muscleand reduce totalbodyfatmaybeeffectivemethodsforreducingpainandimproving functioninpatientswithosteoarthritis. Evidencefromvariouscross sectionalandlongitudinalstudiedsuggested that major trauma to the joint increases the risk for developing osteoarthritis

The clinical manifestations ofosteoarthritis are joint pain, stiffness, decreased range of joint movement, muscle weakness of the quadriceps, and alterations in proprioception**. Slemendaand colleagues**examinedthe relationshipbetweenmusclestrengthandknee osteoarthritisinthe populationofrandomlyselectedcommunitydwelling olderadultsage65 yearsandolder. Theyreportedthatinthosewiththehistoryofkneepain isolatedquadricepsmuscleweakness was stronglyassociatedwithradiographicosteoarthritis.**Paiandcolleagues**showedthattheknee

proprioceptionwassignificantlydiminishedinoldera dults with osteoarthritis whencomparedwiththeircounterpartswithoutosteoar thritis.

Inosteoarthritis decreased strength in the muscle groups involving the joints is significant because it causes progressive loss of function. These symptoms significantly restrict the individual's ability to get up from a chair, walk, or climb stairs.Walking with a limp, poor alignment of the limb, and instabilities can also be observed in individuals with osteoarthritis . During movements, crepitation can be heard because of arthritis of the irregular joint surfaces.

Pain is the dominant symptom of osteoarthritis. Pain along with the joint stiffness, instability ,swelling and muscle weaknessleadstophysicaland physiologicaldisability andimpairedqualityoflife. Osteoarthritis often affects one of the three compartments of the knee: the patella femoral joint or the medial or lateral joint compartment. Osteoarthritis of the knee can be classified according to the Kellgren-Lawrence scale, which consists of five degrees of OA: 0=no OA, 1=doubtful, 2=minimal, 3=moderate and 4=severe.

The treatment of osteoarthritis should be multidisciplinary and aim for functional, mechanical and clinical improvement .The treatment options may be non-pharmacological, pharmacological or surgical. Total hip or knee joint replacement is common for advanced disease. Medicationssuchasanalgesics and non steroidal anti inflammatory drugs should not be used alone as theprimary therapy but instead used in conjunction with non pharmacological measures .These include education about the joint protection ,weight loss counselingforobesepatients ,developmentofpain copingskill, enhancement ofsocialsupport, applicationofheatandcoldtopainfuljoints, exercises that strengthen muscle and the use of cane or a walker. Clinical guidelines advocateexercises programgiven theirease of application, small number of potentialadverseeffectsandlowcostsaimed atalleviatingpainand improvingoverallphysicalfitnessisespeciallyimport ant, becausetheprimary concern for many osteoarthritis patients is maintenance of functional independence**. A systematic review** has shown that exercise reduces pain and improves function in patients with osteoarthritis of the knee. One of the most common forms of achieving this functional improvement is by following a program of daily exercises.

Physiotherapy is a non-pharmacological intervention for osteoarthritis of the knee that is recommended by the **American College of Rheumatology and the European League against Rheumatism**. Thebasiccomponent forany physicalactivityprogramareexercisestoimproveflexi bility ,muscle strength andenduranceand themaingoalsofexercises inthispatientgroup are toreducepain, improve physicalfunctionand optimize participation in social, domestic, occupationalandrecreationalpursuits. Regular exercises can improve physiological improvements associated with osteoarthritis including musclestrength, jointrangeofmotion, proprioception andbalance.

A placebo-controlled study by Deyle et al showed that patients with knee osteoarthritis experienced significant improvements in clinical status as well as pain, stiffness, and function (walking distance) when submitted to exercises combined with manual therapy..

Manualtherapydiffersdependinguponthetypeofmus cle contraction:-staticordynamic .Dynamic contractionsarefurtherclassified intoisotonicandisokinetic.

Isokineticmusclecontractionsareperformed onsophisticatedmachinesthatapplyvariableresistanc ethroughouttherangeofmotion .Anisotonicmusclecontractionischaracterizedby variablejointspeedexertedagainstaconstantresistanc e(i.efreeweightbenchpressactivities).**Strength** ,animportantfactorintheperformanceof dailyactivity and also itisanimportantpartofacomprehensive rehabilitationprogramforpatientswith osteoarthritis. Theagingprocess, burdensofchronicdisease, malnutritionandinactivityduetoosteoarthritis painallcontributetoreducedmusclemass (sarcopenia) andweakness. The mainobjectiveofstrengthtrainingprogramaretoincre asethe strengthof musclethatsupportaffectedjoints. **Thusthestaticorisometriccontractions** does not change the length of muscle or move a joint instead strength the muscle thesupporttheaffectedjointsandalleviatepain, improvesphysicalmobility arerecommendedfor osteoarthritispatients.

It was suggested with theevidencethat the guidance of the medical team member guarantees that the physical exercises are being practiced correctly. Unfortunately, there is a high demand in large public health services, and it is often impossible to meet the needs of everyone, particularly those who have difficultytravelingtothetrainingcenter.Thephysicale xercises,however,canbe

done both in the clinic and in home-based exercising programs, provided that the patient returns for some supervised visits. The utilityof home-based exercise was clearly shown by another study performed by **Deyle's research** staff, which compared a group of osteoarthritis patients submitted to exercises, individualized manual therapy, and a home-based exercise program for four weeks with a group of osteoarthritis patients receiving the same home exercise program and a clinic visit 2weeks later. Both groups demonstrated a significant clinical improvement compared to baseline. Initially, the clinic-based patients showed a greater level of improvement, but the results of both groups were equally beneficial one year later.In addition, **Thomas et al**. showed that home-based exercise for two years could result in significant control of knee pain. Thehomebasedisometric exercises on painand functionof osteoarthritis patientsarethemainstay this study.

1.2 NEEDFORTHESTUDY

Osteoarthritis is one of the oldest and most common forms of arthritisknown as the "**wear and tear**" kind of arthritis.Osteoarthritis is a chronic joint disorder in which there is progressive softening and disintegration of articular cartilage accompanied by new growth of cartilage and bone at the joint margin (osteophytes) and capsular fibrosis. Osteoarthritis is more common in older people, can develop it usually as the result of a joint injury, a joint malformation, or a genetic defect in joint cartilage. Both men and women have the disease. Before age 45, it equalizes in both men and women. At the age of 45 it is more common in women.It is also more likely to occur in people who are overweight and those with jobs that stress particular joints.

Osteoarthritis is the most prevalent form of arthritis in the **United States**, affecting more than 70% of adults between 55 and 78 years of age. Women are affected more than men .Hip osteoarthritis is more common in Western populations, suggesting that race and environmental factors might also be important. The incidence of symptomatic knee osteoarthritis is 1% per year, with aradiographicincidence of2%per year.The rate ofradiographicprogressionhas been estimated at about 4% per year.

The incidence and prevalence of osteoarthritis at different anatomic region varydependingonwhetherthisconditionisdefinedbyclinicalsymptoms,
radiological finding or a combination of the two. Although all peripheral joints may be affected, osteoarthritis of the knee has been the focus of many epidemiological studies.

Ageisthemostconsistentriskfactorforbothradiographicandsymptomatic osteoarthritis atallarticularsites.Theprevalenceofosteoarthritis increasesafter the age of 40 in women and 50 in men.Osteoarthritis affects about 50% of person age 65 and older and this prevalence increase to 85% in the group age 75 and older.

Global scenario-osteoarthritisisoneofthemostfrequent causesof physicaldisabilityamongadult. Morethan40millionpeopleinunited stateshavethedisease. By2030anestimated20 percentofAmericans about70millionwillhavepassedtheir65thbirthdayand willbeattheriskofdevelopingosteoarthritis. In **Asia** the affectedrural population shows 13.7% compared with urban population which shows 6%. In **china** the men prevalence rate is 2.9(95%)and the women prevalence rate is 1.6(93%)In western countries the prevalence rate of symptomatic osteoarthritis is 1% per year whereas the prevalence of radiographic osteoarthritis is 2%.it is now increased to 4 % peryear.

Indian scenario- the prevalence rate in 2013 is 1% among people aged 25 to 34 years, 19.2%aged over 45 and 43.7% aged over 80."**The Dutch InstituteOf The Public Health**: the prevalence rate among men of 55 years and above is 15.6% and among women it is 30.5%.The incidence is higher in women thanmen. In **Tamilnadu**those 2 in 10 women and 1 in20 men experiencing osteoarthritis. Asof2010 total numberofpatientswithosteoarthritisas primarydiagnosisis118,700.In **Chennai(**2004-2005)the prevalence rate among men is 5.8% and in women 4.1%.The prevalence rate is increasing 1.5% each year.

The article published in **Times of India** "Osteoarthritis is India's No. 1 ailment" has ranked osteoarthritis as number one comparing with diabetes mellitus and hypertension. The high incidence of osteoarthritis in India is the result of its prevalence among women who fall victim to it. Menopausal women areespeciallypronetoit.Thediseaseishowever,notrestrictedtowomen,

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althoughdiabetesandhypertensionremainthemostprevalentailmentsamong men.

Most successful treatment programs involve a combination of treatments tailored to the patient needs, lifestyle and health. Most programs include ways to manage pain and improve function.These involve exercise, weight control, rest and relief from stress on joints, pain relief techniques, medication, and surgery, complementary and alternative therapies. Research shows that exercise is one of the best treatments for osteoarthritis. Exercise is also inexpensive and one of the non pharmacological therapy. is often required,For patient with knee osteoarthritis, twice daily set of supine 10 second isometric, quadriceps contractions can improve strength, reduce pain and reduce the risk of falling.This exercise is said to be well tolerated by moderately severe knee pain.

Various studies revealed that isometric exercise can be effective in reducing pain and improving functional ability of clients with osteoarthritis.**Ende et al** (1996and2000)showedthatshorttermintenseexercise programconsistingofdynamicandisometricstrengthe ningandtricycling couldimprovemusclestrengthwithoutdeleteriouseffe ctondisease activity. Howevertheauthorsrecommendedcontinuedlongter mstudiesto notetheeffectondiseaseprogressionandfunctionalabi lity.

Handa(2005)had conducteda studyto determinetheeffectiveness of muscle strengthening exercises for quadriceps and hamstring muscles are started in gradual manner. The findings show that initially isometric muscle setting exercises which are of low intensity helps in promoting relaxations, increasecirculation , decreasespainandspasm. Laterresistedisometric exercisesatdifferentanglesaregiventoincreasethemu sclestrength. Hence the researcher felt the importance of these exercise in a view to meet the needs of clients suffering from osteoarthritis and thus improve their functional outcome.

1.3 STATEMENTOFTHEPROBLEM

A study to Assess the Effectiveness of Isometric exercises on pain among patients diagnosed with osteoarthritis in selected hospital,Vadnagar,Gujarat.

1.4 OBJECTIVES

1. To assess thepre test and post testlevel of painamong patients diagnosed with osteoarthritis in both experimental and control group .
2. Toevaluatetheeffectivenessof isometricexercises
3. Tofindouttheassociationbetweenposttestle vel ofpainin experimental group and their selected demographic variables.
4. To find out the association betweenpost test level ofpain in control group and their selected demographic variables

1.5 HYPOTHESES

- **H1**: Therewill besignificant differencebetween thepretest and post test level of pain in the experimental group
- **H2** : There will significant difference between the post test level of pain between the experimental and control group.
- **H3**:Therewillbeasignificantassociationbet weenposttestlevelofpainin experimental group and their selected demographic variables.
- **H4**:Therewillbeasignificantassociationbet weenposttestlevelofpainin control group and their selected demographic variables

OPERATIONAL DEFINITION:

1. **EFFECTIVENESS:**Effectiveness is the extent to which an activity fulfils itsin tented purpose or function .In this study it refers to expected outcome towards reductionofpain andfunctionaldisabilityamongpatientswithosteoarth ritisafter exposure to isometric exercises as elicited through differences between pretest and post test score.

2. **ISOMETRICEXERCISES**:
Itisaformofexercisesinvolvingthestatic contraction of muscle without any visible movement in the angle of knee joints.In this study the isometric exercises are: straight leg raising, ,adduction isometric ballsqueezing,quadsets,isometrichamstringsets,lon garcquads,shortarc quadsstandingtoeandheelraising,isometricthighmus clestrengthening.10 repetitions of each exercises are recommended three times for a day

3. **PATIENTS DIAGNOSED OSTEOARTHRITIS**: In this study it refers to individual who are diagnosed to have osteoarthritis less than one yearby orthopedic an consultant and who is admitted in the in patient department as well attending out patient department of selected hospital ,Vadnagar

4. **PAIN**:Pain is an unpleasant sensory or

emotional experience associated with actual or potential tissue damage.In this study it refers to perception of pain by newly diagnosed patients with osteoarthritis which is measured by visual analogue pain scale.

