**Article Full Title**

Effects of manual therapy on body posture: Systematic review and meta-analysis

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**Paper Abstract**

Abstract

Background

Several clinical trials investigated the effectiveness of MT on body posture, but a systematic review grouping the results of these studies was not found in the literature.

Research question

Does manual therapy (MT) cause postural changes?

Methods

 Inclusion criteria were: randomized controlled trials in any population; studies in which the primary intervention was the use of any MT technique; studies that evaluated the immediate, short, medium, or long-term effects of interventions on body posture; and studies published in peer-reviewed scientific journals in any year and language. In March 2022, we conducted a search in the PUBMED, Cinahl, Embase, PEDro, and Cochrane Central databases that yielded 6627 articles, of which 38 including 1597 participants were eligible; of these, 35 could be grouped into 12 meta-analyses. The risk of bias was assessed using the PEDro scale and the certainty in the scientific evidence rated through the GRADE system.

Results

The results allowed us to conclude with moderate certainty in the evidence that, when compared to no intervention or sham, in the short and medium term, MT reduced the forward head posture (14 studies, 584 individuals, 95%CI 0.38, 1.06), reduced thoracic kyphosis (5 studies, 217 individuals, 95%CI 0.37, 0.94), improved lateral pelvic tilt (5 studies, 211 individuals, 95%CI 0.11, 0.67) and pelvic torsion (2 studies, 120 individuals, 95%CI 0.44, 1.19) and increased plantar area (3 studies, 134 individuals, 95%CI 0.04, 0.74). With moderate certainty, there was no significant effect on shoulder protrusion (5 studies, 176 individuals, 95%CI −0.11, 0.61), shoulder alignment in the frontal plane (3 studies, 160 individuals, 95%CI −0.15, 0.52), scoliosis (2 studies, 26 individuals, 95%CI −1.57, 2.19), and pelvic anteversion (5 studies, 233 individuals, 95%CI −0.02, 0.51). With low certainty, MT had no effect on scapular upward rotation (2 studies, 74 individuals, 95%CI −0.76, 2.17). With low to very low certainty, it is possible to conclude that MT was not superior to other interventions in the short or medium term regarding the improvement of forward head posture (5 studies, 170 individuals, 95%CI −1.39, 0.67) and shoulder protrusion (3 studies, 94 individuals, 95%CI −4.04, 0.97). Significance MT can be recommended to improve forward head posture, thoracic kyphosis and pelvic alignment in the short and medium term, but not shoulder posture and scoliosis. MT reduces the height of the plantar arch and this must be taken into account in physical therapy planning. PROSPERO registration number: CRD42021244423.

**NIH Risk of Bias Tool**

Quality Assessment of Systematic Reviews and Meta-Analyses

1. **Is the review based on a focused question that is adequately formulated and described?**

Yes

1. **Were eligibility criteria for included and excluded studies predefined and specified?**

Yes

1. **Did the literature search strategy use a comprehensive, systematic approach?**

Yes

1. **Were titles, abstracts, and full-text articles dually and independently reviewed for inclusion and exclusion to minimize bias?**

Yes

1. **Was the quality of each included study rated independently by two or more reviewers using a standard method to appraise its internal validity?**

Yes

1. **Were the included studies listed along with important characteristics and results of each study?**

Yes

1. **Was publication bias assessed?**

Cannot Determine, Not Reported, Not Applicable

1. **Was heterogeneity assessed? (This question applies only to meta-analyses.)**

Yes

**Key Finding #1**

Manual therapy is shown to have an effect on forward head posture and thoracic kyphosis in the short and medium term, suggesting its effects are more likely immediate than cumulative.

**Key Finding #2**

There is evidence that shows manual therapy can improve frontal plane alignment of the pelvis and increasing plantar support area by correcting muscular imbalances.

**Key Finding #3**

Manual therapy has not been shown to change pelvic anteversion posture and hyper lordotic posture in the short term.

**Key Finding #4**

Manual therapy has not been shown to affect the posture of the shoulder or scoliosis in those with a forward head and rounded shoulders posture.

**Please provide your summary of the paper**

This systematic review/meta-analysis was hard to follow due to the large amount of studies considered with a heterogenous participant pool. Given the explanation about manual therapy addressing muscular imbalances, it is reasonable to see changes in body posture such as arch height and pelvis symmetry. Although manual therapy was concluded to be a short- and medium-term effector, more research needs to be done on manual therapy in the long term. It is possible that a patient’s perception may contribute to long term effectiveness of manual therapy. In regard to body posture, manual therapy was shown to be effective for a forward posture and thoracic kyphosis, but manual therapy was not shown to be any more effective than other interventions or sham interventions.

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

Given that manual therapy was effective in the short and medium term, it may be a way to make patients comfortable, build rapport, and eventually follow it with exercise. However, since manual therapy is not more effective than other interventions, it may be best for some patients to combine manual therapy with exercise and other interventions or forego manual therapy all together.

Forward head posture is common and can be caused by muscular imbalances. According to the meta analysis, manual therapy has worked to correct muscular imbalances in other areas of the body. Manual therapy can be option to correct these imbalances if the patient is comfortable. Clinicians should consider muscular imbalances in upper-crossed syndrome and use manual therapy in the cervical region to target short and tight muscles/lengthened and weak muscles.

A key aspect of the meta analysis was that manual therapy does not work in the long term. If clinicians decide to use manual therapy, there needs to be an intervention given to the patient to use between treatments. Manual therapy coupled with interventions between sessions may be able to make the most difference long term.