

To Evaluate the Effectiveness of Isometric Exercises in Osteoarthritic Knee Joint

Sanjai Kumar¹, Avikirna Pandey², Shweta Bhardwaj³

Abstract

Objective: The study was done to find out the effectiveness of isometric exercises in Osteoarthritic knee joints. **Methods:** The study was of experimental design, with 30 subjects (both male and female), The subject diagnosed as osteoarthritis knee by orthopedician who showed a sign and symptoms requested to participate in the study were randomly selected according to the inclusion and exclusion criteria and carried out at Physiotherapy O.P.D. of CSS Hospital, Jai Physiotherapy and Dental Clinic, Ansal Town, Modipuram, Meerut, and Physiocare Clinic and Rehabilitation Centre, Meerut. On day one we have taken pre-assessment of the osteoarthritis knee patients, after that we took range of motion of the knee and evaluated the VAS and WOMAC scale respectively and then we started physiotherapy treatment i.e. hot fomentation with knee isometric exercises. The treatment comprises of 10 minutes hot fomentation followed by exercises for 15 minutes. Subjects were asked to come for physiotherapy treatment for 6 days in a week or 6 weeks. All the analysis were obtained using SPSS version 13.0 (for window 7). Demographic data of the patients including age and gender were summarized. The dependent variable for the statistical analysis was knee ROM, pain, and WOMAC. A base line data was taken at the beginning of the study (pre test values) and after the completion of the treatment protocol reading was taken for the same parameters (post test values) to analyze the difference, independent t-test was used. A level of 0.05 was used to determine the statistical significance. **Results:** The results showed that there was statistically significant improvement in the ROM and Pain of the knee joint after treatment. The p-value of pre and post VAS and WOMAC was 0.05. So we found, Isometric to be the most effective treatment for knee OA.

Keywords: O.A; Isometrics; VAS and WOMAC.

Introduction

Osteoarthritis is a degenerative condition of joints. It is non-inflammatory process. It is characterized by progressive degeneration of new bone i.e. Osteophytes. It is more common in weight bearing joint such as hip and knee. Osteoarthritis is one of the most common cause of pain and disability in the western world and it affects up to 80% of people over the age of 65. Despite numerous research studies, the exact pathways and triggers involved in O.A are

still the cause of some debate. O.A is some time known as degenerative joint disease Both men and women are affected but the joint distribution pattern is different [1].

Primary osteoarthritis of knee joint is more common than the secondary osteoarthritis in Indians. It commonly seen in the middle age, obese female however male are not exempted. The symptoms are gradual onset.

Pain is at first intermittent and is provoked by the use of the joint and relieved by rest. The disease progress is characterized by movement in the affected joint being increasingly limited, initially as a result of pain arms muscular spasm, but later because of capsular fibrosis, osteophytes formation and remodeling of bone [3].

Painful cracking and grating on active motion particularly about the patella is an early finding even before roentgenograms become revealing. Quadriceps weakness is even present in very early joint degeneration, suggesting that it may be primary

Author Affiliation: ¹Associate Professor, ²Assistant Professor Subharti College of Physiotherapy, Meerut, Uttar Pradesh, India. ³Consultant Physiotherapist, Physiocare Clinic and Rehabilitation Centre, Meerut, Uttar Pradesh, India.

Reprint Request: Sanjai Kumar, Associate Professor, Subharti College of Physiotherapy, Meerut 250005, Uttar Pradesh, India.

E-mail: kumarsanjai880@gmail.com

Received on 08.09.2017, Accepted on 13.10.2017

risk factor for aspects of knee osteoarthritis. The quadriceps is the prime stabilizer of the knee, affording protection of the articular structure. Muscle strength in older person with knee osteoarthritis may be reduced by up to one third compared with age. Extended periods of inactivity caused by the joint pain in arthritis patient can lead to disuse atrophy of the involved musculature and can produce strength declines of up to 3% a week [4].