1.4 ASSUMPTION:

- Osteoarthritismaycommonamongelderly.
- Patients who are diagnosed with osteoarthiritis more than one or two years may already practicing knee strengthening program.
- Osteoarthritis patient experiences joint pain, stiffness, difficulty in performanceof physical activity.
- Isometric exercises will reduce the joint pain, stiffness and difficulty in performing physical activities among newly diagnosed patients withosteoarthritis.
- Selecteddemographicvariableswillinfluencethe painandfunctionaldisability.

1.5 DELIMITATIONS

- Studywas limited to the period of4weeks.
- Studywas limited to 60samples

1.6 PROJECTEDOUTCOME

- Thisstudymayhelptoknowabouttheeffectivenessofisometricexercises on reduction ofpainamong the patients with osteoarthritis and to provide the guidelinesforthenursestopracticeisometricexercises asaroutinetherapyin reducing the symptoms of osteoarthritis.

CONCEPTUAL FRAMEWORKOFTHE STUDY

Conceptual framework is a theoretical approach to the study of the problem that is scientifically based and emphasizes the selection, arrangementand classification of its concept. The conceptual framework states functional relationships between events and is not limited to statistical relationships.

The study is intended the effectiveness of Isometric exercises on the level of pain among the patients with osteoarthritis .The present study is based on general system theory which was introduced by Ludwig Von Bertalanffy (1968) with input, throughput, output and feedback.

According to system's theory, a system is a group of elements thatinteract with one another in order to achieve the goal. An individual is system because he/she receives input from the environment. This input when processed provides an output. This system is cyclical in nature and continues to be so, as long as the input, throughput, output and feedback keep interacting. If there are changes in any of the parts, there will be changes in all parts. Feedback from within the systems or from the environment provides information, which helpsthe system to determine whether it meets its goal.In the present study these concepts can be explained asfollows:

Input

Theinputconsistsofinformationmaterial orenergythat entersthesystem. These input's include Age, Gender,Occupation,Education ,Family income, duration of illness, perception of pain andtreatment

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Throughput

It refersto the actionneededtoaccomplishthederivedtaskto achieve the desired output, i.e effectiveness of Isometricexercises on the level ofpain among the patients diagnosed with osteoarthritis.

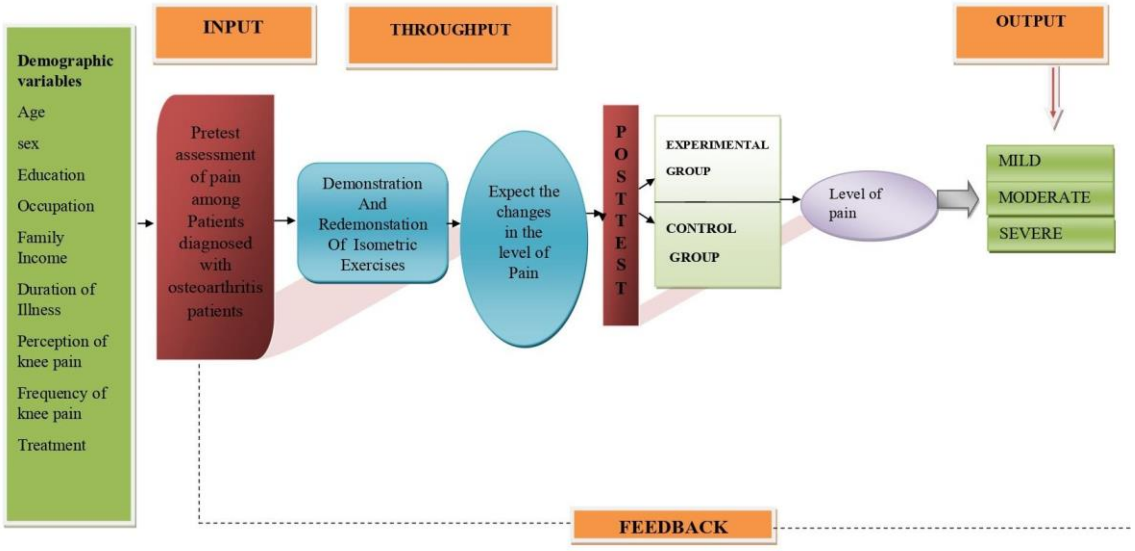
1. Demonstrationandre-demonstrationofisometric exercises
2. AssessmentoflevelofpainusingNumericalPainRatingScale..

Output

Output is the improved responses of the osteoarthiritis patients in the context ofpain .In thepresent studyoutputis the reduced pain level . This system achieved through a comparison betweenmean pre-test and post-test level of pain scores of the samples.

Feedback

It is a process by which information is received at each stage of thesystem output and its redirection to input. Accordingly the reduced pain is the feedback obtained after the successful implementation of isometric exercises. If the level of pain among samples falls under the category of severe level, it is stated that the throughput(process)has to be repeated till the desired result.



MODIFIED CONCEPTUAL FRAMEWORK BASED ON LUDWING VON BERTANLAFFY (1968) GENERAL SYSTEM THEORY

II. REVIEWOFLITERATURE

Review of literature helps to develop a strong knowledge base to carry out research in educational, clinical practice setting and for further development of knowledge in nursing science (Polit, 2008)

The review of literature was done in order to broader the understanding and to create an insight regarding selected areas of the study. It helps in selecting the appropriate methodology, developing tool and analyzing the data. conducting the review of literature is a challenging and enlightening experience.

2.1 SECTIONOFLITERATURERERE VIEW

A) Studiesrelated toosteoarthritis

B) Studiesrelatedtoisometricexercisesreducingpainamongpateients with osteoarthritis.

Section -A:Studiesrelatedto osteoarthritis

A prospective study was conducted in University of Punjab to determine the average age group for Osteoarthritis. In this study participants were 200 patients attending an orthopaedic outpatient department of the Punjab university health centre. Demographic analysis of this study revealed that, out of 200 patients84percentageofpatientswereinthe agegroupof40-70 yearswiththe complaints of knee joint pain[4].

An another study was conducted to support the claim that prevalence of osteoarthritis rises with

age. In their study of the relationship between age and osteoarthritis, in which they evaluated three different age groups consisting of thoselessthan45yearsold,45to64yearsold,andoldert han65,theyfound2%, 30%, and 68% of women with osteoarthritis according to their respective age groups and 3%, 24.5%, and 58% respectively for men with osteoarthritis. Nearly 100% of the subjects over the age of 65 in their study showed at least minimal radiographic signs of the occurrence of osteoarthritis in the hands, feet, spine, knees, or hips, revealing a direct relationship between age and osteoarthritis.

University of North Carolina conducted a study to determine the gender difference for getting Osteoarthritis. In this study the participants included were 3,200 citizens of North America. Anyone who was over the age of 50 years was eligible to join the study, whether theyhad arthritis or not. The conclusion revealed that, among 3,200 citizens, 74% of the participants had Osteoarthritis, of which47% percentage were women and remaining were men.

A study was conducted to determine the incidence of radiographic knee osteoarthritis(OA)andsymptomaticOA(symptomspl usradiographicOA),aswell as the rate of progression of preexisting radiographic OA in a population-based sample of elderly persons. Framingham Osteoarthritis Studysubjects who had knee radiographs and had answered questions about knee symptoms in 1983–1985 were reexamined in 1992–1993 (mean 8.1-year interval) using the same protocol. Subjects were defined as having new (incident) radiographic OA if they developed grade above 2OA (at least definite osteophytes or definite joint space narrowing). New symptomatic OA was present if subjects developed a combination of knee symptoms and grade above 2 OA. Progressive OA was diagnosed whenradiographs showing grade2disease at baselineshowed grade ≤3disease onfollow up. Of 1,438 participants in the original study, 387 (26.9%) died prior to follow up. Of the 1,051 surviving subjects, 869 (82.7%) participated in the follow up study (mean ± SD age 70.8 ± 5.0 at baseline). Rates of incident disease were 1.7 times higher in women than in men (95% confidence interval [CI] 1.0–2.7), and progressivediseaseoccurred slightlymoreoften in women (relativerisk = 1.4; 95% CI 0.8–2.5) but rates did not vary by age in this sample. Among women, approximately 2% per year developed incident radiographic disease, 1% per year developed symptomatic knee OA, and about 4% per year experienced progressive knee OA. In elderly persons, the new onset of knee OA is frequent and is more common in women than men. However, among the elderly, age maynot affect new disease occurrence or progression.

Altman *et al.* (2006) described the criteria for classification of osteoarthritis of the knee. For the purpose of classification, it is described as primary (idiopathic) or secondary (if related to a known medical condition) osteoarthritis. Clinical criteria for classification of idiopathic osteoarthritis of the knee were developed through a multicentre study group. It is divided into three categories: clinical examination,clinicalexaminationandlaboratorytests andclinicalexaminationand

radiographic features. Knee pain, stiffness, crepitus, tenderness and bony enlargement were included in clinical examination. Changes are also seen in the biochemical parameters. ESR < 40 mm/hr and Rheumatoid factor <1 : 40 are included in laboratory examination for classification. Presence of osteophytes, reduction of joint spaces and destruction of articular cartilage are seen in radiological examination.

Howell (2006) studied the development of new technologies in the fields of cellular and molecular biology which is contributing significantly to the understanding of the disease processes involved in the development and progression of osteoarthritis. In particular, the relationships between enzymes degradative pathways are becoming increasingly clear. It was found that two prominent metalloenzymes and the specific tissue inhibitor of metalloproteinase have been studied in humans and animal models. Results indicate that such enzyme pathways may play a significant role in the degenerative tissue changes that are observed in osteoarthritis

Davis *et al.* (2010) conducted study on The importance of systemic and metabolic factors in the association of obesity with radiographic knee osteoarthritiswas examinedin3,905 adultsforUnitedStatesNational Healthand Nutrition Examination Survey. Obesity was associated with both bilateral and unilateral osteoarthritis, but more strongly with bilateral osteoarthritis. Obesity was also associated with both symptomatic and non symptomatic knee osteoarthritis.

Hart *et al.* (2005) studied the association of metabolic risk factors and knee osteoarthritis in women. One thousand three women aged 45-64 years were included in the study. Blood pressure, fasting blood glucose, serum cholesterol, serum

triglycerides, serum high density lipoprotein cholesterol(HDL-c) and uric acid levels were measured. These variables were significantly associated with raised blood glucose and moderately with raised serum cholesterol. Serum uric acid was non-significantly increased. No association was foundwithraisedserumtriglycerideorserumhighdens itylipoproteincholesterol levels or with current systolic blood pressure. These data suggest that hypercholesterolemia and blood glucose are associated with both unilateral and bilateral knee osteoarthritis independent of obesity and support the concept that osteoarthritishasanimportantsystemicandmetabolic componentinitsetiology.

Sturmer*et al.* (2008) studied the association between serum cholesterol and osteoarthritis. A total of 809 patients with knee or hip osteoarthritis were studied. Radiographs of the joints as well as blood samples for serum cholesterol were obtained. According to the presence or absence of radiographic features in osteoarthritis, participants were categorized as having bilateral or unilateral osteoarthritis. 85% of participants with radiographs had bilateral osteoarthritisand 26% had generalized osteoarthritis. Hypercholesterolemia was independently associated with generalized osteoarthritis. This association was almostexclusively due to participants with knee osteoarthritis

Shakoor and Loeser (2004) conducted studyon the symptoms, evaluation and management of a woman with osteoarthritis were described. Osteoarthritis is the most common form of arthritis worldwide and it is a major cause of disability in the elderly. Although there are several aging-related changes in the musculoskeletal system that may contribute to the pathogenesis of this disease, research suggests that osteoarthritis is not merely an inevitable result of aging. Osteoarthritis is most likely a multifactorial process whereby non aging related factors also contribute to the onset, progression and symptomatology of the disease. Specifically both biochemical factors, included physiological properties of cartilage and bone and biomechanical factors such as muscle strength, proprioception and joint loading have been implicated in the pathogenesis of osteoarthritis. Newernon pharmacological treatment options arefocusingon how to improve symptoms and prevent progression of the disease through mechanical interventions

Sun *et al.* (2000) studied the association between uric acid and patterns ofosteoarthritis.Patterns ofosteoarthritiswerestudiedin809patientswithhipor knee osteoarthritis. Patients with osteoarthritis were categorized as having bilateral or generalized osteoarthritis according to the presence of radiographic features. Odds ratios (OR) and 95% confidence intervals (CI) for serum uric acid and osteoarthritis patterns were estimated with multivariable logistic regression.A positiveassociation between serum uricacid and generalized osteoarthritis was observed. The results suggest a possible role of elevated serum uric acid in the multifactorial etiology of generalized osteoarthritis.

