Review article

Manual therapy treatment of cervicogenic dizziness:
a systematic review

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Abstract

Dizziness is a common and often disabling disorder. In some people the cause of their dizziness is pathology or dysfunction of upper cervical vertebral segments that can be treated with manual therapy. The aim of the present study was to systematically review the literature on the manual therapy treatment of patients with cervicogenic dizziness, by identifying and evaluating both randomized controlled trials (RCTs) and non-RCTs (controlled clinical trials and non-controlled studies). Seven electronic databases were searched up to July 2003, article reference lists were screened and an expert panel elicited to obtain relevant trials. Nine studies met the inclusion criteria and key data was extracted. Two reviewers assessed the validity of the studies using the Cochrane format and found that all studies had low methodological quality. However, a consistent finding was that all studies had a positive result with significant improvement in symptoms and signs of dizziness after manual therapy treatment. Therefore, Level 3 evidence for manual therapy treatment of cervicogenic dizziness was obtained indicating it should be considered in the management of patients with this disorder provided there is evidence of improvement. This review has identified the need for further RCTs of acceptable methodological quality.

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1. Background

Dizziness is a common complaint in manual therapy and practice. It can be described as light-headedness, imbalance, giddiness or unsteadiness (Oostendorp et al., 1992a). It is a symptom of non-specific pathological importance (Luxon, 1984). A subgroup of those with dizziness complains of vertigo which is an illusion of movement, usually rotation, whirling or spinning of the person or the environment (Froehling et al., 1994; Cronin, 1997; Aalto et al., 1998).

Dizziness and vertigo are common presenting symptoms, and were second to low back pain in frequency of occurrence in the adult population at an American Rehabilitation Hospital (Shumway-Cook and Horak, 1989). Dizziness accounts for eight million primary care visits to doctors in the United States each year and is the most common presenting complaint in patients over 75 years (Colledge et al., 1996). It is reported in 30% of people over 65 years and 39% of these people fall because of their dizziness (Colledge et al., 1996). It is particularly relevant to note that out of 18,263 patients presenting to The National Institute of Physical Therapy in the Netherlands for manual therapy from 1972–1992, 18% suffered from vertigo (Oostendorp et al., 1992b). In fact, 40–80% of neck traumatized patients experience vertigo, particularly following whiplash injury (Fitz-Ritson, 1991; Oostendorp et al., 1999; Wrisley et al., 2000).

The frequency of dizziness can vary from a rare episode to a constant sensation. There are many symptoms of varying severity reported by patients with dizziness. These symptoms can lead to emotional problems, disorientation, depression, anxiety, a fear of open spaces, an inability to perform activities of daily living, employment difficulties, early retirement and family problems (Yardley et al., 1992).

There are a number of different causes of dizziness including those arising from disturbances of the ear, nose and throat (ENT), central nervous system (CNS), cardiovascular system and benign positional paroxysmal vertigo (BPPV). Although diagnosis of the disorder can sometimes be difficult and require specialist facilities, these problems can often be successfully treated. However, in addition to these problems, a group of patients remains and it is suspected that the cause of their problem is a disorder of the cervical spine, known as cervicogenic dizziness.

Cervicogenic dizziness was first described in 1955 by Ryan and Cope who used the term ‘cervical vertigo’ to refer to a combination of cervical spine problems and dizziness. It is defined as vertigo induced by changes of position of the neck (Luxon, 1984) or vertigo originating from the cervical region (Oostendorp et al., 1992a). Cervicogenic vertigo or dizziness has been a contentious topic since this time.

Nevertheless, there is much evidence that cervicogenic dizziness is a distinct disorder. Injections of local anaesthetic into the neck muscles by De Jong et al. (1977) induced ataxia and vertigo in normal volunteers. Wyke (1979) also presented experimental and clinical evidence that altered function of the mechanoreceptors in the cervical joints leads to disequilibrium and ataxia in the older population.