It is a degenerative joint disease. The etiology is multifactorial still not understood, But commonly it is thought to be wear and tear of joints as one ages. About 80% of people above age of 60 will have symptomatically evidence of osteoarthritic, males and females both are affected. However it is more over the age of 50 particularly in post menopausal age [5].

It is due to friction of patella femoral articulation associated muscle wasting which is an important factor in the progress of the disease, as in the absence of normal muscular control the joint become more prone to injury pain arises from tubercle micro fracture traumatic lesion in the capsule and periarticular tissue and low grade synovitis nocturnal aching may attributed to hyperemia of the subchondral bone [6].

Traditional quadriceps and hamstrings strengthening exercise a isotonic treatment with follow up home exercise program also use full in patient with OA many of the nonmedical, non surgical treatment including superficial and deep heat, cold, exercise, weight loss, acupuncture, Transcutaneous electrical stimulation low energy LASER deep, vibration, topical applied creams pulsed electromagnetic fields a orthotic devices are used to treatment patient with OA [7].

Nonsteroidal NSAID' drugs have been mainstay of medical management, all NSAIDS drugs have performed similarly, with patients report approximately 30% reduction in pain and 15% improvement in function. Surgical interventions relives symptoms in some patients but arc expansive and also associated with risk [6].

Statement of Study

Weather the isometric exercise improves range of motion and pain in osteoarthritis of knee patients or not?

Aims and Objectives

To study the effect of isometric exercise on subject with osteoarthritis knee.

Need of Study

Osteoarthritis knee is a common problem in both male and female population. This study is intended to find out an effective treatment for treating osteoarthritis knee.

Hypothesis

Experimental hypothesis: Isometric exercise will have different effect in improvement of range of motion and pain on patient with osteoarthritis of knee.

Null hypothesis: Isometric exercise will have no similar effect in improvement of range of motion and pain on patient with osteoarthritis of knee.

Purpose and Significance of Study

To find out an effective treatment which help in the treatment of osteoarthritis of knee.

To improve functionally in clinical sittings.

Materials and Methods

The purpose and procedure of the study was explained to all the subjects and informed consent was obtained, from those who diagnosed as osteoarthritis knee by orthopedician. Who showed a sign and symptoms were requested to participate in the study and randomly selected according to the inclusion and exclusion criteria and requested to participate in the study, carried out at Physiotherapy O.P.D. of CSSHospital, Jai Physiotherapy and Dental Clinic, Ansal Town, Modipuram, Meerut, and Physiocare Clinic and Rehabilitation Centre, Meerut. On day one we have taken pre-assessment of the osteoarthritis knee patients, after that we took range of motion of the knee and evaluated the VAS and WOMAC scale respectively and then we started physiotherapy treatment i.e. hot fomentation with knee isometric exercises. The treatment comprises of 10 minutes hot fomentation followed by exercises for 15 minutes. Subjects were asked to come for physiotherapy treatment for 6 days in a week or 6 weeks.

Isometric Exercise

Position of patient: Patient in supine lying position with a small towel rolled under knee with knee in 15° of flexion.

Position of therapist: Standing on the affected side of the patient.



Fig. 1: Hot fomentation



Fig. 2: Isometric exercise

Technique: The Patient is asked to press his affected knee on to the rolled towel and hold it for (10-15 sec.) This should be repeated for 20 counts.

Inclusion Criteria

- Age above 35 years
- Presence of sign and symptoms of osteoarthritic knee
- Pain in knee which increases on palpation
- Presence of crepitus
- Osteophytes formation
- Reduced range of motion at knee joint

Exclusion Criteria

Age below 35 years.
Injury around knee joint (ACL and PCL or SOFT Tissue Injury).

Fracture in and around knee joint.

Instruments and Tools Used in the Study

Couch for examination and treatment of the patients.

Universal Goniometer (Half circle): for measuring ROM of joint.

Pillow: For positioning the patient.

Pen and paper.

