

Effect of additional use of shoe raise on unaffected side along with motor relearning programme (mrp) on ambulation in chronic hemiplegics: A Hypothesis

Gajanan Bhalerao¹, Dhanashre Parab¹

¹Department of Neuro-Physiotherapy, Sancheti Healthcare Academy, Pune Maharashtra.

Institute at which research was conducted: Sancheti

Institute of Orthopaedics and Rehabilitation.

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Address of Correspondence

Dr. Gajanan Bhalerao,

Department of Neuro-Physiotherapy, Sancheti Healthcare

Academy, Sancheti Institute College of Physiotherapy, 12,

Thube Park, Shivaji Nagar, Pune - 411005, Maharashtra.

Email: gajanan_bhalerao@yahoo.com



Dr. Gajanan Bhalerao



Dr. Dhanashre Parab

Abstract

Background: Ambulation is a complex movement pattern which relates to one's ability to transport oneself in the environment, both on a small (i.e., household) and large (i.e., community) scale. Patients who have had a cerebrovascular accident (CVA) present with disruptions to many physiologic systems, leading to multiple disabilities out of which walking is most commonly affected. About 52% to 85% of hemiplegics regain the capacity to walk, but their gait differs from that of the healthy subjects. Hemiplegic gait is characterised by gait deviations and alterations in gait parameters. Motor Relearning Programme (MRP) is a safe and evidence based treatment technique which can be used to improve hemiplegic gait cycle. Increasing the length of unaffected leg by shoe-raise of 1 cm will help in foot clearance of affected leg. In -turn reducing the effort of walking and the circumduction pattern of gait Hence, to find out the use of shoe raise on uninvolved leg along with motor relearning program to improve gait parameters and gait deviations of the affected gait cycle, is a need of time in neuro rehabilitation. Present study is a Randomised Single Blinded Control Trial enrolling 30 (15 per group) chronic stroke patients subjected to Motor Relearning Programme (MRP) (Group A) and combination of MRP and shoe raise on uninvolved leg (Group B) for 1 hr/day for 6 days/wk for a period of four weeks.

Hypothesis: It is hypothesised that combined use of shoe raise on uninvolved leg with MRP is more effective in improving the gait parameters and reducing gait deviations compared to MRP alone.

Clinical Importance: Use of shoe raise in gait training will be helpful in reducing the difficulty of foot clearance, more energy expenditure and assist in symmetrical weight bearing. So use of shoes raise can be a good adjunct in initial period of gait training.

Future direction: Along with the gait parameters there is a need for studying the effects of combination of shoe raise of 1 cm on uninvolved leg with MRP on kinematic parameters post-stroke.

Keywords: Shoe-raise, motor relearning programme, hemiplegia, ambulation.

THESIS SUMMARY

Introduction

Ambulation is a complex movement pattern which relates to one's ability to transport oneself in the environment, both on a small (i.e., household) and large (i.e., community) scale. [1,2] Patients who have had a cerebrovascular accident (CVA) present with disruptions to many physiologic systems, leading to multiple disabilities out of which walking is most commonly affected. About 52% to 85% of

hemiplegics regain the capacity to walk, but their gait differs from that of the healthy subjects [3]. Hemiplegic gait is characterised by gait deviations and alterations in gait parameters. The parameters which are affected are reduced gait velocity, step length, stride length and cadence [4]. The stroke patients present with lower extremity extensor synergy with equinovarus positioning of foot and ankle complex, sustained knee and hip extension, pelvic retraction and

reduced weight bearing symmetry on involved side. Owing to the above mentioned factors the patient is not able to do the required hip-knee-ankle flexion while walking; this leads to the lengthening of affected lower extremity. Thus giving rise to a circumduction gait[5,6]. Based on Dynamic System's theory of Motor Control concepts, different task specific training approaches for Stroke have evolved such as Motor Relearning Program (MRP), Sensory Integration, Robotic Therapy, Mental Imagery, Virtual Reality, and Body Weight Supported Treadmill Training and Neuro-developmental Treatment. Despite the evolution of these task specific approaches, in India many physical therapists tend to commonly practice and teach the traditional approaches like Rood's Approach; Brunnstrom Approach, Proprioceptive Neuromuscular Facilitatory Techniques(PNF), Bobath Approach and strength training[7]. Current rehabilitation approaches in stroke rehabilitation are shifting trends and task specific training is gaining importance amongst the neuro-physical therapists. Studies have been conducted to show that MRP shows significant improvement in functional recovery, ambulation and motor function, balance and quality of life usually in acute and sub-acute stroke patients[8,9,10]. Aruin et al studied the immediate effect of shoe lifts on static balance and weight bearing symmetry, ranging from 0.6 to 1.2 cm with more symmetrical weight distribution with increase in the size of lifts[11]. Compelled Body Weight Shift Therapy (CBWST) is defined as prolonged lift of the unaffected lower extremity through the use of shoe insert which forces loading of bodyweight towards the affected lower extremity during treatment and daily activities, thus helping in overcoming learned disuse of affected lower limb. Jeba Chitra et al evaluated the effect of CBWST along with conventional physiotherapy for 2 weeks on weight bearing symmetry and on the Berg Balance Scale components in post stroke patients[15]. There is a dearth of literature about the long term effects of using shoe raise on uninvolved leg on gait parameters and gait deviations in stroke subjects. Hence, to find out the use of shoe raise on uninvolved leg along with motor relearning program to improve gait parameters and gait deviations of the affected gait cycle, is a need of time in neuro rehabilitation.