In a more recent study of patients with chronic cervicobrachial pain and nerve root compression, 50% were presumed to have cervicogenic dizziness (Persson et al., 1996). It has been suggested that it is a malfunction or disturbance in the afferent flow of impulses from deep cervical tissues and cervical proprioceptors that causes cervicogenic dizziness (De Jong et al., 1977; Luxon, 1984; Persson et al., 1996; Cronin, 1997; Oostendorp et al., 1999; Brandt and Bronstein, 2001). Traumatic, degenerative, inflammatory or mechanical problems in the cervical spine can cause cervicogenic dizziness and unsteadiness. It has been noted that the severity of the dizziness is usually proportional to the severity of more common cervical symptoms such as pain, stiffness and numbness (Wyke, 1979; Froehling et al., 1994; Bracher et al., 2000; Furman and Whitney, 2000).

Cervical vertigo is often associated with whiplash injury. Whiplash injuries will be experienced by 0.1% of the population. The incidence of symptoms of dizziness or vertigo in whiplash patients has been reported as 20–58% by Wrisley (Wrisley et al., 2000) and 80–90% by Hinoki and Heikkila et al. (Hinoki, 1985; Heikkila et al., 2000). Besides whiplash, people with cervical spondylosis and cervical muscle spasms can also have dizziness (Ryan and Cope, 1955). It has been suggested by Hulse that one third of people with cervical disequilibrium have their onset due to trauma such as whiplash, one third have insidious onset and one third have other causes such as manual therapy (Hulse, 1983).

It is often assumed that the management of dizziness of cervical origin should be the same as for cervical pain.
If one is able to reproduce the patient’s dizziness on testing active cervical spine movements, or with passive cervical joint movements, a mechanical disorder is presumed to be indicated (Cronin, 1997). It is clinically expected that manual therapy which increases the range of movement of the neck, reduces muscle spasm, and restores mechanical gliding of the zygapophyseal joints will decrease dizziness and vertigo of suspected cervical origin (Wyke, 1979; Mulligan, 1991; Furman and Cass, 1996; Wilson, 1996). Several case studies have suggested that manual therapy to the upper cervical spine can result in a reduction of dizziness symptoms in patients with cervicogenic dizziness (Ryan and Cope, 1955; Cote et al., 1991; Fitz-Ritson, 1991; Mulligan, 1991; Cronin, 1997; Zhou et al., 1999; Kessinger and Boneva, 2000; Wrisley et al., 2000). Nevertheless, the role of manual therapy in the treatment of cervicogenic dizziness is far from clear and has not been systematically reviewed in the literature.

2. Objective

The purpose of this study was to systematically review the literature to evaluate the evidence for the efficacy of manual therapy treatment in the management of cervicogenic dizziness. The review examines the evidence in order to inform practitioners.

2.1. Criteria for considering studies for this review

2.1.1. Types of studies

The objective was to include randomized controlled clinical trials (RCTs) and non-RCTs. Non-RCTs (controlled clinical trials and non-controlled studies) were included because there were so few RCTs on this topic.

2.1.2. Types of participants

Trials were included that reported on subjects with dizziness or vertigo which was considered to be caused by the cervical spine. These were patients who had dizziness and either simultaneous complaints of pain or stiffness in their cervical spine or dizziness brought on by cervical spine movements or positions. Trials that included subjects with dizziness from ear, nose and throat (ENT), central nervous system (CNS), cardiovascular and benign positional paroxysmal vertigo (BPPV) causes were excluded.

2.1.3. Types of intervention

Trials in which at least one of the treatments administered was a type of manual therapy, including manipulation (high-velocity, low-amplitude techniques), mobilization (low-velocity, small or large-amplitude techniques), massage or other manual treatments were included. Non-touch techniques were excluded. Multimodal interventions were included if they involved a component of manual therapy.

2.1.4. Types of outcome measures

Outcome measures had to be for pain (visual analogue scale [VAS], numerical rating scale), dizziness (Dizziness Handicap Inventory [DHI], VAS, numerical rating scale, subjective improvement), postural performance (posturography) or a global measure (overall improvement, per cent of patients better, subjective improvement, functional changes, patient satisfaction, participation in daily activities, global perceived effect).

