Spinal Manipulative Therapy and Sports Performance Enhancement: A Systematic Review

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Abstract

Objective: The purpose of this study was to review the literature regarding the relationship between spinal manipulative therapy (SMT) and sports performance.

Methods: PubMed and Embase databases were searched for original studies published up to July 2016. Inclusion criteria were if SMT has been applied to athletes and if any sports performance–related outcome was measured.

Results: Of the 581 potential studies, 7 clinical trials were selected. Most studies had adequate quality (≥6/11) when assessed by the PEDro scale. None of those studies assessed performance at an event or competition. Four studies revealed improvement in a sports performance test after SMT. Meta-analysis could not be performed because of the wide differences in methodologies, design, and outcomes measured. Spinal manipulative therapy influences a wide range of neurophysiological parameters that could be associated with sports performance. Of the 3 studies where SMT did not improve test performance, 2 used SMT not for therapeutic correction of a dysfunctional vertebral joint but to an arbitrary previously set joint.

Conclusions: Although 4 of 7 studies showed that SMT improved sports performance tests, the evidence is still weak to support its use. Spinal manipulative therapy may be a promising approach for performance enhancement that should be investigated with more consistent methodologic designs. (J Manipulative Physiol Ther 2017;40:535-543)

Key Indexing Terms: *Musculoskeletal Manipulations; Athletic Performance; Sports; Athletes; Spine*

Introduction

The competitive nature of professional sports creates a constant demand for therapeutic options that could influence sports performance.[1,2] Most of the spinal manipulative therapy (SMT) studies in athletes are mainly focused on frequency of use, and the results are merely descriptive.[1,3-6] It is also easy to find anecdotal statements in which professionals or athletes claim that SMT increased performance. However, the majority of such reports are based on the opinion or background experience of these individuals and not on the result of specific scientific research designed for this purpose.[7-10]

Spinal manipulative therapy consists of a high-velocity, low-amplitude movement, applied at the paraphysiological space, just beyond the passive joint range of motion.[9] Several studies have evaluated its safety[11,12] and efficacy for the treatment of musculoskeletal disorders,[11] in short-term[12-17] as well as long-term results.[18,19] These and other studies indicate that SMT is considered a safe and effective approach for the treatment of biomechanical musculoskeletal disorders.[12,20-26] Different disciplines, such as chiropractic,[9,27-29] physiotherapy,[30] osteopathy,[31] and orthopedics,[32] use SMT as a therapeutic option in their practices.

Sports performance is defined as a combination of specific physical routines or procedures performed by someone who is trained or skilled in a physical activity and influenced by physiological, psychological, and sociocultural factors.[33] Interestingly, it is rare to find studies that evaluate treatment effects on athletes' real performance during a competitive event. Usually, researchers use laboratory or field tests that they believe to be directly associated with the event performance in spite of knowing that this relationship between test and event performance has not been adequately established thus far.[34]

Spinal manipulative therapy has been increasingly utilized in sports and has been shown to be a useful therapeutic strategy for biomechanical joint dysfunction,

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especially that involving the spine.[5,6,9,27] Several neurophysiological effects have been described,[35,36] but a unifying physiological mechanism is still not clear. Electromyographic activity is usually decreased in resting muscles after SMT[37-39] and increased at isometric contraction.[40] Corticospinal[41,42] excitability is usually increased, with some exceptions.[39] Increased muscle strength,[43,44] decreased muscle inhibition,[45] and muscle fatigue prevention were observed,[46] as were lower levels of proinflammatory cytokines[47] and pain sensation in humans[11,13-19,48-51] and animals.[52,53]

All these changes could interfere with sports performance, but there is still limited evidence to support SMT's ability to enhance sports performance. The aim of this study was to systematically review the scientific literature for clinical trials addressing this question.

Methods

Search Strategy

Two reviewers defined the search strategy and entered it independently in the PubMed and Embase databases, with no language or temporal restrictions, for the period up to July 2016. This review was not previously registered. Studies addressing any type of manipulative therapy in athletes were selected for full reading. The reviewers selected papers that specified SMT application and assessed its relationship to performance. The search strategy was composed of 3 interrelated main domains (Appendix A) and in accordance with the Cochrane library guidelines.[54,55]

The type of studies included was clinical trials that assessed the effects of SMT in any sports-related performance outcomes. The type of participants was active athletes from any sports modality. The term "athlete" was defined as an individual who is trained or skilled in a sports modality and is currently training or competing. The type of interventions included SMT administered to athletes, with comparison groups of sham, placebo, or controlled procedures. The type of outcomes was any factors that related to sports performance (outcomes based on PICOS strategy, as described in Appendix A), such as strength, muscle and physical resistance, speed, coordination, proprioception, and muscle and mental fatigue.

Study Selection

All titles or abstracts acquired through application of the search strategy and manual search were read. The papers were screened independently by 2 reviewers to assess whether inclusion criteria were met. The consensus was that studies would be fully read. Disagreements were resolved through the intervention of a third reviewer.

Quality Assessment

The PEDro scale was used to assess the quality of the selected studies.[56] Its validity and reliability have already been tested for the quality assessment of clinical trials.[57,58] The PEDro scale has been shown to be more appropriate for studies in which blinding is almost impossible because of intervention or disease characteristics, common to SMT or other physical interventions.[59] For each of the 11 criteria in the scale, 1 point was given if the criteria were fully met and 0 if not met. Studies that scored 6 or more were considered to be of adequate quality.

Results

Database research revealed 576 articles, and 5 additional articles were found through expert suggestions and manual search[60-64] (total of 581). After title and abstract evaluations, 12 papers were selected for full-text reading.[30,44,60-69] Five of these were excluded: 3 for not addressing SMT,[64,67,68] 1 for not assessing its effects on a sports performance variable,[30] and 1 for not addressing athletes.[62] The 7 remaining studies were included (Fig 1) and had their quality assessed through the PEDro scale.

Study Design

Selected studies were mostly parallel-randomized clinical trials, and 2 had a crossover design.[63,66] Shrier et al[66] analyzed 19 athletes from "sprint sports" and Olson et al[63] assessed 20 cyclists, and after the initial group randomized allocation, these findings were crossed between groups.[63,66] Sandell et al[60] randomized 17 middle distance runners, Costa et al[61] studied 43 golfers, Botelho and Andrade[44] studied 18 elite judokas, Humphries et al[65] studied 24 recreational basketball players, and Deutschmann et al[69] studied 40 soccer players.

All of these studies evaluated the effects of SMT on a specific sports-related performance test. Furthermore, they compared these outcome measures before and after the proposed interventions.

Quality Assessment

The quality of the selected studies was adequate (≥6/11) by PEDro scale assessment, with the exception of the study by Deutschmann et al,[69] which was the only study that had a poor quality score (5/11). None of the studies had undergone quality assessment or had registered at the PEDro scale database. The methodologies were markedly different among all of these studies. No attempt had been made in these studies to standardize the methods or to measure similar outcomes.

Previous sample size calculations were not performed by any of the studies. Humphries et al[65] and Shrier et al[66] used placebo interventions that were not validated as placebo-effective approaches to SMT. None of the sham procedures was assessed for blinding efficacy.[44,63,69]