Does high-intensity exercise better improve ambulation in the population with chronic stroke, as compared to standard care?: A Systematic Review of the Literature

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Does high-intensity exercise better improve ambulation in the population with chronic stroke, as compared to standard care? A Systematic Review of the Literature

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Introduction

Background

Each year approximately 1.5 million strokes occur worldwide, making strokes the leading cause of adult disability.1 The prevalence of stroke is predicted to increase with the growth of the aging population, and as a result, the population of those living with disability post-stroke is expected to rise similarly. Following a stroke, survivors’ walking deficits often include decreased velocity, alterations in walking mechanics, and impairments in cardiovascular fitness.2,3 Post-stroke walking deficits have been shown to have a profound impact on functional independence, and therefore are a major contributor to adult disability.4 Historically, physical therapy has been successful in the recovery of walking for this population. Previous studies suggest that physical therapists utilize a combination of intensive mobility training, functional strengthening, balance exercises, aerobic training, and variable walking task training are generally successful with improving gait ability in the population with chronic stroke.5 However, more recent research suggests that it is not only the type of training that is important to achieve maximal results, but also how the training is implemented. Much of the functional improvement that occurs with activity during physical therapy is in response to neuroplastic changes in the brain,6 and intensity of exercise has been shown to be one of the key principles impacting the induction of neuroplastic changes.6 This leads to the question: does high-intensity exercise have a greater impact on the recovery of walking than standard care in chronic stroke survivors?7

Currently, there is a lack of evidence evaluating whether interventions performed at sufficient high-intensity in the population with chronic stroke have an effect on improving gait. Given that high-intensity exercise has been shown to induce neuroplastic changes, we hypothesize that high-intensity training will better facilitate neuroplasticity and result in greater improvements in gait than standard care.

Purpose

To assess the effectiveness of high-intensity exercise on the improvement of gait deficits in survivors of chronic stroke as compared to standard care.

Methods

A literature search was conducted during July and September of 2015 (Figure 1). The database searched were PubMed, Ovid, CINAHL, Scopus, and CINAHL. The search terms used were “high-intensity” AND “stroke” AND task OR walk OR walk. The search included the following limits: English language, human participants, and publication in the last 10 years (2005-2015). The final inclusion criteria was as follows:

1. High-intensity as defined by ≥60% HR reserve (HRR), ≥85% max HR, RPE scale ≥15, ≥85% HRmax, SF-36 (2013). The seven articles included in this systematic review of the literature are as follows:

- Stookey, et al., 2012
- Moore, et al., 2015
- Holleran et al., 2012
- Helgerud et al., 2013
- Hafer, et al., 2013
- Cerny, et al., 2014
- Jakobsen, et al., 2014

Across the seven papers chosen for inclusion in this systematic review, high-intensity training was achieved in multiple ways: treadmill and over ground gait training (with and without body weight support), lower extremity cycle training, and aerobic training. The following results were found: