

## Effectiveness Of Rhythmic Stabilization Technique (Pnf) With Conventional Physiotherapy In Osteoarthritis (Oa) Knee

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### Abstract

**Background:** Osteoarthritis of the knee leads to pain, difficulty in joint, reduced ROM and impaired Proprioceptive accuracy. PNF stretching are used to improve muscle flexibility, pain, ROM. Recently, impaired Proprioceptive accuracy of the knee has been proposed as a local factor in the onset and progression of radiographic knee OA. rhythmic stabilization of proprioceptive neuromuscular facilitation (PNF) is specifically designed to stimulate mechanoreceptors and Literature show significance of rhythmic stabilization proprioceptive neuromuscular facilitation (PNF) on clinical symptoms of OA knee.

**AIM:** The aim of this study is to find out effectiveness of two different therapeutic interventions in the management of knee OA that is rhythmic stabilization of Proprioceptive Neuromuscular Facilitation (PNF) and conventional physiotherapy.

**MATERIALS AND METHODOLOGY:** In this study 36 participants of age group between 40 - 60 were Selected according to selection criteria and randomly. The participants are divided into 2 groups, Group A(n=18) received rhythmic stabilization techniques (PNF) and Group B(n=18) received conventional physiotherapy. in which Outcome Measure used are Western Ontario and McMaster Universities Arthritis index (WOMAC) to assess patients with OA knee also for pain assessment visual analog scale (VAS) is used.

**RESULT:** Results: Both experimental groups significantly reduced pain, increased flexibility and independence in functional mobility following the treatment duration. There is a significant difference between the two experimental groups in reducing pain, increasing flexibility and an independency in functional mobility at the post-intervention stage.

**CONCLUSION:** rhythmic stabilization of Proprioceptive Neuromuscular Facilitation (PNF) is significantly more effective than conventional physiotherapy (CPT) alone in reducing pain increasing flexibility and an independency in functional mobility in Grade 2 – 3 osteoarthritis of knee.

### Introduction

India's Osteoarthritis (OA) is a chronic disorder which is degenerative in nature having a multifactorial etiology characterized by subchondral sclerosis, loss of the articular cartilage, hypertrophy of the marginal bone along with morphological and biochemical changes in the joint capsules and synovium<sup>1</sup>. The prevalence of OA knee in India is 28.7%<sup>2</sup>. There are possibilities for a rise in the prevalence of Osteoarthritis due to an improvement in the expectancy of human life, it is a condition that causes severe pain and disability adversely affecting the quality of life of the individuals suffering<sup>3</sup>. Symptoms include pain, tenderness in the knee, stiffness when standing or walking, loss of flexibility grating sensations that can be heard when the knee joint is used<sup>4,5</sup>.

Degenerative changes may result in imbalance in equilibrium between breakdown and repair process of joint tissue. <sup>8</sup> Impaired Proprioceptive accuracy of the knee is a local factor in the onset and progression of radiographic knee osteoarthritis. Additionally Proprioceptive impairments could be a cause of knee pain or activity limitations in knee OA patients<sup>6,7</sup>.

There is a wide range of treatment methods available for OA knee but there remains still scope for interventions which help in improving the symptoms with very less side effects<sup>3</sup>. The treatment for OA knee involves a variety of pharmacological and non-pharmacological approaches. Currently not many disease modifying approaches are present, and the pharmacological interventions are directed towards alleviating symptoms to prevent loss of function and inactivity<sup>12</sup>. The pharmacological treatment options involve non-steroidal anti-inflammatory drugs (NSAIDs), Acetaminophen, Opioids, Intra articular injections, Chondroitin sulfate, Glucosamine sulfate whereas the non-pharmacological approach involves Massage therapy, Hydrotherapy, Thermotherapy, Manual therapy, Electrotherapy, other physiotherapeutic modalities and Surgery<sup>13</sup>. Pharmacological approaches have been majorly used for the management of Osteoarthritis knee. Pharmacological interventions have been observed to improve the condition but they have to be taken for a long period of time and also have significant side effects<sup>3</sup>. Physiotherapeutic approaches have been found to have positive effects in reducing disability and pain in individuals with OA knee, apart from the above mentioned modalities, proper use of canes, taping of knee, orthotics, balance training and isometric exercises to prevent muscle atrophy are used<sup>14</sup>.

rhythmic stabilization techniques of Proprioceptive Neuromuscular Facilitation (PNF) have also been used for the management of OA knee. Intervention like PNF is proven to be safe and effective in improving the symptoms of OA knee with minimal side effects by the patients<sup>3</sup>. The term stretching is generally used to describe any therapeutic technique to elongate the structures which are shortened pathologically and thus effective in improving the range of motion<sup>9</sup>. PNF (hold-relax) technique involves a short isometric contraction of the agonistic muscles which are targeted to be stretched<sup>10</sup> and is useful in improving the range of motion<sup>11</sup>.

