Non-pharmacological treatments of postpolio syndrome: a systematic review

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INTRODUCTION

It was believed that after recovery from acute paralytic polio, the physical conditions of survivors would remain stable for the rest of their lives. However, up to 40% of polio survivors may develop what has been called postpolio syndrome (PPS) approximately 15 to 40 years after the original paralytic polio infection. Symptoms of PPS include increasing muscle weakness, muscle fatigue, general fatigue, muscle and joint pain, muscle loss, respiratory problems, sleep disturbance, swallowing difficulties, and cold intolerance. These PPS symptoms can affect the polio survivors' daily functioning, mobility, quality of life, and psychological well-being. There are unmet needs of polio survivors with PPS for effective rehabilitation programs in Hong Kong. Therefore, it is important to gain some insight on how to help guide this particular population, their caregivers, and healthcare professionals in managing PPS.

OBJECTIVES

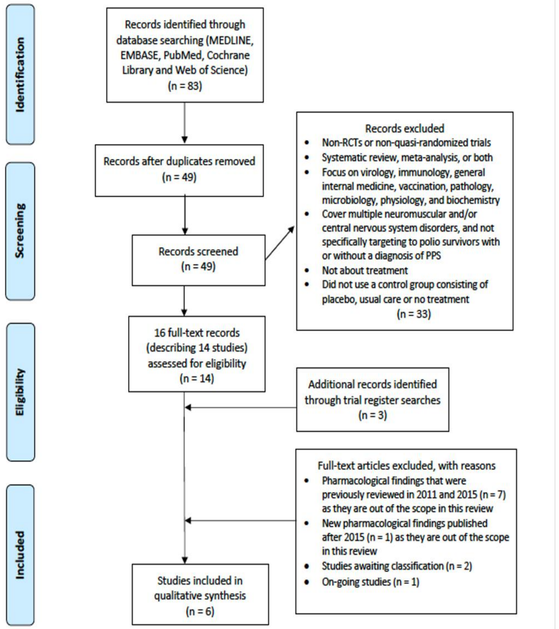
This review aimed to systematically review the evidence from randomized and quasi-randomized controlled trials for the effect of any form of non-pharmacological treatment for individuals with prior paralytic poliomyelitis with or without a diagnosis of PPS, in comparison of placebo, usual care or no treatment.

METHODOLOGY

Systematic search of MEDLINE, MEDLINE In-Process & Other Non-Indexed Citations, EMBASE, Cochrane Library, PubMed and Web of Science for published and unpublished RCTs and quasi-randomized trials over the past 20 years. Selection criteria included polio survivors with or without a diagnosis of PPS and any form of non-pharmacological treatment. Placebo, usual care or no treatment were used as control in the relevant trials. Each study had its own outcome measures of interest. We reported this review following PRISMA guidelines for systematic reviews, and adopted Physiotherapy Evidence Database (PEDro) scale to determine the methodological quality of individual RCTs.

RESULTS

There has been an earlier Cochrane review on the treatment for PPS published in 2011 and later updated in 2015. In this review, we identified **four** new non-pharmacological studies published after the 2015 review and **two** previously reviewed studies on non-pharmacological intervention.



Studies Characteristics

6 studies, N = 260	
Range of sample size	Treatment ix: 5 – 30 Control ix: 5 - 29
Completion of trials	Earliest: 2003 Latest: 2020
Study Design	RCTs – 5 studies Quasi experimental – 1 study

Participants Characteristics

6 studies, N = 260	
Recruitment	• University clinic – 2 studies • Hospitals and rehabilitation centres – 2 studies • Did not specify – 2 studies
Mean age	• Youngest: 54.57 years • Oldest: 65 years
Gender	• Male only – 1 study • Did not specify – 2 studies • Female > 50% distribution – 3 studies
Diagnosis	• PPS – 4 studies • History of polio with or without PPS – 2 studies

