

## Comparison Of The Effect Of Active Release Technique Versus Proprioceptive Neuromuscular Facilitation Stretching (Modified Hold-Relax) On Hamstring Flexibility In Patients Having Chronic Low Back Pain.

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**Abstracts:** Background and Objectives: Low back pain(LBP) is the leading cause of occupational injury and disability. The hamstring tightness was found to be one of the leading causes for development of LBP. Active Release Technique(ART)&PNF(Proprioceptive neuromuscular facilitation) stretching both the methods work on different physiological principles to increase the hamstrings flexibility. Hence objective of the study was to compare the effect of ART and PNF on hamstrings flexibility, Pain and functional disability in patients having LBP. Methodology: 30 subjects were taken in the study and divided in to 2 groups, 15 in each group. Measurement of the severity of pain by using VAS, degree of hamstrings tightness by active knee extension test and functional disability by modifies oswestry disability index was done. Group A was given modified hold relax PNF stretch and Group B was given ART for 10 sessions. Results: There was significant difference for Mean of AKE ( $t=2.31$ ,  $p=0.028$ ), pain at activity ( $t=52.00$ ,  $p=0.012$ ) and functional disability ( $U=-2.224$ ,  $p=0.026$ ) between both groups. Conclusion: Both the techniques Modified hold-relax PNF stretch and ART improve hamstrings flexibility and reduce pain and disability over time but PNF (modified hold relax) was more effective than ART. [Mistry G NJIRM 2015; 6(5):66-70]

**Key Words:** Chronic low back pain, Hamstrings flexibility, Active release technique, proprioceptive neuromuscular facilitation stretching.

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**Introduction:** Chronic low back pain (CLBP) is defined as back pain lasting more than 12 weeks.<sup>1</sup> A previous history of low back pain is often predictive of future back problems<sup>2</sup>, and chronic cases represent a significant burden on the health care and compensation systems.<sup>3</sup>

Now a days most of the professions require prolonged sitting on chairs like computer/ visual display unit users, bank clerks, accountants, stock exchange worker, industrial workers, architects, etc. An inactive posture is a common feature among computer/visual display unit users as technology and its use is becoming more and more common.<sup>4</sup>

In contextual concept of International Classification of Functioning (ICF) Model, both environmental and individual factors affect the development of low back pain. Lifestyle is a factor that could affect individual's health (WHO2001). Sedentary life style is associated with obesity as well as muscle shortening, which in turn is linked to chronic health problems.<sup>5</sup> Among all these factors the hamstring tightness was found to be one of the leading causes for development of LBP.

Different stretching methods are effective to increase hamstrings flexibility and among them both ART(Active Release Technique) as well PNF(Proprioceptive neuromuscular facilitation) are found to be effective treatment of choice for treatment of hamstrings flexibility(HF)<sup>6,7</sup>.

Although research and clinical experience has shown that treatment of HF is important, there is no widely acceptable form of treatment that is agreed upon to successfully improve flexibility of hamstrings which may indirectly affect the back region. Both the methods work on different physiological principles to increase the HF. Besides this, there are no studies done comparing the effect of ART and PNF on HF for patients having chronic low back pain and their effect on improvement of low back pain. Hence there is a need for the study to find which technique is better for improving of HF in chronic LBP patients.

**Material and Methods:** A Quasi experimental study was conducted at Suresh Brahmakumar Bhatt Collage of physiotherapy, V.S. hospital, Ahmadabad. Ethics approval was obtained from the Institutional Review Board. Purposive samplings with random allocation using lottery

method with 30 subjects were included in the study and were divided into two groups each containing 15 subjects. 10 sessions were given over a period of 6 months.

Patients with CLBP with hamstrings tightness referred to physiotherapy department of V.S hospital, Ahmedabad with age between 20 to 60 years, having CLBP (more than 3 months) of mild-moderate intensity, subjects not involved in any flexibility exercise program, having popliteal angle < 160° and subjects willing to participate were included.

Subjects with medical history of injury to back, constant or persistent severe pain, inflammatory conditions (rheumatoid arthritis, ankylosing spondylitis), Spinal infections (neuralgia, discitis, osteomyelitis, epidural abscess), hamstrings injury and strains, knee deformities and injuries, Any previous surgery around the knee and hip, Pregnancy, patients having radiating pain were excluded.

