**Article Full Title**

Spinal manipulation and exercise for low back pain in adolescents: a randomized trial

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**Paper Abstract**

Low back pain (LBP) is common in adolescence but there is a paucity of high quality research to inform care. We conducted a multicenter randomized trial comparing 12 weeks of spinal manipulative therapy (SMT) combined with exercise therapy (ET) to ET alone. Participants were 185 adolescents aged 12–18 years with chronic LBP. The primary outcome was LBP severity at 12, 26, and 52 weeks. Secondary outcomes included disability, quality of life, medication use, patient and caregiver-rated improvement and satisfaction. Outcomes were analyzed using longitudinal linear mixed effect models. An omnibus test assessing differences in individual outcomes over the entire year controlled for multiplicity. Of the 185 enrolled patients, 179 (97%) provided data at 12 weeks and 174 (94%) at 26 and 52 weeks. Adding SMT to ET resulted in a larger reduction in LBP severity over the course of one year (P=0.007). The group difference in LBP severity (0–10 scale) was small at the end of treatment (mean difference=0.5; P=0.08), but was larger at weeks 26 (mean difference=1.1; P=0.001) and 52 (mean difference=0.8; P=0.009). At 26 weeks, SMT with ET performed better than ET alone for disability (P=0.04) and improvement (P=0.02). The SMT with ET group reported significantly greater satisfaction with care at all time points (P≤0.02). There were no serious treatment-related adverse events. For adolescents with chronic LBP, spinal manipulation combined with exercise was more effective than exercise alone over a one-year period, with the largest differences occurring at six months. These findings warrant replication and evaluation of cost-effectiveness.

**NIH Risk of Bias Tool**

Quality Assessment of Controlled Intervention Studies

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

Yes

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

Yes

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

Yes

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

No

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

Yes

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

Yes

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

Yes

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

Cannot Determine, Not Reported, or Not Applicable

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

Yes

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

Yes

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

Yes

1. **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?**

Yes

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

Yes

1. **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**

Spinal manipulation combined with exercise was more effective in reducing pain severity compared to exercise alone for adolescents with low back pain over the course of one year.

**Key Finding #2**

Differences in reported pain between groups were not statistically significant at the end of treatment at 12 weeks, however differences were statistically significant at the 6-month and 12-month follow-ups. The largest between-group differences occurred at 6 months.

**Key Finding #3**

The SMT + ET group had statistically significant higher patient-rated and parent-rated satisfaction with treatment compared to the exercise alone group at all time points of the study.

**Please provide your summary of the paper**

The results of this study found significant between-group differences in spinal manipulative therapy combined with exercise (SMT + ET) versus exercise alone in adolescents with low back pain over the course of one year. Due to the abundance of research on the effectiveness of exercise in patients with low back pain, the authors decided to include exercise in both treatment groups rather than looking at SMT alone. One of the limitations of this study was the inability to blind patients and providers to the nature of the interventions. Additionally, this study was unable to differentiate between specific and non-specific treatment effects, such as the effect of patient-provider interactions. This study did not touch on the impact of the provider’s preference on SMT + ET versus ET alone, thus further research on the provider’s preference and resulting patient education and motivation on the reduction of pain severity would be worthwhile. While this is a newer area of research in adolescents, this study clearly supports the use of SMT in conjunction with exercise to reduce LBP severity and enhance long-term outcomes.

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

This study clearly supports the use of spinal manipulative therapy in adolescents with low back pain alongside traditional therapeutic exercise intervention. Though short-term outcomes were not significantly different between SMT + ET and ET alone groups, there was an increase in long-term benefits when spinal manipulation was included in treatment. Though further research is necessary surrounding chronic low back pain in adolescents and manual therapy, this article is very revealing in the effectiveness of SMT and thus should be integrated into clinical practice. However, it is important to note that this study did not look at SMT alone, and thus exercise is still an essential component of treatment in this population.