

Case Report

Effectiveness of dynamic balance training on balance and physical function in alcoholic neuropathy: a case report

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ABSTRACT

Alcoholic neuropathy is a common complication of chronic alcohol consumption characterized by peripheral nerve damage, resulting in impaired sensation, muscle weakness, poor balance, and reduced functional ability. These impairments increase the risk of falls and negatively affect daily activities. Dynamic balance training has been shown to improve postural stability and neuromuscular control in individuals with balance deficits. This study was conducted to evaluate the effectiveness of dynamic balance training in improving balance and functional ability in individual with alcoholic neuropathy. The aim of the study is to evaluate the effectiveness of dynamic balance training on balance and physical function in patient with alcoholic neuropathy. This study involved a man of 64 year diagnosed with alcoholic neuropathy, selected based on predefined inclusion and exclusion criteria. A pre-test assessment was conducted on balance and functional ability and were assessed using Berg Balance Scale and Physical Performance Test. The intervention focused on progressively challenging balance activities aimed at enhancing postural control and functional mobility. Dynamic balance training program was given for 6 weeks, consisting of 5 sessions per week, with each session including 3 sets of 10 repetitions of balance exercises. Following the intervention, post-test assessment was also carried out using the same outcome measures. Following the six weeks of intervention, the participant demonstrated improvements in balance performance and functional ability following the dynamic balance training program. Enhanced postural stability and mobility were observed, indicating a reduction in balance-related impairments. Dynamic Balance Training improved balance and physical function in patient with alcoholic neuropathy following a 6-week intervention.

Keywords: Alcoholic neuropathy, Dynamic balance training, Balance, Functional ability, Physiotherapy, Rehabilitation

INTRODUCTION

Alcoholic neuropathy is one of the most prevalent and debilitating neurological complications of chronic, excessive alcohol consumption, affecting an estimated 25% to 66% of individuals with chronic alcohol use disorder. The pathogenesis of this condition is multifactorial, resulting from the cumulative effects of direct ethanol-induced neurotoxicity and secondary

nutritional deficiencies most notably a critical lack of thiamine (vitamin B1) and cobalamin (vitamin B12). This dual mechanism causes progressive, structural damage to peripheral nerves, disrupting normal nerve conduction and axonal transport, which ultimately culminates in widespread sensory and motor dysfunction.¹

Clinically, this nerve impairment manifests in a length-dependent, symmetrical pattern that predominantly targets

the lower extremities. Patients frequently experience debilitating symptoms, including numbness, paresthesia, neuropathic pain, progressive muscle weakness, diminished deep tendon reflexes, and severe deficits in proprioception. This loss of sensory feedback, compounded by lower-limb weakness, profoundly compromises postural control. Consequently, individuals suffer from marked balance instability and gait abnormalities during standing and walking, which exponentially elevates their risk of falls and restricts their capacity to perform basic activities of daily living.²

While primary medical management fundamentally relies on absolute alcohol abstinence and aggressive nutritional supplementation to halt disease progression, targeted rehabilitation is essential to restore lost physical function. Physiotherapy plays a crucial role in addressing these mobility limitations; however, high-quality clinical evidence evaluating the efficacy of specific balance training interventions in this population remains remarkably scarce. Most existing protocols rely on general physical conditioning rather than targeted neuromuscular retraining. Therefore, the present study was undertaken to evaluate the effectiveness of a structured dynamic balance

training program on postural stability and functional ability in individuals with alcoholic neuropathy, aiming to provide an evidence-based framework for clinical rehabilitation.³

CASE REPORT

This case report was conducted to evaluate the effectiveness of dynamic balance training in individual with alcoholic neuropathy. Participant was selected using a convenience sampling method based on predefined inclusion and exclusion criteria. After obtaining informed consent, baseline assessments of balance and functional ability were performed using the Berg Balance Scale (BBS)⁴ and Physical Performance Test (PPT).⁵

Participant then underwent a dynamic balance training program for 6 weeks, consisting of 5 sessions per week, with each session including 3 sets of 10 repetitions of balance exercises. Following completion of the intervention, participants were reassessed using the same outcome measures to determine changes in balance and functional performance.

Table 1: Exercise regimen of dynamic balance training.