They were briefly stated about the nature of the study and intervention and written consent was taken from them. Demographic and baseline data were taken including history, occupation, duration of pain etc. Measurement of the severity of pain by VAS, degree of hamstrings tightness by Active knee extension test and functional disability by Modified Oswestry disability index was done.

**Group A: Modified hold relax PNF stretch<sup>7</sup>**

The subject was in supine position. The modified hold - relax stretch was performed with no hip rotation. The therapist passively stretched the hamstrings, until the subject first reported mild stretch sensation and held that position for 7 counts. Then the patients were instructed to perform a maximum isometric contraction of the hamstring for 7 counts by attempting to push his leg back towards the table against the resistance of therapist. After the contraction, a 5 second rest period was given to the patient. The therapist then passively stretched the hamstrings until a mild sensation was again reported. The stretch was maintained for another 7 counts. This sequence was repeated 3 times in a session and given for 10 sessions.

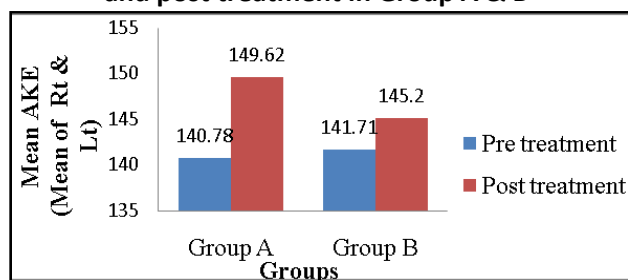
**Group B: Active release technique (ART)<sup>8</sup>**

The patient was in a prone position on the treatment table with his feet hanging off the end of the. The knee was then flexed to shorten the hamstrings. The therapist then evaluated the texture & tightness of the hamstrings by palpating and manually contacting the exterior skin to see where maximum tightness could be felt. The therapist then placed tension on the bellies of hamstrings longitudinally at a specific tension & asked the patient to extend his knee as per ART protocol. This cycle was repeated 5 more times on each patient. The treatment was given for 10 sessions.

For both the groups associated with PNF and ART, the patients were given isometric abdominal exercises, isometric extensor exercises and hot packs for low back region.

**Results:** Statistical analysis was done using SPSS version 16 and Microsoft excel 2007. Level of significance was kept at 5%. The data was screened for normal distribution using Kolmogorov Smirnov normality test and histogram with normal curve. Within group analyses and between group analyses were done using the mean of outcome measures taken before the intervention and after 10 sessions of intervention.

**Graph 1: Mean AKE (Mean of Rt & Lt) scores pre and post treatment in Group A & B**



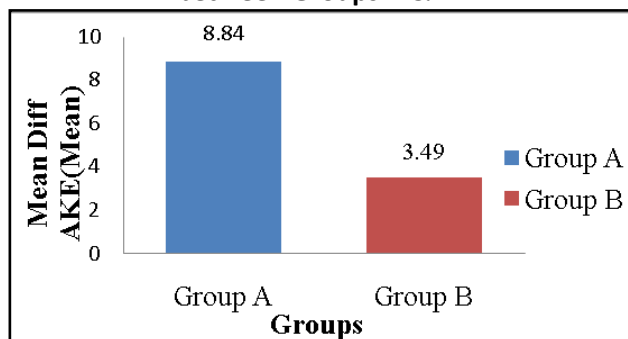
Comparison of mean of Active knee extension test (Mean of Rt and Lt) scores pre and post intervention within Group A and B was done using Paired t-test and was found to be statistically significant but it is not so for Group B as shown in Graph 1.

**Table 1: Mean VAS and MODI scores pre & post treatment in Group A & B**

Outcome measures	Group	Pre-treatment		Post-treatment		t/Zvalue	p-value
		Mean	SD	Mean	SD		
VAS (Rest)	A	2.55	1.87	1.12	1.05	t=4.83	< 0.001
	B	2.57	2.31	1.70	1.89	Z=-2.371	0.18
VAS (Activity)	A	7.89	2.75	3.64	1.92	Z=-3.296	0.001
	B	7.55	1.79	5.18	2.50	t=5.88	< 0.001
MODI		Median		Median			
	A	30		10		Z=-3.302	0.001
	B	33		23		Z=-3.411	0.001

Within group analysis of difference in mean of pre and post VAS at activity in Group A was done using Wilcoxon matched paired signed rank test (Z=-3.296, p<0.001). In Group B, Paired t-test was used (t=5.88, p<0.001). As shown in Table 1 for both the Groups A & B, p<0.001 was found to be statistically significant and for difference in median scores of MODI in Group A & B was done using Wilcoxon matched pairs signed rank test. For both, Group A (Z=-3.302) & B (Z=-3.411), p=0.001 was found to be statistically significant.