Section –B: Studies related to isometric exercises reducing pain among patients with osteoarthritis

Ray Marks(2005)conducted a study to assess the effect of quadriceps exercise for osteoarthritis of knee. The study compared the short term (six week) versus a long term (13 months) quadriceps strength training regimen for osteoarthritis of knee. The results indicated that the isometric exercises were associated with a 40% increase in maximal isometric torque at six weeks, a 10% torque decline with detraining, with an additional torque increase of 30% after 13 months of further training.

Center for Health, Exercise, and Sports Medicine, School of Physiotherapy, TheUniversity of Melbourne, Victoria, Australia conducted a study to examine whether the effects of 12 weeks of quadriceps strengthening on the knee adduction moment, pain, and function in people with medial knee osteoarthritis (OA) differ in those with and without varus mal alignment. A single-blind, randomized controlled trial of 107 community volunteers with medial knee OA was conducted. 3-dimensional gait analysis, Western Ontarioand McMaster Universities Osteoarthritis Index scores (measuring pain and physical function), step test score, stair climb test score, and maximumquadriceps isometric strength was assessed. The study concluded that Quadriceps strengthening did not have any significant effect on the knee adduction momentin participants either more varus or more neutral alignment. The benefits of quadriceps strengthening on pain were more evident in those with more neutral alignment.

Baker,et al(2009) conducted a study to assess the efficacy of home based progressive strength training in older adults with knee osteoarthritis: a randomized controlled trial**.** Forty-six community

dwelling patients, aged 55 years or older with knee pain and radiographic evidence of knee OA, were randomized to a 4 month home based progressive strength training program or a nutrition education program (attention control). The primary outcome was the WesternOntarioandMcMasterUniversitiesOsteoarthritis(WOMAC)indexpain and physical function subscales. Secondary outcomes included clinical knee examination, muscle strength, physical performance measures, andquestionnairestomeasurequalityoflifevariables. ThestudyconcludedthatHigh intensityhomebasedstrengthtrainingcanproducesubstantialimprovementsin strength,pain, physical functionand qualityoflifein patientswith kneeOA.

Sheila C O'Reilly et al (2009),conducted a studyto assess the effectof a home based exercise programme, designed to improve quadriceps strength, on knee pain anddisability.191 men and women with knee pain aged 40-80 were recruited from the community and randomized to exercise (n=113) or no intervention (n=78). The exercise group performed strengthening exercises daily for six months. The primary outcome measure was change in knee pain (Western Ontario McMaster Osteoarthritis index(WOMAC)). Secondary measuresincluded visual analogue scales (VAS)for pain on stairs and walking and WOMAC physical function scores. WOMAC pain scorereduced by22.5% in the exercise group and by 6.2% in the control group.VAS scores for pain alsoreducedintheexercisegroupcomparedwiththecontrolgroup($p<0.05$).Physical function scores reduced by 17.4% in the exercise group and were unchanged in controls ($p<0.05$). The study concluded that a simple programme of home quadriceps exercises can significantly improve self reported knee pain and function.

A subsequent 12-week studyinvestigated the effects of functional mobility (measured by using 3D motion analysis during gait) on pain and function in individuals with knee osteoarthritis Measures of knee varus/ valgus laxity were assessed as well as isometric quadriceps and hamstring torque measures. The Western Ontario and McMaster Osteoarthritis Index (WOMAC), which is a 24- question self - assessment questionnaire regarding pain, stiffness and functionwas used. Performance measures included the step test, stair climb test and walking speed. Quadriceps exercises were performed over a 12-week period, which consisted of heated knee extension, short arc quads, straight leg raises and isometric knee flexion exercises with ankle weights. In this study, the severity of the disease was significantly associated with the degree of mal-alignment.Both the groups with neutral and mal-aligned knees had an increase in quadriceps strength and functional measures.

A study was conducted to assess efficacy of an exercise program for elderly people with knee pain conducted via video conferencing. Twenty-two community-dwelling subjects aged 60 years or above with knee pain were recruited from two community centres in Hong Kong. A 12-week exercise program,includingstrengtheningandbalancetraining,wasgivenvia videoconferencing to subjects at both centres, in conjunction with a home-based exercise program. The outcome measures included the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), quadriceps muscle strength, Berg's Balance Scale (BBS) and subjects' degree of acceptance of videoconferencing. Twenty subjects completed the 12-week program. and significant improvements occurred in all domains of the WOMAC score ($P<0.003$). There was a 44% and a 13% increase in quadriceps muscle strength ($P<0.001$) and BBS ($P<0.001$), respectively. Over 80% of the elderly subjects who joined the program agreed or strongly agreed about all aspects of using videoconferencing. Most of them felt that the system was user-friendly and convenient. Videoconferencing appears to be a useful method of delivering a resistance-training program for community-dwelling elderly persons with knee pain.

Chamberlain etat(2002) practiced the patients with osteoarthritis ofknees with the two simple exercises with graduated weights. Patients were randomly divided in to those receiving treatment at hospital and those doing exercises at home .Both groups showed decrease pain and increase function ,maximumweight lift and endurance at the end of four weeks. The subjects which continued daily exercises restrained benefits, whereas those which cease exercising experiencedmorepain.Itwasconcludedthatiftheregimenswereroutinelyused, there would be great practical benefits for patients and physiotherapist.

MarziyeTalebNajafabadi et al(2008) conducted Studyto compare the effect of isometric and Pilates exercise on pain and physical and mental aspectsof quality of life in women 40 to 65 years with knee osteoarthritis.40 female patients with knee osteoarthritis were selected randomly and divided into two groups. Pilates exercise, (n=20,mean age 54/8 ± 7/1 years, height 159/ 8± 6/4 cm and weight

67/1 ± 14/7 kg) and isometric exercise (n=20, mean age 56± 5/2 years, height 161/25 ± 7/5 cm weight 70/15 ± 9/7 kg) were used . Before beginning an exercise, the pain visual analogue scales (vas) were used. For physical and mental aspects of quality of life questionnaire SF36 was used. Both exercises groups were executed for 8 weeks, 3 times per week and each session 1 hour.After8weekstraining,bothgroupswereassessed .Statisticalanalysis using analysisofcovariance,significantatP<0/05wasperformed.Theresultsshowed that in both Pilates and isometric group's decreased pain and as well asimproving the physical and mental aspects of quality of life.

CarvalhoNAetal (2005)conductedstudytoassesstheefficiency of a guidance manual for patients with osteoarthritis of the knee in relation to pain, range of movement, muscle strength and function, active goniometry, manual strength test and function Thirty-eight adults with osteoarthritis of the knee (>or= 45 years old) who were referred to the physiotherapy service at the university hospital were studied. Patients received guidance for the practice of specific physical exercises and a manual with instructions on how to perform the exercises at home. They were evaluated for pain, range of movement, muscle strength and function. Theseevaluations wereperformed before theyreceived the manual and three months later. The program was effective for improving muscle strength, controlling pain, maintaining range of movement of the knee joint, and reducing functional incapacity. Even when performed at home without constant supervision, the use of the printed manual for orientation makes the exercises for osteoarthritis of the knee beneficial.

A Single Case Studywas conducted on Quadriceps Exercises for Osteo-arthritis of the KneeComparing Short term*versus* Long-term Training Effectscompared the strengthening effect of a short-term (six-week) *versus*a long-term (13-month) quadriceps strength training regimen for one 58-year-old womandiagnosedashavingosteo-arthritisofthekneewhowasnotreceivingany other form of intervention. The strengthening regimen was initially carried out three times a week for six weeks under supervision using a standardized protocol of six bi-lateral maximal isometric quadriceps contractions at an angle of 60°. After a six-week detraining period, the same exercises were carried out in a similar manner at home for a further 13 months. The results indicated that the isometric exercises were associated with a 40% increase in maximal isometric quadriceps torque at six weeks, a 10% torque decline with detraining, with an additional torque increase of 30% after 13 months of further training.

Md. A. Shakoor et al(2006)conducted study onEffects of isometric quadriceps muscle strengthening exercise on chronic osteoarthritis of the knee. A total of 64 patients of osteoarthritis of the knee joints were studied to observe the effects of isometric quadriceps muscle strengthening exercise plus non-steroidal anti-inflammatorydrugs(NSAIDs)onosteoarthritisofkne

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ejoints.Another75 patients were treated with NSAIDs as control. They were assessed by visual analogue scale, OMAC scale and range of motion of the knee joints andfollowed-up weekly for six weeks. Improvement was found in both groups (p= 0.001) after treatment. In comparison, more improvement was found in the exercise group after four weeks (p= 009). Then improvement was gradually increased day by day and finally there was highly significant improvement (p=0.001). This study suggests that isometric quadriceps muscle strengthening exercise has its beneficial role to reduce symptoms in osteoarthritis knee.

Mark(2008) conducted a study to describe the effect of strengtheningthequadricepsofan effusedosteoarthritiskneejointofa53 yearoldmanisometric allyinmidrange. Theoutcomemeasuresof isometricquadricepstorqueandwork ,clinicalstatusandpainwere recordedbeforeandaftertheexercisesintervention. Theexerciseswere carriedoutthree timesperweekforasixweeksperiodwiththesubject seated on an exercises chair.Following training,quadriceps torque increased, clinicalstatusimprovedandpainwithwalkingdecreas ed.

Chaipingo and karoonsupcharoon(2009) conducted a study on simple home based standing balance training and isometric knee extensionexercisesforfourweekswouldimprovefunc tionalability and knee musclestrengthofpatientswithkneeosteoarthritis .standingbalance andmini squatexercisesperformed30times per dayononeside ,fivedays per week for 4 weeks and isometric knee extension exercises performed 10 repetitionsperset,3setsperday,5daysperweekfor4we eksbetweenthe age group of 50-80 years .The result shows that there is a significantimprovementinthefunctionalabilityandkn eemusclestrengthofpatients withkneeosteoarthritisinboth.

Deyleetal (2005)conductedastudytoinvestigatebothsubjective andobjectivemeasurementsoftheeffectivenessof treatment for osteoarthritis of the knee. Clinically and statistically significant improvements in six min walkdistance and Western Ontario M c master Universityosteoarthritisindex(WOMAC) score at 4 weeksand 8 weekswere seenin thetreatmentgroup .Thestudyconcludedthatacombinationof manualphysicaltherapyandsupervisedexerciseyield sfunctionalbenefits forpatients with osteoarthritis of the kne

Pietrosimone Bet al (2009), conducted a study to examine the association between quadriceps strength and self-reported physical activity in patients with radiographically confirmed kneeOA. Secondarily, the authors' sought to determine if there were differences in quadriceps strength betweenkneeOApatientswithlowphysicalactivity(L PA)and kneeOA patients with higher physical activity (HPA). A tertiary aim of this study was to examine theeffectof gender on physical activity and quadriceps strength in patients withkneeOA. Thirty-six patients with radiographically diagnosed tibiofemoralkneeOA participated (15 males, 21 females; age = 59.9±11.6 yrs; height = 171.2±9.2 cm; mass = 84.3±18.9 kg; body mass index (BMI)= 28.9±6.9;Godin Leisure-Time questionna ire =32.5±25. 01). Maximalisometricknee extensor strength was assessed with a Isokinetic dynamometerin70°ofkneeflexion.Kneeextensiontor quevalueswere normalized to body mass (Nm(*)kg(-1)). Physical activity was evaluated using the Godin Leisure-Time questionnaire. A Godin-Leisure time score of 32.5, which was themean scorein the current dataset, was what was used to categorize subjects into LPA and HPA subgroup: Higher levels of quadriceps strength correlate with higher physical activity in kneeOA patients. The association between higher strength and increased physical activity is stronger in the HPA subgroup compared to the entire sample. Additionally, the HPA subgroup demonstrated greater quadriceps strength compared to the LPA subgroup

AnwerS,AlghadirA(2013)conductedstudyonEffec tofisometricquadricepsexerciseon muscle strength, pain, and function in patients with knee osteoarthritis: a randomized controlled study. investigate the effects. Outpatients (N=42, 21 per group; age range 40-65 years; 13 men and 29 women) withosteoarthritisof the knee participated in the study. The experimentalgroup performedisometric exercisesincludingisometricquadriceps, straight leg raising, and isometrichip adductionexercise5 days a week for 5 weeks, whereas the control group did not performed anyexerciseprogram. The outcome measures or dependent variables selected for this study were pain intensity,isometricquadriceps strength, and knee function. These variables were measuredusingtheNumericalRatingScale(NRS),stre

ngthgaugedevice,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 maximumisometricquadriceps strength, reduction in pain intensity, and improvement in function in theisometricexercisegroup at the end of the 5th week were significantly greater than those of the control group ($p<0.05$).Theresultwasfiveweekisometricquadricepsexerciseprogram showed beneficial effects on quadriceps muscle strength, pain, and functional disability in patients with osteoarthritis of the knee.

