ORIGINAL RESEARCH

Mechanical Low Back Pain (MLBP): Emphasis on Disability & Mobility.

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ABSTRACT

Objectives: To date, there are no reports comparing hamstring stretching & core stabilization in low back pain for parameters of Range of Motion, Disability & Pain. Moreover this is most ignored treatment aspect in Indian Physiotherapy clinics. Our study decide the fate of hamstring stretching & core stabilization in Chronic low back pain & helps to design a more efficient & refined treatment approach for future. **Subjects:** One hundered & Eighty patients (Males) ranging 20-40 years are equally divided in three groups are included in study. Group A subjects are treated with hot packs for 20 minutes followed by first grade core stabilization. Group B subjects are given 20 minutes hot packs followed by passive hamstring stretching & Group C subjects are given no treatment. **Methods:** Measurements are taken on day 1 and after 6 weeks of treatment/ control study. Outcomes are assessed on basis of Osweatry Disability Index (ODI) & Lumbar Range of Motion (ROM). Osweatry Disability Index (ODI) is measured as percentage of disability decided by questionnaire. Lumbar Range of Motion is measured using inch tape method. **Results:** Appropriate statistical test are applied using SPSS 12.0.1 software to signify the findings. All three groups' shows improvement on each parameter studied yet their level of improvement varies much between experimental & control group. Group B i.e. Hamstring stretching group shows maximum improvement for outcome measures of Disability & Lumbar Range of Motion. On contrary Group C shows minimum improvement in all measured parameters. **Conclusion:** This study suggests that hot packs followed by hamstring stretching are most effective in improvement of Disability & Lumbar Range of Motion out of all studied treatment parameters. Thus Passive hamstring stretching should be used as a cardinal approach for an effective treatment of chronic low back pain.

Key Words: Core Stabilization, Stretching, Hot Pack, Low Back Pain.

INTRODUCTION

All most 80% human beings experience low back pain at least once or more in their life time. It is second only to headache as a medical complaint. Low back pain is a symptom not a disease and has many causes. It is described as pain between lower costal margin and gluteal folds. Almost 40% people say that have had Low back pain in last 6 months **(Von Kroff et al., 1988).**

Multiple treatments of chronic low back cases have been reported by various disciplines. Physical therapy strategies emphasize use of traction, lumbo-sacral corset, hot packs, core stabilization exercises and manipulation techniques **(Mayo Clinic, 2006).** An alternative approach to abdominal muscle exercise in the treatment of low back pain is abdominal hollowing. This exercise is thought to retrain the transverse abdominis by having patients isometrically contract or ‘‘draw in’’ the abdominal wall without movement of the spine or pelvis (**Souza GM et al., 2001**).

Moist heat packs are a form of superficial heating modality that penetrate to depths of 1-2cm (**Sawyer P et al., 2003 & Denegar C et al., 2006**). Studies have shown that this modality is capable of improving active joint range of motion (**Robertson V et al., 2005**). **Funk et al., 2001** found that a 20 minute MHP treatment without a stretch was no more effective than 30 seconds of static stretching with heat.

Low back pain is frequently associated with tightness of the musculature in the lower spine and also of the hamstring muscles (**Prentice WE, 2000**). **Bandy and Irion, (1994)** found that 30 seconds of static stretching significantly increased flexibility.

OBJECTIVES & NEED OF STUDY

In the Indian Physiotherapy clinics not much stress is laid on the hamstring muscle stretching & core stabilization for treatment of low back pain. Existing

literature significance of these protocols in back pain is doubted as well. The significance of this study lies in this very fact. Thus findings of the present study will help in deciding the appropriate treatment needed to bring early relief on basis of disability & range of motion in low back pain.

INCLUSION CRITERIA

- Age between 20-40 years
- Chief complaint of low back pain without radiation of pain.
- Average pain equal to or above 4/10 on VAS scale.
- The Oswestery Disability Index score of disability at least 20%.
- Clinically diagnosed mechanical low back & low back strains.
- Only males were included in study on basis of inclusion & exclusion parameters.

EXCLUSION CRITERIA

- Diagnosed cases of Tumor, Metabolic diseases, Rheumatoid Arthritis, Ankylosing Spondylosis, PIVD, Osteoporosis, spinal compression fracture, prolonged history of steroid use, Diabetic neuropathy, reduced lumbar lordosis & spinal structural abnormalities.
- Pregnency (to avoid risk to foetus)
- Any hip pathology (i.e. Avascular necrosis, Degeneration).
- Evidence of Cauda Equina Syndrome (loss of bladder/ bowel control, saddle region paraesthesia).
- Patient reports complete absence of low back and leg symptoms or healthy subjects.
- Recent surgery (< 6 months) to lumbar spine & lower limbs.
- Patients having Quadriceps, piriformis tightness.
- Spondylolisthesis/ Spinal canal stenosis.
- Congenital Spinal anomaly.
- Sacroiliac joint dysfunction.
- Inability of patient to comply with treatment schedule (mental disabilities).
- Structural & Functional Leg length discrepancies.
- Subjects taking analgesics or taken any other form of conservative treatment in last 6 weeks.
- If at any time during the course of study due to intolerable pain or due to other factors patient takes analgesics or other form of medication then from that point subject will be excluded from the study.
- Female subjects were excluded from study.

