

# Motor control exercise versus standard care for cervical radiculopathy

## Review information

### Authors

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### What's new

| Date / Event | Description |
|--------------|-------------|
|              |             |

### History

| Date / Event | Description |
|--------------|-------------|
|              |             |

## Abstract

### Background

### Objectives

### Search methods

### Selection criteria

### Data collection and analysis

### Main results

### Authors' conclusions

## Plain language summary

### [Summary title]

[Summary text]

## Background

### Description of the condition

### Description of the intervention

### How the intervention might work

### Why it is important to do this review

## Objectives

## Methods

### Criteria for considering studies for this review

#### *Types of studies*

#### *Types of participants*

#### *Types of interventions*

#### *Types of outcome measures*

Primary outcomes

Secondary outcomes

### Search methods for identification of studies

#### *Electronic searches*

#### *Searching other resources*

### Data collection and analysis

#### *Selection of studies*

*Data extraction and management*

*Assessment of risk of bias in included studies*

*Measures of treatment effect*

*Unit of analysis issues*

*Dealing with missing data*

*Assessment of heterogeneity*

*Assessment of reporting biases*

*Data synthesis*

*Subgroup analysis and investigation of heterogeneity*

*Sensitivity analysis*

## Results

Description of studies

*Results of the search*

*Included studies*

*Excluded studies*

Risk of bias in included studies

*Allocation (selection bias)*

*Blinding (performance bias and detection bias)*

*Incomplete outcome data (attrition bias)*

*Selective reporting (reporting bias)*

*Other potential sources of bias*

Effects of interventions

## Discussion

Summary of main results

Overall completeness and applicability of evidence

Quality of the evidence

Potential biases in the review process

Agreements and disagreements with other studies or reviews

## Authors' conclusions

Implications for practice

Implications for research

## Acknowledgements

## Contributions of authors

## Declarations of interest

## Differences between protocol and review

## Published notes

## Characteristics of studies

Characteristics of included studies

*Kuijper 2009*

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Methods</b>      | <b>Study design:</b> Randomized controlled trial<br><b>Study grouping:</b> Parallel group<br><b>Open Label:</b><br><b>Cluster RCT:</b>                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Participants</b> | <b>Baseline Characteristics</b><br>physiotherapy <ul style="list-style-type: none"> <li>• <i>age:</i> 46.7 (10.9)</li> <li>• <i>male sex:</i> 34 (49)</li> <li>• <i>number participants:</i> 70</li> <li>• <i>duration arm pain:</i> 2.8 (1.4)</li> <li>• <i>duration neck pain:</i> 3.0 (2.1)</li> </ul> collar <ul style="list-style-type: none"> <li>• <i>age:</i> 47.0 (9.1)</li> <li>• <i>male sex:</i> 38 (55)</li> <li>• <i>number participants:</i> 69</li> <li>• <i>duration arm pain:</i> 2.8 (1.4)</li> </ul> |

