**Article Full Title**

The effects of high-velocity low-amplitude thrust manipulation and mobilisation techniques on pressure pain threshold in the lumbar spine

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**Paper Abstract**

Objective: To compare changes in pressure pain threshold (PPT) following spinal high-velocity low-amplitude thrust manipulation (HVLAT) and spinal mobilisation. Design: Fifty asymptomatic subjects (mean age 27 (6) years; 29 males and 21 females) volunteered to participate in a randomised controlled, singled blinded design study. Subjects were screened for suitability and were randomly allocated into one of three intervention groups where they received either a unilateral spinal HVLAT or a spinal mobilisation of the lumbar spine, or a sham ‘laser’ procedure (control). PPT measurements were made immediately pre- and post-intervention, using a hand-held algometer which was positioned directly over the lumbar spinous process. A two-way ANOVA with repeated measures was conducted to determine PPT changes between the groups. Statistical significance was set at the 0.05 level. Results: There were no significant differences in PPT across time for each of the groups ( P = 0.584). The mobilisation group displayed a small increase, though not a significant change in the mean pressure pain threshold (0.434(0.55) kg/cm 2 ), although effect size was considered to be large (ES = 0.78). The HVLAT group demonstrated a decrease in the mean PPT (−0.173(0.48)) (ES = 0.36, small), and a smaller decrease was noted for the control group (0.105(0.425) kg/cm 2 ) (ES = 0.25, small). Conclusion: Neither spinal HVLAT nor mobilisation had a significant effect on PPT of the lumbar spine in asymptomatic subjects. Only spinal mobilisation appeared to have a greater mean increase in PPT and effect size than the control group. Further investigation into the hypoalgesic effects of these techniques on symptomatic subjects is suggested.

**NIH Risk of Bias Tool**

Quality Assessment of Controlled Intervention Studies

**Was the study described as randomized, a randomized trial, a randomized clinical trial, or an RCT**

Yes

**Was the method of randomization adequate (i.e., use of randomly generated assignment)?**

Yes

**Was the treatment allocation concealed (so that assignments could not be predicted)?**

Yes

**Were study participants and providers blinded to treatment group assignment?**

Yes

**Were the people assessing the outcomes blinded to the participants' group assignments?**

Yes

**Were the groups similar at baseline on important characteristics that could affect outcomes (e.g., demographics, risk factors, co-morbid conditions)?**

No

**Was the overall drop-out rate from the study at endpoint 20% or lower of the number allocated to treatment?**

Yes

**Was the differential drop-out rate (between treatment groups) at endpoint 15 percentage points or lower?**

Yes

**Was there high adherence to the intervention protocols for each treatment group?**

Yes

**Were other interventions avoided or similar in the groups (e.g., similar background treatments)?**

Cannot Determine, Not Reported, or Not Applicable

**Were outcomes assessed using valid and reliable measures, implemented consistently across all study participants?**

Yes

**Did the authors report that the sample size was sufficiently large to be able to detect a difference in the main outcome between groups with at least 80% power?**

No

**Were outcomes reported or subgroups analyzed prespecified (i.e., identified before analyses were conducted)?**

Cannot Determine, Not Reported, or Not Applicable

**Were all randomized participants analyzed in the group to which they were originally assigned, i.e., did they use an intention-to-treat analysis?**

Yes

**Key Finding #1**

There was no significant difference in the lumbar spine PPT values in the mobilization or HVLAT group.

**Key Finding #2**

The mobilization group demonstrated a slight increase in PPT with a large effect size (d = 0.78).

**Key Finding #3**

The HVLAT group demonstrated a slight decrease in PPT with a small effect size (d = 0.36).

**Key Finding #4**

The authors suggest that lumbar spine mobilization may have a stronger effect on lumbar PPT values compared to HVLAT according to the results of this study.

**Please provide your summary of the paper**

This article studied the effect of lumbar spine mobilization versus high-velocity low-amplitude thrust (HVLAT) manipulation on pain pressure thresholds (PPT) in asymptomatic subjects. Ultimately, they found no significant differences in PPT values in the mobilization group or the HVLAT group. This study varies from similar studies of the cervical and thoracic spine, which revealed significant increases in PPT following SMT. This may be attributed to research indicating PPT values increase in a caudal direction due to a lower mechanoreceptor and nociceptor density in the lumbar spine. There are also several limitations to this study. Firstly, it is noted that PPT values vary between males and females, with females tending to exhibit lower PPT values compared to males. In this study, there were uneven male-to-female ratios among the mobilization, HVLAT, and sham treatment groups, potentially impacting the results obtained. Secondly, the chosen mobilization technique utilized lumbar rotation, however, it is noted that there is limited rotation available in the lumbar spine. The authors suggested that if a flexion mobilization technique had been used, which allows for five times greater motion than rotation, the results may have differed. Thirdly, all subjects were osteopathic students and therefore may have been aware the laser treatment was a sham procedure, however, no-follow up was done to address this. Lastly, the small sample size used in this study may not be representative of the general population. This was the first study done to compare the effects of mobilization and HVLAT in the lumbar spine, thus further research is needed in this area, especially in symptomatic subjects.

**Please provide your clinical interpretation of this paper. Include how this study may impact clinical practice and how the results can be implemented.**

Results from this article revealed no significant difference in PPT values due to lumbar spine mobilization or HVLAT. However, the authors noted that the mobilization group demonstrated a slight increase in PPT with a large effect size, implying mobilization may be more effective than HVLAT. It is important to note that this study investigated the impact of SMT on PPT values in asymptomatic subjects, making this study difficult to generalize to clinical practice when working with symptomatic patients. Therefore, further research is needed with symptomatic subjects in order to implement these practices with evidence to back them up.