Protocols: After receiving the informed consent from all subjects. The total of 180 subjects were selected on basis of inclusion – exclusion criteria. The subjects with low back pain were then randomly assigned to either Group A (Experimental First Grade Core Stability Exercises); Group B (Experimental Bilateral Passive Hamstring Stretching) & Group C (Control Group i.e. without any treatment). Out of all subjects 60 subjects were assigned to Group A; 60 to Group B & remaining 60 were assigned to Group-C. The subjects for all three groups were measured for Lumbar spine ROM and Oswestry Disability Index on Day 1 prior to treatment.

Intervention in Experimental Group A: The subject were given hot packs for **20 minutes**, in prone lying position for lumbar spine & bilateral hamstrings. Then followed by **Core Stability Exercise** Level 1 – (Lower Stomach to spine) with subject in crook lying with feet flat on couch and knees flexed to 90 degree. Subject pulled stomach towards spine with so much force that he can breathe comfortably. Hold for 5 seconds, breathed continuously, released stomach. Repeat whole exercise 10 times. Procedure will be given for 5 times a week for 6 weeks (**Cheri et al., 2004)**.

Intervention in Experimental Group B: Selected subjects also given hot packs for 20 minutes in prone lying position for lumbar spine & bilateral hamstrings. Then followed by Passive Static hamstring stretching in supine lying with 30 second stretch repeated for 5 times on each side. Procedure were given for 5 times a week for 6 weeks **(A.P. Marques et al, 2009)**.

Intervention in Control Group C: Selected subjects were given no treatment. This group is designed to see that without any treatment & with only rest was produce how much improvement.

Outcome measures were reassessed on post treatment i.e. after 6th week in all three groups. The pretreatment (Day1) measurements were than compared with post treatment (6th week) and appropriate data analysis was done.

RESULTS

Paired t-tests were applied within the groups using SPSS 12.0.1 software to signify the findings. All three groups' shows improvement on each parameter studied yet their level of improvement varies much between experimental & control group.

Unpaired t-test was applied between groups to examine statistical differences of improvement scores. The calculated value of t for ODI between groups A & B is 2.591. Calculated value is greater than table value of t at $p< 0.001$ which suggests that difference between two improvement scores are statistically significant. Thus group B is more effective in improving disability in low back pain. Similarly t-value for groups B & C is 4.967 and that of groups C & A is 2.394 which shows that group B shows significant changes than group C and group A shows significant changes than group C.

For Lumbar extension ROM t- value for group A & B is 1.234, for group B & C is 7.724 and for group C & A is 6.792 reflecting significant improvements. For

left side lumbar flexion ROM between group A & B t-value is found to be 3.425, B & C is 7.542 and C & A is 4.597 also reflecting significant improvements. For right side lumbar flexion ROM between groups A & B t- value is found to be 2.980, between B & C is 8.349 and C & A is 5.889 also indicating significant improvements. Group B shows maximum mean difference on either side of flexion.

S.No.	Age Group	N	Oswestry Disability Index	
			Mean	Standard Deviation
1.	Group A	60	31.30	11.84
2.	Group B	60	26.93	10.98
3.	Group C	60	36.67	12.71

Post treatment mean of Group A, Group B and Group C for Oswestry Disability Index (ODI).

ANOVA Table	df	Sum of Squares	Mean Square	F-ratio
Between Groups	2	3478	1739	12.36
Within Groups	177	24900	140.7	
Total	179	28380		

Analysis of Variance on means of Group A, B & C for oswestry disability index. Calculated value of F ratio is 12.36. This value is greater than table value of F at 1 percent, which suggests significant difference between means of Group A, Group B & Group C for oswestry disability index (ODI)

S.No.	Age Group	N	Lumbar Flexion ROM	
			Mean	Standard Deviation
1.	Group A	60	6.15	0.66
2.	Group B	60	6.40	0.60
3.	Group C	60	5.46	0.89

Post treatment mean of Group A, Group B and Group C for Lumbar Flexion Range of Motion (ROM)

ANOVA Table	df	Sum of Squares	Mean Square	F-ratio
Between Groups	2	28.14	14.07	26.74
Within Groups	177	91.55	0.5261	
Total	179	119.7		

Analysis of variance on means of Group A, B & C for lumbar flexion range of motion. Calculated value of F ratio is 26.74. This value is greater than table value of F at 1 percent, which suggests significant difference between means of Group A, Group B & Group C for lumbar flexion range of motion.