3. Methods

3.1. Literature search

Several bibliographic databases were searched in July 2003. The following electronic databases were searched: MEDLINE using OVID (January 1, 1966 onwards), EMBASE (1988 onwards), Cumulative Index to Nursing and Allied Health Literature (CINAHL) (from 1983 onwards), Physiotherapy Evidence Database (PEDro), the Cochrane Controlled Trials Register in the Cochrane Library (latest edition), Manual Alternative and Natural Therapy Index System (MANTIS) (1880 onwards) and the Allied and Complementary Medicine Database (AMED) (from 1985 onwards). The search strategy recommended by the Cochrane Collaboration (Van Tulder et al., 1997) was used.

The search strategies for the databases included terms related to the condition: cervical spine, dizziness, vertigo; terms related to the intervention: manual therapy, chiropractic, physiotherapy, manipulation; and terms related to the method of the studies: randomized controlled trial, placebo, controlled clinical trial, random allocation, double blind method, single blind method, experimental clinical trial, volunteer. These terms were linked with Boolean operators. No language restrictions were applied.

3.2. Study selection

One reviewer (SR) performed the database searches and downloaded the authors, title and abstracts. If it was thought that they might meet the inclusion criteria, full text articles were obtained and selection criteria applied.

3.3. Methodological quality

The name of the authors, institution and journal were removed from articles before assessment of the methodological quality was performed. Two reviewers (SR
and DR) independently assessed the articles using the criteria list and the uniform operationalization of criteria recommended in the method guidelines for the Cochrane Back Review Group (van Tulder et al., 1997). A consensus method was used to discuss and resolve disagreements between the two reviewers.

This criteria list, also known as the Maastricht-Amsterdam criteria list, consists of 19 items that can be rated individually using one of three options: ‘yes/no/ don’t know’ (Table 1). The overall methodological quality score (overall QS) is determined by the traditional vote-counting method of adding up the ‘yes’ ratings and the maximum score is 19. Several items refer to internal validity (criteria B, E, F, G, H, I, J, L, N, P) (Van Tulder et al., 1997). The descriptive criteria (A, C, D, K, M) evaluate external validity. The remaining two items (O, Q) are statistical criteria.

Due to different definitions of quality, an internal validity score (IVS) was also given by adding the positive scores for internal validity items (Van Tulder et al., 1997; Peeters et al., 2001; Verhagen et al., 2002). Studies that scored greater than 50% on overall QS or IVS were considered of acceptable validity (Verhagen et al., 2002).

### 3.4. Data extraction

The articles were evaluated and key data were extracted by both reviewers (SR and DR) in the following categories: characteristics of participants (age, gender and diagnosis), treatments given, outcome measures used and results. An attempt was made to contact the authors of the articles by e-mail to obtain more information.

### 3.5. Analysis

If the studies had been less heterogeneous and had valid data of high quality then the results would have been combined in a meta-analysis to provide an overall effect estimate, using a random effects model. If the studies are clinically heterogeneous it is not advisable to perform quantitative analysis (Van Tulder et al., 1997). Qualitative analysis was achieved by attributing levels that rate the scientific evidence (Van Tulder et al., 2003a).

**Level 1**: Strong evidence—provided by generally consistent findings in multiple higher quality RCTs.

**Level 2**: Moderate evidence—provided by generally consistent findings in one higher quality RCT and one or more lower quality RCTs.

**Level 3**: Limited evidence—provided by generally consistent findings in one or more lower quality RCTs.

**Level 4**: No evidence—if there were no RCTs or if the results were conflicting.

A trial was considered to be of higher quality if it scored 50% or more for the IVS (Van Tulder et al., 1997, 2003a; Verhagen et al., 2002). Generally consistent findings were defined as 75% or more of the studies having statistically significant findings in the same direction (Van Tulder et al., 2003a, b).

A sensitivity analysis was conducted looking at different cut-off points for methodological quality. Acceptable (higher) quality was originally defined as 50% or more of the maximum available QS, however an analysis cut-off of 40% was also performed. In addition, a sensitivity analysis was conducted in which all ‘don’t know’ scores on the validity items were assumed to be ‘yes’.

