

Systematic Reviews on Spinal Manipulation: What does the Best Evidence about the Best Intervention Gives us?

Senthil P. Kumar

Abstract

Spinal manipulation is most rapidly evolving evidence-informed technique and hence it is essential to imply high quality evidence in terms of systematic reviews and/or meta-analyses for this highly popular therapeutic technique. The objective of this short review was to provide an update of systematic reviews and/or meta-analyses on spinal manipulation through a preliminary search of PubMed database. The ten identified systematic reviews were on adverse events, and of them four were on spinal manipulation and six were on cervical spinal manipulation. Majority of systematic reviews on spinal manipulation reported on cervical spine, since the presumed risks due to manipulation of the cervical spine are much more than that of the lumbar spine due to the related neurovascular structures and hence most studies on adverse events concentrated on cervical spinal manipulation.

Keywords: Manual Therapy; Manipulative Therapy; Pubmed; Adverse Events.

Introduction

Manipulation is defined as a "high-velocity low-amplitude technique applied as a unidirectional (non-oscillatory) 'thrust' beyond the restrictive barrier in an attempt to improve the joint mobility and treat joint dysfunction [1]. The technique is not under the volitional control of the patient, and when suitably indicated in selective cases, is to be applied with clinical reasoning [2].

Manipulation is a technique whereas manipulative therapy is a professional specialty, although many authors interchangeably use these terms [3]. Manipulative therapy encompasses manipulation and mobilization for articular, myofascial and neural tissue elements along an impairment-based model of decision-making [4].

Spine being the most sophisticated in terms of its structure-function inter-relationship and its regional interdependence with somato-visceral/viscero-somatic associations is the region most commonly involved in dysfunctions [5] either due to abuse, misuse or overuse, resulting in increased application of manipulation/ mobilization for low back pain and neck pain [6].

Low back pain is the most common musculoskeletal complaint for visiting a manual therapist, and neck pain is the third common reason for visiting a healthcare practitioner, and presents the most common indication for receiving conservative treatments in out-patient settings. Common conservative interventions for spinal conditions include mechanical traction[7], segmental stabilization exercise[8], spinal mobilization [9], lateral glide[10], neurodynamics [11], and craniosacral therapy [12].

Spinal manipulation is most rapidly evolving evidence-informed technique and hence it is essential to imply high quality evidence in terms of systematic reviews and/or meta-analyses for this highly popular therapeutic technique. The objective of this short review was to provide an update of systematic reviews and/or meta-analyses on spinal manipulation through a preliminary search of PubMed database.

Author Affiliation: Professor and Principal, Maharishi Markandeshwar Institute of Physiotherapy and Rehabilitation (MMIPR), Maharishi Markandeshwar University (MMU), Mullana (Ambala), Haryana, India.

Reprint Request: Senthil P. Kumar, Professor and Principal, Maharishi Markandeshwar Institute of Physiotherapy and Rehabilitation (MMIPR), Maharishi Markandeshwar University (MMU), Mullana-Ambala-133207, Haryana, India.

E-mail: senthilparamasivamkumar@gmail.com

*Adverse Events**Spinal Manipulation*

Stevinson and Ernst [13] searched MEDLINE, EMBASE, Cochrane Library and found that minor, transient adverse events such as vertebrobasilar accidents, disk herniation, and cauda equina syndrome occur in 50% of all patients receiving spinal manipulation.

Ernst [14] searched six electronic databases from January 2001 to June 2006 and identified 32 case reports, four case series, two prospective series, three case-control studies and three surveys which reported serious harm on more than 200 patients. Vertebral artery dissection was the most common serious event, and 30%-61% of all patients were reported to have mild adverse effects in two prospective studies. The case-control studies reported a causal association between spinal manipulation and the adverse effect.

Vohra et al [15] searched eight databases and identified 13 studies (2 randomized trials, 11 observational reports) that reported 14 pediatric cases of direct adverse events involving neurologic or musculoskeletal events: "nine cases involved serious adverse events (eg, subarachnoid hemorrhage, paraplegia), 2 involved moderately adverse events that required medical attention (eg, severe headache), and 3 involved minor adverse events (eg, midback soreness).

Gouveia et al [16] systematically reviewed two databases (PubMed and the Cochrane Library) from 1966 to 2007 for safety of chiropractic procedures and identified 46 suitable articles (1 randomized controlled trial, 2 case-control studies, 7 prospective studies, 12 surveys, 3 retrospective studies, and 11 case reports). Life-threatening complications included arterial dissection, myelopathy, vertebral disc extrusion, and epidural hematoma which occurred with a frequency of between 33% and 60.9%.