HafezAR,etal(2014)conductedastudy"Toassess theeffectof hamstring and quadricepsstrengtheningexerciseson pain intensity, gait velocity, maximum isometricstrength, and activities of daily living of patients with kneeosteoarthritis(OA)".A total of 20 patients with knee OA, 50 to65 yearsofage(57.65±4.78 years),receivedhotpacks, strengtheningexercisesfor the quadriceps and the hamstring muscles and stretchingexercisesfor hamstring muscles. Outcome measures included: the Western Ontario and McMaster Universities OA index questionnaire (WOMAC) scores for assessing health status and health outcomes of knee OA; self-reported pain intensity scores, measured using a visual analogue scale; the 50 ft walk test (a measure of gait velocity and function); and handheld dynamometry (a toolused to measure maximum isometricstrength of knee extension and flexion). There was a significant difference between pre- and post-intervention measuresof pain intensity, 50 ft walk times, hamstring strength, WOMAC measures and quadriceps strength.. Strengthening the hamstring muscles in addition to strengthening the quadriceps muscles proved to be beneficial for perceived knee pain, range of motion, and decreasing the limitation of functional performance of patients with knee OA.

JuhlCetal(2013)conductedastudyonImpactofexercisetype and dose on pain and disability in knee osteoarthritis: A systematic review and meta-analysis of randomized controlled trials were performed. Forty-eight trials were included. Similar effects in reducing pain were found for aerobic, resistance, and performance exercise(SMD 0.67, 0.62, and 0.48, respectively; P = 0.733). These single-typeexerciseprograms were more efficacious than programs that included different exercise types (SMD 0.61versus0.16;P<0.001).Theeffect ofaerobic exerciseonpainreliefincreased with an increased number of supervised sessions (slope 0.022 [95% confidence interval0.002,0.043]).Morepainreductionoccurredwithquadriceps-specificexercisethan with lower limbexercise (SMD 0.85 versus 0.39; P = 0.005) and when supervisedexercisewas performed at least 3 times a week(SMD0.68versus0.41;P =0.017).Noimpactofintensity,durationofindividual sessions, or patient characteristics was found.. For best results, the program should be supervised and carried out 3 times a week. Such programs have a similar effectregardless of patient characteristics, including radiographic severity and baseline pain.

Ettinger*et al.* (2007) determined the effects of structuredexercise programmes on self-reported disability in older adults with knee osteoarthritis. A total of 439 community dwelling adults, aged 60 years or older with radiographically evident knee osteoarthritis and self reported physical disabilitywereincluded in thestudy. Atotal of365 (85%)participants completed the trial. Overall compliance with the exercise prescription was 68% in the aerobic training group and 70% in the resistance training group. Older disabled persons with osteoarthritis of the knee had modest improvements in measures of disability, physical performance and pain from participating in either an aerobic or a resistance exercise programme. These data suggest that exercises should be prescribed as part of the treatment for knee osteoarthritis.

Miyaguchi*et al.* (2003) analyzed the biochemical changes in the joint fluid and pain relief resulting from isometric quadriceps exercise in patients with osteoarthritis of the knee. Nineteen patients of osteoarthritis knee with joint effusion were included. The patients performed isometric quadriceps exercise for 3 months. Isometric muscle torque, pain (as measured using visual analogue scale) and biochemical markers in joint fluid were evaluated before and after the exercise. Pain score decreased, isometric muscle torque increased and the molecular weight of hyaluron increased. Also, the concentration of chondroitin sulfate in joint fluid decreased. Isometric quadriceps exercise resulted in significant changes in joint fluid biochemical parameters, and these changes may explain the ameliorative effect of muscle exercise for osteoarthritis of the knee.

Deyle*et al.* (2000) evaluated the effectiveness of physical therapy for osteoarthritis of the knee. 83 patients with osteoarthritis of the knee were randomly assignedtoreceivetreatmentorplacebo.Thetreatment groupreceived manual therapy applied to the knee

as well as to the lumbar spine, hip and ankle as required, and performed a standardized knee exercise program me in the clinic and at home. The placebo group had sub therapeutic ultrasound to the knee at an intensity of 0.1 W/cm2 with a 10% pulsed mode. Both groups were treated at the clinic twice weekly for 4 weeks. Distance walked in 6 minutes and sum of the function, pain and stiffness sub scores of WOMAC index were measured at 4 weeks, 8 weeks and 1 year. Clinically and statisticallysignificantimprovements in 6-minute walk distance and WOMAC score at 4 weeks and 8 weeks were seen in the treatment group but not in the placebo group. They concluded that a combinationofmanualphysicaltherapyandsupervise dexercise yieldsfunctional benefits for patients with osteoarthritis of the knee and may delay or prevent the need for surgical intervention.

Huang*etal.*(2003)investigatedthetherapeuticeffects ofdifferent muscle-strengthening exercises on the functional status of patients with knee osteoarthritis. Patients with bilateral knee osteoarthritis were divided into 4 groups.Thepatientsingroup Ireceivedisokinetic muscle-strengtheningexercise, patients in group II received isotonic muscle-strengthening exercise, group III received isometric muscle-strengthening exercise and group IV acted as controls. Isotonic exercise is suggested for initial strengthening in patients with osteoarthritis with exercise knee pain and isokinetic exercise is suggested for improving joint stability or walking endurance at a later.

Topp*et al.* (2002) compared 16 weeks of isometric versus dynamic resistance training versus a control on knee pain and functioning among patients with knee osteoarthritis. A total of 102 volunteer subjects with osteoarthritis of the knee randomized to isometric and dynamic resistancetraining groups or a control were taken. The patients were given strength exercises for the legs, 3 times weekly for 16 weeks. Dynamic or isometric resistance training improves functional ability and reduces knee joint pain of patients with knee osteoarthritis.

Roginde*t al*. (2008) investigated physical function in patients with severe osteoarthritis of knees during and after a general physical training program me. 12 patients received training in groups of 6, twice a week for 3 months.Trainingfocusedongeneralfitness,balance,c oordination,stretchingand lowerextremitymusclestrength.Frombaselineto6mo nths,isometric quadriceps strength improved 20% in the least affected leg, isometric strength improved 21%. General physical training appears to bebeneficial in patients with osteoarthritis of the knee. As shown by the high compliance and low dropout frequency, such a program me is feasible even in patients with severe osteoarthritis of the knee.

Sharma *et al.* (2003) studied quadriceps muscle strengthening as a common goal in the management of knee osteoarthritis. In healthy knees, strength protects against new osteoarthritis. In arthritic knees, greater strength may protect joints and thereby delay osteoarthritis progression. Quadriceps strength, knee laxity and alignment, and osteoarthritis progression was studied. Subset-specific approaches beyond strengthening exercises should be developed to enhance joint-protective muscle activity.

Thomas *et al.* (2002) was to determine whether a home based exercise programme can improve outcomes in patients with knee pain. 786 men and women aged ≥ 45 years with self reported knee pain were included in the study. Participants were randomized to four groups to receive exercise therapy, monthly telephone contact, exercise therapy plus telephone contact or no intervention. At 24 months, highly significant reductions in knee pain were apparent for the pooled exercise groups compared with the non exercise groups. Regular telephone contact alone did not reduce pain. It was concluded that a simple home based exercise programme can significantly reduce knee pain. The lack of improvement in patients who received only telephone contact suggests that improvements are just due to psychosocial effects because of contact withthe therapist.

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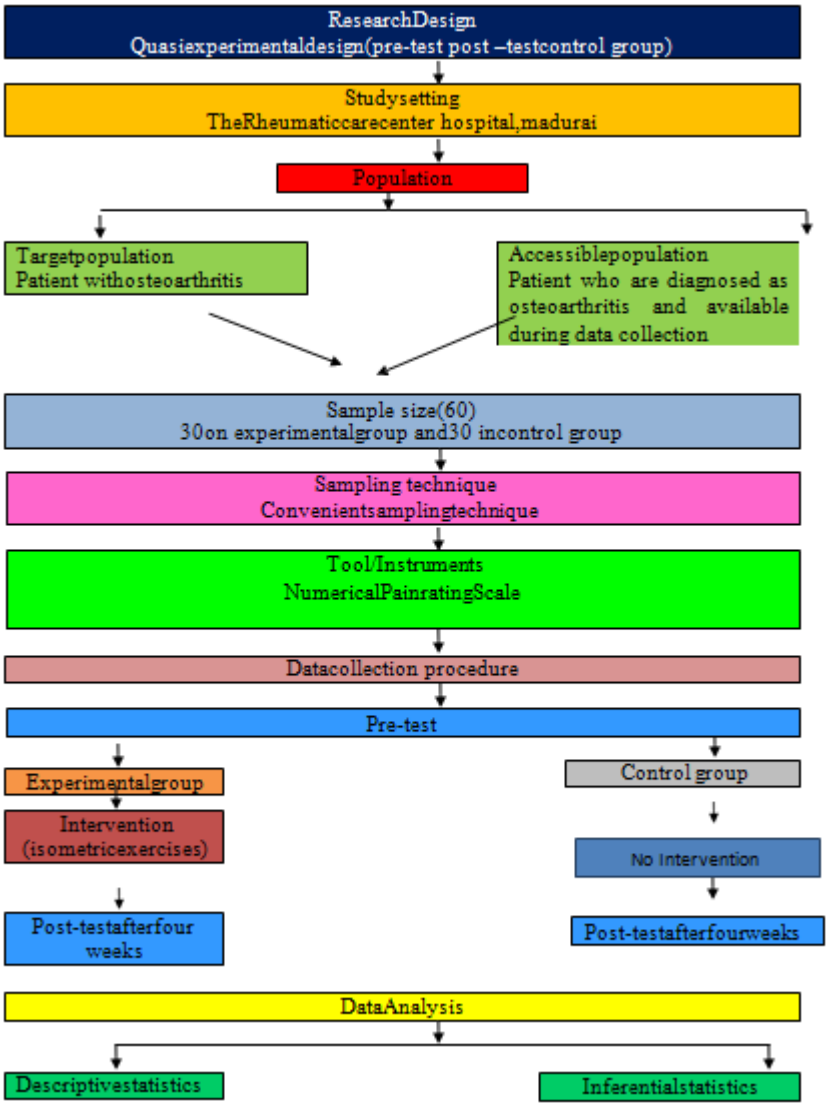

Fig-1.1SchematicRepresentationoftheResearch Design

III. METHODOLOGY

Research methodology provides a brief description of themethod adopted by the investigator in this study .This chapter includes the researchapproach, researchdesign ,thesettingofthestudy ,sampleselection anditfurtherdealswithdescriptionofthetools, testingofthetool,procedurefor datacollectionandplanfordataanalysis andpilotstudy.

3.1 Researchapproach:

The quantitative research approach was used in this study to determine the effectiveness of isometric exercises on pain amongpatients diagnosed with osteoarthritis .

3.2 Researchdesign:

The research design selected for this study was quasi-experimental design (pretest and post test control group design)

Table3.1Thediagrammaticrepresentationofthedesign isas follows:

Group	Before	Intervention	After
E	O1	X	O2
C	O1	-	O2

E-Experimentalgroup

O1 - Pre-assessmentlevelofpainamongtheexperimentalgroupand control group
X - Isometricexercises
O2 - Post-assessmentlevelofpainamongtheexperimentalgroupand control group
C - Control group

3.3 Variablesunderthe study

Dependent variables: levelofPain Independentvariables:Isometricexercises

3.4 Studysetting :

StudySettingis thephysical location and condition in which datacollection takes place . The study was conducted in the outpatient department as well as in the in patient department of The Vasant PrabhaHospital,Vadnagar.. Thishospital consists of orthopedic ward, pharmacy, radiology department ,biochemistry lab physiotherapy unit, . The hospital was chosen because of the researcher familiaritywith the setting.

3.5 Population:

Population is the aggregation of cases about which the researcher wouldlike to make generalization. It refers to group of individuals with some common characteristics and it is important to make distinction between the target population and accessible population

The target population of this study includes patients withosteoarthritisand the accessible population are those who are with diagnosed as osteoarthritis less than one year by consultant orthopedicianattending outpatient department as well as admitted inselected hospital and available during the time of data collection.

3.6 Sample:

Patients with osteoarthritis diagnosed as less than one year by consultant orthopedician

3.7 Samplesize:

The sample size consist of 60 newly diagnosed osteoarthritis patients, amongthat 30 of samples belongs to experimental group and 30 belongs to controlgroup.

3.8 Samplingtechnique:

Convenientsamplingtechniquewas used forthestudy.

