Walking ability in stroke patients using knee gaiter and suspended walker for gait training

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ABSTRACT

Background and Objective: The objective of this study is to assess the walking ability of a stroke patient using knee gaiter and suspended walker. Methodology: Thirty participants with first acute stroke within first 3 months with the mean age of 55.73 years participated and were allocated randomly into two groups. Participants were taken from Inpatient Department of Medicine of Shree Krishna Hospital, Karamsad and Physiotherapy Department of Shree Krishna Hospital, Karamsad. Both the groups received conventional physiotherapy for 3 weeks. Group A was administered knee gaiter, and Group B was allocated suspended walker. Outcomes/scales were measured in terms of 10-meter walk test (10MWT), 3-min walk test (3MWT), and dynamic gait index (DGI). Results: After the treatment, both the groups showed significant improvement (P < 0.001) in 3MWT, 10MWT, and DGI scores, but Group A shows additional beneficial effect on 3MWT (P = 0.023) and 10MWT (P = 0.754) with using t-test and no significant improvement in all the components of the DGI except step component with using the Mann–Whitney test. Conclusions: The findings support the hypothesis that knee gaiter has better gait outcome as compared to suspended walker in stroke patients.

Keywords: Knee gaiter, stroke, suspension walker

Introduction

Stroke may compel the person to lead bed-bound life, and inability or difficulty in walking may lead to decreased self-image and thereby increased burden to family and society. The walking ability becomes the utmost important to prevent various complications and to maintain self-esteem in their life. Hence, walking is a common and important goal after stroke.[1]

Decreased endurance also contributes to compromise functional walking after stroke.[2] It has been demonstrated that stroke survivors are not physically fit, and this affects their functional abilities.[3] If interventions for those poststrokes are to include early mobilization and endurance training, a clinical measure of fitness is necessary. A well-planned, coordinated strategy toward stroke rehabilitation is bound to yield good results.[4]

There was no evidence to evaluate the effects of gait training with partial body-weight support (BWS) during overground walking. Previous studies concerning BWS during overground walking investigated changes in gait patterns but not its training effects.[5-7] Therefore, the purpose of this study was to investigate the effects of gait training on ground level with partial BWS on temporal-spatial parameters and on lower limb and trunk segmental angles of individuals with acute stroke during overground walking without BWS.

Knowing the importance of various walking aids that can be provided, but the major problem in any developing country like India is that during the past four decades, several orthotic devices have been developed to allow some patients to stand and walk with the use of walking aids.[8] Even if one agrees in theory that everyone should be given a chance to walk, the high cost of orthosis remains a barrier.[9]

Knee immobilizers (gaiters) are used which are much cost effective than other orthosis. Moreover, it is the primary source

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Objective

The objective of this study is to compare the walking ability of a stroke patient between knee gaiter and suspended walker.

Methodology

A cross-sectional quantitative research had been approved by the ethical committee of our institute. Participants were randomly allocated into two groups, Group A (knee gaiter) and Group B (suspended walker). After randomization, both the groups were assessed on day 1 as per the neurological examination format. Three-min walk test (3MWT), 10-meter walk test (10MWT), and dynamic gait index (DGI) were administered.

A structured, custom-made physiotherapy program was planned and implemented for both the groups. Both the Group A (experimental group) and Group B (control group) were received physiotherapy treatment 1 time in a day for 3 weeks. Physiotherapy treatment and gait training as per the grouping will be given for 5 days/weeks for consecutive 3 weeks. At the end of study, the patient will be reassessed to note the changes.

Results

All 30 participants divided into two equal groups with the mean age of 55 years were included in the study completed 3 weeks of intervention.

The mean score was 103.27 ± 52.780 in Group A whereas that of Group B was 63.60 ± 35.587. To compare the score between two groups, unpaired t-test was applied and its P value was obtained. Statistically significant difference was found between these two groups (P = 0.023) [Table 1].

The mean score was 32.40 ± 19.79 in Group A whereas that of Group B was 29.60 ± 28.05. To compare the score between two groups, unpaired t-test was applied and its P value was obtained. No statistically significant difference was found between these two groups (P = 0.754) [Table 2].

To compare the score between two groups, Mann–Whitney test was applied and its P value was obtained. There was no significant improvement in all eight components of DGI, but there was mild significant improvement in step component (P > 0.005) [Table 3].

Discussion

There is a range of clinical tests available to assess walking after stroke, many of which have good psychometric properties and assess wider aspect of gait thought to relate to walking in community environments. In the present study, total 30 participants with first stroke were included in the study. Fifteen persons were in experimental group who had received treatment in stroke patients using knee gaiter while other 15 persons in control group had received suspended walker for gait training. Sample of the present study consisted 6 females and 24 males; Group A consisted 2 females and 13 males. Group B consisted 4 females and 11 males [Graph 1]. In the present study, age group participated in each group between 21 and 70 years.

In Group A (experimental group), the mean age is 55.73 years, and in Group B (control group), the mean age is 55.93 years. In the present study, more number of patients were having hemorrhagic stroke compared to ischemic stroke with ratio of ischemic to hemorrhagic is 1:2.