Assessment Tool

Goniometer: The range of motion measurement is taken with universal Goniometer for joints of extremities, which generally have good to excellent reliability. The accurate application of knowledge and skill, combined with interpreting the results as measurement of range of motion only, provide sufficient evidence to ensure content validity. Active flexion and extension were measured with patient in sitting position [9].

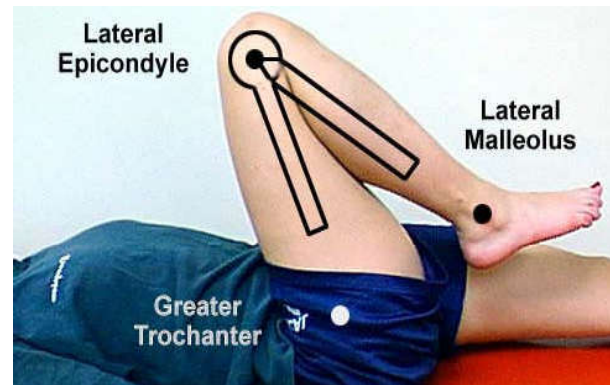


Fig. 3: Goniometer

VAS Scale: Visual analogue scale is a straight line, the ends of which are the extreme limits of the sensation can be measured. The intensity of the pain is measured/ rating on the position of the patient's, and is expressed in terms of a fraction of the whole line i.e. 10 cm. Patients of all groups were assessed for following parameters before starting the range of motion using half circle goniometer [10].

Operational Definition

Osteoarthritis

Osteoarthritis is a non inflammatory degenerative disorder of joints characterized by progressive deterioration of the articular cartilage and formation of new bone (osteophytes). It is primary when the etiology is unknown and secondary when it follows some known cause- e.g Trauma, infection, rheumatoid arthritis etc. It is more common in weight bearing joints such as hip and knee. The concept of "wear" and "tear" is generally attributed as a cause of osteoarthritis [11].

Isometric Exercise

Isometric exercises is a form of exercise that occurs when a muscle contracts without an appreciable change in the length of the muscle or without visible joint motion .Although there is no physical work done, a great amount of tension and torque output are produce by the muscle. Various forms of isometric exercise include muscle setting exercise, resisted isometric exercises, and stabilization exercises. Isometric resistance training improves muscle strength only at the joint angle at which the training takes place [12,13].

Visual Analog Scale

Attempt to represent measurements quantities in terms of a straight line placed vertically or horizontally on paper. The end points of the line are labeled with descriptive or numeric terms to anchor the extremes of the scale and provide the frame of reference of any point in the continuum between them. The patient is asked to bisect the line at a point representing assessed position on the scale. The patient score is thus obtained by measuring from zero to mark bisecting the line [14].

Table 1: Mean and SD of age pre and post vas and WOMAC

	AGE	PRE VAS	POST VAS	DIFF	KNEE FLEX PRE ROM	KNEE FLEX POST ROM	PRE WOMAC	POST WOMAC
MEAN	54.30	8.20	1.33	6.87	117.60	132.27	79.07	33.13
SD	9.07	0.76	0.96	1.04	11.61	8.27	7.18	4.33
MIN	40.00	7.00	0.00	5.00	96.00	120.00	68.00	24.00
MAX	68.00	9.00	3.00	9.00	138.00	142.00	92.00	41.00

Table 2: Frequency and percent of gender

Gender	Frequency	Percent
1.00	10	33.3
2.00	20	66.7
Total	30	100.0

Table 3: Mean and STD dev and STD error mean

	Mean	Std. Deviation	Std. Error Mean
Pre Vas	8.2	0.8	0.1
Post Vas	1.3	1.0	0.2
Knee Flex Pre Rom	117.6	11.6	2.1
Knee Flex Post Rom	132.3	8.3	1.5
Pre WOMAC	79.1	7.2	1.3
Post WOMAC	33.1	4.3	0.8