3.9 CRITERIAFORTHE SELECTION:

INCLUSIONCRITERIA:

- Patientsbetweentheageof60-75years.
- Patientswho arediagnosedto haveosteoarthritislessthan oneyear.
- Patientswhoarewillingto participate.
- Thosewho presentat thetimeofdata collection.
- Patientswithunilateralorbilateralknee osteoarthritis.
- Bothmaleandfemalepatientsareincluded.

EXCLUSIONCRITERIA:

- Oldcasesofosteoarthritiswho participate inknee strengthening program.
- Patientswhohaverheumatoidosteoarthritis.
- Patientswhoarecriticallyill.

- Patientswithsystemicdiseaseslikehypertension,diabetesmellitus,cardiovascular disease.
- Patientswhohaveundergoneorthopedicsurgery.
- Patientswho arenotwillingtoparticipateinthisstudy.

RESEARCHTOOLANDTECHNIQUE

3.10 DATACOLLECTIONTOOL

The instruments used in this study are demographic and selected baseline variables.

3.11 METHODSOFDEVELOPMENTALOFTHETOOL

Thetool waspreparedafter reviewingtherelatedliterature such as journals, past experience and also from experts opinion.

PARTI:

Deals with demographic variables such as Age,Gender,Educationalstatus, Occupation, Family income ,Duration of illness, perception ofknee pain, Frequency of painand Taking treatment.

PARTII:

NumericalRatingScale forpain

3.12 DESCRIPTIONOFTHETOOL

This scale is used to assess the level of pain . Maximum score is 10 and the minimum score is 0-3.If the client have mild pain the score is given from 0-3,if patient have moderate pain the score is 4-6and for severe painthe score is from 7-10.Basedontheobtainedscorethesubjectsareorbitrarilygroupedin4 groupsasgivenbelow.

Table3.2Scoreinterpretation

NumericalRatingScale for pain	levelofpain
0-3	Mild pain
4-6	Moderatepain
7-10	Severepain

3.13 TESTINGOFTHETOOL VALIDITY

validityofthetoolwasestablishedbysubmittingthetooltofive expertsinthefieldofmedicalsurgicalnursing,oneexpertinthefieldof physiotherapy ,oneclinicalexpertinthefieldoforthopedic .Thetoolwas valuatedregardingtheadequacyofthecontent. Afterestabilishingthe validity ,thetoolwastranslatedintoGujarati andagaintranslatedinto Englishtovalidatethelanguage.

RELIABILITY

Thetestretestmethodwasusedtoestablish thereliabilityofthetool.
Byusingcoefficientformulathe‘r’= o.8 ,thetoolwashighlyreliable.

3.14 PILOTSTUDY

In order to findoutthefeasibility and practicability ofthestudy, a pilot study wasconducted. The researcher conducted pilot studyin the Rheumatic care center hospital,outpatient department at Vadnagar .The study was carried out among six subjects(three subjects in experimental group, three subjects in control group) whofulfill the sampling criteria .Itwas conducted in same wayas the final study .In order to test the feasibility andpracticability of the tool ,it wasconductedaftergettingpermissionfromthe orthopedican,physiotherapistof selected orthopedic hospital and consent from the samples. Six patients was selected by Convenient sampling method. After proper explanation about the purpose of study ,the demonstration and re demonstration of the following isometricexercises:straightlegraising,,adductionisometricballsqueezing ,quad sets, isometric hamstring sets ,long arc quads ,short arc quads, standing toe and heel raising ,isometric quadriceps muscle strengthening was done to the samplesinexperimentalgroup.NumericalPainRatingScalewasusedtoanalyze the score obtained by the samplesbefore and after intervention .These subjectswere excluded in the main study.

3.15 DATACOLLECTION:

The investigator obtained permission from the dissertation committee of Hemachandracharya North Gujarat UniversityPatan, the college authorities and theorthopedicand physiotherapist of Vasant Prabhahospitan,vadnagar . Data collection period was six weeks. The time scheduling for data collection wasfrom 9.30 am to 4.30 pm. Convenient sampling technique was used to select samples and they were randomly allocated as 30 to experimental group and 30 to control group. The investigator initially establish rapport with the studysubjects . The purpose of the study was explained to each subjects and consent was obtained. Ten patients (five belongs to experimental and five belong to control group) were assessed in a day .Each study subjects were assessed separately & privacy was maintained. During the assessment the patients were very co operative..The patientsin experimental group were taken to a separate unitby the researcher and demonstration ,re demonstration of the following isometric exercises: straight leg raising, ,adduction isometric ball squeezing ,quad sets, isometric hamstring sets ,long arc quads ,short arc quads, standing toe and heel raising ,isometric quadricepsmuscle strengtheningwas done to them. Thetime takenfor eachpatientwas35-40 mins. These researcher instructed these samples to come to the out patient department forsubsequent three days and tore demonstrate the same isometric exercises,which was strictly supervised and their doubts were cleared. These samples received aexercisemanual prepared by the investigatorwith instructions on how to perform the

isometric exercise at home and they were asked to record the time and frequency of exercises in the manual to make their practice beneficial. Researcher motivated the samples to do the isometric exercises with 10 repetitions of each exercises three times a day for six weeks period .The post test was conducted after six weeks,pain was measured by using NumericalRating Pain Scale.

3.16 DATAANALYSIS:

The data was analyzed according to the objectives of the study by using the descriptive and inferential statistics such as

- Frequency and percentage distribution were computed for describing the sample demographic variables.
- Paired t -test was computed to compare the pretest and post test mean scoreof pain among experimental group and control group.
- Unpaired t- test was used to compare the post test mean score of pain among experimental group and control group.
- The Chi square test was computed to describe the association between the post test level of pain among experimental group control group and their selected demographic variables.

3.17 PROTECTIONOFHUMANSUBJECTS:

The researchproposal was approved by dissertation committee prior topilot studyand main study .Permissionobtained from The Authorities of college and the selected hospital. Verbal consentandwritten consentwasobtained fromthestudysubjectanddatacollectionwaskeptasconfidential
.Assurance was given to the study subjectthat anonymity of each individual would be maintained.

IV. ANALYSISANDINTERPRETATIONOFDATA

This chapter deals with analysis of the samples and interpretation of data to determine the effectiveness ofisometricexercises onpainand functionaldisabilityamongnewlydiagnosedosteoarthritispatientsat selectedhospital ,Madurai.

According to Polit (2007) analysis helps a researcher to make a sense of quantitative information. Statistical procedure enable researchers to summarize, organize, evaluate, interpret and communicate numeric information.

The obtained data has been classified, grouped and analyzed statistically based on the objectives of the study.

OBJECTIVES:

1. To assess thepre test and post testlevel of painamong patients diagnosed with osteoarthritis in both experimental and control group
2. To evaluate the effectiveness ofisometric exercises on pain among patients diagnosed with osteoarthritis in experimental group.
3. To find out the association betweenpost test level ofpain in experimental group and their selected demographic variables.
4. To find out the association betweenpost test level ofpain in control group and their selected demographic variables

HYPOTHESES

- **H1**: Therewill besignificant differencebetween thepretest and post test level of pain in the experimental group
- **H2** : There will significant difference between the post test level of pain between the experimental and control group.
- **H3**:Therewillbeasignificantassociationbetweenposttestlevelofpainin experimental group and their selected demographic variables.
- **H4**:Therewillbeasignificantassociationbetweenposttestlevelofpainin control group and their selected demographic variables

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Distributionofsamplesaccordingtotheir selecteddemographic variables among experimental group and control group.
Section-II
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Associationbetweentheposttestlevelofpaininthecontrol group andtheirselecteddemographicvariables**.**

SECTIONI
DISTRIBUTIONOFSAMPLESACCORDINGTOTHEIR SELECTED DEMOGRAPHIC VARIABLES AMONG EXPERIMENTAL GROUP AND CONTROL GROUP.
TABLE4.1:Distributionofsamplesaccordingtotheirselecteddemographic variables among experimental and control group..
(N=60)

Demographicdata	**Experimental group**		**Controlgroup**	
	(n=30)		(n=30)	
	F	**%**	**F**	**%**
1.Age(in years):				
a. 60-65years	**16**	**53.3**	**25**	**83.3**
b. 66-70years	**9**	**30**	**4**	**13.3**
c. 71-75years	**5**	**16.7**	**1**	**3.3**
2.Gender				
a. Male	**6**	**20**	**6**	**20**
b. **Female**	**24**	**80**	**24**	**80**
3.Education:				
a. Illiterate	**0**	**0**	**6**	**20**
b. Primaryeducation	**5**	**16.7**	**5**	**16.7**
c. Secondaryeducation	**8**	**26.7**	**7**	**23.3**
d. Collegiate	**17**	**56.7**	**12**	**40**
4.Occupation:				
a. Employed	**28**	**93.3**	**21**	**70**
b. **Unemployed**	**2**	**6.66**	**9**	**30**
5.Familyincome:				
a. Below5000	**0**	**0**	**0**	**0**

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b. 5001-10000	**4**	**13.3**	**0**	**0**
c. 10001-15000	**22**	**73.3**	**20**	**66.7**
d. **Above 15001**	**4**	**13.3**	**10**	**33.3**
6.Duration of illness:				
a. 2 months	**8**	**26.7**	**15**	**50**
b. 4 months	**10**	**33.3**	**12**	**40**
c. 8 months	**11**	**36.7**	**3**	**10**
d. 1year	**1**	**3.3**	**0**	**0**
7.perceptionofknee pain:				
a. One knee	**9**	**30**	**13**	**43.3**
b. **Boththe knee**	**21**	**70**	**17**	**56.7**
8.Frequencyofknee pain:				
a. Allthetime	**4**	**13.3**	**8**	**26.7**
b. Sometime	**1**	**3.3**	**4**	**13.3**
c. Whiletakingrest	**0**	**0**	**1**	**3.3**
d. **Duringactivities**	**25**	**83.3**	**17**	**56.7**
9.Takingtreatment:				
a. Yes	**5**	**16.7**	**5**	**16.7**
b. No	**25**	**83.3**	**25**	**83.3**

Table1:Showsthefrequencyandpercentagedistributionofdemovariables suchas age,sex,education,occupation,familyincome,durationofillness,perceptionofknee pain ,frequency of knee pain and any treatment. Total samples 60 were divided into 30 as control and 30 as experimental.

- Regardingagemajorityofthepatientsinexperimentalgroup16(53.35%) are at theagebetween60-65yearsandincontrolgroup25(83.3%) patients are at the age between 60-65 years .
- RegardingGendermajorityofthepatientsinexperimentalgroup 24(80%)areMalesandincontrolgroup24(80%)patientsareMale
- Withregardtoeducationmajorityofthepatientsinexperimentalgroup 17(56.7%)arecollegiate andincontrolgroup 12(40%) patients are collegiate .
- Regardingoccupationmajorityofthepatientsinexperimental group28(93.3%)areemployed,02(6.660%)areunemployedandincontrol group 21(70%) patients are employed.
- When considerthe totalincome of the family per monthmajority ofthe patientsinexperimentalgroup22(73.3%)areearning10,001-15,001andin controlgroup 20(66.7%)patients areearning 10,001-15,000 .
- Regardingduration of illness majority ofthe patientsinexperimental group11(36.7%)aresufferingfromjointpainfor8months andincontrol group 15(50%) patients are sufferingfromjointpainfor2 months .

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❖ Regardingthe perception ofknee painmajorityofthe patientsin experimentalgroup21(70%) havebilateral knee painandincontrol group 17(56.7%) patients havebilateral kneepain .

❖ Regardingthe frequency of knee pain majorityofthepatientsin experimentalgroup25(83.3%)havejointpainduringactivitiesandin controlgroup 17(56.7%) patients havejointpainduringactivities.

❖ Regardingtreatmentmajorityofthepatients in experimental group 25(83.3%)havenotreatmentandincontrolgroup25(83%)patientshave no treatment.

