Role of posterior-anterior vertebral mobilization
versus thermotherapy in non specific lower back pain

Aftab Ahmed Mirza Baig1, Syed Imran Ahmed2,
Syed Shahzad Ali3, Asim Rahmani4, Faizan Siddiqui5

ABSTRACT
Background & Objective: Low back pain (LBP) is the foremost cause to hamper an individual's functional
activities in Pakistan. Its impact on the quality of life and work routine makes it a major reason for therapeutic
consultations. About 90% of the cases with LBP are non-specific. Various options are available for the treatment
of LBP. Posterior-anterior vertebral mobilization, a manual therapy technique; and thermotherapy are used
in clinical practice, however evidence to gauge their relative efficacy is yet to be synthesised. This study
aimed to compare the effectiveness of posterior-anterior vertebral mobilization versus thermotherapy in
the management of non-specific low back pain along with general stretching exercises.

Methods: A randomised controlled trial with two-group pretest-posttest design was conducted at IPM&R,
Dow University of Health Sciences (DUHS). A total of 60 Non-specific low back pain (NSLBP) patients with
ages from 18 to 35 years were inducted through non-probability and purposive sampling technique. Baseline
screening was done using an assessment form (Appendix-I). Subjects were allocated into two groups
through systematic random sampling. Group-A (experimental group) received posterior-anterior vertebral
mobilization with general stretching exercises while group B (control group) received thermotherapy with
general stretching exercises. Pain and functional disability were assessed using NPRS and RMDQ respectively.
Pre & post treatment scores were documented. A maximum drop-out rate of 20% was assumed. Recorded
data were entered into SPSS V-19. Frequency and percentages were calculated for categorical variables.
Intragroup and intergroup analyses were done using Wilcoxon signed ranked test and Mann-Whitney Test
respectively. A P-value of 0.05 was considered statistically significant.

Results: Pre and post treatment analysis revealed that
P-values for both pain and disability were less than
0.05, suggesting significant difference in NPRS and RMDQ scores. Whereas, median scores for both pain and
disability were decreased by 75% in experimental group and 50% in control group. For inter group analysis
p-values for both pain and disability were found to be less than 0.05.

Conclusion: Both physiotherapeutic interventions, the PAVMs and thermotherapy, have significant effects
on NSLBP in terms of relieving pain and improving functional disability. However PAVMs appeared to be
more effective than thermotherapy.

KEYWORDS: General stretching exercises, Non-specific low back pain, Posterior-anterior mobilization,
Thermotherapy.

doi: https://doi.org/10.12669/pjms.342.12402

How to cite this:
Baig AAM, Ahmed SI, Ali SS, Rahmani A, Siddiqui F. Role of posterior-anterior vertebral mobilization versus
thermotherapy in non specific lower back pain. Pak J Med Sci. 2018;34(2):435-439. doi: https://doi.org/10.12669/pjms.342.12402

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/3.0),
which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Low back pain (LBP) is increasingly becoming one of the main health concerns nowadays. It
affects daily life and work routine and leads to medical consultations.1 Formerly considered to be
confined only to affluent western countries, the LBP is also becoming a formidable burden to the
The pain or discomfort present arising in the region between costal margin and inferior gluteal folds, with idiopathic cause and devoid of any precise pathology is commonly referred to as Non-specific low back pain. The lifetime prevalence of LBP is approximately 85% (probably closer to 100% in adults). About 90% of all LBP cases are non-specific low back pain (NSLBP). LBP has attained 31.0% global mean prevalence, 38.0% annual prevalence and 18.3% mean point prevalence. 83.1 million is the recently reported figure of years lived with disability (YLDs) associated with LBP. In Pakistan, LBP is the third leading cause of YLDs and its prevalence has been found to be 19.5%. The countries where point prevalence has been reported includes China (34.1%), Bangladesh (20.1%), Iran (14.8), United Kingdom (9.0%) and India (8.4%).

