

## Effectiveness of task specific training in improving functional independence after spinal cord injury

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**Objective:** To determine the effectiveness of task specific training in improving functional independence after spinal cord injury.

**Methodology:** This single group pre test post test interventional study was conducted in Chambeli Rehabilitation Center, Rawalpindi and Neurocounsel, Islamabad, Pakistan from September 2015 to February 2017 and included 30 patients with complete or incomplete injury, both with paraplegia and tetraplegia using non probability purposive sampling. All patients with any type of tumor causing spinal cord injury, stroke patients, patients with Gullian Barre syndrome, peripheral neuropathies, myopathies were excluded from the study. Data were collected using Spinal Cord Independence Measure (SCIM) and Clinical Outcome Variable (COV) scale at

baseline and after 6 weeks. All patients were provided with task specific training plus electrical muscle stimulation for 6 weeks. Data analysis was done using SPSS version 20.

**Results:** Significant improvements were noted in SCIM, both in its total score and its subscales ( $P < 0.001$ ). Patients also reported marked improvements on COV scale. All domains of self care, respiratory and sphincter management and in and out door mobility improved

**Conclusion:** Task specific training was an effective technique for improving functional outcomes in spinal cord injury giving promising results to improve activities of daily living. (Rawal Med J 201;43:245-247).

**Key Words:** SCI, Task specific training, functional outcomes, SCIM, COV scale.

### INTRODUCTION

Around 17000 new cases of spinal cord injury present every year among which road car accidents are the major cause after which falls come and then bullet injuries and sports injuries.<sup>1</sup> Spinal cord injury is a very devastating problem in which extensive rehabilitation is required by specialized persons.<sup>2</sup> In general, those who suffered from spinal cord injuries are young population.<sup>3</sup> Although spinal cord injury can cause different levels of disability, but incomplete tetraplegia is the most common injury that occurs followed by incomplete paraplegia, complete paraplegia and complete paraplegia.

Goals for patient recovery largely depends upon the amount of disability present with tetraplegics having more focused on the recovery of the upper limb and paraplegics more concerned with walking. However, goals can be achieved or not largely depends upon whether spinal cord injury is complete or incomplete.<sup>4</sup> In Pakistan, a study on non disaster spinal cord injuries have reported fall as

62% and road traffic accidents in 32%, fracture dislocations and burst fractures were 36% each as most important causes of spinal cord injury and majority of the injuries were at T11-L1 level.<sup>5</sup>

Many treatment regimes have been used for the rehabilitation of these patients. Task-oriented training is a technique in which multiple repetitions of a single motor task is practiced until patient can perform it by his own without making marked errors. The basic mechanism behind this is the performance of the whole functional task without considering much range of movement at individual joints.<sup>6,7</sup> Duration of stay in the hospital ranged from 60 days to 267 days.<sup>7</sup> It also depends upon age, complications and the facility available in different areas of the world.<sup>8,9</sup> The aim of this study was to determine the effectiveness of task specific training in improving functional independence after spinal cord injury.

### METHODOLOGY

This single group pre test post test study was carried

out in Chambeli Rehabilitation Center, Rawalpindi and Neurocounsel, Islamabad, Pakistan from September 2015 to Feb 2017 after taking permission from the institution. Informed written consent was taken from all the patients. Thirty patients whether complete and incomplete injury, both with paraplegia and tetraplegia were included in the study using non probability purposive sampling. All patients with any type of tumor causing spinal cord injury, stroke patients, patients with Gullian Barre Syndrome, peripheral neuropathies and myopathies were excluded from the study.

