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# MECHANICAL LOW BACK PAIN: RANDOMIZED CONTROL TRIAL

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**ABSTRACT:**

*Objectives: To date, there are no reports comparing hamstring stretching & core stabilization in low back pain for parameters of Disability & Pain. Moreover, this is most ignored treatment aspect in Indian Physiotherapy clinics. Our study decides 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 Hundred & Eighty (Males) ranging between 20 to 40 years of age, 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 and Group C subjects are not given any treatment. Methods: Measurements are taken on day 1 and after 6 weeks of treatment/ controlled study. Outcomes are assessed on basis of Oswestry Disability Index (ODI) & Visual Analogy Scale (VAS). Oswestry Disability Index (ODI) is measured as percentage of disability decided by questionnaire, whereas Visual Analogy Scale (VAS) is level of pain calculated by 10 cm line. Results: Appropriate statistical test are applied using SPSS 12.0.1 software to signify the findings. All three groups show improvement on each parameter studied, yet their levels of improvement vary between experimental & control group. Group B i.e. Hamstring stretching group shows maximum improvement for all outcome measures of Pain & Disability. On the 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 Pain & Disability 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.*

**KEYWORDS:** *Core Stabilization, Stretching, Hot Pack, Low Back Pain.*

## INTRODUCTION:-

Almost 80% of 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 they 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 (MHP) 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 stress is not laid on the hamstring muscle stretching & core stabilization for treatment of low back pain. Existing literature's 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 pain & disability 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.
- Symptoms lasting 12 weeks or more.

**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.
- 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.

**Protocols:** After receiving the informed consent from all subjects, a total of 90 subjects were selected on the 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 30 subjects were assigned to Group A; 30 to Group B & remaining 30 were assigned to Group C. The subjects for all three groups were measured for VAS score and Oswestry Disability Index on Day 1 prior to treatment.

**Intervention in Experimental Group A:** The subjects 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, held for 5 seconds, breathed continuously, released stomach. Repeated whole exercise 10 times. Procedure was given for 5 times a week for 6 weeks (**Cheri et al., 2004)**.

**Intervention in Experimental Group B:** Selected subjects in group B were 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 was 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 the level of improvement with only rest and without any treatment.

Outcome measures were reassessed on post treatment i.e. after 6$^{th}$ week in all three groups. The pretreatment (Day1) measurements were then compared with post treatment (6$^{th}$ 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 show 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 is 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 VAS scores, t-value for group A & B is 5.322, for group B & C is 10.12 and for C & A is 5.966. Therefore, group B is more significant than A and group A is more significant than C.

**Comparison of Post treatment test of Oswestry Disability Index (ODI) between Group A & Group B.**

| | Number of patients | Mean | Standard Deviation | S.E.M. | Mean Difference | t-value |
|---|---|---|---|---|---|---|
| Group A | 60 | 31.30 | 11.84 | 1.529 | 5.40 | 2.591 |
| Group B | 60 | 25.90 | 10.98 | 1.417 | | |

Result is significant, p<0.001

**Comparison of Post treatment test of Oswestry Disability Index (ODI) between Group B & Group C.**

| | Number of patients | Mean | Standard Deviation | S.E.M. | Mean Difference | t-value |
|---|---|---|---|---|---|---|
| Group B | 60 | 25.90 | 10.98 | 1.417 | 10.77 | 4.967 |
| Group C | 60 | 36.67 | 12.71 | 1.64 | | |

Result is significant, p<0.001

**Comparison of Post treatment test of Oswestry Disability Index (ODI) between Group A & Group C.**

| | Number of patients | Mean | Standard Deviation | S.E.M. | Mean Difference | t-value |
|---|---|---|---|---|---|---|
| Group A | 60 | 31.30 | 11.84 | 1.529 | 5.37 | 2.394 |
| Group C | 60 | 36.67 | 12.71 | 1.640 | | |

Result is significant, p<0.001

**Comparison of Post treatment test of Visual Analogy Scale (VAS) between Group A and Group B.**

| | Number of patients | Mean | Standard Deviation | S.E.M. | Mean Difference | t-value |
|---|---|---|---|---|---|---|
| Group A | 60 | 3.42 | 0.91 | 0.117 | 0.89 | 5.322 |
| Group B | 60 | 2.53 | 0.91 | 0.117 | | |

