Case Report

iMedPub Journals
www.imedpub.com

Stroke Research & Therapy

2019
Vol.3No.1:1

High Intensity Group Gait Training: Is it Intense Enough?

Lenhart L*and Huckstep A

Shirley Ryan Ability Lab-Homewood Day Rehab, 345 East Superior Street, Chicago, IL-60611, USA

***Corresponding author:** Laura H Lenhart, Physical Therapist, Shirley Ryan Ability Lab-Homewood Day Rehab, Chicago, Illinois, USA, Tel: 712-898-3853; E-mail: llenhart@sralab.org

Citation: Lenhart L, Huckstep A. High Intensity Group Gait Training: Is it Intense Enough? Stroke ResTher. 2019, 3:1.

Received Date: September 25, 2019; **Accepted Date:** October 08, 2019; **Published Date:** October 15, 2019

Abstract

Background and purpose: Research indicates that high intensity gait training promotes walking recovery and neuroplasticity following neurological injury. The aim of this study was to assess the feasibility and effectiveness of implementing intensive gait training using a group model.

Methods: 50 individuals completing outpatient therapy following neurological injury were recruited. All participants had to be able to ambulate for at least 10 min continuously (Goal of 30 min total) without physical assistance from a therapist. These participants were placed in groups of 2-4 with one therapist, and a goal to ambulate at 60-80% maximum heart rate. Heart Rates (HR) and RPEs (Rate of Perceived Exertion) were monitored throughout the session as participants were ambulating.

Results: For all group configurations, average intensities were within the target range. Statistical analysis revealed that for those participants whose HR was monitored, groups of 2 and 3 showed slightly higher averages than those in groups of 1 or 4. For participants whose intensity was monitored *via* RPE, groups of 3 and 4 showed a significantly higher average RPE compared to those in groups of 1-2 (P4>P1 (p=0.025) and P3>P1 (p=0.057).

Discussion and conclusions: For all group sizes, gait training is feasible and effective without sacrificing intensity. Furthermore, for participants who received a minimum of five training sessions, 86% demonstrated improvements of at least 1 MCID in functional outcomes. While one cannot draw direct causation, there does seem to be a benefit of completing training in a group.

Keywords: Hypotension; Rehabiliation; Gait training; Neuroplasticity

Introduction

Research has shown that high-intensity gait training is the best way to promote walking recovery and neuroplasticity following neurological injury. A wide range of studies recommend 60 min of high-intensity stepping/gait at least 5x per week [1-3] . However, the current clinical application of these recommendations is not feasible in many rehab settings. Insurance, staffing, and equipment shortages limit the ability of clinics to implement these research protocols and recommendations. Clinical pilot studies completed in the Neuro Day Rehab setting have shown that high intensity gait training is feasible and effective when provided in a group based model [4] . However, there is no current research/ literature that has objectively examined the level of intensity achieved in a group setting compared to training received in an individual session. This current study looks to evaluate the level of intensity that can be achieved when completing high-intensity gait training in a group

Group therapy, as an intervention format, has been primarily studied in the pediatric and orthopedic realm. Current literature supports the effectiveness of group intervention and proposes that a group model also supports healthy and supportive social interaction [5-8]. In one article, the implementation of group intervention allowed for improved access and decreased wait list time for patient. Currently, literature and research supports individualized high intensity training [6] . However, demands of rehabilitation clinics make this an inefficient model for physical therapists to consistently provide the frequency and length of gait training required for patients to see effective results [4].

Intensity has been measured through a variety of methods including: monitoring of heart rate, measured RPE (rate of perceived exertion), and number of steps. Due to the neurologic injuries of the study's participants, number of steps is less representative of intensity whereas heart rate and RPE correlate more closely to cardiovascular intensity [1-3,9,10].

Methods

Approval for this study was obtained through the Northwestern International Review Board. Individuals attending the Homewood Neuro-Day Rehab program were identified by their primary therapists as appropriate for participation in a gait group model. Inclusion criteria included the following: being able to ambulate at least 10 min on the treadmill or overground with supervision (Contact guard

assistance from harness) without a seated rest break and a minimum goal of 30 min in a session. High-intensity gait training was completed in groups of 2-4 with the goal of working participants to 60-80% of their heart rate max. For those individuals on beta blockers, the Modified RPE scale was used with a goal rating of 6-8/10. The modified RPE was used due the difficulty patients had in understanding the traditional Borg Scale. Exclusion criteria included any patient who was cardiovascularly unstable or started to demonstrate increased compensatory gait strategies that led to pain or fostered pathological gait patterns. Tables one through three provide participants demographics.

Intensity was modulated by changing gait speeds, adding inclines, use of ankle weights, incorporating obstacles, use of weighted vest and therabands, promoting multidirectional walking, and decreasing use of AD when ambulating overground. Individuals participated in both overground and treadmill training with use of harness to ensure safety for those patients deemed appropriate. Groups were mixed with some participants on treadmill and some overground due to the 'non-gait' time required to switch between equipment within a session. Therefore, participants completed all training on a single apparatus each session. Equipment used included treadmills (With and without harness) and overground harness and track system. Group sessions were run by a single therapist with assistance from a therapy aide when available. Therapy aide assisted in setup (i.e. harness donning and walking patients to various equipment) but all intensity modulation was done by the therapist.

