



EFFECT OF SINGLE TASK CROSS TRAINING TO REDUCE THE FEAR OF FALL IN NON –TRAUMATIC SPINAL CORD INJURY PATIENT – A CASE STUDY

Neurophysiotherapy

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ABSTRACT

Background: Spinal cord injuries disrupt sensory, motor, and autonomic functions, often from trauma or infection. Incomplete damage allows potential recovery, focusing on critical functions like gait and trunk stability. Orthoses enable ambulation, but fear of falls hinders mobility. To address this, complex treatments covering simple and intricate tasks aim to reduce the fear and enhance overall functionality. **Method:** A 30 years old female came with chief complaint of unable to stand and walk independently since 4 years. She underwent posterior decompression at D12-L1 in 2019 as she was diagnosed with D12-L1 infective Spondylodiscitis with right Psoas abscess in 2018. On physiotherapy assessment motor score for both lower limb was 3/5. According to ASIA scale her Neurological level is L2 with AISAC (incomplete). Single task obstacle cross training on even surface and on slop was given for 5days/week for 4 weeks along with conventional treatment **Results:** The Fall Efficacy scale international score improved from 58/64 pre- treatment to 38/64 post-treatment, while the Spinal Cord Independence Measure increased from 78/100 pre- treatment to 86/100 post-treatment. **Conclusion:** The study concluded that in patient, obstacle cross-training has lowered the fear of falling and promoted increased independence.

KEYWORDS

Spinal cord injury, Obstacle cross training, fear of fall, fall efficacy scale international, spinal cord independence measure.

INTRODUCTION

SCI, whether caused by trauma or non-traumatic factors, alters life profoundly, impacting sensory, motor, and autonomic functions. Rehabilitation is crucial for mobility enhancement and independence. In India, about 0.15 million people are affected by SCI, with an annual incidence of 15,000.

At the cervical level, SCI distressingly impairs arm and hand function, affecting independence. Incomplete SCI from trauma or infection may allow recovery of vital functions like gait. Walking and trunk stability are top priorities for functional recovery across SCI levels. Low-level paraplegia individuals can achieve ambulation with Knee-Ankle-Foot Orthoses (KAFO), facilitating access to confined spaces.

Falls are common post-SCI, especially among ambulatory patients, impacting work, parenting, and daily activities. Factors like muscle weakness, balance deficits, and environmental conditions contribute. Overcoming the fear of falling is challenging for clinicians, necessitating estimation for tailored rehabilitation.

The fear of falling leads to mobility restrictions, hindering life role participation, impacting well-being, and diminishing the quality of life for SCI patients. Clinicians adapt programs, incorporating lower limb loading training and dual-task obstacle cross training to enhance mobility, safety, and cognitive activity in ambulatory SCI individuals. Limited studies suggest that obstacle cross training reduces the fear of falling, emphasizing the need for further research in promoting safe ambulation

METHODS

A 30-year-old mesomorphic female, employed as a housewife, presented at Pravara Rural Hospital, Loni, Ahmednagar, with a chief complaint of being unable to stand and walk independently for the past 4 years. The onset traces back to a fall during her 6th month of pregnancy in March 2018, leading to back pain. Despite a normal delivery, she experienced tingling, numbness, and a progressive mid-back swelling in October 2018. Diagnosed with D12-L1 infective Spondylodiscitis and right Psoas abscess, she underwent delayed surgery due to adverse reactions to AKT treatment. In January 2019, she had posterior decompression at D12-L1 and subsequent physiotherapy.

Following a year of physiotherapy in Vasai, Mumbai, interrupted by the COVID-19 pandemic, she switched to another Ahmednagar hospital for 3 months, eventually discontinuing due to personal reasons. After home exercises, she sought further physiotherapy at Pravara Rural Hospital. The assessment revealed normal higher mental functions, cranial nerves, and muscle tone. Deep tendon reflexes were 2+ for both upper and lower limbs. ASIA assessment indicated a motor score of 5/5 for both upper limbs, 3/5 for the right

lower limb, and 3/5 for the left lower limb. Deep anal pressure and voluntary anal contraction were present. While upper limb coordination was normal, lower limb coordination couldn't be assessed. The patient walks with a KAFO and elbow crutch, displaying altered range of motion in the right lower limb. Standing balance couldn't be evaluated.