Hypothesis

MRP is a therapeutic approach which was developed based on Motor learning theory by Card and Shepherd. To enhance the relearning post-stroke, the motor task involved is practiced within a context that can be a task or environment specific with active participation of subjects[16]. Additionally by increasing the length of uninvolved lower extremity with shoe raise of 1 cm will help to reduce the effort of walking by mechanically correcting joint position and limb length discrepancy, thus promoting foot clearance of affected lower extremity[15]. Thus, it becomes necessary to introduce and evaluate the combined effect of MRP and shoe raise on uninvolved leg on Hemiplegic gait. Hence, it is hypothesised that effect of use of shoe raise on uninvolved leg along with MRP is more effective in improving the gait parameters and gait deviations compared to MRP alone. The present study is a Randomised Control Trial. Thirty stroke patients will be recruited from Tertiary Health Care Centre located in Pune, India. The participants will be screened using the following inclusion criteria: chronic patients with first time stroke, both male and female, FAC score more than 2, ambulatory with or without device for at least 10 meters, with or without AFO

or cane or any such orthosis. Patients with unstable medical conditions, history of other neurological diseases and fixed contracture or deformities will be excluded from the study. Patients will be randomly allocated in two group using block randomization. Group A, 15 subjects will receive Motor Relearning Programme (MRP) (Carr and Shepherd, 1987) and Group B, 15 subjects will receive MRP along shoe raise of 1 cm on uninvolved leg. Both the groups will receive treatment for 1 hr/day for 6 days/wk for a period of four weeks. All the procedure was approved by the Institutional Ethics Committee on Human Research and conducted in conformity with ethical and principles of research. Pre and post the treatment protocol the subjects will be assessed for gait parameters such as step length, stride length, speed, cadence, angle of toe-out using foot-print method, additionally gait deviations will also be assessed using Rivermaid Visual Gait Analysis (RVGA) Scale[17,18].

Group A:

The patients in this group will receive MRP.

There are 4 steps in MRP.

1. Identification of missing performance components
2. Training of missing components
3. Practice of walking
4. Transfer of skills to functional task performance

Group B:

Shoe raise of 1cm on uninvolved leg while ambulating with or without assistive device along with MRP will be given to all subjects in this group. The patients will also wear the shoe raise daily during all the activities of daily living. Shoe to be used in the experiment will be a pair of floaters. A raise with height of 1 cm will be prepared according to the shoe base shape. All the cutting, pasting work will be done at workshop for prosthesis and orthotics at Sancheti hospital.

Paired t- test shall be used for intra-group assessment of gait parameters. Unpaired t- test shall be used for inter-group assessment of gait parameters. Mann Whitney U Test shall be used for intra-group assessment of the gait deviations using the RVGA scale. Wilcoxon matched pair shall be used for intra-group assessment of the gait deviations using the RVGA scale.

Discussion

Gait problem is evident in most of stroke patients, often making them dependent in their day to day activities[1,2,3]. Previous studies concluded that MRP shows significant improvement in functional recovery, ambulation and motor function, balance and quality of life usually in acute and sub-acute stroke patients. Thus MRP is a safe and evidence based treatment technique which can be used to improve hemiplegic gait cycle[16]. Aruin et al studied the immediate effect of shoe lifts on static balance and weight bearing symmetry, ranging from 0.6 to 1.2 cm with more symmetrical weight distribution with increase in the size of lifts[11]. Compelled Body Weight Shift Therapy (CBWST) is defined as prolonged lift of the unaffected lower extremity through the use of shoe insert which forces loading of bodyweight towards the affected lower extremity during treatment and daily activities, thus helping in overcoming learned disuse of affected lower limb. Jeba Chitra et al evaluated the effect of CBWST along with conventional physiotherapy for 2 weeks