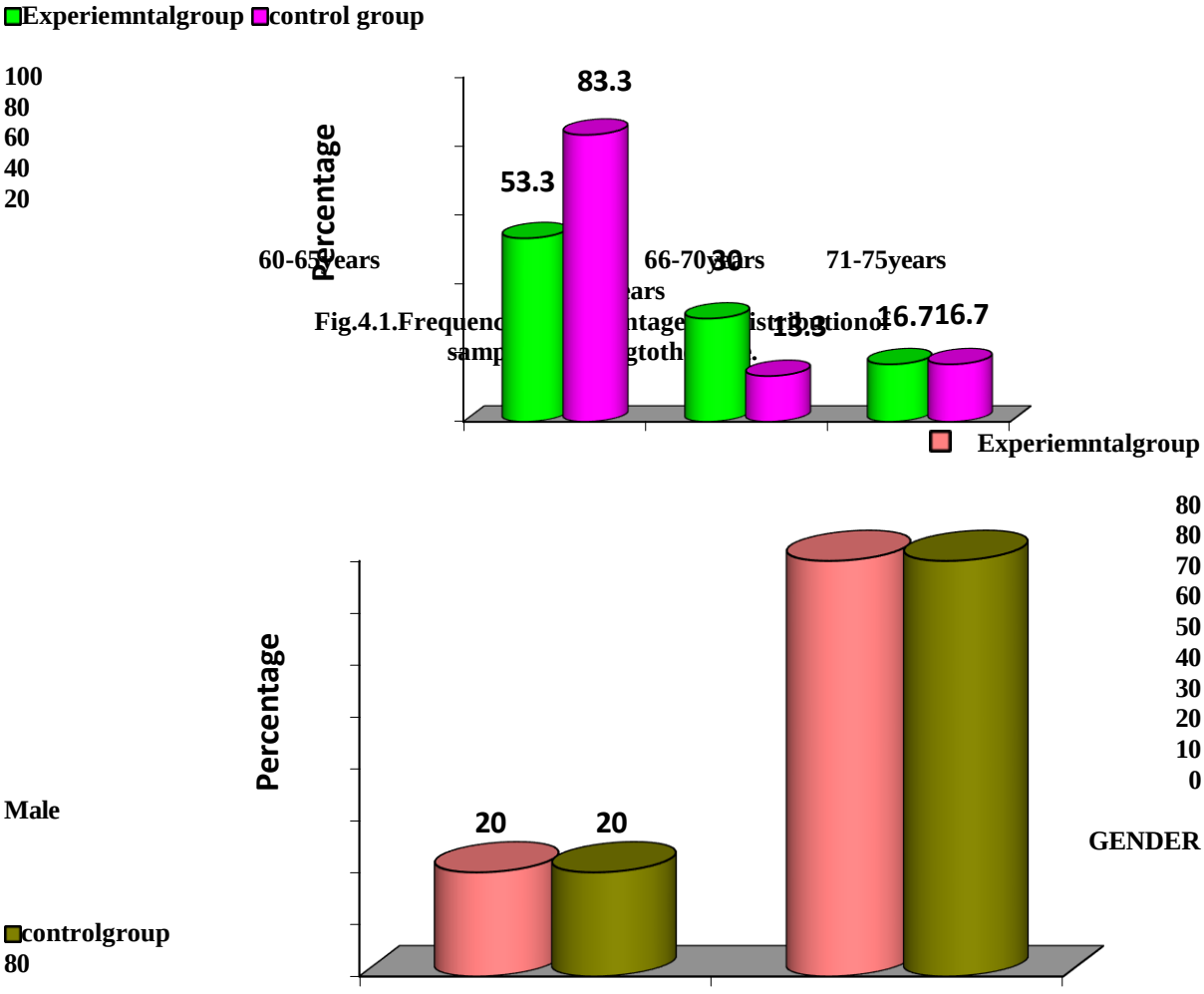

Fig.4.1.Frequenc ntage istributionof sampl gtoth .

Fig-4.2:DistributionofsamplesaccordingtotheirGender

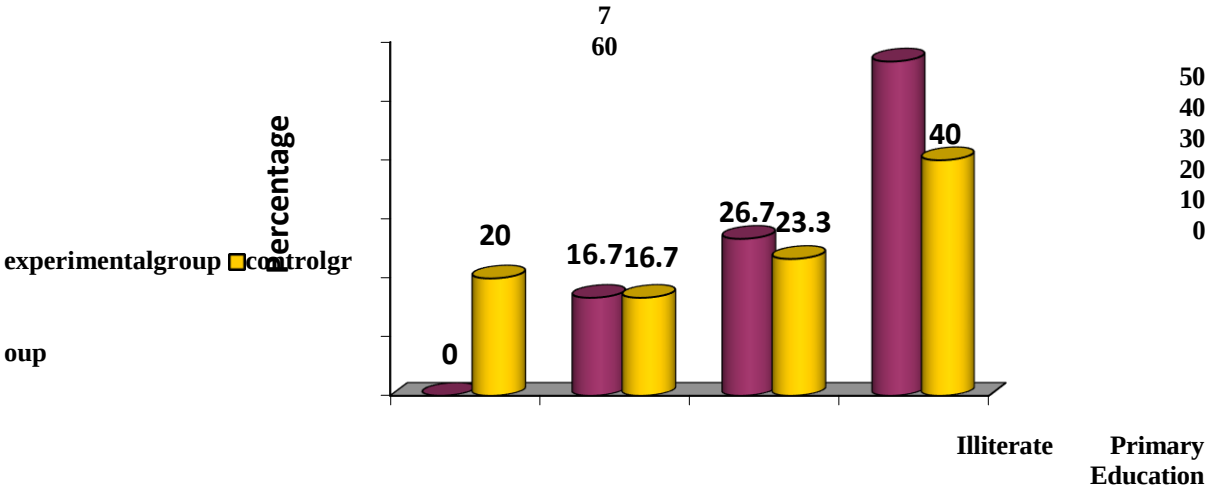

Fig-4.3:Distributionofsamplesaccordingtotheireducation.

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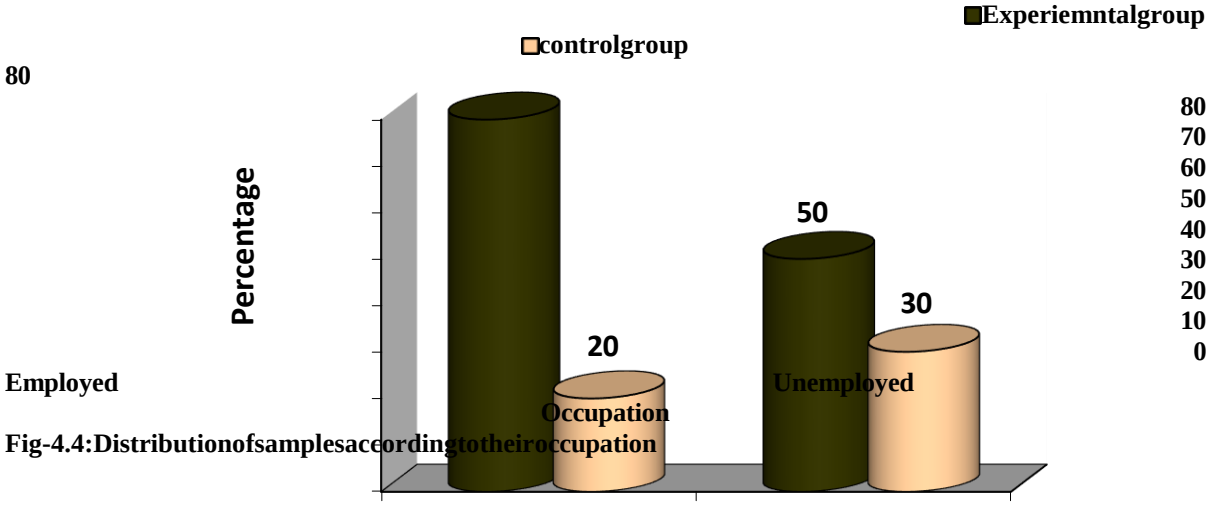
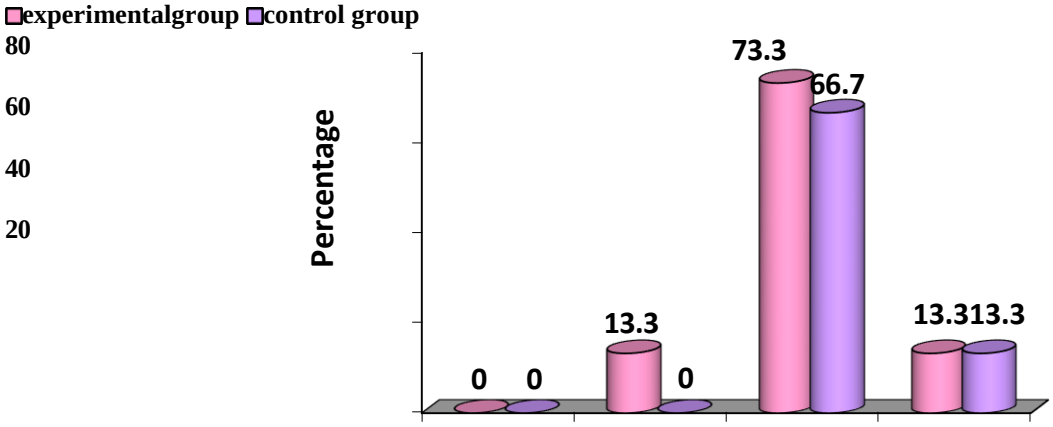


Fig-4.4:Distributionofsamplesaccordingtotheiroccupation



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0
Below 5000

5001-
10000

10001-
15000

SECTIONII.

DISTRIBUTIONOFSAMPLESACCORDINGTOTHELEVEL OFPAINAMONGEXPERIMENTALGROUPANDCONTROL GROUP.

TABLE–4.2:Distributionofsamplesaccordingtothelevelofpainamong experimental group and control group

(N=60)

Levelof pain	**Experimental**				**controlgroup**			
	(n=30)				**(n=30)**			
	pretest		**Posttest**		**Pretest**		**Posttest**	
	f	**%**	**F**	**%**	**f**	**%**	**f**	**%**
Mild	**-**	**-**	**21**	**70**	**-**	**-**	**-**	**-**
Moderate	**9**	**30**	**9**	**30**	**11**	**36.7**	**12**	**40**
Severe	**21**	**70**	**-**	**-**	**19**	**63.3**	**18**	**60**

Table4.2shows,inExperimentalgroupduringpretest9(30%)sampleshave moderatepain, 21(70%) samples haveseverepain. And in the Control group 11(36.7)samples have moderate pain and 19(63.3)sampleshave severe pain

During post test 21(70%) samples have mild pain , 9(30%) samples have moderate pain . No one have severe pain in post test in Experimental group.And in control group 12(40)samples have moderate pain and 18(60)samples have severe pain

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Fig-4.10:Distributionofsamplesaccordingtothelevelofpaininpretestandpost test among experimental a group

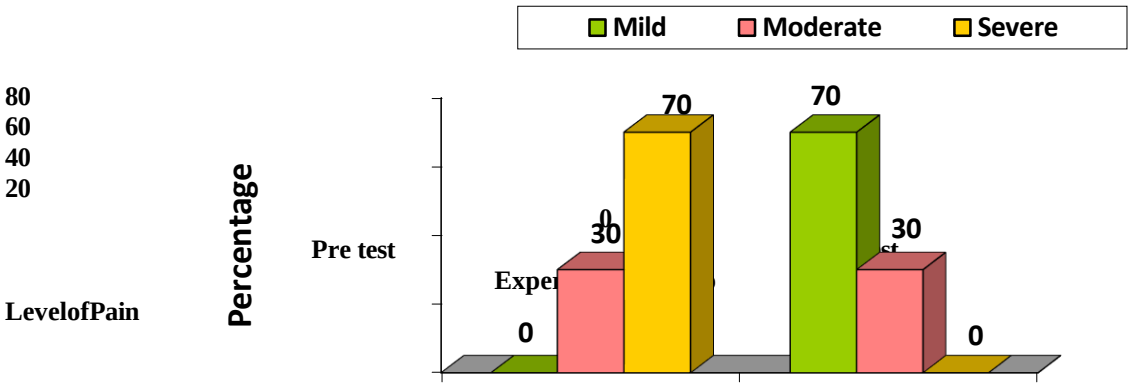
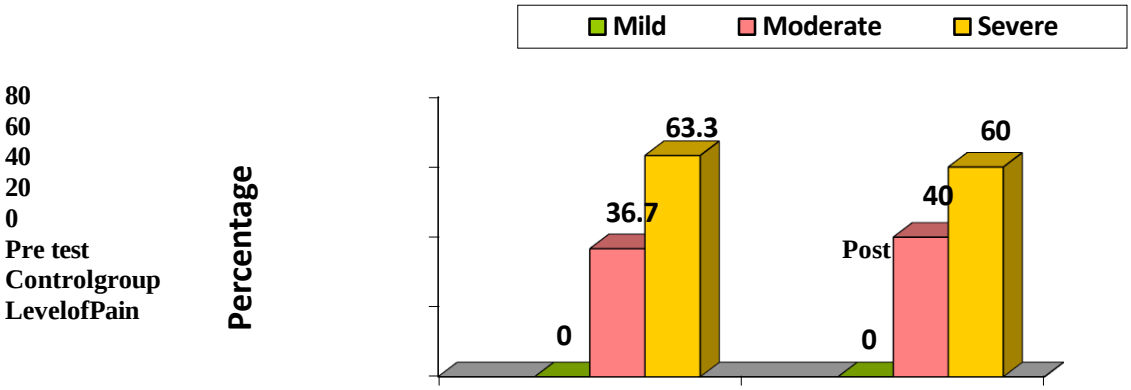


Fig-4.11:Distributionofsamplesaccordingtothelevelofpaininpretestand post test amongcontrol group



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SECTION-III

COMPARISON OF PRETEST MEAN SCORE AND POST TEST MEANSCOREOFLEVELOFPAINAMONGEXPERIMENTAL GROUP.

TABLE : 4.3 Comparison OfPretest Mean ScoreAnd PostTestMeanScore Of Pain Among Experimental Group

(n=60)

Levelof pain	**Experimental**		**Experimental**		**t-value**
	Pretest		**post test**		**26.104*** **
	Mean	**SD**	**Mean**	**SD**	
	6.7	**0.59**	**2.53**	**0.82**	

(* significantatp<0.001level)**

Table 4 .3shows the comparison of pretest mean score and post test meanscore of pain in experimental group. The Research hypotheses H1 stated as follows: There will be significant difference between the level of pain before and after intervention in the experimental group.As itstatestheabove table depictsthepretestmeanscoreoflevelofpain inexperimentalgroupis 6.7(standarddeviation0.59)and theposttest mean score is 2.53(standarddeviation 0.82). The obtained 't' value26.104 is highly significant at level of p< 0.001%. Bycomparingthepretest mean andposttest mean scoreoflevelofpaininexperimentalgroupitwasestimatedthat thepost test scoremean islower thanthepre test mean score. The researcher accepted the research hypothesis and rejected the null hypothesis.

SECTIONIV

COMPARISONOFPRETESTMEANSCOREANDPOSTTEST MEAN SCORE OFLEVEL OF PAINAMONG CONTROL GROUP

TABLE:4.4Comparisionofpretestandposttestlevelofpainamongthe control group (n=60)

Levelof Pain	**Control**		**Control**		**t-value**
	pretest		**post test**		
	Mean	**SD**	**Mean**	**SD**	**2.41****
	7.1	**0.92**	**6.93**	**0.87**	

(significant atp<0.01level)**

Table 5 shows the comparison of pretest mean scoreand post test mean score of pain among control group. Thepretest mean score of level of pain in control groupis 7.1 ,(standard deviationis0.92)andtheposttestmeanscoreis 6.93,(standarddeviationis0.87). The obtained 't' value 2.41 is highly significant at p<0.01% .

Bycomparingthe pretest mean andposttest mean scoreoflevelofpain incontrolgroup ,itwasestimatedthatposttest mean scoreislowerthanthe pretest meanscore and this could be because of hospital routines**.**

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SECTION-V
COMPARISON OFPOSTTESTMEAN SCORE OFPAIN AMONGCONTROLGROUPANDEXPERIMENTALGROUP

TABLE4.5ComparisionofmeanandSDofexperimentalandcontrol group

(n=60)

Levelof Pain	Experimental		Control		t-value
	post test		post test		20.18***
	Mean	SD	Mean	SD	
	2.53	0.82	6.93	0.87	

(*significantatp<0.001level)**

Table4.5showsthecomparisonofPosttestmeanscoreofamongexperimentalgroup and control group.

The research hypothesis H2 states that there will be significant difference in the post testlevelofpainamongbothexperimentalandcontrolgroup.AsstatedTheposttest mean scoreof levelofpain scale incontrolgroupis 6.93, (standarddeviation 0.87). The posttest mean scoreoflevelofpain inexperimentalgroup is 2.53,(standarddeviation0.82). The obtained 't' value 20.18 is highly significant at p<0.001%.Bycomparingtheposttest mean score offunctionaldisabilityand levelofpain inexperimentalgroup and control groupitwasestimatedthat the post test mean score of functional disability and pain among experimental is lower than the control group. The researcher accepted the research hypothesis and rejected the null hypothesis.

SECTION-VI
ASSOCIATION BETWEENTHEPOSTTESTSCOREOF LEVELOFPAININEXPERIMENTALGROUPANDTHEIR SELECTEDDEMOGRAPHICVARIABLES.

TABLE:4.6Associationofdemovariableswithpostlevelofpainin experimental group

(n=30)

Demographicvariables	Mild		Moderate		χ2valueatthe level of p<0.5
	F	%	f	%	
1.Age(in years):					p-value =0.99(NS)
a. 60-65years	16	53.3	6	66.6	
b. 66-70years	9	30	3	3.33	
c. 71-75years	2	7.4	0	0	
2.Gender:					p-value=1(NS)
a. Male	20	95	8	89	
b. Female	1	5	1	11	
3.Education:					

a. Illiterate	0	0	0	0	
b. Primaryeducation	5	16.7	0	0	p-value=0.82(NS)
c. Secondary education	8	26.7	6	66.6	
d. Collegiate	8	26.7	3	3.33	
4.Occupation:					p-value=0.29(NS)
a. Employed	26	93	6	66.6	
b. Un employed	1	7	3	3.33	
5.familyincome:					
a. Below5000	0	0	0	0	p-value=0.99(NS)
b. 5001-10001	4	19	0	0	
c. 10001-15000	16	76	6	6.66	
d. Above 15001	1	5	3	3.33	
6.Duration of illness:					p-value=0.99(NS)
a. 2 months	8	26.7	6	66.6	
b. 4 months	10	33.3	3	3.33	
c. 8 months	3	14	0	0	
d. 1year	0	0	0	0	
7.Perceptionofknee pain:					p-value=1(NS)
a. One knee	1	5	6	66.6	
b. Boththe knee	20	95	3	3.33	
8.Frequencyofknee pain:					p-value=0.99(NS)
a. Allthetime	4	13.3	6	66.6	
b. Sometime	1	3.3	3	3.33	
c. Whiletakingrest	0	0	0	0	
d. During activities	16	76	0	0	
9.Anytreatment:					p-value=0.96(NS)
a. Yes	1	5	6	66.6	
b. No	20	95	3	3.33	

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NS=Notsignificant*=significant

Theabovetable4.6showstheassociationbetweenthepostteststscoreofpainandtheir selected demographic variables ofpatients with osteoarthritis in experimental group. The result shows that the x2 value for level of pain is not significant . So, it is concluded that there is no significant association betweenthe post test score of level of level of painand the selected demographic variables such as age, gender, education, occupation, family income, duration of illness, perceptionof knee pain, frequency of knee pain and any treatment and the researcher accepts the Null hypothesis.

SECTION-VII

ASSOCIATIONBETWEENTHEPOSTTESTLEVELOFPAININ CONTROL GROUPANDTHEIR SELECTEDDEMOGRAPHIC VARIABLES

TABLE:4.7Associationofdemovariableswithpostlevelofpainincontrol group

n=30

Demographicvariables	**Moderate**		**Severe**		**χ2valueatthe level of p<0.5**
	F	**%**	**f**	**%**	
1.Age(in years):					**p-value =0.99(NS)**
a. 60-65years	**10**	**83.33**	**15**	**83.33**	
b. 66-70years	**2**	**16.6**	**3**	**16.6**	
c. 71-75years	**0**	**0**	**0**		
2.Sex:					**p-value=1(NS)**
a. Male	**11**	**91.6**	**17**	**94.4**	
b. Female	**1**	**8.3**	**1**	**5.5**	
3.Education:					**p-value=0.82(NS)**
a. Illiterate	**0**	**0**	**0**	**0**	
b. Primaryeducation	**5**	**41.6**	**2**	**11.11**	
c. Secondary education	**6**	**50**	**6**	**33.3**	
d. Collegiate	**1**	**8.3**	**10**	**55.5**	
4.Occupation:					**p-value=0.29(NS)**
a. Employed	**11**	**91.6**	**15**	**83.3**	
b. Un employed	**1**	**8.3**	**3**	**16.6**	
5.familyincome:					

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a. Below5000	0	0	0	0	p-value=0.99(NS)
b. 5001-10001	4	19	0	66.6	
c. 10001-15000	17	76	15	3.33	
d. Above 15001	1	5	3	0	
6.Duration of illness:					p-value=0.99(NS)
a. 2 months	2	26.7	15	66.6	
b. 4 months	10	33.3	3	3.33	
c. 8 months	0	14	0	0	
d. 1year	0	0	0	0	
7.Perceptionof knee pain:					p-value=1(NS)
a. One knee	1	5	15	66.6	
b. Boththe knee	11	95	3	3.33	
8.Frequencyofknee pain:					p-value=0.99(NS)
a. Allthetime	4	13.3	15	66.6	
b. Sometime	1	3.3	3	3.33	
c. Whiletakingrest	0	0	0	0	
d. During activities	7	76	0	0	
9.Anytreatment:					p-value=0.96(NS)
a. Yes	1	5	3	33.3	
b. No	11	95	13	66.6	

NS=Notsignificant *=significant

The above table4.7 shows the association between the post test level of pain and the selected demographic variables ofpatientswith osteoarthritis in control group. The result shows that the x2 value is not significant. So, it is concluded that there is no significant association between level of Painand the selected demographic variables such as age, gender, education, occupation,family income, duration of illness, perception of kneepain, frequency ofknee pain and any treatment.Hence The researcher accepts the Null hypothesis.

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DISCUSSION

Theaim ofthestudywasto assesstheeffectiveness ofisometricexercisesonpain amongpatients diagnosedwith osteoarthritis at selectedhospital, Vadnagar.The methodologyof the study was a quasi experimental pretest posttest controlgroupdesign.Thestudy was conductedin the outpatient department as well as the inpatient departmentoftheVasant Prabha Hospital , Vadnagar. It isa 150 bedded hospital, the outpatient department census per day is approximately 100.Thesamplesizewas60,amongthat30belongstocontrol groupand30 belongstoexperimental group.

THEOBJECTIVESOFTHESTUDYWERE:

- Toassessthepretestandposttestlevelofpainamongpatientsdiagnosed with osteoarthritis in both experimental and control group .
- Toassessstheeffectivenessofisometricexercisesonpainamongpatients diagnosed with osteoarthritis in experimental group.
- To find out the association between post testlevel ofpainand their selected demographic variables in experimental group
- To find out the association between post testlevel ofpainand their selected demographic variables in control group

DEMOGRAPHICDISTRIBUTIONOFSAMPLES

- Majority of the patients in experimental group 16(53.35%) are at the age between60-65yearsandincontrolgroup25(83.3%) patients are at theage between60-65 years .
- Majorityofthepatientsinexperimentalgroup 24(80%) arefemales and incontrolgroup24(80%) patients are females.
- Majorityofthepatientsinexperimentalgroup 17(56.7%)are collegiate andincontrolgroup 12(40%) patients are collegiate .
- Majorityofthepatientsinexperimentalgroup28(93.3%)areemployed, 2 (6.66%)areunemployed and incontrolgroup 21(70%) patients are employed and 9(30) are unemployed
- Majorityofthepatientsinexperimentalgroup 22(73.3%) are earning 10,001-15,001andincontrolgroup 20(66.7%)patientsareearning10,001- 15,000 .
- Majority ofthe patients inexperimentalgroup 11(36.7%) are suffering fromillness for 8 months andincontrolgroup 15(50%)patients are sufferingfrom illness for2 months.
- Majorityofthe patients inexperimentalgroup21(70%) havebilateral kneepain and incontrolgroup 17(56.7%) patients havebilateralknee pain .
- Majority of the patients in experimental group 25(83.3%) have joint pain during activities andin controlgroup17(56.7%) patients havejoint pain duringactivities.
- Majorityofthepatients inexperimentalgroup25(83.3%)havenotreatment andincontrol group 25(83%) patients have no treatment.

The firstobjective is :To assess thepretest and post test level of pain among patients diagnosed with osteoarthritis in both experimental and control group

Table4.2shows,inExperimentalgroupduringpretest9(30%)sampleshave moderatepain, 21(70%) samples haveseverepain. And in the Control group 11(36.7)samples have moderate pain and 19(63.3)sampleshave severe pain

Duringposttest21(70%)sampleshavemildpain,9(30%)sampleshave moderatepain.NoonehaveseverepaininposttestinExperimentalgroup.Andin control group 12(40)samples have moderate pain and 18(60)samples have severe pain

Theabovestudyfindingsrevealed,theposttestlevelofpainislowerthe pretestlevel ofpain amongexperimentalgroup.

Thesefindings arestrengthened by**Sheila CO'Reilly etal (2009)**,conducted a studyto assess the effectof a home based exercise programme, designed to improve quadriceps strength, on knee pain anddisability.191 men and women with knee pain aged 40-80 were recruited from the communityand randomized to exercise (n=113) or

no intervention (n=78). The exercise group performed strengthening exercises daily for six months. The primary outcome measure was change in kneepain (Western Ontario McMaster Osteoarthritis index(WOMAC)). Secondary measuresincludedvisualanaloguescales(VAS)forpainonstairsandwalkingand
WOMAC physical function scores. WOMAC pain score reduced by 22.5% in the exercise group and by 6.2% in the control group.VAS scores for pain also reduced in the exercise group compared with the control group ($p<0.05$). Physical functionscores reduced by 17.4% in the exercise group and were unchanged in controls ($p<0.05$).Thestudyconcludedthat asimpleprogrammeofhomequadricepsexercises can significantly improve self reported knee pain and function.

