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A COMPARATIVE STUDY TO FIND THE EFFICACY OF 3 COMBINATION METHOD OF INTERMITTENT LUMBAR TRACTION WITH ACTIVE NEURAL MOBILIZATION ON PAIN, ANGLE OF SLR AND DISABILITY IN PATIENT WITH LUMBAR RADICULOPATHY

Physiotherapy

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ABSTRACT

Background- Traction, neural mobilisation and combination of traction and neural mobilisation are used to decrease pain and improve function. In combination ANM can be used either during traction phase or rest phase of ILT. But so far to our knowledge no research has compared the difference in effect of neural mobilization given during traction or rest phase of lumbar traction.

Purpose- To find effectiveness of 3 different combination of ILT with ANM on pain, P1 and P2 angle of SLR and functional abilities in acute or subacute lumbar radiculopathy patient age group 40 to 60 years – A. Only ILT, B. ILT with ANM during traction phase, C. ILT with ANM during rest phase.

Method- 45 patients with Lumbar Radiculopathy were divided into 3 groups A. Only ILT, B. ILT with ANM during traction phase, C. ILT with ANM during rest phase and treated for 2 weeks. Comparison of Pre and post effect on pain, angle of SLR and Functional abilities was done between 3 groups.

Result – Within and between group analysis in all 3 groups were done after 2 weeks of intervention for NPRS (rest and activity), P1 and P2 angle of SLR and Oswestry disability index (ODI).

Conclusion- Among 3 combination methods of ILT with ANM, active neural mobilization during traction phase of intermittent lumbar traction with conventional treatment is more effective in reducing pain, improving P1 and P2 angles of SLR and functional activities in acute/ subacute lumbar radiculopathy patient.

KEYWORDS

Lumbar radiculopathy, Active neural mobilization, Intermittent lumbar traction

INTRODUCTION

Lumbar radiculopathy is a set of symptoms caused by irritation or compression of one or more of five sciatic spinal nerve roots leading to radiating pain in respective dermatome. [1] Herniated disc and degenerative changes are the most frequent causes in lumbar radiculopathy patients.

In India, lifetime incidence of Lumbar radiculopathy varies from 13% to 40% and annual incidence from 9.9% to 25 %[1].The location and pattern of the patient's symptoms may vary according to the nerve root affected. L5-S1 and L4-5 are the most common levels affected in lumbosacral radiculopathy. Typical symptoms include radiating pain, often with numbness, paraesthesia, muscle weakness or a combination of all these symptoms which often leads to functional disability. [2]

Traction is commonly used modality to treat lumbar radiculopathy patient. Traction is the process of drawing or pulling. When traction is used to draw or pull on the spinal column it is called spinal traction [3]. Traction leads to reduction of disc protrusion by positive decompression; drawing the protrusion towards the centre thus the pressure on the contents of inter-vertebral foramina gets released. All these effects may decrease the overall pain from restricted movement or strain on tight muscles.[4]

Neural mobilization techniques are used for lumbar radiculopathy patients. Neural mobilization techniques are passive or active movements that focus on restoring the ability of the nervous system to tolerate the normal compression, friction and tensile forces associated with daily and sport activities[5]. Neural mobilisation restores the dynamic balance between the relative movements of neural tissues and surrounding mechanical interfaces allowing reduced intrinsic pressures on the neural tissues promoting optimum physiological function. (Butler, 1989).

The combination of 2 therapy i.e., active neural mobilization (ANM) and Intermittent lumbar traction (ILT) was hypothesized to give additive effect and was studied by various authors. Authors have studied individual effect of neural mobilization given during traction phase or rest phase of lumbar traction. But so far to our knowledge no research has compared the difference in effect of neural mobilization given during traction or rest phase of lumbar traction. [4][8][9] The need of study is to compare effect of ANM given during traction of ILT with the one given during rest phase of ILT and only ILT.

So aim of our study is to compare effectiveness of 3 combination method of Intermittent lumbar traction with Active neural mobilization on pain, P1 and P2 angle of SLR and functional abilities in lumbar radiculopathy patient.

MATERIALS AND METHODS

Experimental study was conducted for 1 year in government physiotherapy college jamnagar OPD. Sample size calculated by using effect size and Standard Deviation (SD) from previous study was found to be 15 in each group[10] .Ethical clearance was obtained from ethical committee of M P shah medical college.