Diagnosis:-

Based on symptoms my patient who is 30 years old female is a case of non- traumatic incomplete spinal cord injury at level L2 with ASIA – C.

Intervention:-

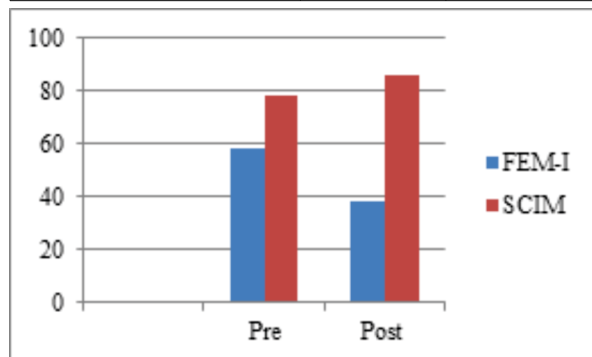
Sr no	Intervention	Dose/ Duration
1	For strengthening of lower limb In parallel bar - Strengthening in standing position with weight cuff (1.5 kg) for both side (hip flexors, extensors, abductors) - Sit to stand on Swiss ball with AFO - Step up and step down with AFO	5days/week for 4 weeks
2	Gait training - Railing support : - Side walking with KAFO - Forward walking with help of elbow crutch and with KAFO - Slope walking with KAFO and elbow crutch.	5days/week for 4 weeks
3	Single task obstacle cross training - On even surface with support of railing and with elbow crutch with KAFO - On slope with support of railing and elbow crutch with KAFO - With progression of initially 10 cm height obstacle than 12cm and 14 cm and than 16cm at distance of 2m interval.	5days/week for 4 weeks

RESULTS

The Fall Efficacy scale international score has been reduced from 58/64 pre treatment to 38/64 post treatment which shows there is decreased fear fall while walking at the end of treatment in patient. The Spinal cord independence measure score has been increased from 78/100 pre treatment to 86/100 post treatment which shows there is increase independency at the end of treatment in patient.

Table 1: Outcome scores for Fall efficacy scale international and Spinal cord Independence measure.

Outcome measure	Pre	Post
FES-I	58 /64	38 /64
SCIM	78 /100	86/100



Graph no:1 comparisons of pre and post scores for Fall Efficacy scale international and functional independence measure.

DISCUSSION

This case study intends to demonstrated how single task cross training can be beneficial for reducing the risk of fall while walking in a patient who has suffered from non traumatic spinal cord injury patient. During early chronic phase independent mobility is the most important objective for people with incomplete spinal cord injury. Rehabilitation of spinal cord injury patient is primarily depends on the neurological level. The amount of motor and sensory preservation decides the patients ambulation potential. Falls are common occurrence after spinal cord injury especially among ambulatory patients, which might later reflected in fear of falling. And due to this fear there is mobility restrictions and participation in their life roles.

In this study we asked the patient to cross the obstacle while walking with elbow crutch and KAFO. Initially we kept obstacles of same height (10 cm) on even surface and then on slop at a distance of 2 meter interval and after that to add complexity in task we added obstacles of varying height (12cm high, 14cm high, 16 cm high) which were placed at a distance of 2 meter interval on even surface and on slop. participants walked with their normal speed. Treatment was given 5 days / week up to 4 weeks.

We assessed the fear of fall while using scale Fall Efficacy scale international($r=0.9$). score has been reduced from 58/64 pre treatment to 38/64 post treatment which shows there is significant in decreased fear fall while walking at the end of treatment in patient. Falling has a detrimental effect on their ability to work, parent, perform self care and practicing their daily activities so we have also assessed the performance of in activities of daily living by using Spinal cord independence measure and the score has improved 78/100 pre treatment to 86/100 post treatment which shows there is increase in independency at the end of treatment in patient.

There are some studies who have shown that obstacle cross training has significantly improved functional ability of ambulatory individuals in SCI after the training. And some studies have compared the dual task training while obstacle crossing which has improved cognition function in spinal cord injury patient . And cognition play important role in fall, cognitive impairment increases the risk of fall. Reduced lower limb strength, gait impairment, previous fall, are the risk factors for fall. The possible mechanism for reduction in fear of fall in patient is that the patient had intact cognition which might increases attention and simultaneously strength training and gait training was given to patient which has reduced the fear of fall.

CONCLUSION

This case study finding shows that obstacle cross training requires patients attention and due to intact attention there is reduction in fear of fall.

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