### 4. Results

#### 4.1. Selection of studies

Twenty-six trials were identified using MEDLINE. These were scanned and three trials were identified that met the criteria for inclusion (Karlberg et al., 1996; Bracher et al., 2000; Heikkila et al., 2000). The search of EMBASE identified three German studies (Konrad and Gereneser, 1990; Uhlemann et al., 1993; Biesinger, 1997). The search of AMED identified a further study accepted for the review (Zhou et al., 1999). PEDro, MANTIS, CINAHL and the Cochrane Controlled Trials Register did not identify any further trials.

Reference lists of the above English language articles were searched to see if other relevant articles could be identified. Trials by Galm et al. (1998) and Wing and...
Hargrave-Wilson (1974) were found in this manner. Five experts in the field (authors of these articles or other papers on this topic) were contacted by e-mail to see if they knew of any additional relevant sources of information. One unpublished study (Gargano, 2002) was identified but was not able to be accessed and therefore was not included.

Thus, nine studies (Wing and Hargrave-Wilson, 1974; Konrad and Gerencser, 1990; Uhlemann et al., 1993; Karlberg et al., 1996; Biesinger, 1997; Galm et al., 1998; Zhou et al., 1999; Bracher et al., 2000; Heikkila et al., 2000) met the inclusion criteria for quality assessment.

4.2. Methodological quality

Table 2 details the methodological assessment of the nine included studies. The scores from both reviewers for each article were within three points, indicating this to be a reliable process. Any disagreements related to differences in interpretation of the criteria and were resolved with discussion.

The methodological quality of the nine trials was poor. None of the studies scored 50% or more on the overall methodological QS or IVS and hence none had acceptable validity (Tulder et al., 1997; Peeters et al., 2001; Verhagen et al., 2002).

All studies failed to meet or lacked adequate information on several of the internal validity items (B1, B2, E, F, G, H and I). A common methodological weakness was the failure to have a control group. Following on from this, the method of randomization was not described (B1) and there was no blinding of group allocation (B2, E), binding of the patient to the intervention (H) or blinding of the outcome assessor to the intervention (I). Insufficient information was given about co-interventions (F) and compliance with interventions (G). Methodological quality is largely defined by the internal validity criteria, and if these are scored low the study can be considered to have biased findings.

The interventions (type, intensity, duration, number and frequency of sessions [D]) were generally not well described for most studies. Initial group characteristics (C) and adverse effects (K) were usually not described and may affect the external validity of the studies.

Statistical information was poor. Point estimates and measures of variability (Q) were only described for three trials (Karlberg et al., 1996; Zhou et al., 1999; Heikkila et al., 2000).

4.3. Study characteristics

See Table 3 for selected characteristics of these studies.

Despite the low quality of the selected studies there was a consistent trend in the findings of all the trials. All nine studies found a positive result. There was a significant improvement in symptoms and signs of dizziness after manual therapy treatment of participants with cervicogenic dizziness. See Table 4 for the eight studies that reported the percentage of patients experiencing complete relief or improvement of dizziness. The other trial (Heikkila et al., 2000) reported a reduction in duration of dizziness from 4.5 to 2.2 days in a week and a reduction in maximum intensity of dizziness from 61 to 49 mm on a 100 mm VAS scale.

The sole RCT (Karlberg et al., 1996) used passive cervical joint mobilization combined with other interventions including soft tissue treatment, stabilization exercises, relaxation and ergonomic changes to reduce cervical discomfort. Four of the trials used cervical spine manipulation either alone (Zhou et al., 1999; Heikkila et al., 2000) or combined with other interventions, such as electrotherapy, muscle relaxation techniques and collars (Wing and Hargrave-Wilson, 1974; Bracher et al., 2000).

| Methodological quality scores in decreasing order of overall quality score |
| RCT | Karlberg et al. (1996) | No | D/K | D/K | D/K | No | No | D/K | D/K | No | D/K | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | 9 | 4 |
| Non-RCTs | Zhou et al. (1999) | Yes | No | No | No | Yes | No | D/K | D/K | No | No | Yes | No | Yes | No | Yes | No | Yes | Yes | Yes | 8 | 3 |
| | Galm et al. (1998) | No | No | No | D/K | No | No | D/K | D/K | No | D/K | Yes | No | Yes | Yes | Yes | Yes | Yes | Yes | Yes | 7 | 4 |
| | Bracher et al. (2000) | Yes | No | No | No | Yes | No | D/K | No | No | Yes | No | Yes | No | Yes | No | Yes | Yes | Yes | No | 7 | 3 |
| | Heikkila et al. (2000) | Yes | No | No | No | Yes | No | D/K | D/K | No | D/K | Yes | No | D/K | Yes | No | Yes | D/K | Yes | Yes | 7 | 2 |
| | Uhlemann et al. (1993) | No | No | No | No | No | D/K | D/K | No | D/K | Yes | No | Yes | Yes | No | Yes | Yes | Yes | Yes | No | 6 | 4 |
| | Konrad and Gerencser (1990) | No | No | No | No | No | D/K | D/K | No | D/K | Yes | No | Yes | Yes | No | D/K | Yes | Yes | No | Yes | 5 | 3 |
| | Biesinger (1997) | No | No | No | No | No | D/K | D/K | No | D/K | Yes | No | Yes | Yes | No | D/K | Yes | Yes | No | Yes | 5 | 3 |
| | Wing and Hargrave-Wilson (1974) | No | No | No | No | No | D/K | D/K | No | D/K | Yes | No | Yes | Yes | No | D/K | D/K | D/K | D/K | Yes | D/K | No | 2 | 1 |