Data were collected by using spinal cord independence measure (SCIM) and clinical outcome variable scale (COV scale). All patients were provided with task specific training plus electrical muscle stimulation for 6 weeks and again data was collected by using same scales. These exercises include, catch and throw a ball, throwing towel off the table, doing dusting of the table, and supination over foam roll, later these exercises were progressed to include throwing cup with wrist, exercises with puttey and putting glasses on top of each other. When finger movements improved then exercises for fingers were initiated these include switching, needling a macroni, turning and lifting cards off the table. These exercises were carried out 3 times /week on alternate days. Similarly for lower limbs, strengthening, stretching and range of motion were carried out but along with them static cycling and body weight supported treadmill training for 20 minutes 3 days/week. 3 patients were dropped from the study as they developed serious complications or have not completed the study. Data was then analyzed by using SPSS version 20. Both descriptive and inferential statistic was performed and after checking normality of the data by Shapiro Wilk test and Wilcoxon signed rank test was applied.

## RESULTS

Most of the patients had T12 level of injury occurring in about 37% of the patients, followed by T10 level(14.8%), C6 and T6 occurring in about 11.1% of the patients followed by cauda equina and T4 occurring in 7.4% and C5, C7 and T11 occurring in about 3.7% of the patients presenting with spinal

cord injury. Spinal cord injury occurred after a fall in 37% followed by road traffic accidents (29.6%), transverse myelitis (22.2%) and bullet injury (11.1%). Most patients had a level of A on ASIA impairment scale i.e. 51.9% followed by level C (25.9%), level B and D (11.1%, 11.1%).

**Table. Inferential statistics of subscales of SCIM.**

Variable	Pre Intervention Mean $\pm$ SD	Post Intervention Mean $\pm$ SD	P Value
Self Care	8.89 $\pm$ 5.92	13.89 $\pm$ 5.92	0.000**
Respiration And Sphincter Management	13.44 $\pm$ 6.51	24.04 $\pm$ 5.70	0.000**
Mobility (Indoor and out door)	5.11 $\pm$ 5.44	12.00 $\pm$ 5.33	0.000**

Before intervention, COV scale was 26.93 $\pm$ 9.79 and improved after intervention as 49.33 $\pm$ 13.04 (P<0.001). Similarly, SCIM score before intervention were 26.62 $\pm$ 13.92 and after intervention was 50.15 $\pm$ 13.76 (P<0.001) (Table).

## DISCUSSION

The current study showed that task specific training can improve the functional independence of the patients suffering from spinal cord injury. If rehabilitation is started earlier after spinal cord injury, then patient can be made more independent functionally.<sup>10</sup> A study done by Hoffman et al reported the beneficial effects of bimanual training not only on improving the functional movement of upper limb but also have found dramatic changes in the cortical mapping that have occurred as a result of this training.<sup>4</sup>

A study from CMH Rawalpindi, reported most common etiology with which patients presented after spinal cord injury was the fall followed by road traffic accidents.<sup>5</sup> Our results were similar. A study from India showed that patient can have only good quality of life after spinal cord injury, if he is physically active and independent in most of the activities of daily life.<sup>3</sup> Physical therapy can be used to manage the patients after spinal cord injury as it causes a decrease in the dependency of patient and make the patient perform things on its own.<sup>11</sup>

Hubli et al in their review suggested that functional training can enhance the activity of spinal cord both

after complete and incomplete injuries, however functional improvement in locomotion is more appropriately achieved in those suffering from incomplete spinal cord injury.<sup>12</sup> Harkema et al reported significant functional recovery when provided with locomotor training.<sup>13</sup> Dobkin reported that task specific training can be used to enhance both upper and lower limb function even after spinal cord injury.<sup>6</sup> Dunlop reported that exercises enhanced recovery after spinal cord injury.<sup>14</sup>

Although significant improvements were shown in our study but still there were some limitations; small sample size, single group study and patient compliance with follow up. In addition, all types of spinal cord injury with different lesion levels were included. It is recommended that further studies with large sample size should be conducted with a different study design on single type of spinal cord injury in order to further specify the effects.

## CONCLUSION

Task specific training was beneficial in improving functional independence after spinal cord injury.

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