on weight bearing symmetry and on the Berg Balance Scale components in post stroke patients[15]. This weight shift on affected side during walking will improve the motor control in stance phase. The subjects with hemiplegia will bear equal weight on bilateral lower extremities which will correct the asymmetry and improve balance. Due to extensor synergy seen in affected leg the stroke participants are not able to perform desired hip-knee-ankle flexion while walking, leading to lengthening of affected leg during swing phase. Thus while walking the subjects perform various gait deviations in order to achieve foot clearance of affected leg, i.e. circumduction. Treatment of this can be, improving the hip and knee control in swing phase or increasing the length of unaffected leg by shoe-raise of 1 cm helping in foot clearance of affected leg. In-turn reducing the effort of walking and circumduction pattern of gait[5]. Hence, the study hypothesis states that the combination of shoe raise on uninvolved leg along with motor relearning programme will improve the gait parameters and reduce the gait deviations of the affected gait cycle.

Clinical Importance

Use of shoe raise in gait training will be helpful in reducing the difficulty of foot clearance, more energy expenditure and assist in symmetrical weight bearing. So use of shoes raise can be good adjunct in initial period of gait training.

Future Direction

Along with the gait parameters there is a need for studying the effects of combination of shoe raise of 1 cm on uninvolved leg with MRP on kinematic parameters post-stroke.

Bibliography

1. Duck-Woh Oh, *Int J Phys Med Rehabil Community Ambulation: Clinical Criteria for Therapists' Reasoning and Decision-making in Stroke Rehabilitation* 2013, 1:4.
2. Perry J, Garret M, Gronley JK, Mulroy ST *Classification of walking handicap in stroke population Stoke, 1995, June; 26(6): 982-989.*
3. Burdett RG, Borello France D, Blatchy C, Poptter C. *Gait comparison off subjects with hemiplegia walking unbraced with ankle foot orthosis and air-stirup brace, Phys Ther* 1988; 68.
4. Hendriks HT, Vav Limber J, Geurs AC, Zwarts MJ *Motor recovery after stroke, Archives Physical Medicine and Rehabilitation; 83:1629-37.*
5. Susan Ryeuron *Functional Movement and re-education, second edition; 441-442.*
6. Patricia M Dawies *Right in the middle, Selective trunk activity in treatment of adult hemiplegia, 2003; Springer, 33, 34, 53, 54, 169-193.*
7. Davidson I, Waters K *Physiotherapists working with stroke patients: A national survey Physiotherapy* 86 269-8.
8. Langhammer B, Stanghella JK *Bobath or Motor Relearning Programme? A comparison of two different approaches of physiotherapy in stroke rehabilitation: a randomized controlled study, Clinical Rehabilitation* 2000;14:361-369.
9. Langhammer B, Stanghella JK. *Bobath or Motor Relearning Programme? A follow-up one and four years post stroke Clinical Rehabilitation, 2003; 17.*
10. Bhalerao G, Kulkarni V, Doshi C, Rairikar S, Shyam A, Sancheti P. *Comparison of MRP vs Bobath Approach at every 2 weeks interval for improving Activities of daily living and Ambulation in Stroke Rehabilitation, Int J of Basic and Applied Medical Sciences* 2013;3:3.
11. Aruin AS, Hanke T, Chaudhari G, Harvey R, Rao N *Compelled weight bearing in persons with hemiparesis following stroke :The effect of a lift insert and goal directed balance exercises, J of Rehabilitation Research and Development; 37:1.*
12. Rodriguer GM, Aruin AS. *The effect of shoe wedges and lifts on symmetry of stance and weight bearing in hemiparetic individuals, Arch Phys Med Rehabil* 2002;83.
13. Mohapatra S, Evioto AC, Ringquist KL, Muthukrishnan SR, Aruin A. *Compelled Body Weight Shift Technique to facilitate rehabilitation of individuals with acute stroke, Int Scholarly Research Network Rehabil* 2012;10.
14. Chaudhari S, Aruin SA. *The effect of shoe lifts on static and dynamic postural control in individuals with hemiparesis, Arch Phys Med Rehabil* 2000;81.
15. Jeba C, Mishra S. *Effect of Compelled Body Weight Shift Technique on weight bearing symmetry and balance in post stroke patients: An experimental Pre-Post study, Int J Physiother* 2014;2:6.
16. Carr JH, Shepherd RB. *A Motor Relearning*

Programme for stroke, Aspen Publishers, 2nd edition 1987.

17. Zverev Y, Adeloje A, Chisi J. Quantitative analysis of gait pattern in hemiplegic patients, *East African Medical Journal* 2002;79:8

18. Lord SE, Halligan PW, Wade DT. *Visual gait analysis: the development of a clinical assessment and scale*, *Clinical Rehabilitation* 1998;12.

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