Note: D/K = don't know; QS = overall quality score; IVS = internal validity score.
<table>
<thead>
<tr>
<th>Authors</th>
<th>Participants</th>
<th>Interventions</th>
<th>Outcome measures</th>
<th>Results</th>
<th>Comments</th>
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<tr>
<td>Karlberg et al. (1996)</td>
<td>17 patients with recent onset of dizziness of suspected cervical origin referred by GPs (range 25–49 years, mean 37 years). Controls were 17 healthy volunteers (range 25–55 years, mean 36 years)</td>
<td>Patients randomized into 2 groups: treatment (n=9) and delayed treatment (n=8). Physiotherapy treatment included soft tissue treatment, exercises, passive and active cervical spine mobilization, relaxation, home training programs, ergonomics changes. Frequency: median 13 sessions (range 5–23) over 13 weeks (range 5–20). Delayed treatment group waited 8 weeks then had treatment as above</td>
<td>Posturography body sway, 100mm VAS for pain, 5-point scale for frequency and intensity of dizziness</td>
<td>Dizzy patients had impaired postural performance (0.5 &gt; P &gt; 0.0001) Physiotherapy reduced neck pain intensity (55 to 33 on VAS, P = 0.004), dizziness frequency (4 to 2, P = 0.002), dizziness intensity (3 to 2, P = 0.007) and improved postural performance (P &lt; 0.05). 12% complete relief of dizziness, 71% improved</td>
<td>RCT with objective outcome measures. No blinding. Multi-modal approach. Small sample size</td>
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<tr>
<td>Zhou et al. (1999)</td>
<td>34 patients with dizziness, nausea and headache (12 males and 22 females, range 29–55 years, mean 39.6 years). Illness for 6 months to 10 years. 45 in control group</td>
<td>Traditional Chinese manipulations to the atlantoaxial joint</td>
<td>X-rays to show deviation of dens within the atlas</td>
<td>Excellent results in 73.5% with complete relief of symptoms, partial relief in 17.6%</td>
<td>Non-randomized controlled clinical trial. No concealment of group allocation. No short-term follow-up. Insufficient information on blinding of outcome assessor</td>
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<td>Galm et al. (1998)</td>
<td>50 patients with dizziness and cervical spine disorders (range 19–78 years, mean 43 years)</td>
<td>Group A (n = 31)(with upper cervical spine dysfunction) had cervical mobilization and/or manipulation. Group B (n = 19)(no dysfunction) had similar manual therapy to Group A. Treatment was for 3 months</td>
<td>Subjective rating: “free of vertigo, improved or not improved”</td>
<td>Group A: 77.4% improved, 16% free of vertigo. Group B: none had improvement after 2 weeks, 26.3% improved after 3 months. None free of symptoms</td>
<td>Non-randomized controlled trial. Eligibility criteria not described. No objective outcome measures</td>
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<td>Bracher et al. (2000)</td>
<td>15 patients with cervical vertigo from otolaryngology practices (range 27–82 years, mean 41 years).</td>
<td>Group A (n = 31)(with upper cervical spine dysfunction) had cervical mobilization and/or manipulation. Group B (n = 19)(no dysfunction) had similar manual therapy to Group A. Treatment was for 3 months</td>
<td>Subjective rating: “free of vertigo, improved or not improved”</td>
<td>Group A: 77.4% improved, 16% free of vertigo. Group B: none had improvement after 2 weeks, 26.3% improved after 3 months. None free of symptoms</td>
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<td>Heikkila et al. (2000)</td>
<td>14 patients with dizziness of suspected cervical origin referred by GPs to otorhinolaryngology clinics (range 22–54 years, mean 36 years)</td>
<td>Acupuncture, cervical manipulation, no treatment and NSAIDs. All 4 interventions received in random order</td>
<td>VAS for pain, VAS for dizziness, duration of dizziness, symptom questionnaire, CROM, kinesthetic awareness</td>
<td>Dizziness improved with manipulation ($P&lt;0.034$), duration reduced from 4.5–2.2 days/week, maximum intensity 61 to 49 mm (VAS). Pain (39–27 mm) and dizziness (69–59) decreased by acupuncture. Pain intensity decreased by NSAIDs</td>
<td>Single-subject experimental design. 4 interventions in random order. No long-term follow-up</td>
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<td>Uhlemann et al. (1993)</td>
<td>12 patients with dizziness and 'functional disturbance of the upper cervical spine'</td>
<td>Three treatments of manual therapy over 8 days: mobilization and manipulation (traction manipulation of C7/T1)</td>
<td>Cervical turn test with electronystagmography, subjective reporting of dizziness</td>
<td>Significantly fewer cervical joint blockages, less dizziness (92% reduced dizziness, 8% no change) and decreased cervical nystagmus</td>
<td>Non-controlled study. No long-term follow-up. Small sample size. No point estimates or measures of variability</td>
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<td>Konrad &amp; Gerencser (1990)</td>
<td>54 patients with cervical vertigo (14 males and 40 females, &lt;55 years, mean 34.7 years)</td>
<td>Mobilization and manipulation, 1–3 treatments</td>
<td>Electronystagmography, subjective reporting of dizziness</td>
<td>Dizziness no longer present in 33%, improved in 41% and unchanged in 26%. Nystagmus and central signs improved 58% were complaint free, 31% had subjective improvement, 11% felt no change</td>
<td>Non-controlled study. No long-term follow-up. No point estimates or measures of variability</td>
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<td>Biesinger (1997)</td>
<td>52 patients with dizziness and upper cervical spine disturbances, in whom ear and vestibular causes had been eliminated</td>
<td>Manual therapy: manipulation, and/or soft tissue techniques and physiotherapy over a 6 week period. Of those who became complaint-free 47% had 1 treatment, 50% had 2</td>
<td>Electronystagmography, subjective reporting of dizziness</td>
<td>73% significantly improved with electronystagmography. 53% reported complete relief and 36% significant relief of symptoms</td>
<td>Non-controlled study. No long-term follow-up. Intervention not fully described. No point estimates or measures of variability</td>
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<td>Wing &amp; Hargrave-Wilson (1974)</td>
<td>80 patients with vertigo and cervical pain or occipital headaches (60 females and 20 males, 54% aged 40–60 years, 32% aged 20–40 years)</td>
<td>Cervical spine manipulation, support in a collar, ergonomic changes, anti-inflammatory drugs</td>
<td>Electronystagmography, subjective reporting of dizziness</td>
<td>73% significantly improved with electronystagmography. 53% reported complete relief and 36% significant relief of symptoms</td>
<td>Non-controlled study. No long-term follow-up. No random allocation to groups or ‘blinded’ research assistant</td>
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</table>

Note: EMG = electromyogram; GP = general practitioner; NSAID = non-steroidal anti-inflammatory drug; VAS = visual analogue scale; CROM = cervical range of motion instrument; RCT = randomized controlled trial.
et al., 2000). The three German trials (Konrad and Gerencser, 1990; Uhlemann et al., 1993; Biesinger, 1997) and Galm et al. (1998) used both cervical spine mobilization and manipulation. It is therefore not clear whether a particular type of manual therapy is superior to other types or whether any benefit can be solely attributed to the manual therapy interventions.