A total number of 45 patents with Lumbar Radiculopathy diagnosed by orthopedician or neurologist were selected for the study as per the selection criteria as follows -

Inclusion criteria [4] -

Lumbar radiculopathy patient with age group of 40-60 years, involvement of L4- S2 nerve root pain radiating to leg, positive SLR / slump test, acute or sub acute duration of symptoms < 12 weeks ,all patients with Oswestry disability index score > 20%.

Exclusion criteria [3] -

Any spinal conditions in which movement are contraindicated, acute strain, sprains and inflammation or any painful symptoms aggravated by initial traction treatments rheumatoid arthritis, tumours or infections like TB , malignancy and pregnancy.

Special tests for Lumbar radiculopathy were performed on each and every participant to confirm the diagnosis. After proper explanation about the purpose and procedure of the study subjects who were found suitable and willing to participate in the study were requested to sign consent forms.

The selection of subjects was done by convenient sampling i.e. 1st - A group, 2nd - B and 3rd - C group. Total 45 subjects were divided into 3 groups; 15 patients were allocated in each group. All the participants were asked to avoid additional exercise, stimulant/depressant drugs, and pain medications prior and during participation in the study.

NPRS, P1 and P2 angle SLR and ODI was measured before the treatment and 2 weeks after treatment in all 3 groups. From this 45 patients 6 dropped out during the study. Due to either transport

problems as they travelled from villages or due to personal reason.

Clinical Intervention:

GROUP A (control)	GROUP B (ANM traction phase of ILT)	GROUP C (ANM rest phase of ILT)
• ILT (20 MIN) • HOT PACK (10 MIN) • ISOMETRIC BACK (1 SET 10 REPS)	• ANM during traction phase of ILT, 1: 7 duty cycle 20 min) • HOT PACK (10 MIN) • ISOMETRIC BACK (1 SET 10 REPS	• ANM during traction phase of ILT, 1: 7 duty cycle 20 min) • HOT PACK (10 MIN) • ISOMETRIC BACK (1 SET 10 REPS

Intermittent lumbar traction was given with patient in supine and spine in pain free position supported by stool progressed to flex position of spine (Weight applied was half of body weight). [3,11]

ANM was performed by the patient in the form of active Straight leg raise with ankle dorsi-plantar flexion upto slightly lower than P1 angle of SLR during traction phase of ILT (group B) and rest phase of ILT (group C) and gradually amplitude, number of oscillation and angle of SLR was increased as per patient tolerance (1:7 duty cycle) [6] .After lumbar traction, back and abdominal isometric exercises were given to the all 3 group patient. (1 set of 10 repetitions per day with hold time 10 second). All the groups received treatment 5 times/ day for 2 weeks.

All the participants were asked to avoid additional exercise, stimulant/depressant drugs, and pain medications prior and during participation in the study.

Pre and post comparison of 3 outcome measures were used-
1. PAIN- NPRS (reliable and valid) [12]

2. DISABILITY- Gujarati and English version ODI 2.1a (reliable and valid)[13,14]

3. P1 AND P2 ANGLE OF SLR- P1 represent angle of SLR where their first onset of symptoms and P2 represent angle of SLR with maximally tolerable pain [15]

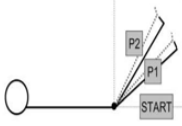


Fig- 1 P1 and P2 angle Measurement **Fig- 2 ANM with ILT**

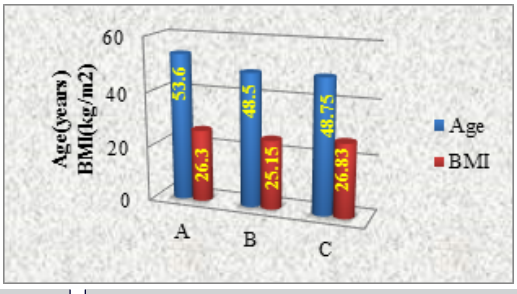
RESULTS

The statistical analysis was done by using SPSS 20 version for windows software. Mean and standard deviation were calculated as measure of central tendency and measure of dispersion respectively. Level of significance kept at 5 % with confidence interval (CI) at 95% (p value = 0.05).