The present study was intended to find the effectiveness of rhythmic stabilization techniques (PNF) with conventional physiotherapy treatments to reduce pain and improve functional ability in patients with knee osteoarthritis.

## Materials And Methods

An experimental study was conducted in the department of physiotherapy Krishna institute of medical sciences, Karad. All procedures performed in this study involving human participants were in accordance with the ethical standards of the Institutional ethics committee of Krishna institute of medical sciences (Ethics committee Registration No. ECR/307/Inst/MH/2013/RR-16). About 36 patients were selected based on the inclusion criteria (1) Radiologically and clinically diagnosed cases of Osteoarthritis knee by certified Orthopaedic surgeon or Physiotherapist. (2) Between the age group of 40-60 years including both men and women. (3) Patients with Grade 2 or 3. Osteoarthritis knee using Kellgren - Lawrence classification, and exclusion criteria (1) Other knee joint pathologies eg. Chondromalacia patella, plica syndrome, (2) Neurological disorders, (3) Post traumatic knee patients, (4) Post surgical patients, (5) Any contraindication for exercise, (6) Un-cooperative patients. A written informed consent has been taken from all the participants. The study has been approved by the Ethics committee of Krishna institute of medical sciences. The participants have been divided into 2 groups, Group A (18 participants) received rhythmic stabilization techniques (PNF) and Group B (18 participants) received conventional physiotherapy (CPT), baseline treatment given to both groups included HMP and IFT. The participants have to undergo treatment protocol consisting of the following:

### Group A

Hot moist pack The patient will be made to lay in a supine position with the affected knee slightly flexed. A hot moist pack will be applied around the knee for 15 minutes.

- rhythmic stabilization techniques (PNF): PNF techniques Hold Relax (2 sets of 5 repetitions) The subject will be positioned in supine lying with 90° hip flexion. Therapist extends the patient's knee until a mild stretch is felt in the hamstrings. An isometric contraction is achieved by asking the subject to flex his knee against resistance by the therapist. Contraction is held for 8 seconds after which the therapist commands to relax the hamstrings, immediately after which the muscle is extended until a mild to moderate painless stretch is felt which is held for 30 seconds. The procedure is performed in 2 sets with 5 repetitions and 10 seconds relaxation phase in between for once a day for 3 days a week for 6 weeks to<sup>15</sup>.
- Interferential therapy: Interferential therapy will be applied using the four pole vector method for 20 minutes.

## Group B

- The patient will be made to lay in a supine position with the affected knee in slight flexion A hot moist pack will be applied around the knee for 15 minutes.
- Conventional Physiotherapy(CPT) was given in form of Isometric quadriceps exercises, High sitting knee extension, Straight leg raise, Hip abduction, hip extension, With 10 repetitions for each exercise were given once a day for 5 consecutive days a week for 6 weeks<sup>16</sup>.
- Interferential therapy: Interferential therapy will be applied using the four pole vector method for 20 minutes.

## ETHICAL CLEARANCE

Approval for the study was obtained from the protocol committee and institutional ethical committee of Krishna Institute of Medical Science ‘Deemed to be University’ (Ethics committee Registration No. ECR/307/Inst/MH/2013/RR-16).

## OUTCOME MEASURES

- WOMAC The Western Ontario and McMaster Universities Arthritis Index is used to assess patients with OA knee<sup>26</sup>. This scale includes the measurements of the levels of functional mobility and pain levels of the participants based on their subjective ratings out from 0-4.
- The visual analog scale (VAS) is a validated, subjective measure for acute and chronic pain. Scores are recorded by making a handwritten mark on a 10-cm line that represents a continuum between “no pain” and “worst pain.”

## STATISTICAL ANALYSIS

A total of 36 subjects were selected on the basis of the inclusion and exclusion criteria and were randomly divided into two groups Group A (PNF) Group B(CPT); the outcome measures used were the VAS, WOMAC. PNF was given to group A and CPT was applied to group B along with baseline protocol to both groups respectively. The data was analysed using parametric tests such as paired ‘t’ test( before and after treatment) and independent ‘t’ test (comparisons between group) using theGraphPad instat version.