The high number of ‘don’t know’ scores was a reflection of the fact that these studies were generally not adequately described.

4.4. Analysis

4.4.1. Quantitative analysis

Since none of the studies had acceptable validity by scoring an overall QS or IVS of 50% or more, and because they were too heterogeneous, a meta-analysis was not performed.

4.4.2. Qualitative analysis

Level 3 evidence (limited evidence provided by generally consistent findings in one or more lower quality RCTs [Van Tulder et al., 2003a]) was obtained in this systematic review. Although this ‘levels-of-evidence system’ normally applies to RCTs, in this case it was used to describe non-RCTs due to the lack of RCTs on this topic. Based on these results, manual therapy could be considered for the treatment of patients with cervicogenic dizziness provided there was evidence of improvement in reported and measurable outcomes. Nevertheless, the small number of studies available and their poor quality does not permit firm conclusions to be made.

4.4.3. Sensitivity analysis

If the threshold of acceptability was lowered to 40% of the maximum QS (QS 8/19) then two studies (Karlberg et al., 1996; Zhou et al., 1999) would have achieved ‘acceptable validity’. Therefore, changing the threshold of acceptability would strengthen the conclusions of this review. By changing the threshold to more than 40% for the IVS would not have changed the result as no studies would have achieved ‘acceptable internal validity’.

If all ‘don’t know’ scores are assumed to be ‘yes’ instead of ‘no’ the overall QS for each of the studies becomes: Karlberg et al. (1996) 15; Zhou et al. (1999) 11; Galm et al. (1998) 11; Bracher et al. (2000) 8; Heikkila et al. (2000) 12; Uhleman et al. (1993) 9; Konrad and Gerencser (1990) 9; Biesinger (1997) 9; and Wing and Hargrave-Wilson (1974) 9. Four studies would have achieved 50% or more. If all ‘don’t know’ scores are assumed to be ‘yes’ the IVS for each of the studies becomes: Karlberg et al. 8; Zhou et al. 6; Galm et al. 7; Bracher et al. 4; Heikkila et al. 7; Uhleman et al. 7; Konrad and Gerencser, 7; Biesinger, 6 and Wing and Hargrave-Wilson, 6. All of the studies except Bracher et al. would therefore have been rated of acceptable quality by scoring more than 5 out of 10 for internal validity. This would have strengthened the recommendation that manual therapy can be used to treat cervicogenic dizziness.

5. Discussion

Results from the studies examined in this systematic review showed that there is limited evidence that manual therapy is beneficial in the treatment of cervicogenic dizziness.

Due to the lack of RCTs on this topic non-RCTs were included. It has been acknowledged that RCTs are not the only or necessarily the best means of evaluating health care, and the Cochrane Collaboration has considered changing to include other research methodologies (Newman and Jacobsen 1993; Mulrow and Oxman, 1997). However, it is acknowledged that studies which are not RCTs are usually placed low on the ‘hierarchy of evidence’ (McPherson and Lord, 2000).

The study by Heikkila et al. (2000) was included for assessment of methodological quality even though it is a single subject experimental design because there were so few clinical trials. It was found to have a control group, random allocation to groups and appropriate outcome measures. Heikkila et al. (2000) was also included in an effort to eliminate inclusion criteria bias.

Besides the lack of RCTs and the low-methodological quality of the studies another problem was the poor reporting of the trials which often meant it was not possible to decide if a criterion had been met.