Result is significant, p<0.001

**Comparison of Post treatment test of Visual Analogy Scale (VAS) between Group B and Group C.**

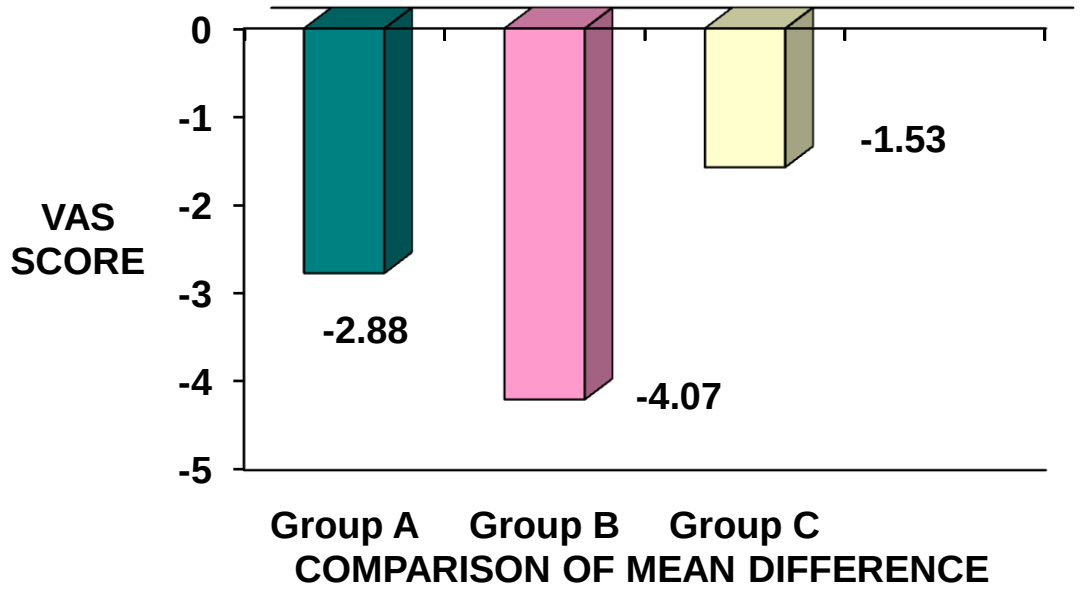
| | Number of patients | Mean | Standard Deviation | S.E.M. | Mean Difference | t-value |
|---|---|---|---|---|---|---|
| Group B | 60 | 2.53 | 0.91 | 0.117 | 2.15 | 10.12 |
| Group C | 60 | 4.68 | 1.37 | 0.117 | | |

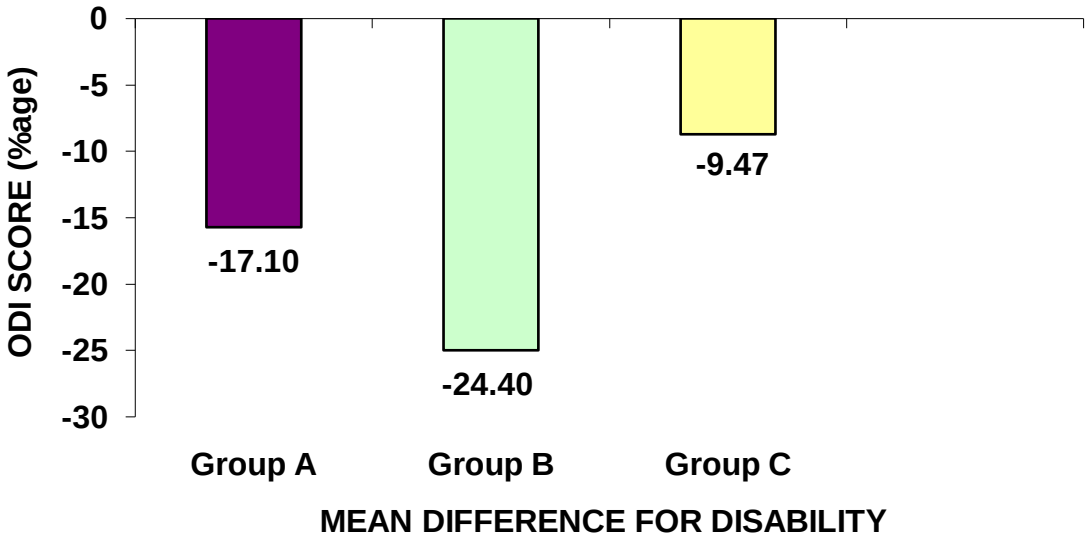
Result is significant, p<0.001

**Comparison of Post treatment test of Visual Analogy Scale (VAS) between Group A and Group C.**

| | Number of patients | Mean | Standard Deviation | S.E.M. | Mean Difference | t-value |
|---|---|---|---|---|---|---|
| Group A | 60 | 3.42 | 0.91 | 0.117 | 1.27 | 5.966 |
| Group C | 60 | 4.68 | 1.37 | 0.117 | | |

Result is significant, p<0.001




**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 the parameters of pain & disability. 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 of 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 limitations 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 is 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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