

**A critical appraisal of “Effects of the Gait Training Device Plus
Physiotherapy in Improving Ambulatory Functions in Patients With
Subacute Stroke With Hemiplegia: An Assessor-Blinded,
Randomized Controlled Trial”**

By

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Abstract

This paper offers a critical appraisal of an article published in 2022 from the Archives of Physical Medicine and Rehabilitation about the effectiveness of combined robot-assisted gait training (RAGT) and traditional gait-training methods in stroke with hemiplegia. Within the introduction, the importance of the topic of interest is outlined along with a specification of the clinical question being analyzed. The methods utilized to find and select the article for the appraisal are summarized. The result section of this appraisal highlights the main points of the article and critiques the introduction, methods, results, and discussion sections of the article. The discussion section of this paper that follows elaborates on the clinical significance and applicability of the article and the results of the intervention studied. Finally, the conclusion revisits the practicality of the clinical use of this type of intervention as well as offering future directions to take this gait-training technology and the related research related.

Key words: Stroke, robot-assisted gait training (RAGT), mobility

Introduction

Subacute stroke with hemiplegia is a worldwide health problem that greatly affects individuals who face this disability. Patients with hemiplegia may have major gait deficits which make completing activities of daily living difficult to nearly impossible. One way medical professionals are trying to improve patient care for these individuals is through the use of robot-assisted gait training (RAGT). Difficulty completing daily living activities are issues that we, as physical therapists, and students, must always search for new ways to help our patients overcome. With the prevalence of technology in our world, it is important to be well-versed in the types of technology we have at our disposal to help with patient treatment. In light of this information, I formed my clinical question, “Is exoskeleton gait training more effective in improving mobility than standard gait training in patients with neuromuscular disorders?”

Methods

To complete my literature search, I utilized the CINAHL and PubMed databases with key words including “exoskeleton gait training”, “standard gait training”, and “stroke patients”, as well as Boolean terms during those searches to narrow my results. The selected article came from the CINAHL database. Due to the specific nature of my clinical question, the only limit I placed on my search was limiting the articles to research articles to remove meta-analysis/literature review articles from the results. My inclusion criteria included any articles that compared robot-assisted gait training to conventional gait-training methods. Exclusion criteria included any articles that focused on healthy individuals alone and how they responded to exoskeleton gait training because I was focused solely on individuals with deficits. I also excluded any articles that did not have a comparison between standard gait training and exoskeleton gait training because my question was centered around comparing the two

intervention types. With the criteria listed above in place, I ended up with roughly 200-250 results before I began reviewing and analyzing articles.

After narrowing my choices down to three relevant articles, I decided on an article written by Natapatchakrid Thimabut and others, titled “Effects of the Robot-Assisted Gait Training Device Plus Physiotherapy in Improving Ambulatory Functions in Patients With Subacute Stroke With Hemiplegia: An Assessor-Blinded, Randomized Controlled Trial”. This study, published in the Archives of Physical Medicine and Rehabilitation, was conducted in Thailand in 2022. I chose this article because I was compelled by this type of intervention and was interested in looking at research with patients with musculoskeletal disorders. I feel the authors did a great job spelling out their methods which gave me, the reader, a clear understanding of how they conducted their study. Overall, I felt this article was the most credible of the three I had originally selected.

Results

Summary of the study

Individuals with subacute stroke with hemiplegia face difficulties completing functional activities of daily living, so aiding these patients in returning to prior level of function as quickly and efficiently as possible is important. Robot-assisted gait training may serve as an effective intervention strategy to aid these patients with gait training. This study looked at ambulatory function improvement through the use of a specific type of RAGT known as Welwalk and compared its effects to conventional gait training. The study participants, individuals with subacute stroke with hemiplegia, were randomly assigned to either the control group or the Welwalk group. All participants received thirty days of their respective training, with both groups participating in conventional physiotherapy, and after training, the researchers looked

primarily at the FIM-walk score and the efficacy of the FIM-walk, comparing these results to their baseline measurements. At the end of training, the study found that both primary measures were higher in the Welwalk group than the control group, most notably after the 15th session, suggesting that the Welwalk training protocol may improve ambulatory function faster than conventional gait training alone.

Appraisal of the study introduction

The introduction is comprehensive and clear with good evidence for choosing to implement their study. They expanded on why they chose to do a study with stroke patients as well as why they chose to look at the effectiveness of RAGT, with evidence to support these choices. From further investigation of the evidence cited, I found these references to be credible. The conclusion from the literature review found that the Gait Exercise Assist Robot (GEAR) had favorable outcomes in patients with stroke with hemiplegia compared to the control, and that patients in the GEAR group had earlier improvement of walking ability. The authors list their key words as hemiplegia, rehabilitation, and stroke, and I feel that they do a good job of addressing these in the introduction. The introduction as a whole flows in a way that is easy to follow and understand, and the authors thoroughly explain themselves and their reasoning behind wanting to perform this study.