Heart Rate was monitored *via* a finger pulse oximeter with a goal of at least five readings per session. Participant's whose intensity was measured *via* RPE were asked for ratings throughout the training session either verbally or with a visual aide for anyone with language or cognitive deficits.

Patients participated in the gait groups on a rolling schedule with varying group configurations each time. Due to a variety of reasons (Including scheduling, insurance, length of stay, patient goals etc.), each patient's total number of group sessions was unique. Patients averaged 30-45 min based on time of setup with 30 min being the minimum threshold to be counted as a completed session (Tables 1-3).

Table 1: Diagnosis of participants.

Diagnosis	Number of participants
Stroke/CVA	33
Brain Injury	9
Spinal Cord Injury	5
Other	3

Table 2: Age of participants.

Age	Number of participants
18-25	2
26-35	3
36-55	18
56-75	23
75+	4

Table 3: Gender of participants.

Gender	Number of diagnosis
Male	34
Female	16

Results

For both RPE and HR, all group configurations averaged within the target range. T-tests were used to determine statistical significance of difference between RPE/HR measurements based on group configurations. Analysis revealed that for those patients whose HR was monitored, groups of 2 and 3 showed slightly higher averages than those in groups of 1 or 4. For patients whose intensity was monitored *via* RPE, groups of 3 and 4 showed a significantly higher average RPE compared to those in groups of 1-2 (P4>P1 (p=0.025) and P3>P1 (p=0.057). For both RPE and HR, patients in a group model demonstrated a higher intensity level than those who were treated individually.

When comparing overground versus treadmill training, individuals whose intensity was tracked *via* RPE demonstrated significantly higher reported intensity when participating in overground training of groups of 2 or more (p=0.000). Of the 50 participants, 27 completed a combination of treadmill and overground training. Of these 27, 15 demonstrated higher intensity (RPE and HR combined) with overground training (55.6%) and 12 demonstrated increased intensity with treadmill training (44.4%). When further divided based on diagnosis (CVA, SCI, and BI), there appeared to be no significant difference between treadmill/overground for achieving intensity. Finally, presence of a physical therapy aide demonstrated significant higher reported intensity (RPE) than those groups who functioned without an aide (p=0.000).

49 out of the 50 patients who participated in the high intensity gait training group demonstrated improvements in at least one outcome measures (10MWT, 6MWT, or BBS) with 32 out of 50 improving by at least 1 MCID/MDC based on literature based norms. When further broken down to look only at patients who received a minimum of five training sessions, 19 out of 22 patients (86%) demonstrated improvements of at least 1MCID [11-13]. Of the three patients who did not make progress consistent with significant MCID change, one was due to cognitive functional decline and two started at gait speeds at the low end of age expected norm minimizing potential for improvements. Of note, outcome measures were assessed retroactively with the pre-test score marked as the test completed closest to the start of the participants time in the gait group and the post-test coinciding with the end of the participants time in the gait group. These

tests were completed both by the research therapists as well as the participant's primary therapist.

Discussion

Gait training in a group model does not appear to sacrifice intensity. In fact, this current study seems to suggest that group based training may actually enhance intensity. While it cannot be considered directly causal, both RPE and HR demonstrate a trend toward increased intensity with group based interventions. As stated in previous research on group based models, there appears to be a positive social component to training in groups [5-8] . This may be related to feelings of camaraderie: "We are all in this together" or friendly competition: "If you can do this, so can I". Further research is needed to determine any specific causal relationships between increased intensity and group models.

Analysis showed a stronger relationship between group based models and intensity for those individuals whose intensity was measured by RPE. This may be due to the higher subjective nature of this measurement compared to heart rate.

There appears to be a definitive benefit to having an aide present to help setup groups. Since the aide did not help with any modulation of intensity, the benefit can likely be attributed to increased training time made possible by decrease in setup time. It should be noted however, that even though intensity was significantly higher for those patients participating in groups setup with an aide present, both conditions achieved target intensity.

Retrospective review of outcome measures for this study's participants showed that for all but one of the 50 participants, everyone demonstrated at least one MCID improvement in either balance or gait outcome measures. For the one participant who demonstrated no change, cognitive changes/ limitations appeared to be primary cause with patient demonstrating difficulty with carryover of instruction.

Oftentimes patient to therapist ratios may be 15:8 making solely individual intervention impossible. Implementation of group-based model allows for an increased number of patients to receive high intensity training. By grouping together higher level patients with a single therapist, individual gait training can be reserved for those patients who require increased physical assistance and setup. Group models appear to be an efficient and effective way to provide gait training to a larger number of individuals.