Drop out 6 patients were not included in analysis. 39 patients were analysed group A (n=15), group B (n=12), group C (n=12)

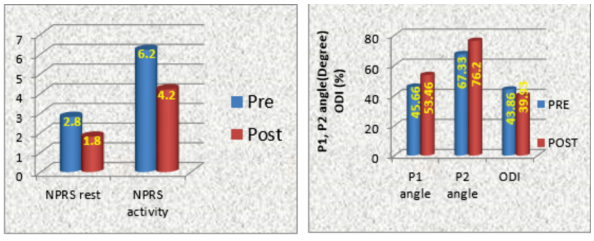
Between group comparison for baseline data of age and Body Mass Index (BMI) was done using one way Analysis of variance ANOVA test. At the beginning of study, no significant difference was found in three groups in terms of age and BMI as shown in graph 1.

Graph 1 - Baseline between group comparison of age and BMI (Body mass index) in all

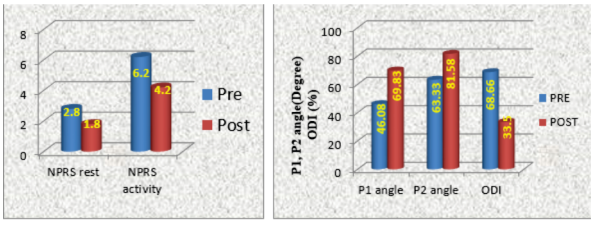


Within group analysis in all 3 groups after 2 weeks of intervention for NPRS (rest and activity) and P1 and P2 angle of SLR were done using Wilcoxon Signed Rank test and paired t-test was used for Oswestry disability index (ODI) analysis.ODI outcome in all three groups was found to be normally distributed in Shapiro wilk test.

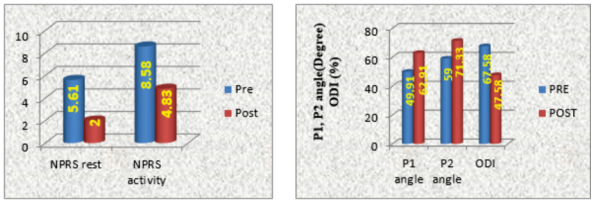
GRAPH 2-3 : Within group comparison of NPRS rest and activity , P1 and P2 angle of SLR and Oswestry disability index (ODI) in control group(A) at 2 weeks (n=15):



GRAPH 4-5 : Within group comparison of NPRS rest and activity , P1 and P2 angle of SLR and Oswestry disability index (ODI) in ANM during traction phase of ILT group(B) at 2 weeks (n=12):



GRAPH 6-7 : Within group comparison of NPRS (rest and activity), P1 and P2 angle of SLR and Oswestry disability index (ODI) in ANM during rest phase of ILT group (C) at 2 weeks (n=12):



Significant difference was also found in between groups comparisons of NPRS (rest and activity), p1 and p2 angle of SLR and Oswestry disability index (ODI) as shown in table 8.

Group B was found to be best among three groups in terms of NPRS (rest and activity), p1 and p2 angle of SLR and Oswestry disability index (ODI) on post hoc Scheffe's test as shown in Table no. 1.

TABLE 1 -Between group analysis after 2 weeks of intervention for difference of NPRS (rest and activity), P1 and P2 angle of SLR and Oswestry disability index (ODI) at 2 weeks.

	Mean of difference(SD)			F Ratio	P value	Result
	A	B	C			
NPRS Rest	1.00 (0.53)	4.33 (1.61)	3.16 (1.40)	25.83	0.000	significant
NPRS Activity	2.00 (1.13)	5.66 (1.43)	3.75 (0.62)	35.96	0.000	significant
P1 Angle (degree)	7.80 (6.41)	23.75 (10.41)	13.0 (6.23)	14.128	0.000	significant
P2 Angle (degree)	8.86 (7.69)	18.25 (10.90)	12.33 (5.80)	4.241	0.022	significant
ODI(%)	9.86 (7.24)	35.16 (12.89)	20.00 (5.20)	26.908	0.000	significant

Where group A = control group, B = ANM (active neural mobilization during traction phase of ILT (Intermittent lumbar traction) group, C= ANM (active neural mobilization during rest phase of ILT (Intermittent lumbar traction) group, NPRS = Numerical pain rating scale , ODI = Oswestry disability index.