** . Correlation is significant at the 0.01 level (2-tailed).

Table 4: R and p - value of pre and post vas and womac

		PRE WOMAC	POST WOMAC	PRE VAS	POST VAS
PRE WOMAC	r- value	1	.537**	-.160	-.139
	p-value		.002	.397	.465
POST WOMAC	r- value	.537**	1	.159	-.136
	p-value	.002		.401	.475
PRE VAS	r- value	-.160	.159	1	.283
	p-value	.397	.401		.129
POST VAS	r- value	-.139	-.136	.283	1
	p-value	.465	.475	.129	

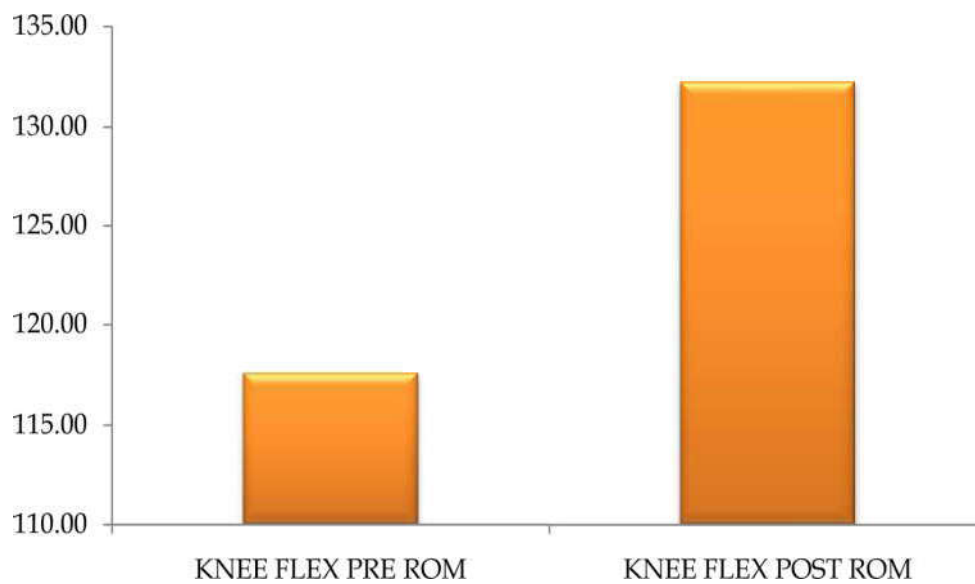
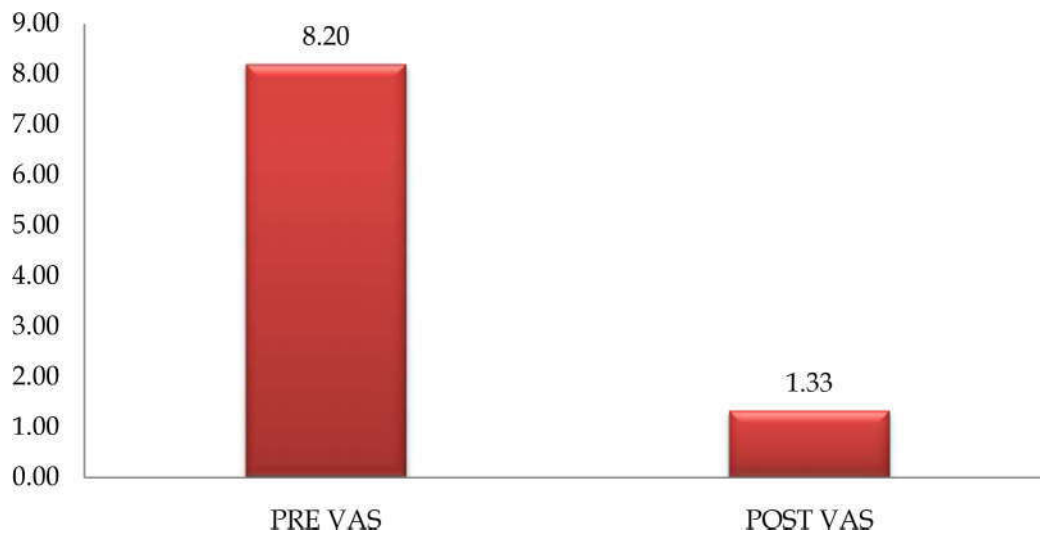
** . Correlation is significant at the 0.01 level (2-tailed).

Table 5: Sample correlation

	N	Correlation	Sig.
Pre Vas & Post Vas	30	.283	.129
Knee Flex Pre Rom & Knee Flex Post Rom	30	.946	.000
Pre WOMAC & Post WOMAC	30	.537	.002

Table 6: Paired difference

	Mean	Std. Deviation	Paired Differences		t	DF	Sig. (2-tailed)	
			Std. Error Mean	95% Confidence Interval of the Difference				
				Lower				Upper
Pre Vas - Post Vas	6.867	1.042	0.190	6.478	7.256	36.106	29	.000
Knee Flex Pre Rom - Knee Flex Post Rom	-14.667	4.649	0.849	-16.402	-12.931	-17.281	29	.000
Pre WOMAC - Post WOMAC	45.933	6.074	1.109	43.665	48.201	41.421	29	.000

**Fig. 4:** Knee flex pre and post rom**Fig. 5:** Pre and post vas

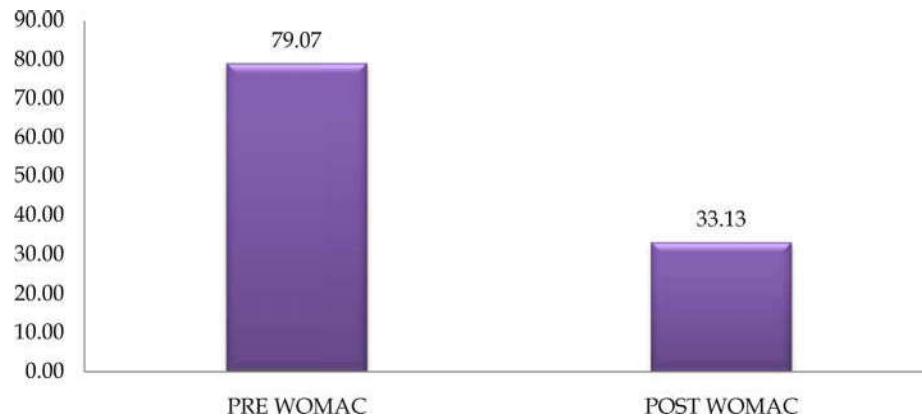


Fig. 6: Pre and post womac

Womac Index

It is used to assess patients with osteoarthritis of the hip of the knee or knee using 24 parameter . It can be used to monitor the course of the disease [15].

Data Analysis

All the analysis were obtained using SPSS version 13.0 (for window 7). Demographic data of the patients including age and gender were summarized. The dependent variable for the statistical analysis was knee ROM, pain, and WOMAC. A base line data was taken at the beginning of the study (pre test values) and after the completion of the treatment protocol reading was taken for the same parameters (post test values) to analyze the difference , independent t-test was used. A level of 0.05 was used to determine the statistical significance.

The mean age of 53.87 with the standard deviation of 10.00. In this study isometric exercise applied in patient with OA knee. As an outcome pain, ROM and WOMAC were taken. In isometric exercise technique group with $p=0.05$ pain has improved.

A total number 50 patient was screened for the application technique From which 20 subjects was withdrawal from the study due to some personal reason. So effect of isometric quadriceps muscles strengthening exercise on osteoarthritis of the knee was included in the study after the examination and analysis inclusion and exclusion criteria. The subjects was taken subharti hospital. In the study both female and male was there but, the ratio between them is not equal. The female was more in number than male.

Md. A. Shakoor et al. found significant improvement muscle strengthening exercise is found to have better effect when it is used in adjunct to NSAIDS in osteoarthritis knee joint. Exercise may decrease the need of NSAIDS and thereby side effects of NSAIDS can be avoided.