With the study being completed as part of active client care, the study had some inherent logistical limitations. The study was open to any person, regardless of diagnosis, who was appropriate for gait training. This resulted in a heterogeneous study population. Furthermore, the number of gait sessions completed by a participant was dependent on the participant's attendance at therapy. As is often the case with outpatient therapy, attendance can be highly variable among individuals. It should also be noted, that since study participants were actively receiving therapy, interventions outside of gait training were being received simultaneously. This limits drawing any direct causal relationship between group based gait training and positives changes noted in outcome measures. Equipment for measuring heart rate was limited to a single pulse oximeter with readings taken intermittently throughout the session. Continuous heart rate monitoring, such as with a chest or earlobe monitoring system, would have allowed for more accurate data and a more direct calculation of time spent in the target intensity zone. While it cannot be concluded that group models result in higher average intensities, this study suggests some amount of positive correlation between group models and higher intensities. Further research is warranted to explore and possibly identify any direct causes for this relationship. Informal review of the data suggests that patients with spinal cord injury demonstrate suppressed heart rate response despite higher RPE ratings [14,15] . Further research may be warranted to explore the best ways to modulate and measure intensity in this population.

Conclusion

This initial study shows that high intensity gait training, when implemented in a group format, mirrors the intensity seen with individual training and with similar improvements in functional outcome scores. In fact, there seems to be some evidence for a positive correlation between group models and higher average intensities. With the continually evolving world of insurance and other resource limitations, knowing that intensity is not sacrificed with a group based model, this format offers clinics an effective and feasible option to provide this intervention to a larger number of patients. Further research to determine any direct correlation between group model and high intensity training may be warranted.

Clinical messages

- Completing high intensity gait training in a group model does not appear to sacrifice intensity.
- There appears to be a positive correlation between group based model and increased intensity.
- Group based gait training may be an effective and feasible alternative option to individual gait training.

References

1. Holleran CL, Rodriguez KS, Echauz A, Leech KA, Hornby TG (2015) Potential contributions of training intensity on locomotor performance in individuals with chronic stroke. J Neurol Phys Ther 39: 95-102.
2. Holleran CL, Straube DD, Kinnaird CR, Leddy AL, Hornby TG (2014) Feasibility and potential efficacy of high-intensity stepping training in variable contexts in subacute and chronic stroke. Neurorehabil Neural Repair 28: 643-651.
3. Hornby TG, Straube DS, Kinnaird CR, Holleran CL, Echauz AJ, et al. (2011) Importance of specificity, amount, and intensity of locomotor training to improve ambulatory function in patients poststroke. Top Stroke Rehabil 18: 293-307.

4. Huckstep A, Lenhart L. Bridging clinical research and clinical practice in day rehab: Implementing feasible high intensity gait training in a group format [Scholarly project].
5. Allen KD, Bongiorni D, Bosworth HB, Coffman CJ, Datta SK, et al. (2016) Group versus individual physical therapy for veterans with knee osteoarthritis: Randomized clinical trial. Phys Ther 96 : 597-608.
6. Camden C, Tetreault S, Swaine B (2012) Increasing the use of group interventions in a pediatric rehabilitation program: Perceptions of administrators, therapists, and parents. Phys Occup Ther Pediatr 32: 120-135.
7. Hung W, Pang M (2010) Effects of group-based versus individual-based exercise training on motor performance in children with developmental coordination disorder: A randomized controlled study. J Rehabil Med 42: 122-128.
8. Zanca JM, Natale A, Labarbera J, Schroeder ST, Gassaway J, et al. (2011) Group physical therapy during inpatient rehabilitation for acute spinal cord injury: Findings from the SCI rehab study. Phys Ther 91: 1877-1891.
9. Machac S, Radvansky J, Kolar P, Kriz J (2016) Cardiovascular response to peak voluntary exercise in males with cervical spinal cord injury. J Spinal Cord Med 39: 412-420.
10. Mccrory P (2007) Cardiovascular responses and postexercise hypotension after arm cycling exercise in subjects with spinal cord injury. Yearbook of Sports Medicine. p: 172.
11. Beninato M, Fernandes A, Plummer LS (2014) Minimally clinically important difference of the functional gait assessment in older adults. Phys Ther 94: 1594-1603.
12. Donoghue D, Stokes EK (2009) How much change is true change? The minimal detectable change of the berg balance scale in elderly people. J Rehabil Med 41: 343-346.
13. Perera S, Mody S, Woodman R, Studenski S (2006) Meaningful change and responsiveness in physical performance measures in older adults. J Am Geriatr Soc 54: 743-749.
14. Grigorean V, Sandu A, Popescu M, Lacobini M, Syoian R, et al. (2009) Cardiac dysfunctions following spinal cord injury. J Med Life 2: 133-145.
15. Outermans JC, Peppen RP, Wittink H, Takken T, Kwakkel G (2010) Effects of a high-intensity task-oriented training on gait performance early after stroke: A pilot study. Clin Rehabil 24: 979-987.