The second objective is: To assess the effectiveness of isometric exercises among newly diagnosed patients with osteoarthritis in experimental group

Table 4.3 reveals thepretest meanscoreoflevelofpaininexperimentalgroup is 6.7,[SD 0.59] and theposttest meanscore is 2.53, [SD 0.82]. Theobtained 't' value26.104 is highly significant at the level of $P< 0.001$.
By comparing the pretest mean and post test mean scoreof pain in experimentalgroupitwasestimatedthat thepost testmean score of painis lowerthanthepre testmean score of pain. The researcher accepted the research hypothesis and rejected the null hypothesis.
The above studyfindingswas supportedby **HinmanRs et al(2007**) to evaluatetheeffectsofisometric exercises on reductionofpain, 71volunteers wereparticipated.Theparticipantswererandomlyrevisedexercisestherapyon 6weeks. Theresultshowedthattotalof72%ofparticipantsreported improvementinpain.84% ofparticipantscontinuedexercise therapy independently.
The above study finding was lined with ,**Md. A. Shakoor et al**(2006)study on'Effects of isometric quadriceps muscle strengthening exercise on chronic osteoarthritis of the knee'. A total of 64 patients of osteoarthritis of the knee joints were studied to observe the effects of isometric quadriceps muscle strengthening exercise plus non-steroidal anti-inflammatory drugs (NSAIDs) on osteoarthritis of knee joints. Another 75 patients were treated with NSAIDs as control. They were assessed by visual analogue scale, OMAC scale and range of motion of the kneejoints and followed-up weekly for six weeks. Improvement was found in both groups ($p= 0.001$) after treatment. In comparison, more improvement was found in the exercise group after four weeks ($p= 009$). Then improvement was gradually increased daybydayandfinallytherewashighlysignificantimprovement($p=0.001$).This
study suggests that isometric quadriceps muscle strengthening exercise has its beneficial role to reduce symptoms in osteoarthritis knee.
Thepost test mean scoreof levelofpain incontrolgroupis 6.93, standarddeviation is 0.87.The posttest mean scoreoflevelofpain in experimentalgroup is 2.53,(standarddeviationis 0.82).The obtained t value20.18 is highly significant at the level of $p<0.001$
Thestudyfindings weresupported by**MCConnell(2008)** conductedastudy todetermine theeffectiveness ofisometricexercises inimprovingdailyactivities and reduction of pain. Randomized controlled trails were used.320 participants includedforthestudy.Theresult confirmed the isometricexercises were effectivein improving physical function and reduce the pain
Pister MF et al(2009) didastudytodeterminethelongterm effectiveness of exercise therapy on pain, physical function among osteoarthritis patients. Bothrandomizedandcontrolledclinicaltrailswereused. The assessment was done by 2 reviewers about 6 months.Theresult revealedexercise therapy was benefited in reducing the level of pain and improve the function among osteoarthritis patients.

Thethird objective is : To find outtheassociation between posttest level ofpain in experimentaland theirdemographic variables.

Table :4.6 Showsthatthere is no significantassociationbetween posttest levelofpainin experimental group and their selecteddemographicvariablessuch as age, sex,education, occupation, familyincome,duration of illness, perception of knee pain, frequency of knee pain and any treatment.

The fourth objective is : To find out the association between post test level ofpain in Controland theirdemographic variables.

Table :4.7 Showsthatthere is no significantassociationbetween posttest levelofpainin Control group and their selecteddemographicvariablessuchasage, sex,education, occupation, familyincome,duration of illness, perception of knee pain, frequency of knee pain and any treatment.

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CHAPTER-VISUMMARY,FINDINGS,IMPLICATIONS RECOMMENDATIONS,LIMITATIONS ANDCONCLUSION

This chapter presents the summary of the study, findings and its implications for nursing and health care services and ends with recommendations for further research on this field.

6.1 SUMMARY OFTHE STUDY:

The purpose of the study was to assess the effectiveness of isometric exercises onpainamongpatients diagnosed with osteoarthritisatselected hospital ,vadnagar.

The quasi experimental studypretestandpost testcontrol group was designed bythe researcher .The Convenient sampling technique was used to select 60 samples. The tool was developed and adopted after reviewing the relevant literature, Numerical pain rating scale was used to assess the level ofpain.The data were collected and analyzed using both inferential statistics based on the objectives of the study. The study tested and accepted the hypotheses . The data collected were statistically analyzed and represented as tables and graphs in previous chapter.

6.2 MAJORFINDINGS OFTHESTUDY

- Majorityofthepatientsinexperimentalgroup 16(53.35%) were at the agebetween60-65yearsandincontrolgroup25(83.3%) patients were at the age between 60-65 years .
- Majorityofthepatientsinexperimentalgroup 24(80%) werefemales andincontrolgroup24(80%) patients werefemales
- Majorityofthepatientsinexperimentalgroup 17(56.7%)werecollegiate andincontrolgroup 12(40%)patients werecollegiate .
- Majorityofthepatientsinexperimentalgroup28(93.3%)wereemployed ,02(50%)were unemployed and incontrolgroup21(70%)patients were employed and 9(30) were unemployed.
- Majority of the patients in experimental group22(73.3%) were earning 10,001-15,001 andincontrolgroup 20(66.7%)patients were earning 10,001-15,000 .
- Majority ofthe patientsinexperimentalgroup 11(36.7%) were suffering fromjointpainfor 8 monthsandincontrolgroup 15(50%) were sufferingfromjointpainfor 2 months.
- Majorityofthe patientsinexperimentalgroup21(70%) havebilateralkneepainandincontrolgroup17(56.7%)patientshavebilateralknee pain
- Majorityofthepopulationinexperimentalgroup25(83.3%) havejointpainduringactivities andin controlgroup17(56.7%) patients have jointpainduringactivities.
- Majorityofthepopulationin experimental group25(83.3%) haveno treatment andincontrol group 25(83%)patients have no treatment.
- In experimental groupduringpretest9 (30%)samples havemoderatepain, 21(70%) samples haveseverepain. During post test 24(80%) samples have mild pain , 6(20%) samples havemoderate pain .
- Thepretest mean score of pain in experimentalgroupis6.7 [SD 0.59]and theposttest meanscore is2.53 [SD 0.82],(t value 26.104) .The study findings revealedthat,in experimental group the post test meanscore of pain andislowerthanthepre test mean score of pain .
- Thepost test meanscore ofpaininExperimentalgroup is 2.53[SD 0.82](t value 20.18). The post testmeanscore ofpainincontrolgroupis 6.93[SD0.87](t value 20.18). The study findings revealed that the post test mean score of pain in experimental group who received isometric exercises is lower than the control group.
- The study findings revealed that there isno significantassociationbetween posttest level of painin experimentalgroup and controlgroup with their selecteddemographicvariablessuchasage,sex,education,occupation ,familyincome, duration of illness ,perception of knee pain, frequencyof knee painand any treatment.

6.3 IMPLICATIONS

Nursingisadynamicprocess,whichinvolvesqualitybasedpractice ,scientificbodyofknowledgeanddisseminationof research knowledge in to practices. Nursingprofessionalsfind thehealthpromotionveryrelevant,because itappliesacrossthespan andusefulinavarietyofsettings. sothepresent studyaddmajorimplicationsintoavariousareasofnursingcaretothepatients.

Physical therapy is a branch of rehabilitative health ,that uses special designed exercises and equipment to help patients regainimprove their physical ability. Therapist can design and individualized program that emphasis active and passive range of motion exercises ,muscle strengthening and joint production principles .In addition modalities such as ultra sound, massage, hot application, electrical stimulation are available for uses if needed.

Nursing practice:

- Motivatetheagedandadultto dotheexercises.
- Encouragethe client toknow thebenefits of exercises.
- Encouragethe client tomodifydailyactivities.
- The training program me should be given to health care team members about osteoarthritis and exercises to treat them.

Nursing education:

- Managementoforthopedicproblemssuchasosteoarthritis,osteoporosisetc can be included in depth in basic curriculum
- Thestudyhelpsstudent to gain knowledgeabout thebenefits ofexercises.
- The nurse educator encourage the students nurses to conduct health education program me among adults with osteoarthritis .
- Nurse educator can conduct workshop, seminar and conferences on exercises to improve their dailyactivities among people with musculoskeletal problems.
- StudentscanbeencouragedtoprepareIECmaterialsregarding exercises.
- Students are encouraged to do the project work in the non focused area in the management of osteoarthritis.

Nursing administration:

- Nurse administrator can plan and organizein service education program me for health personnel to renew their knowledge.
- Nurse administrator can promote efficient team work .They also make a plan for manpower, money, materials and method to conduct health education program me regarding exercises.
- Nurse administrator can appoint skillful nurses for caring patients with Osteoarthritis.
- Nurse administrator insists the nurses to teach the exercises with the care of patients with Osteoarthritis.

Nursing researcher:

Thisstudycan bebaselinefurtherstudies to buildup on,

- ToidentifyindepthknowledgeandvariousmanagementonOsteoarthritis patients.
- Thestudycanencourage studentnursestoconductthemajorprojectregarding Osteoarthritis.
- The study paves the way to identify the newer method of impacting the health information that will be empirically tested.

6.4 RECOMMENDATIONS

Thefollowingrecommendationsaremadebasedonthefindingsofthe study:

Onthebasisofpresentstudythefollowingrecommendationsaremade

- A similarstudycouldbedonewithlargesamples.
- Astudycanbedonetoassessthequalityoflifeamongpatientswith osteoarthritis.
- Acomparative studybetween the effects of isometric quadriceps exercise and isometric quadriceps exercise along with ultrasound in osteoarthritis of knee.
- Massmediacanbe usedtopopularizetheimportanceofexercisesamong patientswithosteoarthritis.

6.5 LIMITATIONS

- Theconvenientsamplingtechniquewasusedforthestudy.Hencethe studywaslimitedtogeneralization.

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❖ Thestudycouldbeeffectivewhentheisometricexercisesaregivenalongwith other exercise like aerobic exercises and isokinetic exercises

6.6 CONCLUSION

"Ifyouworkhardenough,youpropablydon,tneed anydoctor"

- BRUCECHATWIN

Osteoarthritis isa progressive degenerative disease that affects the joint cartilage, subchondral bone, synovial and joint capsule .pain is the dominant symptom of osteoarthritis .pain along with the joint stiffness, instability ,swelling and muscle weaknessleadstophysicalandphysiologicaldisabilityandimpairedqualityoflife .Nurseis akeypersonforprovidingcaretopatients.Asforthisresearchis concerned, the intervention study proved that there is a significant reduction of pain among patients with osteoarthritis.The followingconclusions are drawn from the findings of study.The result of this study reveals that the effectiveness of isometric exercises can help to reduce the pain. Thus the practice of isometric exercises in physical therapyforpatientswithosteoarthritisshouldbeencouragedtoindividualandsociety ,throughprogramme and mass media or health education program to lead a healthy life.The isometric exercises forms the effective non pharmacological intervention to reduce painamong osteoarthritis patientsalso it proved to be non invasive and no sideeffects arereported. Thefindingsofthisstudyagreewiththefindings ofprevious clinical study, regarding isometric exercises technique.

QUADSETS

Situprightinachair,straighten yourleg,tighten yourthighandpull your toes back

- Holdfor10secondsandrepeatupto20times.Themoreyoutighten yourmuscles, the better results you'll get from this exercise
- .Youmayfeelastretchbehindyourkneeduringtheexercise.Foragreater challenge, straighten both legs at the same time, or do this exercise with an adjustable ankle weight up to 5 pounds

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STANDINGTOESRAISESANDHEELRAISES


START END

- Standwith asecuresupportin frontofyouto holdon to
- Raiseyourtoesup
- Returntostartingpositionand repeat


START END

- Standwithasecuresupportin frontofyou toholdon to
- Raiseyourheelsoffthe ground
- Returntostartingpositionand repeat

ISOMETRICSTRENGTHENINGEXERCISES

- Askthepatienttositcomfortablyinachairwiththehipsandkneesin90°of Flexion, with ankles crossed.
- The ankles are pressed against each other to contract the quadriceps and contralateral Hamstrings for a series of contractions. 10 repetitionsare recommened.Then,the anklesarecrossedinreversefashion,andtheopposingquadricepsandhamstringsare cocontractedARCQuads