DISCUSSION

The results of the present study show that all 3 groups had significant

effect on pain, angle of SLR and disability post 2 week of intervention. Overall group B i.e. Active neural mobilization during traction phase of intermittent lumbar traction was found to be more effective than other 2 groups (A and C).

Thus we accept alternative hypothesis i.e there is significant difference between effect of 3 combination methods like ILT with ANM during traction phase, ILT with ANM during rest phase and only ILT on pain, P1 and P2 angle of SLR and functional abilities in lumbar radiculopathy patients.

ILT stimulates mechanoreceptor which blocks the transmission of nociceptive stimuli at the spinal cord or brain stem level and inhibits reflex muscle guarding which decrease the discomfort from the contracting muscle. ILT causes unloading of the content of Vertebral foramen thus it improves circulation and relieves stenosis caused by circulatory congestion and restore axoplasmic flow. All these effects may decrease the overall pain from restricted movement or strain on tight muscles and also reduction in disability due to pain.[4]

Findings of improvement in control group are consistent with **Zeliha unlu M** who found significant difference in severity of pain and disability following traction in acute lumbar disc herniation patient.[16] Hot Pack and isometric exercises also helps to restore the mobility, relive pain and reduce disability.

Thus in this study improvement in pain and disability in control group receiving only ILT can be due to above mentioned effect of lumbar traction combined with Hot pack and isometric exercise.

Neural mobilisation restore the dynamic balance between the relative movement of neural tissues and surrounding mechanical interfaces allowing reduced intrinsic pressures on the neural tissue promoting optimum physiologic function. There is facilitation of nerve gliding, reduction of nerve adherence, dispersion of noxious fluids, increased neural vascularity and improvement of axoplasmic flow which reduces disability level and improves range of motion.[6]

These hypothesized benefits were found to be consistent with studies done in lumbar radiculopathy patients in which significant improvement was found in pain, SLR angle and disability of patient.[17-19] While performing active neural mobilization there is considerable caudal moment of lumbar and sacral roots in relation to interfacing tissues such as intervertebral foramina and traction opens these intervertebral foramina , freeing the compressed nerve roots and mobilizes the nerve making it free within the sheath.

More effective gliding of nerves can be done by combining giving active neural mobilization during traction phase of ILT. This can be the reason for more improvement in NPRS, angle of SLR and ODI in group B in comparison to group A. Whereas comparatively delay pain relief in group C may be due to the reason that patients in this group received neural mobilization after traction phase was over i.e. when the spine was not that much unloaded as it was during traction phase.

This can be reason for significantly more improvement in NPRS activity and functional ability group B in comparison to group C who received active neural mobilization during rest phase of intermittent lumbar traction.

Findings of present study are consistent with **Jaywant Nagulkar et al** who studied effect of combination of traction with active neural mobilization 2 groups were included in study, Group A received active neural mobilization during traction phase of intermittent lumbar traction and group B received intermittent lumber traction followed by active neural mobilization.ANM during traction phase of ILT was found to be more effective in terms of pain and responses in patients of LBP with radiculopathy.[4]

Kattela Suneel Kumar et al also found similar result in study to find effect of combination of traction with neural mobilization in cervical radiculopathy patients 3 groups were included. Simultaneous application of mechanical cervical traction with neural mobilization was found to be more effective in improving pain, functional disability and severity of radicular symptoms than mechanical cervical traction and neural mobilization alone .[20]

Changes in SLR angle cut and sciatica before and after the treatment were signicant in the all the three group was observed. Due to disc herniation the decrease in movement of nerve roots in dural sheath resulting into decrease angle of SLR. The increase in SLR angle and degree of sciatica in our patients in traction group was probably a result of the decrease in root irritation due to the decrease in size of herniated discs which can occur by traction and additional more sliding of sciatic nerve by active neural mobilization during unloading by traction.

Limitation of our study is that we have not taken long term follow up of patients and drop out of 6 patients. In future studies can be done using different techniques of neural mobilisation, different parameters of traction, different outcome measures and different age group. The results of the study can be usefull in conservative management of patients with Acute/ subacute lumbar radiculopathy to get better improvement in pain, angle of SLR and functional abilities.

CONCLUSION-

Among 3 combination methods of ILT with ANM, ANM during traction phase of ILT with conventional treatment is more effective in reducing pain, improving P1 and P2 angles of SLR and functional activities in acute/ subacute lumbar radiculopathy patient.

Conflicts Of Interest None declared.

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