Cervical Spinal Manipulation

Haldeman et al [17] reviewed the 367 case reports from three databases from 1966-1993 for identifying precipitating events and risk factors for vertebrobasilar artery dissection and 160 cases of spontaneous onset, 115 cases of onset after spinal manipulation, 58 cases associated with trivial trauma, and 37 cases caused by major trauma were reported. The risk factors were hypertension, migraines, use of oral contraception and smoking. Important factors such as offending mechanical trauma, neck movement, or type of manipulation precipitating vertebrobasilar artery dissection or the

identification of the patient at risk were not reported in the studies.

Ernst [18] reviewed 31 case reports (42 individual cases) published between January 1995 and September 2001 from five databases (MEDLINE-Pubmed; EMBASE, the Cochrane Library, AMED [Allied and Complementary Medicine Database], and CISCOP [Centralised Information Service for Complementary Medicine]. While most of studies were reported by chiropractors, arterial dissection causing stroke was reported as most common serious adverse event in 18 cases.

Miley et al [19] identified 55 studies out of 169 potentially eligible citations to yield 26 articles- 3 case-control studies, 8 prospective and retrospective case series studies, 4 illustrative case reports, 1 survey, 1 systematic review of observational research, 5 reviews, and 4 opinion and expert commentary pieces. There was weak to moderate strength of evidence for causation between CMT and VAD and associated stroke, especially in young adults (with an Odd's ratio of 5.03 and 1.3/100,000 for people <45 yrs to develop vertebral artery dissection/ stroke within one week of receiving treatment.

Carlesso et al²⁰ searched five bibliographic databases (PubMed, CINAHL, PEDro, AMED, EMBASE) from 1998 to 2009 and identified 76 citations of which 17 reported no serious adverse events. However, transient neurological symptoms, increased neck pain and 58% of studies did not study adverse events and they were excluded. All studies were associated with small sample size, moderate study quality, and notable ascertainment bias.

Haynes et al [21] followed PRISMA guidelines and searched PubMed, Embase, CINAHL Plus and AMED databases and identified four case-control studies and one case-control study, which included a case- crossover design. With many methodological limitations found in those studies, there was lack of conclusive evidence both for a strong association between neck manipulation and stroke, and for its absence.

Wyndet et al [22] reviewed the quality of 43 studies reporting 901 cases of CAD and 707 incidents of stroke after cSMT. Most of studies reported time-to-onset of symptoms and commonly ischemic stroke occurred.

Discussion and Conclusion

We aimed to study systematic reviews and meta-analyses in order to assimilate evidence from highest level of evidence as a 'systematic review of systematic

reviews' perspective. Incidentally, all ten identified systematic reviews were on adverse events, and of them four were on spinal manipulation and six were on cervical spinal manipulation.

The reason why studies on beneficial therapeutic effects were lacking may be due to the 'negative focus' on the technique and its application by various professionals such as osteopaths, chiropractors, physicians and physical therapists. Majority of systematic reviewson spinal manipulation reported on cervical spine, since the presumed risks due to manipulation of the cervical spine are much more than that of the lumbar spine due to the related neurovascular structures and hence most studies on adverse events concentrated on cervical spinal manipulation.

Spinal manipulative therapy through examination is growing in evidence in its normative responses [23], and also in its association with clinical examination methods like pressure pain thresholds [24], and radiological examination such as functional X-ray [25]. More recently, specific clinical prediction rules to identify subgroups of patients who were likely to respond to spinal manipulation were developed based upon treatment-based classification [26].

The future of spinal manipulation lies now in the hands of physical therapists [27], compared to other practitioners to develop the technique in its evolution by establishing more high quality evidence for its effects, efficacy and effectiveness [28] along an evidence-informed paradigm [29] through a symptom control-quality of life continuum of care [30]. The research revolution [31] and its ensuing demand for enhanced role of professional journals for disseminating therapy-related evidence [32] indicated mechanism-based model [33]in order to identify central sensitization [34], cognitive-affective mechanism [35] and sympathetically maintained pain [36] which might not respond to spinal manipulation.

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Disclosure

SPK is the associate editor, and AJS is the editorial board member of this journal.

Conflicts of Interest

None identified and/or declared.

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