|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                       | <ul style="list-style-type: none"> <li>• <i>duration neck pain</i>: 3.3 (2.3)</li> </ul> <p>wait and see</p> <ul style="list-style-type: none"> <li>• <i>age</i>: 47.7 (10.6)</li> <li>• <i>male sex</i>: 32 (48)</li> <li>• <i>number participants</i>: 66</li> <li>• <i>duration arm pain</i>: 3.0 (1.5)</li> <li>• <i>duration neck pain</i>: 3.2 (2.0)</li> </ul> <p><b>Included criteria:</b> Age 18-75 years, symptoms for less than one month, arm pain on a visual analogue scale of 40mm or more, and radiation of arm pain distal to the elbow, plus at least one of provocation of arm pain by neck movements, sensory changes in one or more adjacent dermatomes, diminished deep tendon reflexes in the affected arm, or muscle weakness in one or more adjacent myotomes.</p> <p><b>Excluded criteria:</b> Clinical signs of spinal cord compression, previous treatment with physiotherapy or a cervical collar, and insufficient understanding of the Dutch or English language.</p>                        |
| <b>Interventions</b>  | <p><b>Intervention Characteristics</b></p> <p>physiotherapy</p> <ul style="list-style-type: none"> <li>• <i>dose</i>: Physiotherapy with a focus on mobilising and stabilising of the cervical spine was given twice a week for six weeks. The standardised sessions were "hands off" and consisted of graded activity exercises to strengthen the superficial and deep neck muscles. Patients were advised to do home exercise everyday and to record the duration of the home exercises in their diary.</li> </ul> <p>collar</p> <ul style="list-style-type: none"> <li>• <i>dose</i>: Semi-hard collar. Patients were advised to wear the collar during the day for three weeks and to take as much rest as possible. Over the next three weeks the patients were weaned from the collar, and after six weeks they were advised to take it off completely</li> </ul> <p>wait and see</p> <ul style="list-style-type: none"> <li>• <i>dose</i>: Advised to continue their daily activities as much as possible</li> </ul> |
| <b>Outcomes</b>       | <p><i>Continuous:</i></p> <ul style="list-style-type: none"> <li>• arm pain</li> <li>• neck pain</li> <li>• neck disability index</li> </ul> <p><i>Dichotomous:</i></p> <ul style="list-style-type: none"> <li>• surgery</li> <li>• drop outs</li> <li>• sick leave %</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Identification</b> | <p><b>Sponsorship source:</b> The salary for the research nurse was paid by the Non-profit Foundation, dr Eduard Hoelen Stichting, Wassenaar, Netherlands.</p> <p><b>Country:</b> Netherlands</p> <p><b>Setting:</b> Neurology outpatient clinics in three Dutch Hospitals</p> <p><b>Comments:</b></p> <p><b>Authors name:</b> Barbara Kuijper</p> <p><b>Institution:</b> Maastricht Hospital, Department of Neurology</p> <p><b>Email:</b> kuijperb@maasstadziekenhuis.nl</p> <p><b>Address:</b> P O Box 9119, 3078 AC, Rotterdam, Netherlands</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Notes</b>          | <p><b>Identification:</b><br/><i>Per Kjær</i> Kuijper 2009</p> <p><b>Participants:</b></p> <p><b>Study design:</b></p> <p><b>Baseline characteristics:</b></p> <p><b>Intervention characteristics:</b></p> <p><b>Pretreatment:</b></p> <p><b>Continuous outcomes:</b></p> <p><b>Dichotomous outcomes:</b></p> <p><b>Adverse outcomes:</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

## Risk of bias table

| Bias                                                      | Authors' judgement | Support for judgement                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------------------------------------------|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Random sequence generation (selection bias)               | Low risk           | Comment: For each of the three participating hospitals, randomisation was based on a computer generated sequence that was kept in a separate box with sealed envelopes. The boxes had been prepared by an employee from the Department of Biostatistics who was not otherwise involved in the study. No other stratification or blocking procedure was used.            |
| Allocation concealment (selection bias)                   | Low risk           | Quote: "The boxes had been prepared by an employee from the Department of Biostatistics who was not otherwise involved in the study."<br>Comment: All envelopes were sequentially numbered. After the patient had given informed consent, the investigator opened the envelope with the next consecutive number and informed the patient about the treatment allocated. |
| Blinding of participants and personnel (performance bias) | High risk          | Comment: Patients and investigators were not blinded to the type of treatment.                                                                                                                                                                                                                                                                                          |
| Blinding of outcome assessment (detection bias)           | Unclear risk       | Quote: "At entry and at three weeks, six weeks, and six months after randomisation, the patients filled out all the outcome scales in the presence of, but without interference from, the research nurse who also acted as data manager."<br>Comment: it is not stated the the nurse was not involved in the treatment arms                                             |

|                                          |              |                                                                                                                                                                                                   |
|------------------------------------------|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Incomplete outcome data (attrition bias) | Unclear risk | Quote: "We imputed missing values on the basis of the last observation carried forward technique."<br>Comment: There is a relative low drop out but it cannot be determined in the early outcomes |
| Selective reporting (reporting bias)     | Low risk     | Comment: Reporting according to the published protocol on primary outcomes                                                                                                                        |
| Other bias                               | Unclear risk | Comment: concerns about adherence to treatment protocols which may weaken the results                                                                                                             |

