

CADTH RAPID RESPONSE REPORT: REFERENCE LIST

Exercise for Multiple Sclerosis: Clinical Effectiveness

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Research Questions

1. What is the clinical effectiveness of whole-body vibration therapy for patients with multiple sclerosis?
2. What is the clinical effectiveness of the McKenzie Principle for patients with Multiple Sclerosis?
3. What is the clinical effectiveness of weight-based training for lower body extremities for patients with multiple sclerosis?

Key Findings

One overview of systematic reviews was identified regarding the clinical effectiveness of whole-body vibration therapy and weight-based training for lower body extremities for patients with multiple sclerosis. Additionally, two systematic reviews (one with meta-analyses) and two randomized controlled trials were identified regarding the clinical effectiveness of whole-body vibration therapy for patients with multiple sclerosis. Moreover, three systematic reviews (two with meta-analyses), three randomized controlled trials, and one non-randomized study were identified regarding the clinical effectiveness of weight-based training for lower body extremities for patient with multiple sclerosis. However, no relevant literature was found regarding the clinical effectiveness of the McKenzie Principle for patients with Multiple Sclerosis.

Methods

A limited literature search was conducted by an information specialist on key resources including PubMed, the Cochrane Library, the University of York Centre for Reviews and Dissemination (CRD) databases, the websites of Canadian and major international health technology agencies, as well as a focused Internet search. The search strategy was comprised of both controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings), and keywords. The main search concepts were Exercise and Multiple sclerosis. Search filters were applied to limit retrieval to health technology assessments, systematic reviews, meta-analyses, or network meta-analyses, randomized controlled trials or controlled clinical trials. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 01, 2015 and February 06, 2020. Internet links were provided, where available.

Selection Criteria

One reviewer screened citations and selected studies based on the inclusion criteria presented in Table 1.

Table 1: Selection Criteria

Population	Patients with Multiple Sclerosis (MS)
Intervention	Q1: Whole Body Vibration therapy (stimulate particular receptors over a muscle or tendon, and that leads to a little bit of a contraction) Q2: McKenzie Principle/Method (a system encompassing assessment (evaluation), diagnosis and treatment for the spine and extremities) Q3: Weight training exercises for lower body
Comparator	Q1-3: No exercise
Outcomes	Q1-3: Clinical effectiveness (e.g., fatigue, increase strength, delayed progression of disease, reduced numbness and heaviness in legs)
Study Designs	Health technology assessments, systematic reviews, randomized controlled trials, and non-randomized studies

Results

Rapid Response reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports and systematic reviews are presented first. These are followed by randomized controlled trials and non-randomized studies.

One overview of systematic reviews¹ was identified regarding the clinical effectiveness of whole-body vibration therapy and weight-based training for lower body extremities for patients with multiple sclerosis. Additionally, two systematic reviews (one with meta-analyses)^{3,5} and two randomized controlled trials^{7,9} were identified regarding the clinical effectiveness of whole-body vibration therapy for patients with multiple sclerosis. Moreover, three systematic reviews (two with meta-analyses),^{2,4,6} three randomized controlled trials,^{8,10,11} and one non-randomized study¹² were identified regarding the clinical effectiveness of weight-based training for lower body extremities for patient with multiple sclerosis. However, no relevant literature was found regarding the clinical effectiveness of the McKenzie Principle for patients with Multiple Sclerosis.

Additional references of potential interest are provided in the appendix.

Health Technology Assessments

No literature identified.

Overview of Systematic Reviews

1. Amatya B, Khan F, Galea M. Rehabilitation for people with multiple sclerosis: an overview of Cochrane Reviews. *Cochrane Database Syst Rev.* 2019;1:CD012732. [PubMed: PM30637728](https://pubmed.ncbi.nlm.nih.gov/30637728/)

Systematic Reviews and Meta-analyses

2. Torres-Pareja M, Sanchez-Lastra MA, Iglesias L, Suarez-Iglesias D, Mendoza N, Ayan C. Exercise interventions for improving flexibility in people with multiple sclerosis: A systematic review and meta-analysis. *Medicina*. 2019;55(11):02.
[PubMed: PM31684026](#)
3. Castillo-Bueno I, Ramos-Campo DJ, Rubio-Arias JA. Effects of whole-body vibration training in patients with multiple sclerosis: A systematic review. *Neurologia*. 2018;33(8):534-548.
[PubMed: PM27448520](#)
4. Edwards T, Pilutti LA. The effect of exercise training in adults with multiple sclerosis with severe mobility disability: A systematic review and future research directions. *Multiple Sclerosis and Related Disorders*. 2017;16:31-39.
[PubMed: PM28755682](#)
5. Kang H, Lu J, Xu G. The effects of whole body vibration on muscle strength and functional mobility in persons with multiple sclerosis: A systematic review and meta-analysis. *Multiple Sclerosis and Related Disorders*. 2016;7:1-7.
[PubMed: PM27237747](#)
6. Heine M, van de Port I, Rietberg MB, van Wegen EE, Kwakkel G. Exercise therapy for fatigue in multiple sclerosis. *Cochrane Database Syst Rev*. 2015 (9):CD009956.
[PubMed: PM26358158](#)