Treatment	Dosage
Single leg stance on foam surfaces	
Procedure: The patient performs single leg standing while the supporting foot is placed on a foam pad or balance cushion to create an unstable surface. The opposite foot is lifted off the ground, and the patient maintains an upright posture while holding the position for 20–30 seconds. This variation increases proprioceptive challenge and requires greater postural control. Repeat on both sides.	2 to 3 times daily, 10 reps each for 20 seconds, 6 session per week.
Dynamic reach task	
Procedure: The patient stands on one leg or with feet shoulder-width apart and reaches forward, sideways, or diagonally with one arm toward designated targets placed at varying distances and directions. The movement should be controlled, with the trunk stable and balance maintained throughout the reach. The patient returns to the starting position after each reach and repeats several times in different directions.	2 to 3 times daily, 5 reps each in all directions, 6 session per week.
Obstacle walking	
Procedure: The patient walks at a comfortable and steady pace along a pathway where cones, blocks, or low hurdles are arranged. The task involves stepping over or around the obstacles without touching them, ensuring adequate foot clearance and maintaining balance. Emphasis is placed on controlled steps, proper posture, and safe navigation through the obstacles.	4 to 5 times daily, 20 steps, 6 session per week.
Side walking	
Procedure: The patient stands upright and takes lateral steps to one side, keeping the trunk straight and feet pointing forward. The stepping foot moves first, followed by the trailing foot, maintaining consistent spacing between the feet. After several steps in one direction, the patient repeats the movement in the opposite direction.	4 to 5 times daily, 20 steps, 6 session per week.



Figure 1: Single leg stance on foam surface.



Figure 2: Dynamic reach task.

DISCUSSION

The present case report evaluated the effect of dynamic balance training on balance and physical function in a patient with alcoholic neuropathy. Following the intervention, improvement was observed in both the Berg Balance Scale (BBS) and Physical Performance Test (PPT) scores. These findings suggest that the intervention may have contributed to improved postural control, balance, mobility, and functional performance in the present patient.

Alcoholic neuropathy can involve sensory impairment, muscle weakness, impaired proprioception, reduced coordination, and gait disturbance, which may negatively affect postural stability and functional mobility. Therefore, the improvement observed in the present case may be interpreted in relation to the specific demands of dynamic balance training. Alcohol-related neuropathy is also associated with impaired proprioception and gait instability, supporting the clinical relevance of balance-focused rehabilitation in this population. Streckmann et al in a systematic review and meta-analysis, reported that

exercise interventions can improve balance-related outcomes, including BBS performance, although the strongest evidence was available for diabetic and chemotherapy-induced peripheral neuropathies rather than alcoholic neuropathy.⁶

The improvement in the BBS score indicates better performance in activities requiring static and dynamic postural control. This finding is consistent with previous research in individuals with peripheral neuropathy. Similarly, a systematic review by Menz et al reported that balance exercise produced beneficial effects on motor and sensory symptoms in patients with peripheral neuropathy. These findings support the improvement in balance observed in the present case, while the difference in neuropathy etiology should be considered when comparing the results.⁷

The findings are also comparable with a study by Limaye and Patil, which specifically investigated exercise intervention in patients with alcoholic neuropathy. Their study included 34 patients with alcoholic neuropathy who received a four-week Otago Exercise Program consisting of lower-limb strengthening, balance exercises, and endurance training. Significant improvement in Tinetti Performance-Oriented Mobility Assessment scores was reported following the intervention. Although their intervention and outcome measure differed from those used in the present case, both studies demonstrated improvement in balance-related functional outcomes following structured exercise training in patients with alcoholic neuropathy. This similarity provides condition-specific support for the present findings.⁸

The improvement in the PPT score suggests that the benefits of the intervention extended beyond balance performance to physical and functional activities. This may be explained by the task-oriented nature of the training, as several exercises required repeated performance of movements similar to everyday functional activities. Furthermore, a pilot study involving patients with chronic sensory ataxic neuropathy reported improvements in BBS and functional measures following a three-week balance and treadmill exercise programme. These findings are comparable with the improvement in both balance and physical performance observed in the present case.⁹

The improvement observed in the present patient should therefore be interpreted as a positive functional response to the intervention rather than as evidence that dynamic balance training alone caused the changes. As this was a single-case report, spontaneous recovery, changes in activity levels, medical management, nutritional status, or other factors may also have contributed to the observed improvement. In addition, previous research on exercise for neuropathy has included different neuropathy etiologies, intervention protocols, and outcome measures, limiting direct comparison with the present case.¹⁰

Overall, the present case demonstrated improvement in both BBS and PPT scores following dynamic balance training. The findings are consistent with previous evidence showing beneficial effects of balance and exercise-based rehabilitation on balance and functional outcomes in peripheral neuropathies, and they are also comparable with the limited condition-specific evidence available in alcoholic neuropathy. Larger controlled studies are required to determine the effectiveness of dynamic balance training and to establish appropriate intervention protocols for this population.¹¹

CONCLUSION

The findings of this study demonstrate that dynamic balance training is an effective intervention for improving balance and physical function. By targeting postural stability during movement, this approach helps patients with neurological deficits regain functional independence, overcome activity limitations, and ultimately move through the world with greater confidence.

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