In the present study, 11 participants out of total 30, who participated in the study, were having involvement of
nondominant side of the brain; among them, 7 belong to experimental group.

**Three-minute walk test**

When comparing the change in the scores of outcome measure between two groups, improvement in mean score was $103.27 \pm 52.78$ in Group A and was $63.60 \pm 35.58$ in Group B, and $P$ value is 0.023 which is statistically significant.

A significant difference has been found in 3MWT in Group A in which participants were administered knee gaiter compared to result of 3MWT in Group B who were allocated suspension walker. Few of the factors which can be considered which may affect the result are higher durability, cost-effectiveness, easy availability, psychological well-being, and easy donning and doffing of knee gaiter compared to suspension. From point of view of therapist, it is time consuming and becomes tedious job.

**10 meter walk test**

Between the group analyses, improvement in mean score was $32.40 \pm 19.79$ in Group A and was $29.60 \pm 28.05$ in Group B, and $P$ value is 0.754 which is statistically not significant. There is no improvement in 10MWT between Group A and Group B as exercise program that was administered was may be of short duration course.

**Dynamic gait index**

According to all components of mean value, there was minimum significant improvement in step component. DGI showed significant improvement in Group A compared to Group B in step component. Ascending and descending stairs become easier with knee gaiter as compared to suspension walker which is cumbersome to use.

One of the study showed that individuals with chronic stroke equally improve gait speed and other gait parameters after 18 sessions of BWS gait training on either a treadmill or overground. Only the overground group improved step length in stroke patients. Based on the findings from this study, it is recommended that the use of a knee immobilizer brace in combination with a foot lifter orthosis for postsroke hemiplegic patients in early ambulation can lead to considerably improved standing balance. The current study showed the situation compels use of hypothesis that the result needs additional interpretation. It is responsible to put a patient on routine physiotherapy measures with including knee gaiter. So far, little is known about the walking ability with knee gaiter and suspended walker. It is difficult to assess the walking ability with knee gaiter and suspended walker as the result will be variable according to the patient’s type and duration of the study. It is understood that no comparison is done in the earlier studies. Hence, this study becomes a significant initiation toward establishing the basic guidelines in the acute stroke with knee gaiter.

As very few studies have been done to study the effectiveness of knee gaiter on gait training in stroke condition as compared to suspended walker, this study can be a major contribution in showing efficacy of knee gaiter in early ambulation of stroke patients.

**Conclusion**

Improvement in gait symmetry was observed in both groups, However with knee gaiter minimum improvement in Three minute walk test was seen as compared to suspended walker. Sample size and study duration should be carefully considered in generalizing the results to other population.

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**Conflicts of interest**

There are no conflicts of interest.

**References**

1. Jørgensen HS, Nakayama H, Pedersen PM, Kammersgaard L, Raaschou HO, Olsen TK. Epidemiology of stroke-related disability. Clin Geriatr Med 1999;15:785-99.
2. Cash by J.P. brothers. Clinical aspect of stroke. 4th ed., 1993. p. 243-4.
3. Banerjee TK, Kumar Das S. Review article epidemiology of stroke in India. India Neurol Asia 2006;11:1-4.
4. Jørgensen HS, Nakayama H, Pedersen PM, Kammersgaard L, Raaschou HO, Olsen TS. Epidemiology of stroke-related disability. Clin Geriatr Med 1999;15:785-99.
5. Wade DT, Wood VA, Heller A, Maggs J, Langton Hewer R. Walking after stroke. Measurement and recovery over the first 3 months. Scand J Rehabil Med 1987;19:25-30.
6. Potempa K, Lopez M, Braun LT, Szidon JP, Fogg L, Tincknell T, et al. Physiological outcomes of aerobic exercise training in hemiparetic stroke patients. Stroke 1995;26:101-5.
7. Nair KP, Taly AB. Stroke rehabilitation: Traditional and modern approaches. Neurol India 2002;50:85-93.
8. Hayes SH, Carroll SR. Early intervention care in the acute stroke patient. Arch Phys Med Rehabil 1986;67:319-21.
9. Lamontagne A, Fung J. Faster is better: Implications for speed-intensive gait training after stroke. Stroke 2004;35:2543-8.
10. Shepherd R, Carr J. Treadmill walking in neurorehabilitation. Neurorehabil Neural Repair 1999;13:171-3.
11. Sousa CO, Barela JA, Prado-Medeiros CL, Salvini TF, Barela AM. Gait training with partial body weight support during overground walking for individuals with chronic stroke: A pilot study. J Neuroeng Rehabil 2011;8:48.
12. Gama GL, Celestino ML, Barela JA, Forrester L, Whitall J, Barela AM. Effects of gait training with body weight support on a treadmill versus over ground in individuals with stroke. Arch Phys Med Rehabil J 2017;98:738-45.
13. Talu B, Bazancir Z. The effect of different ankle and knee supports on balance in early ambulation of post-stroke hemiplegic patients. J Neurol Sci 2017;38:1811-6.
14. Carse B, Bowers R, Meadows BC, Rowe P. The immediate effects of fitting and tuning solid ankle-foot orthoses in early stroke rehabilitation. Prosthet Orthot Int 2015;39:454-62.