

EFFECTS OF LOKOMAT TRAINING ON GAIT SPEED IN PEOPLE WITH CHRONIC STROKE: A SYSTEMATIC REVIEW

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ABSTRACT

Background: The use of robotics as a tool in physical therapy rehabilitation has grown in popularity over the past decade. The Lokomat is a robotic assisted gait training device used in the rehabilitation of a variety of populations, including people with stroke and spinal cord injury. Although various studies have been completed using the Lokomat, no systematic review has examined this robot's effectiveness in increasing the gait speed of people with stroke. The objective of this systematic review was to compare the effects of the Lokomat robotic gait training to alternative physical therapy on gait speed in people with chronic stroke. **Methods**: A systematic review was completed following PRISMA guidelines. A search was done of PubMed and EMBASE databases. Inclusion criteria consisted of: (1) participants 18 years or older that had a chronic stroke of greater than or equal to 3 months, (2) intervention that included the use of the Lokomat, (3) comparison of robotics to any other physical therapy intervention, and (4) outcomes including gait speed. Two authors screened titles, abstracts, and full articles in a stepwise process with a separate author acting as the tiebreaker at each stage. The senior author performed an independent screening. The reference list of the final articles was also searched to ensure no studies were missed. Risk of bias of the selected studies was assessed using the PEDro database. **Results**: Five studies were selected based on the inclusion criteria with PEDro scores ranging from 4 to 7 on the 10-point scale. Three studies demonstrated a greater improvement in gait speed after Lokomat training (effect size = 2.39, 0.22, and p- value = 0.007) while two studies showed greater improvement in gait speed with alternative rehabilitation (effect size = -0.38 and -0.17). **Discussion**: This systematic review showed conflicting results with three studies demonstrating greater improvement in gait speed with Lokomat training, while two studies showed improved gait speed with use of an alternative intervention. However, one of the studies that reported increased gait speed with the Lokomat group received a PEDro score of 4/10, indicating caution with interpretation. Limitations of this systematic review include the risk of bias associated with included articles, the smaller sample sizes of the included studies, and the exclusion of articles not written in English. Due to conflicting results regarding the effectiveness of gait speed therapy, well-designed randomized control trials are needed to accurately determine the effects of Lokomat in improving gait parameters. Future research should include studies that consist of larger sample sizes, longer periods of Lokomat gait training, and long-term follow up with study participants. Despite the lack of evidence supporting the improvement of gait speed through robotic assisted gait training, the Lokomat may be useful in reducing physical stress on the participant and the therapist during gait training.

Keywords: Lokomat, physical therapy, stroke, gait speed, gait training, robotic training

INTRODUCTION

When treating patients with neurologic deficits, physical therapists often spend a large portion of their time addressing gait impairments. Gait deficits have a significant impact on a patient's functional mobility, which ultimately led to the development of a variety of body weight supported gait training (BWSGT) devices and robot-assisted gait training (RAGT) devices. BWSGT devices are interventional tools used by physical therapists in the treatment of the neurologic and orthopedic patient populations. Through the use of supportive harnesses, BWSGT allows individuals to perform varying gait tasks either over-ground or on a treadmill system with increased safety. These devices also allow for a percentage of the individual's body weight to be supported, making ambulation less difficult.

RAGT further addresses impairments by using robotic exoskeletons to physically assist a person with gait. Various RAGT devices, including the Lokomat, have been developed to help people with gait impairments sense proper gait movements in