The prevalence of NSLBP is approximately 10 to 25% in young and middle-aged individuals. Even though degenerative changes are minimal in this age group, more physical activities consequently make this group vulnerable to various physical strains. On account of this, incidence of LBP in this age group is high whereas majority of such cases are by and large of NSLBP. Manual workers and labourers who are subjected to heavy physical exertion i.e. weight lifting, repetitive movements, frequent postural vagaries etc. are prone to develop NSLBP.

The clinical practice guidelines (CPGs) developed during the past decades emphasised screening for potentially serious pathologies like infection, precise causes of LBP, and the assessment of pain intensity and functional disabilities. The importance of staying active in patients with NSLBP is now accentuated more than ever. Whereas the use of over-the-counter medications and spinal manual therapy (SMT) like mobilization, manipulation are accentuated more than ever. Combined with physical therapy and exercise, these forms of treatment comfort patients and are instrumental in the recovery process. However, the role of exercise in the treatment of LBP has been a matter of debate, with some studies showing positive effects, while others have found no significant differences between exercise and control groups. Due to these conflicting results, exercise therapy is often used in conjunction with other forms of treatment, such as medication and spinal manipulation, to provide a comprehensive approach to LBP management. It is important to note that the effectiveness of exercise therapy for LBP may vary depending on factors such as the severity of the condition, the duration of symptoms, and the individual's age and underlying health status.

METHODS

A randomized trial was conducted on 60 NSLBP patients those fulfilling inclusion criteria were selected from OPD of neurology Civil Hospital and IPM&R, DUHS, Karachi, Pakistan with non-probability purposive sampling. Inclusion criteria included males and females with age 18-35 years and NSLBP for <3 months. Whereas exclusion criteria included LBP due to specific pathology, patients with neurological deficits in lower limbs with decreased power in myotomes or decreased sensation in dermatomes, patients with neurological diseases (like Stroke, Parkinsonism), any clinical condition that contra indicated mobilization, history of spinal surgery and patients administered epidural injections. Informed consent was taken from all the study participants then they were randomly assigned to either of groups of two with simple random sampling. Each group was having 30 participants, The Group-A received program of PAVMs including, posterior anterior oscillatory movements on specific lumbar segments that demonstrate restricted movement, which at any point of time during the course, is within the ability of patient to resist. Therapeutic movement, which at any point of time during the course, is within the ability of patient to resist. Maitland includes graded Posterior-anterior vertebral mobilizations (PAVMs) as a means of evaluation and treatment of LBP and accompanying stiffness in order to improve function. A careful and comprehensive examination is a requisite for the application of the technique. On the other hand, Thermotherapy is commonly used for the treatment of LBP. It is easy to apply in addition to being cost-effective. Thermotherapy plays putative role in relieving pain and muscle spasm.

The PAVMs is the joint mobilization technique that is considered as the cornerstone in manual therapy. It can be defined as passive oscillatory movement, which at any point of time during the course, is within the ability of patient to resist. Maitland includes graded Posterior-anterior vertebral mobilizations (PAVMs) as a means of evaluation and treatment of LBP and accompanying stiffness in order to improve function. A careful and comprehensive examination is a requisite for the application of the technique. On the other hand, Thermotherapy is commonly used for the treatment of LBP. It is easy to apply in addition to being cost-effective. Thermotherapy plays putative role in relieving pain and muscle spasm.
Each subject received total 12 treatment sessions with the frequency of three sessions per week for four consecutive weeks. The duration of each session given to group A (PAVMs + GSEs) and group B (Thermotherapy + GSEs) was about 30 minutes. The Institutional Review Board of Dow University of Health Sciences approval were taken in advanced for this research study (reference no. IRB-432/DUHS/-14).

**Outcome Tools:**

**Numerical Pain Rating Scale:** The use of NPRS as a self-administered outcome tool is evident by literature as well as clinically with 69% sensitivity and 78% specificity. Patients were requested to fill the pre and post treatment questionnaires. They were allowed to scale their pain severity on NPRS ranging from 0-10 where 0 signifies, No pain. Whereas, 10 signifies most excruciating pain.