**Ragonese 2009**

|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Methods</b>        | <b>Study design:</b> Randomized controlled trial<br><b>Study grouping:</b> Parallel group<br><b>Open Label:</b><br><b>Cluster RCT:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Participants</b>   | <b>Baseline Characteristics</b><br>manual therapy <ul style="list-style-type: none"> <li>sex: ?</li> </ul> exercises <ul style="list-style-type: none"> <li>sex: ?</li> </ul> manual therapy+exercises <ul style="list-style-type: none"> <li>sex: ?</li> </ul> <b>Included criteria:</b> 4 positive fundings: Spurling, positive distraction, upperlimb test for median nerve, ipsilateral rotation less than 60 degrees<br><b>Excluded criteria:</b> medical condition hindering routine practice as Rheumat. Arthritis, cervical/thoracal surgery etc.                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Interventions</b>  | <b>Intervention Characteristics</b><br>manual therapy <ul style="list-style-type: none"> <li>dose: 3 sessions per week for 3 weeksCervical lateral glides (Maitland grade 3-4 oscillatory) performed for approximately 30 to 45 seconds at each segment of the cervical spine. Thoracic postero-anterior oscillatory mobilisation on hypomobile segments 30-45 sec. neural dynamic technique for the median nerve, "sliding" as described by Butler in positions described by Magee</li> </ul> exercises <ul style="list-style-type: none"> <li>dose: 3 sessions per week for 3 weeksStrengthening of deep cervical flexors, lower and middle trapezius and serratus anterior</li> </ul> manual therapy+exercises <ul style="list-style-type: none"> <li>dose: 3 times in 3 weekscervical lat. glides 30 - 45 sec.Posterior-anterior thoracic mobilisation 30-45 secnervemobilisation ULNT 1andprogressiv training of deep cervical flexorslower, middle trapez.serratus anteriore</li> </ul> |
| <b>Outcomes</b>       | <b>Continuous:</b> <ul style="list-style-type: none"> <li>pain</li> <li>neck disability index</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Identification</b> | <b>Sponsorship source:</b> Not declare<br><b>Country:</b> US<br><b>Setting:</b> Outpatient Physiotherapy Department<br><b>Comments:</b> payment model at hospital not mentioned<br><b>Authors name:</b> John Ragonese<br><b>Institution:</b> Outpatient Rehabilitation Department at Loyola Medical Center<br><b>Email:</b> not available<br><b>Address:</b> Chicago, IL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Notes</b>          | <b>Identification:</b><br><b>Participants:</b><br><b>Study design:</b><br><b>Baseline characteristics:</b><br><b>Intervention characteristics:</b><br><b>Pretreatment:</b><br><b>Continuous outcomes:</b><br><b>Dichotomous outcomes:</b><br><b>Adverse outcomes:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

## Risk of bias table

| Bias                                                      | Authors' judgement | Support for judgement                                                                                                                                             |
|-----------------------------------------------------------|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Random sequence generation (selection bias)               | Unclear risk       | Comment: Sequence generation not described. Block randomization refers to the size of groups, not real block randomization.randomised by opening opaque envelopes |
| Allocation concealment (selection bias)                   | Unclear risk       | Comment: Generation of sequence not described                                                                                                                     |
| Blinding of participants and personnel (performance bias) | High risk          | Comment: Not possible to blind patient and clinician in this type of studies                                                                                      |
| Blinding of outcome assessment (detection bias)           | Low risk           | Comment: After 3 weeks evaluated by therapist blinded to treatment allocation                                                                                     |
| Incomplete outcome data (attrition bias)                  | High risk          | Comment: No report of how missing data were delt with if any, no reports of drop outs, attrition or exclusion                                                     |
| Selective reporting (reporting bias)                      | Low risk           | Comment: Standard outcomes of pain and disability reported suggesting no selective outcome reporting                                                              |

|            |           |                                                                                                                      |
|------------|-----------|----------------------------------------------------------------------------------------------------------------------|
| Other bias | High risk | Comment: There are no analyses of baseline statistics there is no power calculation, amount of participants very low |
|------------|-----------|----------------------------------------------------------------------------------------------------------------------|

*Footnotes***Characteristics of excluded studies*****Diab 2012***

|                      |                          |
|----------------------|--------------------------|
| Reason for exclusion | Wrong patient population |
|----------------------|--------------------------|

***Fritz 2014***

|                      |                          |
|----------------------|--------------------------|
| Reason for exclusion | Wrong patient population |
|----------------------|--------------------------|

***Hoving 2002***

|                      |                          |
|----------------------|--------------------------|
| Reason for exclusion | Wrong patient population |
|----------------------|--------------------------|

***Langevin 2014***

|                      |                    |
|----------------------|--------------------|
| Reason for exclusion | Wrong intervention |
|----------------------|--------------------|

***Peolsson 2013***

|                      |                |
|----------------------|----------------|
| Reason for exclusion | Wrong outcomes |
|----------------------|----------------|

***Persson 1997***

|                      |                          |
|----------------------|--------------------------|
| Reason for exclusion | Wrong patient population |
|----------------------|--------------------------|

***Persson 1997a***

|                      |                          |
|----------------------|--------------------------|
| Reason for exclusion | Wrong patient population |
|----------------------|--------------------------|

***Walker 2008***

|                      |                          |
|----------------------|--------------------------|
| Reason for exclusion | Wrong patient population |
|----------------------|--------------------------|

***Wani 2013a***

|                      |                          |
|----------------------|--------------------------|
| Reason for exclusion | Wrong patient population |
|----------------------|--------------------------|

*Footnotes***Characteristics of studies awaiting classification***Footnotes***Characteristics of ongoing studies***Footnotes***Summary of findings tables****Additional tables****References to studies****Included studies*****Kuijper 2009***

Kuijper,B.; Tans,J. T.; Beelen,A.; Nolle,F.; de Visser,M.. Cervical collar or physiotherapy versus wait and see policy for recent onset cervical radiculopathy: randomised trial.. BMJ 2009;339(Journal Article):b3883. [DOI: <http://dx.doi.org/10.1136/bmj.b3883>]

***Ragonese 2009***

Ragonese,J.. A randomized trial comparing manual physical therapy to therapeutic exercises, to a combination of therapies, for the treatment of cervical radiculopathy. Orthopaedic Physical Therapy Practice 2009;21(3):71-76. [DOI: ]

**Excluded studies*****Diab 2012***

Diab,A. A.; Moustafa,I. M.. The efficacy of forward head correction on nerve root function and pain in cervical spondylotic radiculopathy: a randomized trial.. Clinical rehabilitation 2012;26(4):351-361. [DOI: <http://dx.doi.org/10.1177/0269215511419536>]

***Fritz 2014***

Fritz,J. M.; Thackeray,A.; Brennan,G. P.; Childs,J. D.. Exercise only, exercise with mechanical traction, or exercise with over-door traction for patients with cervical radiculopathy, with or without consideration of status on a previously described subgrouping rule: a randomized clinical trial. Journal of Orthopaedic & Sports Physical Therapy 2014;44(2):45-57. [DOI: <http://dx.doi.org/10.2519/jospt.2014.5065>]

***Hoving 2002***

Hoving,J. L.; Koes,B. W.; de Vet,H. C.; van der Windt,D. A.; Assendelft,W. J.; van Mameren,H.; Deville,W. L.; Pool,J. J.; Scholten,R. J.; Bouter,L. M.. Manual therapy, physical therapy, or continued care by a general practitioner for patients with neck pain. A randomized, controlled trial. Annals of Internal Medicine 2002;136(10):713-722. [DOI: ]

***Langevin 2014***

Langevin,P.; Desmeules,F.; Lamothe,M.; Robitaille,S.; Roy,J. S.. Comparison of 2 Manual Therapy and Exercise Protocols for Cervical Radiculopathy: A Randomized Clinical Trial Evaluating Short-term Effects. The Journal of orthopaedic and sports physical therapy 2014;(Journal Article):1-38. [DOI: [10.2519/jospt.2015.5211](http://dx.doi.org/10.2519/jospt.2015.5211) [doi]]

***Peolsson 2013***

Peolsson,A.; Soderlund,A.; Engquist,M.; Lind,B.; Lofgren,H.; Vavruch,L.; Holtz,A.; Winstrom-Christersson,A.; Isaksson,I.; Oberg,B.. Physical function outcome in cervical radiculopathy patients after physiotherapy alone compared with anterior surgery followed by physiotherapy: a prospective randomized study with a 2-year follow-up.. Spine 2013;38(4):300-307. [DOI: <http://dx.doi.org/10.1097/BRS.0b013e31826d2cbb>]

### Persson 1997

Persson, L. C.; Moritz, U.; Brandt, L.; Carlsson, C. A.. Cervical radiculopathy: pain, muscle weakness and sensory loss in patients with cervical radiculopathy treated with surgery, physiotherapy or cervical collar. A prospective, controlled study. European spine journal 1997;6(4):256-66. [DOI: ]

### Persson 1997a

Persson, L. C.; Carlsson, C. A.; Carlsson, J. Y.. Long-lasting cervical radicular pain managed with surgery, physiotherapy, or a cervical collar. A prospective, randomized study. Spine 1997;22(7):751-8. [DOI: ]

### Walker 2008

Walker,M. J.; Boyles,R. E.; Young,B. A.; Strunce,J. B.; Garber,M. B.; Whitman,J. M.; Deyle,G.; Wainner,R. S.. The effectiveness of manual physical therapy and exercise for mechanical neck pain: a randomized clinical trial.. Spine 2008;33(22):2371-2378. [DOI: <http://dx.doi.org/10.1097/BRS.0b013e318183391e>]