**Graph 2: Mean difference in AKE (Mean) scores between Groups A & B**



Between groups analysis for mean difference in AKE (Mean) was done using independent sample t-test and was found to be statistically significant as in Graph 2.

**Table 2: Median difference in MODI scores between Groups A & B**

Outcome Measures	Group A	Group B	U-value	p-value
VAS(Activity)	4.25	2.37	52.00	0.012
MODI	20	10	-2.224	0.026

Between groups analysis for VAS (Activity) scores was done using Mann-Whitney U test. U=52.00,

p=0.012. i.e p<0.05 was found to be statistically significant as shown in Table 2.

Median Difference in MODI scores pre & post intervention between Groups A & B was done using Mann-Whitney U test. U=-2.224 p=0.026, was found to be statistically significant.

**Discussion:** The main findings of the present study are that 10 sessions of PNF significantly reduces mean hamstrings tightness, pain at rest, pain on activity & functional disability within Group A and ART reduces the mean hamstrings tightness, pain at activity & functional disability but hamstrings tightness on left side and pain at rest showed no significant improvement within Group B. There was significant difference for AKE (Mean), pain at activity and functional disability but there was no significant difference for AKE (Lt) and pain at rest between both the groups.

Nagarwala AK et al<sup>6</sup> also found significant improvement in hamstrings flexibility with PNF. Similar findings were seen by Spernoga et al<sup>9</sup>, Bonnar et al<sup>10</sup>, Zakaria A et al<sup>11</sup> in normal subjects using the same protocol for PNF that was used in this study. During PNF- Hold Relax stretching autogenic inhibition of the target muscle takes place<sup>12</sup> As the hamstrings are the joining source between the lower back region and posterior part of the thigh, reduced hamstrings tightness reduces the strain over the lower back region and reduces the low back pain.<sup>13</sup>

For Group B, statistically significant improvement was found in mean hamstrings flexibility (t=2.486, p=0.026) from the baseline. Jessica K et al<sup>14</sup> compared the effects of Active Release Technique and Graston on hamstring flexibility over a period of four weeks. The goal of ART, as with other soft tissue techniques is to remove these “adhesions” and thereby decreasing tissue tension, and thus stopping the cumulative injury cycle as the tissue is taken from a shortened position to a fully lengthened position while the contact hand holds tension longitudinally along the soft tissue fibers.<sup>8</sup> So ART is used to restore uninhibited motion of soft tissues, release entrapped nerves, and restore optimal function of soft tissues.<sup>15</sup>

House RW et al<sup>16</sup> did a comparative study of ART versus PNF to find out the difference in hamstrings flexibility in 34 healthy subjects treated two times per week for 2 weeks. They concluded that PNF demonstrated greater improvement in hamstring flexibility than ART at 10 day follow up. PNF increases ROM by increasing the length of the muscle and increasing neuromuscular efficiency. PNF stretching has been found to increase ROM in trained, as well as untrained individuals.<sup>17</sup> ART is more subjective on the other hand as the therapist use palpation to locate the areas of tension or adhesion in the tissues, then the tissue is taken from the shortened to the lengthened position while using the manual contact to maintain the tension along the fibres of the tissues. So the amount of tension which is applied would also vary.

Diaz DA et al<sup>18</sup>, Koley S et al in<sup>19</sup>, Bellew et al<sup>20</sup>, Esola et al<sup>21</sup> found that hamstrings tightness can be the cause for development of LBP. ART can effectively reduce the hamstrings tightness, which reduces the low back pain as well as functional disability.

Limitations of the study were long term follow up and blinding was not done. The study included the subjects having osteoarthritis of knee joint as the age advances person may more or less develop some amount of degenerative changes in the joint as well as muscles and BMI was not considered as a criterion during data analysis which may have some effect and there were different numbers of subjects in each age group.

Further studies can be done by excluding the osteoarthritis knee patients and with long term follow-up to observe whether the effects are sustained for a longer period of time e.g. 3 months or 6 months. It can be done with blinding and by using BMI as a criterion.

**Conclusion:** Both the techniques Proprioceptive Neuromuscular Facilitation (PNF Modified hold-relax) and Active Release Technique (ART) improve hamstrings flexibility and reduce pain and disability over time but PNF (modified hold relax) is more effective than ART.

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