Outcome Measures

6 studies, N = 260	
Arazpour, 2016	• Primary: gait symmetry index
Chan, 2003	• Primary: muscle function of thumb muscles
Ghelman, 2020	• Primary: pain symptoms • Secondary: quality of life and resilience
Koopman, 2016	• Primary: fatigue • Secondary: self-perceived activity limitations and health-related quality of life (HRQoL)
Silva, 2020	• Primary: upper limb motor function • Secondary: dexterity, functionality, balance, muscle fatigue, upper limb pain
Strumse, 2003	• Primary outcomes: pain, fatigue, health and physical abilities, mobility, activities of daily living (ADLs), depression, life satisfaction

Treatment / Intervention Characteristics

6 studies, N = 260			
Arazpour, 2016	• Conventional knee-ankle-foot orthosis (KAFO) vs. New powered KAFO	Koopman, 2016	• Exercise therapy • Cognitive Behavioural Therapy (CBT)
Chan, 2003	• Strength training	Silva, 2020	• Interactive videogame Nintendo Wii Sports
Ghelman, 2020	• Active transdermal gel • Anthroposophic multimodal treatment	Strumse, 2003	• Individual and group rehabilitation in warm versus cold climate

DISCUSSION

- The current review identified five RCTs and one quasi-experimental trials. It has been impacted by the lack of high-quality trials according to the PEDro scale. Two studies achieved poor quality, one achieved fair quality and three achieved good quality.
- The heterogeneity in treatment interventions and outcome measures made it difficult for comparisons across studies, affecting the ability of drawing an overall conclusion for the current review.

CONCLUSIVE STATEMENT

Due to insufficient good-quality data and insufficient high-quality randomized studies, it was impossible to draw definite conclusions about the effectiveness of interventions for PPS. Results indicated that anthroposophic multimodal treatment on chronic pain and interactive videogames on upper limb motor function may be beneficial but need further investigation to clarify whether any real and meaningful effect exists.

CLINICAL IMPLICATION

More well-designed RCTs with larger sample size and longer follow-up are required for a more conclusive evidence and optimal treatment protocol for individuals with PPS. Future research on which treatment modalities would target which specific PPS symptoms, such as fatigue or pain, would be useful.

INCLUDED STUDIES

Arazpour M, Ahmadi F, Bahramizadeh M, Samadian M, Mousavi ME, Bani MA, et al. Evaluation of gait symmetry in poliomyelitis subjects: Comparison of a conventional knee-ankle-foot orthosis and a new powered knee-ankle-foot orthosis. Prosthet Orthot Int. 2016;40(6):689-95.

Chan KM, Amirjani N, Sumrain M, Clarke A, Strohschein FJ. Randomized controlled trial of strength training in post-polio patients. Muscle & Nerve. 2003;27(3):332-8.

Ghelman R, Akiyama IY, de Souza VT, Falcao J, Orgolini V, Hosomi JK, et al. A twelve-week, four-arm, randomized, double-blind, placebo-controlled, phase 2 prospective clinical trial to evaluate the efficacy and safety of an anthroposophic multimodal treatment on chronic pain in outpatients with postpolio syndrome. Brain and Behavior. 2020;10(4).

Koopman FS, Voorn EL, Beelen A, Bleijenberg G, de Visser M, Brehm MA, et al. No Reduction of Severe Fatigue in Patients With Postpolio Syndrome by Exercise Therapy or Cognitive Behavioral Therapy: Results of an RCT. Neurorehabilitation & Neural Repair. 2016;30(5):402-10.

Silva E, Lange B, Bacha JMR, Pompeu JE. Effects of the Interactive Videogame Nintendo Wii Sports on Upper Limb Motor Function of Individuals with Post-polio Syndrome: Randomized Clinical Trial. Games for Health Journal. 2020;9(6):461-71.

Strumse YA, Stanghelle JK, Utne L, Ahlvin P, Svendsby EK. Treatment of patients with postpolio syndrome in a warm climate. Disability & Rehabilitation. 2003;25(2):77-84.