The data analysis was done by using the software SPSS version 15. In which the test used was paired T-test. There was comparison between pre evaluations of the same group with the post evaluation of the same group. The study shows that there is statistically significant improvement on the knee joint after treatment. The mean value of pre and post was 79.07 and 33.13 and p value is 0.005 (normal pm000) and the mean value of pre and post.

We consider our positive results Isometric was helped by our setting in general practice and adequate selection of patients by diagnostic groups. We found Isometric to be the most effective treatment for knee OA. So on summary we conclude through the improvement shows that the technique has a differential outcome Isometric provide better result.

Limitation of Study

The study was done on a very small sample.

The study is a short time study.

The study is done on a limited part of the body.

Suggestion for further study (future research):

Effectiveness of ultrasound with isometric exercise and deep friction massage can be tried in various other muscle groups .

References

1. Paul A Van den Dolder et al: six sessions of manual therapy increases knee flexion and improve activity in couple with anterior knee pain:A randomized controlled trial. *Ausj Phys* 2006;(52):261-264.
2. LT. Michael T, Kel ly MS. Non Surgical Management of Knee Osteoarthritis, *JAAI'A* 2006;19(1).
3. Chad D. Markcrt et al. Exercise in skeletal muscle regeneration:arch phys Med rehabilitation. 2005;86:1304-1309.

4. Mao IIsuing iluang et al. preliminary results of integrated therapy for patients with OA knee: arthritic and rheum dis. 2005;59:700-704.
5. Gail D deyle, Stephen C ALLison physical therapy management for OA knee. Physical Therapy 2005;85(12).
6. Jayant Joshi, Prakash Kotwal. Essential of of orthopaedics and applied physiotherapy (2004: arthritides-chapter 12:pp292) Sunder: textbook of rehabilitation. 2002;(2):390.
7. Robert Top et al. The effects of dynamic vs isometric resistance training on pain and functioning among adults with OA knee: arch phys med rehabiittio. 2002;83:1187-95.
8. Juiie Haynes, and Paul Creamer. Management of osteoarthritis pain in community dwelling elderly, clinical geriatric 2003;2(4):34-40.
9. D.J. Ward et al. Osteoarthritis: cash textbook of orthopaedics and rheumatology for physiotherapists, 1993;01(Chapter 19):385-386.
10. T.E Mc alindon, S Snow, C Cooper, PA Dippe. Radiographic pattern of osteoarthritis of the knee in the community; the importance of patellofemoral osteoarthritis sampals of rheumatic disease. 1992;5(1):844-849.
11. R.S Hinman, K.L Bennel, LK.M Crossley and J.Mc Connell. Immediate effect of adhesive tape on pain and disability in individuals with knee osteoarthritis, Rheumatology, 2003;42:865-69.
12. Michael J Callaghan. The effect of patellar taping on knee joint proprioception. J of athletic training 2002;37(1);19-24.
13. Mark Overington et al. A critical appraisal and literature critique on the effect of patellae taping – j of physiotherapy newzealand 2006;34(2):66-70.
14. Michael J Callaghan et al. The effect of patellataping on knee joint proprioception; J athktic training; 2002;37(1):19-24.
15. Kay Crossley, Sallie Cowan; Am orthop society for sports medicine; 2002;30(6):54.

REDKART.NET

(A product of RF Library Services (P) Limited)
 (Publications available: Journals, Books, Articles and Single issues)
 (Date range: 1967 to till date)

The Red Kart is an e-commerce and is a product of RF Library Services (P) Ltd. It covers a broad range of journals, Books, Articles, Single issues (print & Online). The publications are available in print and online (PDF) form and the all are in Hindi and English languages. All these publications are in stock for immediate shipping and online access in case of online.

Benefits of shopping online are better than conventional way of buying.

1. Convenience.
2. Better prices.
3. More variety.
4. Fewer expenses.
5. No crowds.
6. Less compulsive shopping.
7. Buying old or unused items at lower prices.
8. Discreet purchases are easier.

URL: www.redkart.net