**Rolland Morris Questionnaire:** The CPGs recommend RMDQ as the authenticated self-administered questionnaires for LBP. It is suitable to recognize the patient present condition comparative to pain, functional disability for assessing any change during treatment. In this greater levels of disability are reflected by higher numbers on a 24-point scale. The RMDQ asks patient to mark whether each of the 24 items is probable to do. The activities are directed by the stem, “Because of my back pain,” thus letting it to be of definite region. The RMDQ has exceptional psychometrics, easy to use, and has been shown to be responsive in RCTs. Subjects were asked to rate their score out of 5 grades of severity that is, no pain, little pain, moderate pain, severe pain and intolerable pain.

**Data Analysis:** Data were analyzed using SPSS 19 version. Frequency and percentages were shown for categorical variables. Non-parametric tests were employed because study data does not follow the normal distribution. Wilcoxon signed ranked test was employed to identify any difference in NPRS and RMDQ scores for pre and post treatment with in each group. Both pvalues of pain and disability were less than 0.05 suggesting significant difference in NPRS and RMDQ scores between pre and post treatment for both group. The inter group analysis comprises mean, standard deviation and p-values of the different parameters, showing the improvement between the two groups by the respective treatment procedures.

It was hypothesized that the PAVMs is more effective as compared to thermotherapy in the management of NSLBP along with GSEs. To test this hypothesis the Mann-Whitney Test were applied that results p-values of both NPRS and RMDQ scores, less than 0.05 which was significant and hence enough to reject null hypothesis and accept alternative hypothesis that posterior-anterior vertebral mobilization is more effective as compare to thermotherapy in the management of NSLBP.

**DISCUSSION**

NSLBP has been recognised as a common public health problem. An RCT was conducted to evaluate...
the effectiveness of PAVMs and thermotherapy along with GSEs in the management of NSLBP. This study included 60 male and female patients with NSLBP and with no serious pathology or any contraindication for the interventions in question. In this study, both the groups evinced significant decreases in NPRS and RMDQ scores at the end of treatment sessions whereas the decrease in NPRS was more pronounced in the experimental group (PAVMs) as compared to the control group (thermotherapy). The significant relief of pain was noted after 12 sessions. When intra-group median values of NPRS and RMDQ were analysed, statistically significant differences in pre and post treatment scores at the end of twelfth session were found for both the groups. In intergroup comparison, statistically significant difference was found between the two groups in relieving pain and functional disability. PAVMs in concert with GSEs proved superior to thermotherapy with GSEs. No study has as yet compared these two techniques, however the present study findings of reduction in pain intensity with application of PAVMs, are consistent with the findings of the studies conducted by Hanrahan et al and Sakulsriprasert et al, indicating PAVMS is effective for pain relief in NLBP. It is important however to note that all the participants were given GSEs within joint range as a common conventional method. Bone and muscle are both dynamic structures that respond positively to exercises and adversely to disuse. The loss of muscle mass due to disuse can be substantially reversed by exercise training program. It has hence been suggested that physiotherapists have a responsibility to include GSEs as an essential component of prophylaxis and treatment, in addition to other passive modalities such as massage, mobilisation, manipulation and traction. Ohtsuki et al. in a study describes that GSEs for managing LBP should include back, hamstring and tensor fascia latae stretching within pain free range.

Numerous studies have shown that spinal mobilisation increases pain tolerance and threshold. One mechanism underlying the effects of spinal mobilisation is the ability to alter central sensory processing by removing sub-threshold mechanical or chemical pain stimuli from para spinal tissues. Substantial evidence demonstrates that spinal manipulation/mobilisationelicitsparaspinalmuscle reflexes and alters motor neurone excitability. The resultant effect of manipulation/mobilisation on these somatic reflexes involves a complex excitation and inhibition neuronal circuitry. The mechanisms behind the effects of vertebral mobilization on these reflexes are beginning to unfold.

Christopher et al conducted an RCT with enrolment of 30 participants having NSLBP, 15 in each group. First group was given PAVMs and the second group was treated by press-up exercise. A major reduction in the average pain intensity for both the groups was observed however that was a single session study with a small sample size. The current study supported the effects of PAVMs on pain intensity. Prasert Sakulsriprasert et al. conducted an RCT in 2010. Improvements in pain intensity, active range of motion, and functional disability were observed in patients with acute NSLBP after receiving either physical therapy or physical therapy combined with spinal mobilization. The study showed no additive effects of spinal mobilisation. On the contrary this was not the case as revealed by the present study findings and indubitable evidence related to additional effects of spinal mobilisation along with exercise was found.

Kent and fellows in 2010 reported four RCTs in their systematic review on vertebral mobilisation. They stated significant effects in LBP but with too small a sample. However this study generated evidence that there are significant effects of PAVMs as a specific technique of vertebral mobilisation. Mulkern and colleagues in a Cochrane review of 5 RCTs reported better effects of heat wrap application in reducing pain in NSLBP when compared with non-heat wrap application. All the outcomes were on the basis of short term effects. Authors cumulatively concluded that thermotherapy has some therapeutic effects in comparison to other treatment options. The current study finding of having significant effects of thermotherapy is in conformity to that study however having proved to be better than thermotherapy this study has unveiled another more prospective avenue of PAVMs for the treatment of NSLBP. French et al in 2006 concluded in a review, that the heat wrap therapy significantly reduced pain after five days compared to oral placebo in two trials on acute and sub-acute LBP. They also reported a trial of 100 participants in which heat wrap along with exercise showed long term pain reduction. The current study corroborated the evidence that heat therapy with exercise, particularly GSEs is beneficial in acute and sub-acute cases of LBP. Middelkoop et al. in a systematic review (2011) highlighted a controversy that existed regarding the clinical effects of thermotherapy or superficial heat therapy. This study affirms significant effects...
of PAVMs than thermotherapy along with GSEs in NSLBP. Aside from this comparison, both the interventions had significant effects and remained beneficial in producing marked improvement in pain intensity and functional disability.

NSLBP being responsible for majority of the LBP cases, is a major health care problem which poses a huge disease burden on the society. Simple, safe and cost-effective therapeutic procedures such as PAVMs and thermotherapy combined with other main stay or conventional modes of treatments such as exercise like GSEs could prove to be of great value.

**Limitations:** Medication acted as confounder as ethical board directed not to alter the prescribed course if any of the study participants is already taking it.

i. Limited inclusion criteria were used in the present study that limits generalising the results to the whole target population.

ii. Long term benefits of PAVMs or thermotherapy in management of NSLBP are not addressed.

**CONCLUSION**

In conclusion, the present RCT provides evidence that physiotherapy techniques i.e. PAVMs and thermotherapy have significant effects in relieving pain and improving functional disability in patients with NSLBP. However PAVMs are shown to be more effective in comparison to thermotherapy. Present study highlights that PAVMs along with GSEs should be used in the patients with NSLBP. Moreover, further research is needed to explore their long term role and effectiveness in contrast to other physiotherapy treatments.

**Declaration of interest:** None.

**Grant Support & Financial Disclosures:** None.

**REFERENCES**

1. Kosloff TM, Elton D, Shulman SA, Clarke JL, Skoufalos A, Solis A. Conservative Spine Care: Opportunities to Improve the Quality and Value of Care. Popul Health Manag. 2013;16(6):390-396. doi: 10.1089/pop.2012.0096.

2. Hoy D, Bain C, Williams G, March L, Brooks P, Blyth F et al. A Systematic Review of the Global Prevalence of Low Back Pain. Arthritis Rheum. 2012;64(6):2028-2037. doi: 10.1002/art.34347.

3. Balague F, Mannion AF, Pellis F, Czedrasci C. Non-specific low back pain. Lancet. 2012;379(9814):482-491. doi: 10.1016/S0140-6736(11)60610-7.

4. Buchbinder R, Blyth FM, March LM, Brooks P, Woolf AD, Hoy DG. Placing the global burden of low back pain in context. Best Pract Res Clin Rheumatol. 2013;27(5):579-589. doi: 10.1016/j.berh.2013.10.007.

5. Taguchi T. Low back pain in young and middle-aged people. Japan Med Assoc J. 2003;46(10):417-423.

6. Thomas M. Kosloff DC, Elton D, Stephanie A. Shulman, Janice L et al. Conservative Spine Care: Opportunities to Improve the Quality and Value of Care. Popul Health Manag. 2013;16(6). doi:10.1089/ pop.2012.0096.

7. Maitland G, Hengevelde, Banks K, English K. Maitland’s vertebral manipulation. Seventh edition 2005.

8. French SD, Cameron M, Walker BF, Raggars JW, Esterman AJ. Superficial heat or cold for low back pain. Cochrane Database Syst Rev. 2006;1:1-42. doi: 10.1002/14651858.CD004750.pub2.

9. Hanrahan S, Van Lunen BL, Tamburello M, Walker ML. The short-term effects of joint mobilizations on acute mechanical low back dysfunction in collegiate athletes. J Athl Train. 2005;40(2):88-93.

10. Nadler SF, Weingand K, Kruse JF. The physiologic basis and clinical applications of cryotherapy and thermotherapy for the pain practitioner. Pain Physician. 2004;7(3):396-40.

11. Ohtsuki K, Suzuki T. A comparison of the immediate changes in subjects with chronic lower back pain effected by lower back pain exercises and direct stretching of the tensor fasciae latae, the hamstrings and the adductor magnus. J Phys Ther Sci. 2012;24(1):97-100. doi: 10.1589/jpts.24.97.

12. Ostelo RW, Deyo RA, Stratford P, et al. Interpreting change scores for pain and functional status in low back pain: towards international consensus regarding minimal important change. Spine (Phila Pa 1976). 2008;33:90-94. doi: 10.1097/BRS.0b013e3181581e30.

13. Sakulsriprasert P, Vachalathiti R, Yongsurinvarat M, Pichaisak W, Sophonratanapokin B. Effects of physical therapy treatments with and without spinal mobilization in individuals with acute nonspecific low back pain: A randomized trial. Indian J Physiother Occup Ther. 2010;4(1):7.

14. Krouwel O, Hebron C, Willet E. An investigation into the potential hypalgesic effects of different amplitudes of PA mobilizations on the lumbar spine as measured by pressure pain thresholds (PPT). Man Ther. 2010;15:7-12. doi: 10.1016/j.math.2009.05.013.

15. Powers CM, Beneck GJ, Kulig K, Landef RL, Fredericson M. Effects of a single session of posterior-to-anterior spinal mobilization and press-up exercise on pain response and lumbar spine extension in people with nonspecific low back pain. Phys Ther. 2008;88(4):485-493. doi: 10.2522/ptj.20070069.

16. Kent P, Mjosund HI and Peterson DHD. Does targeting manual therapy and/or exercise improve patient’s outcome in nonspecific lower back pain? A systematic review. BMC Med. 2010;8:22-36. doi: 10.1186/1741-7015-8-22.

17. Mulkern R, McDonnell N, Hynynen K. Temperature distribution change in low back muscles during applied topical heat: A magnetic resonance thermometry study. Proc Int Soc Mag Res Med Philadelphia. 1999:22-28.

18. Middelkoop MV, Rubinstein SM, Kuijpers T, Verhagen AP, Ostelo R, Koes BW, Tulder MWV. A systematic review on the effectiveness of physical and rehabilitation interventions for chronic non-specific low back pain. Eur Spine J. 2011;20:19-39. doi: 10.1007/s00586-010-1518-3

**Authors’ Contributions:**

AAMB: Data Collection and manuscript writing.

AR and FS: Data Collection and manuscript writing.

SSA: Review and editing of manuscript.

SIA: Review and final approval of manuscript.

**Authors:**

1. Aftab Ahmed Mirza Baig, Lecturer of Physiotherapy, Department of Physiotherapy.

2. Syed Imran Ahmed, Assistant Professor of Physiotherapy.

3. Syed Shahzad Ali, Assistant Professor of Physiotherapy, Dept. of Physiotherapy.

4. Asim Rahman, Assistant Professor of Neurosurgery, Civil Hospital, Karachi, Pakistan.

5. Faizan Siddiqui, Lecturer of Physiotherapy, Department of Physiotherapy, 1-3, 5: Institute of Physical Medicine & Rehabilitation, Dow University of Health Sciences, Karachi, Pakistan.