## Results

**Table number 1:** The mean age and percentage of gender of the participants

Characteristic	Group A		Group B	
	Mean	SD	Mean	SD
Gender	Female	Male	Female	Male
	76.6%	23.33%	66.66%	33.33%
Age	54.4	3.63	57.72	3.34

**Table number 2:** The mean pre and post treatment statistics

Statistical measure -(vas)	Group-A (PNF)		Group-B(CPT)		Pre Post Difference	
	Pre-Test	Post-Test	Pre-Test	Post-Test	PNF	CPT
Mean	7.66	2.88	8.16	6.33	3.50	1.57
SD	1.02	0.32	1.64	0.48	1.97	1.05
Minimum	6.00	2.00	6.00	6.00	1.00	0.00
Maximum	9.00	3.00	9.00	7.00	6.00	3.00
Lower 95% CI	7.15	2.72	7.64	6.09	1.42	0.47
Upper 95% CI	8.17	3.05	8.68	6.57	5.57	2.68
t- value	21.500		7.895		2.100	
p- value	<0.0001		<0.0001		0.0621	

The above table number 2 represents that in Group A the mean pre-treatment VAS was 7.66 ±1.02 with a reduction in the post –treatment VAS as 2.88 ±0.32 . The value was found to be <0.0001 by paired ‘t’ test which is extremely significant.

**Table no. 3 :** The mean pre and post treatment statistics

Statistical measure (WOMAC)	Group-A (PNF)		Group-B(CPT)		Pre Post Difference	
	Pre-Test	Post-Test	Pre-Test	Post-Test	PNF	CPT
Mean	82.50	51.61	85.55	70.44	27.21	14.11
SD	5.33	5.48	3.41	4.51	12.31	7.88
Minimum	74.00	40.00	80.00	61.00	5.63	4.36
Maximum	91.00	61.00	91.00	81.00	42.00	27.00
Lower 95% CI	79.84	48.88	83.85	68.19	14.28	5.83
Upper 95% CI	85.15	54.34	87.25	7.69	40.14	22.39
t- value	23.257		14.690		2.194	
p- value	<0.0001		<0.0001		<0.0001	

The above table number 4 represents that in Group A the mean pre-treatment WOMAC score was 82.50 ±5.33 with a reduction in the post – treatment WOMAC score as 51.61 ±5.48. The value was found to be <0.0001 by paired ‘t’ test which is extremely significant.

## Dissusion

The statistical analysis of the data collected during the pre and post treatment sessions determines that the results obtained were significant. When VAS was taken as an outcome measure for indicating the levels of pain in the subjects of both the groups A and B receiving PNF stretching and CPT respectively, the mean difference improvement seen in group A(7.66 ±1.02 ) was higher than in group B (3.44 ±0.92) and proven significant and the mean difference improvement seen in group A (27.21 ±12.31) was significantly higher than in group B (14.11±7.88) when Western Ontario and McMaster universities arthritis index was used to evaluate the subjects. Osteoarthritis is a degenerative disorder which is chronic in nature and in the older age groups knee is the most common joint affected by osteoarthritis<sup>17</sup>. Knee osteoarthritis has been identified as one of the leading causes of functional limitation and disability in the elderly<sup>18</sup>. The muscles play a significant role in joint structure and functioning. In OA knee, impairment of the muscles lead to loss of knee joint stability causing a decline in the performance and independence in daily activities and also reduction in the confidence levels ultimately leading to disability and dysfunction<sup>19</sup>. The main features of OA knee include joint pain and stiffness along with a marked reduction in the joint range of motion<sup>20</sup>. Out of the 291 disorders identified as the highest cause of disability OA knee ranked 11th<sup>21</sup>. OA knee affects an individual’s quality of life, social participation and body fitness<sup>22</sup>. The primary aim of conducting this study was to determine the effectiveness of PNF and CPT in patients with OA knee on the symptoms such as pain, hamstring flexibility and functional mobility. This study determines that, the patients who received rhythmic stabilization PNF along with the baseline protocol including IFT and HMP resulted in having better improvement in pain, flexibility and functional mobility as compared to the patients who received CPT along with the baseline protocol. CPT seemed to have effects on reducing pain, improving range of motion and functional mobility but less significant as compared to PNF.

## Conculsion

This study resulted in conclusion that PNF stretching and CPT both are effective in decreasing pain levels, enhancing hamstring flexibility and improving functional mobility in patients with OA knee. However, the patients who received PNF stretching along with the baseline protocol involving Interferential therapy and Hot moist pack showed significantly better improvement in their pain levels, the flexibility muscles was seen to be increased and the functional mobility status as compared to patients who received CPT. Thus concluding, the application of rhythmic stabilization of PNF in protocol for OA knee patients yielded better results on pain reduction, increased flexibility and an independency in functional mobility.

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