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<td>Results of manual therapy treatment of cervicogenic dizziness</td>
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<td>Complete relief (%)</td>
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<tr>
<td><strong>RCT</strong> Karlberg et al. (1996)</td>
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<tr>
<td><strong>Non-RCT</strong> Zhou et al. (1999)</td>
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<td>Galm et al. (1998)</td>
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<td>Bracher et al. (2000)</td>
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<td>Konrad and Gerencser (1990)</td>
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<td>Wing and Hargrave-Wilson (1974)</td>
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A qualitative analysis was performed using the levels of evidence approach as recommended by the Cochrane Collaboration Back Review Group (Van Tulder et al., 2003a). However, there are many criteria lists for determining levels of evidence and these have not been standardized. Questions have been raised about the validity of the levels of evidence pooling rules. It is possible that different pooling rules could have resulted in a different level of evidence for this present study (Ferreira et al., 2002).

Studies published in languages other than English were included to exclude language bias and increase precision. However, selection bias may be present in the study as only one person (SR) selected the articles. This person conducted both the citation identification and selection phase of the review. Agreement has been found to be fair to good when two people select the studies so it is still recommended.

During the assessment of the articles the authors' names, institution and journal names were removed. Although there was no true blinding as one of the researchers was also involved in article selection, the process followed was recommended by the Cochrane Collaboration Back Review Group (Van Tulder et al., 1997). Interestingly, blinding is a somewhat controversial issue with some researchers finding that blinding resulted in lower and more consistent scores than open assessment, while others did not find this (Van Tulder et al., 1997; Jadad et al., 1998). Due to minimal evidence it is not seen as a mandatory step in performing a systematic review.

The findings of this review are consistent with findings from indirect evidence. Mulligan recommends the use of manual therapy in the treatment of vertigo and dizziness (Mulligan, 1991, 1999). The Sustained Natural Apophyseal Glides (SNAGs) technique recommended by Mulligan to treat this condition is now taught and practised by physiotherapists worldwide. Many other authors also suggest using manual therapy on the cervical spine to treat cervicogenic dizziness (Ryan and Cope, 1955; Wyke, 1979; Haldeman, 1980; Grieve, 1981; Odkvist and Odkvist, 1988; Fitz-Ritson, 1991; Wilson, 1996; Kessinger and Boneva, 2000; Wrisley et al., 2000; Brandt and Bronstein, 2001). Borg-Stein et al. (2001) retrospectively reviewed outcomes of 15 patients treated in an outpatient clinic with ‘rehabilitation interventions’ for cervicogenic dizziness and found 27% reported no further dizziness, with 82% of the remaining patients reporting some improvement. Several single case studies have also been reported in which manipulation has been used successfully to treat cervicogenic vertigo (Cote et al., 1991; Cagle, 1995; Cronin, 1997).

The findings from this systematic review and from indirect evidence are further supported by the proposed neuroanatomical and neurophysiological basis for cervicogenic dizziness. It has been postulated that cervicogenic dizziness is caused by cervical spine joint dysfunction and spasm of cervical muscles (Borg-Stein et al., 2001). The cervical zygapophyseal joints are the most densely innervated of all the spinal joints (Wyke, 1979). The upper cervical articular mechanoreceptors and proprioceptors contribute to static postural sensation or the sense of balance (Wyke, 1979; Hulse, 1983). The dorsal roots of the spinal nerves of C2 and C3 synapse with the nucleus abducens in the vestibular nuclei (Borg-Stein et al., 2001). Altered Type 1 cervical articular mechanoreceptors and proprioceptors from dysfunctional joints results in a loss of normal afferent input, which leads to aberrant information being sent to the vestibular nuclei (Wyke, 1979; Cagle, 1995). So even though the vestibular system may be normal, this may result in vertigo, poor balance or unsteadiness (Wyke, 1979). It follows that if one can restore normal gliding movement of the zygapophyseal joints in the upper cervical spine through manual therapy, normal afferent input will also be restored and therefore cervicogenic dizziness reduced.

6. Conclusions

This systematic review has found that there is limited evidence at present to support the use of manual therapy in treating cervicogenic dizziness. Insufficient clinical research of satisfactory quality has been performed on this topic. Further RCTs, with high-methodological quality, are needed to clearly determine the role of manual therapy for this disorder. Future research should examine the efficacy of individual types of manual therapy as well as a multimodal approach.

References