S.No.	Age Group	N	Lumbar Extension ROM	
			Mean	Standard Deviation
1.	Group A	60	3.50	0.41
2.	Group B	60	3.60	0.41
3.	Group C	60	2.83	0.64

Post treatment mean of Group A, Group B and Group C for Lumbar Extension Range of Motion (ROM).

ANOVA Table	df	Sum of Squares	Mean Square	F-ratio
Between Groups	2	20.62	10.31	41.35
Within Groups	177	43.38	0.2493	
Total	179	64.00		

Analysis of variance on means of Group A, B & C for lumbar extension range of motion. Calculated value of F ratio is 41.35. This value is greater than table value of F at 1 percent, which suggests significant difference between means of Group A, Group B & Group C for lumbar extension range of motion

S.No.	Age Group	N	Lumbar Lt. Side Flexion ROM	
			Mean	Standard Deviation
1.	Group A	60	4.01	0.62
2.	Group B	60	4.38	0.55
3.	Group C	60	3.38	0.86

Post treatment mean of Group A, Group B and Group C for Lumbar Left Side Flexion Range of Motion

ANOVA Table	df	Sum of Squares	Mean Square	F-ratio
Between Groups	2	30.60	15.30	31.96
Within Groups	177	84.72	0.4786	
Total	179	115.3		

Analysis of variance on means of Group A, B & C for lumbar left side flexion range of motion. Calculated value of F ratio is 31.96. This value is greater than table value of F at 1 percent, which suggests significant difference between means of Group A, Group B & Group C for lumbar left side flexion range of motion.

S.No.	Age Group	N	Lumbar Rt. Side Flexion ROM	
			Mean	Standard Deviation
1.	Group A	60	4.18	0.58
2.	Group B	60	4.47	0.49
3.	Group C	60	3.36	0.91

Post treatment mean of Group A, Group B and Group C for Lumbar Right Side Flexion Range of Motion

ANOVA Table	df	Sum of Squares	Mean Square	F-ratio
Between Groups	2	39.96	19.98	42.64
Within Groups	177	82.94	0.4686	
Total	179	122.9		

Analysis of variance on means of Group A, B & C for lumbar right side flexion range of motion. Calculated value of F ratio is 42.64. This value is greater than table value of F at 1 percent, which suggests significant difference between means of Group A, Group B & Group C for lumbar right side flexion range of motion.

CONCLUSIONS

It is concluded that all treatment approaches i.e. passive hamstring stretching with hot packs, core stabilization with hot packs & rest have positive effect on parameters of disability & lumbar ROM in low back pain. It is also concluded that passive hamstring stretching with hot packs is most effective treatment protocol & should be included in low back rehabilitation programs.

DISCUSSION

Low back pain has been reported most frequent cause of disability for individuals less than 45 years age, third leading cause of disability for those more than 45 years old **(Anderson 1983)**. Flexibility is an important component of physical conditioning program used as an adjunct to muscle strength and endurance training (**Schuftz. P, 1979**). Lack of flexibility results in uncoordinated or awkward movements and predisposes to muscle strain. Low back pain is frequently associated with tightness of the musculature in the lower spine and also of the hamstring muscles (**Prentice WE, 2000**). Static stretching is a method by which soft tissues are lengthened just past the point of tissue resistance and then held in the lengthened position for an extended period of time with a sustained stretched force (**Carolyn Kisner et al. 2002**). Short hamstring muscles are sometimes blamed for limitation of body flexion and the appearance of postural defects **(Lambrinudi 1934). Bandy and Irion, (1994)** found that 30 seconds of static stretching significantly increased flexibility. **Sullivan et al. (1992)** reported that an anterior pelvic tilt during the stretch contributed to greater hamstring muscle length.

It has been demonstrated that the presence of tight hamstrings muscle is associated with lumbar spine disorders (**Barash et al, 1970 & Fisk JW et al, 1984**) & syndromes of low back dysfunctions (**Biering-Sorensen F, 1984**). For chronic low back pain patients, stretching of muscles including the hamstring, improved their physical abilities & reduced their pain level (**Khalil TM et al, 1992**). In terms of viscoelastic effects, changes in range of motion and resistance to stretch after an acute bout of stretching can be described in terms of stress relaxation, creep & hysteresis (**Taylor et al., 1990; McHugh et al., 1992; Magnusson et al., 1998**). With respect to neural effects of stretching, it is apparent that when slow passive stretches are applied to skeletal muscle of healthy individuals, there is minimum active contractile activity in response to the stretch (**Ryan et al., 2008**) and motor neuron excitability are decreased (**Guissard et al., 1988; Avela et al., 1999**).

SUGGESTIONS

- Cross validation on larger population.
- Study can be done with follow up.
- Replication of study in terms of parameters like muscle strength, endurance & ergonomic considerations.
- MRI analysis of changes in spinal cord, neural components & soft tissue changes before & after treatment.

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