When considering the deficits in the introduction, the only other information I might want to know and seek further is more information about the controls in the studies done with stroke patients and RAGT devices. With the present study, the robotic device is paired with a conventional therapy method; I wonder if the other articles mentioned have the same conditions, or if the robotic device was not also paired with conventional methods.

Appraisal of the study methods

The researchers designed their study in an effective way, choosing a randomized control trial (RCT) with assessor blindness (single-blinded). There are two groups employed within the study, the Welwalk with physiotherapy and control group, and the investigators managed all of the groups in the same way except for the experimental interventions, noting that the attending therapist supervised the visual and auditory feedback used during the training session. The reliability and validity of the primary measures and tools are supported by other appropriate evidence.

The differences existing between groups were found to be age and sex, but all other characteristics were not found to be significant. Limitations can be found with the training session itself, along with the settings of the Welwalk used for this study. The training sessions are described in a vague way that is not specific or descriptive; it would be difficult to replicate the exact training program without having to guess what type of exercises were performed and the duration that the therapists had their subjects participating in. The instruments, along with primary and secondary outcome measures are not described in sufficient detail, making these measurements difficult to replicate.

Appraisal of the study results

The result section is written in an organized and clear manner. The research questions presented in the introduction are outlined in the same order in the results section, keeping the flow of the article consistent. The results address the research question, and the aim of the study is addressed through outcome variable results. The figures and tables are presented clearly and accurately, giving me a further and greater understanding of the results. The statistically significant results are discussed and further highlighted through the use of a table. From these

results, it may be clinically important to note that the Welwalk group showed greater improvements more quickly than the control group.

The authors did not mention any concept about minimal clinically important difference (MCID) before analyzing the data and did not describe or calculate the number needed to treat (NNT). When deciding whether this intervention is one that I would recommend using in the clinical setting, I would feel more confident in my choice if I was able to reference these values.

Appraisal of the study discussion

The authors tie their findings from the study into the existing literature and reference back to this literature throughout the conclusion. This literature seems to be from credible sources, which helps me be more confident in understanding how this information may be important clinically. While the authors did not give any measures of clinical significance, the authors do address their understanding of the clinical significance and application of the study at the end of the discussion. The limitations to the study are recognized and mentioned and expand on ideas for future research.

Through this discussion, the authors outline and emphasize the importance that RAGT combined with conventional gait training methods in a clinical sense. As the reader, this information is helpful when considering whether or not I would implement this strategy, but there are not statistical measures of clinical significance to fully back up their claims. While I agree with their take on this information and think their discussion is well written, their claims would be stronger with statistical evidence.

Discussion

The prevalence of individuals with subacute stroke with hemiplegia is a common health problem in the physical therapy realm that will affect our patients for life. We must be open to

investigating new ideas and new ways of treating patients if these methods might be more effective than our current, conventional methods. This study looked at one of these specific technologies and assessed its effectiveness in improving patient functioning. This particular study found that Welwalk, a robot-assisted gait training device, improved patient ambulatory function more quickly than conventional methods. This study, with its comparison of a control and experimental group directly investigated my clinical question and gave evidence for measures of functional mobility.

From the study results, I think that there are certain aspects of RAGT that could be beneficial to implement in the clinical setting. There is evidence for improvements in gait in this patient population, and while both conventional methods and RAGT methods result in improvements, the Welwalk resulted in these improvements more quickly than the conventional method alone. With the benefits considered, it is also important to consider the risks associated with this intervention strategy. The Welwalk may put a load of cardiovascular stress that some patients may not be ready for, which could have detrimental effects. Ensuring that each patient is not progressed too quickly through their treatment would be important and would also ensure that the benefits of this type of intervention outweigh the risks. One way that the authors could have improved their argument in favor of this intervention would be through giving more detail as to what the specific training session consisted of and measuring the clinical significance, as well as measuring the improvements on a week-by-week basis, to give a greater understanding of the timeline associated with these improvements. With all of this information considered, I think that implementing RAGT with conventional gait training methods would be beneficial, if access to the technology is available. If the clinic that I was working at had this type of technology, I would argue that using the Welwalk would be beneficial.

After appraising this article, I feel confident enough in the article's validity to consider implementing a combined conventional gait training and RAGT method with a patient of my own. The authors present their information through a well-designed study with strong references to support their methods, all within a reputable journal. Designing and implementing training sessions with the use of RAGT is something I would like to become proficient in, if given the opportunity to do so. After some education and experience with the use of a Welwalk, I could anticipate safely and appropriately implementing this intervention in the future. The significance of the results and the possibility to give this patient population a more efficient aid in recovery from stroke gives me reassurance in choosing this type of treatment strategy.

In conclusion, this study elaborates on the implementation of robot-assisted gait training with conventional gait training methods, and the improvements reached more quickly than with conventional methods alone. This study recognizes its limitations, proposing strategies to find ways this type of training may be used to find further improvements in this patient population. From the appraisal of this study, I am confident in the validity and reliability of this article to be able to implement this type of intervention in the clinical setting.