Randomized Controlled Trials

7. Abbasi M, Kordi Yoosefinejad A, Poursadeghfard M, Parsaei Jahromi F, Motealleh A, Sobhani S. Whole body vibration improves core muscle strength and endurance in ambulant individuals with multiple sclerosis: A randomized clinical trial. *Multiple Sclerosis and Related Disorders*. 2019;32:88-93.
[PubMed: PM31071658](#)
8. Callesen J, Cattaneo D, Brincks J, Kjeldgaard Jorgensen ML, Dalgas U. How do resistance training and balance and motor control training affect gait performance and fatigue impact in people with multiple sclerosis? A randomized controlled multi-center study. *Mult Scler*. 2019;1352458519865740.
[PubMed: PM31339460](#)
9. Freitas EDS, Frederiksen C, Miller RM, et al. Acute and chronic effects of whole-body vibration on balance, postural stability, and mobility in women with multiple sclerosis. *Dose Response*. 2018;16(4):1559325818816577.
[PubMed: PM30627068](#)
10. Kjolhede T, Vissing K, de Place L, et al. Neuromuscular adaptations to long-term progressive resistance training translates to improved functional capacity for people with multiple sclerosis and is maintained at follow-up. *Mult Scler*. 2015;21(5):599-611.
[PubMed: PM25257612](#)
11. Moradi M, Sahraian MA, Aghsaie A, et al. Effects of eight-week resistance training program in men with multiple sclerosis. *Asian J Sports Med*. 2015;6(2):e22838.
[PubMed: PM26448834](#)

Non-Randomized Studies

12. Aidar FJ, Carneiro AL, Costa Moreira O, et al. Effects of resistance training on the physical condition of people with multiple sclerosis. *J Sports Med Phys Fitness*. 2018;58(7-8):1127-1134.
[PubMed: PM28944644](#)

Appendix — Further Information

Previous CADTH Reports

13. Diagnosis and treatment of multiple sclerosis: Guidelines. (*CADTH Rapid response report: reference list*). Ottawa (ON): CADTH; 2018:
<https://www.cadth.ca/diagnosis-and-treatment-multiple-sclerosis-guidelines-0>.
 Accessed 2020 Feb 11

Systematic Reviews and Meta-analyses

Mixed Population

14. Alashram AR, Padua E, Annino G. Effects of whole-body vibration on motor impairments in patients with neurological disorders: A systematic review. *Am J Phys Med Rehabil*. 2019;98(12):1084-1098.
[PubMed: PM31246611](#)
15. Smith M, Barker R, Williams G, Carr J, Gunnarsson R. The effect of exercise on high-level mobility in individuals with neurodegenerative disease: a systematic literature review. *Physiotherapy*. 2019;02:02.
[PubMed: PM31477333](#)
16. Huang M, Liao LR, Pang MY. Effects of whole body vibration on muscle spasticity for people with central nervous system disorders: a systematic review. *Clin Rehabil*. 2017;31(1):23-33.
[PubMed: PM26658333](#)
17. Cruickshank TM, Reyes AR, Ziman MR. A systematic review and meta-analysis of strength training in individuals with multiple sclerosis or Parkinson disease. *Medicine*. 2015;94(4):e411.
[PubMed: PM25634170](#)

Mixed Intervention

18. Rooney S, Moffat F, Wood L, Paul L. Effectiveness of fatigue management interventions in reducing severity and impact of fatigue in people with progressive multiple sclerosis: A systematic review. *International Journal of Ms Care*. 2019;21(1):35-46.
[PubMed: PM30833871](#)
19. Charron S, McKay KA, Tremlett H. Physical activity and disability outcomes in multiple sclerosis: A systematic review (2011-2016). *Multiple Sclerosis and Related Disorders*. 2018;20:169-177.
[PubMed: PM29414293](#)
20. Platta ME, Ensari I, Motl RW, Pilutti LA. Effect of exercise training on fitness in multiple sclerosis: A meta-analysis. *Arch Phys Med Rehabil*. 2016;97(9):1564-1572.
[PubMed: PM26896750](#)

Alternative Outcomes

21. Manca A, Dvir Z, Deriu F. Meta-analytic and scoping study on strength training in people With multiple sclerosis. *J Strength Cond Res.* 2019;33(3):874-889.
[PubMed: PM30192317](#)
22. Kantele S, Karinkanta S, Sievanen H. Effects of long-term whole-body vibration training on mobility in patients with multiple sclerosis: A meta-analysis of randomized controlled trials. *J Neurol Sci.* 2015;358(1-2):31-37.
[PubMed: PM26421830](#)

Review Articles

23. Manago MM, Glick S, Hebert JR, Coote S, Schenkman M. Strength training to improve gait in people with multiple sclerosis: A critical review of exercise parameters and intervention approaches. *International Journal of Ms Care.* 2019;21(2):47-56.
[PubMed: PM31049034](#)
24. Reynolds E, Ashbaugh AD, Hockenberry B. Multiple sclerosis and exercise: A Literature Review. *Current Sports Medicine Reports.* 2018,17(1): 31-35.
https://journals.lww.com/acsm-csmr/fulltext/2018/01000/Multiple_Sclerosis_and_Exercise__A_Literature.12.aspx
25. Halabchi F, Alizadeh Z, Sahrien M, et al. Exercise prescription for patients with multiple sclerosis; potential benefits and practical recommendations 2017. *BMC Neurol.* 2017, 17(185).
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5602953/>