### Wani 2013a

Wani,Surendra; Raka,Neha; Jethwa,Juhi; Mohammed,Rafi. Comparative efficacy of cervical retraction exercises (McKenzie) with and without using pressure biofeedback in cervical spondylosis. International Journal of Therapy & Rehabilitation 2013;20(10):501-508. [DOI: ]

## Studies awaiting classification

### Ongoing studies

## Other references

### Additional references

### Other published versions of this review

### Classification pending references

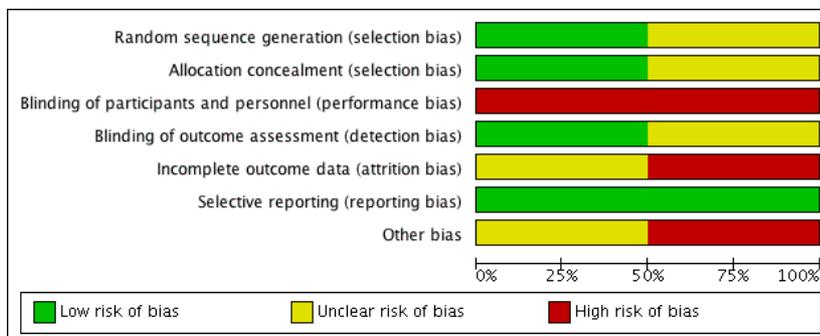
## Data and analyses

### 3 physiotherapy vs manual therapy/wait and see

| Outcome or Subgroup                                    | Studies | Participants | Statistical Method                        | Effect Estimate      |
|--------------------------------------------------------|---------|--------------|-------------------------------------------|----------------------|
| 3.7 Pain (numeric rating scale/pain/neck pain) SMD     | 2       | 153          | Std. Mean Difference (IV, Random, 95% CI) | -0.72 [-1.43, -0.00] |
| 3.8 Neck disability (Northwick Park Questionnaire/NDI) | 2       | 153          | Std. Mean Difference (IV, Random, 95% CI) | -0.49 [-1.43, 0.44]  |

## Figures

Figure 1



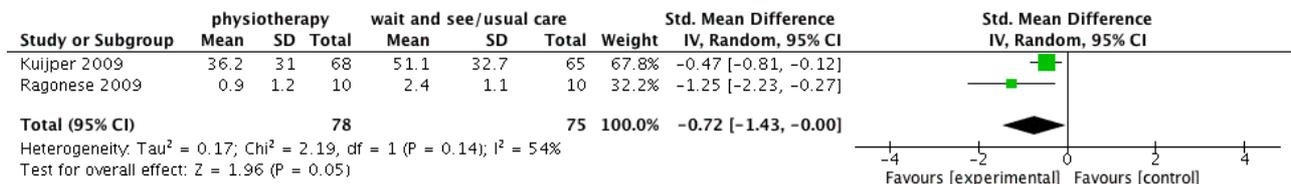
Risk of bias graph: review authors' judgements about each risk of bias item presented as percentages across all included studies.

Figure 2

|               | Random sequence generation (selection bias) | Allocation concealment (selection bias) | Blinding of participants and personnel (performance bias) | Blinding of outcome assessment (detection bias) | Incomplete outcome data (attrition bias) | Selective reporting (reporting bias) | Other bias |
|---------------|---------------------------------------------|-----------------------------------------|-----------------------------------------------------------|-------------------------------------------------|------------------------------------------|--------------------------------------|------------|
| Kuijper 2009  | +                                           | +                                       | +                                                         | ?                                               | ?                                        | +                                    | ?          |
| Ragonese 2009 | ?                                           | ?                                       | +                                                         | +                                               | +                                        | +                                    | +          |

Risk of bias summary: review authors' judgements about each risk of bias item for each included study.

Figure 3 (Analysis 3.7)



Forest plot of comparison: 3 physiotherapy vs manual therapy/wait and see, outcome: 3.7 Pain (numeric rating scale/pain/neck pain) SMD.

Figure 4 (Analysis 3.8)



Forest plot of comparison: 3 physiotherapy vs manual therapy/wait and see, outcome: 3.8 Neck disability (Northwick Park Questionnaire/NDI).

## Sources of support

### Internal sources

- No sources of support provided

### External sources

- No sources of support provided

## Feedback

## Appendices