

## Outcome of Physical Rehabilitation Interventions in Persons with Post-Traumatic Spinal Cord Injuries at Paraplegic Centre Peshawar, Pakistan

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### ABSTRACT

**Objective:** To determine the outcomes of physical rehabilitation interventions at Paraplegic Center, Peshawar.

**Methods:** This was Quasi experimental study, conducted from January 2018 to December 2019 at Paraplegic Center, Peshawar. A total of 306 persons with SCI were included in the study. Patients with ASIA-E level were excluded. Rehabilitation interventions including nursing care, physical and occupational therapy was applied for 4 days per week for a month. Spinal Cord Independence Measure (SCIM) scale was used for data collection. Data were analyzed using SPSS version 20 and T-test was used to compare the pre and post intervention's scores, where p-value <0.05 was considered as significant.

**Results:** A total of 306 persons with SCI, mean age 32.5±14.3 years, out of whom 65 (21.2%) were female and 214 (78.8%) were male. The outcome of occupational therapy (self-care) indicates that mean scores for feeding, bathing, dressing and grooming were improved to significant level (p<0.001). Regarding Nursing care; respiratory & sphincter management, respiration was significantly improved (p < 0.001). While bladder's sphincter management score improved from 2.78±5.6 to 9.9±4.8 respectively. Similar improvement was observed in bowel's sphincter management and use of toilet (p<0.001). Physical therapy outcomes were measured in terms of mobility. A marked improvement was seen in mobility in bed (p=0.002). Other parameters like; transfer from bed to wheelchair, indoor and outdoor mobility for moderate distance and stair management were significantly improved, (p<0.0001).

**Conclusion:** Physical rehab interventions significantly improve independence measures like self-care, respiratory & sphincter management and mobility in persons with SCIs.

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### Introduction

Spinal cord injury (SCI) is the devastating disability known to mankind [1]. Besides paralysis or paresis, bowel & bladder incontinence and sexual impotence are the common outcomes. Persons with SCIs are prone to many secondary complications like pressure ulcers, neuropathic pain, heterotrophic ossifications and respiratory dysfunctions [2]. Among other respiratory complications, persons with SCIs suffered from sleep-related respiratory problems especially obstructive apnea syndrome and it is estimated that it has affected about 25% to 45% of persons with SCIs [3]. Dysreflexia, disturbed gastrointestinal and genitor-urinary system problems are also common among SCI patients [4, 5].

SCI has profound social, financial and psychological implications [6]. Being a lifelong disability person with SCIs is prone to frequent rehospitalization due to secondary complications throughout

their lives [7]. Since complete spinal cord injury is incurable but physical rehabilitation strategies aim to minimize complications and maximize independence according to the patient's functional capabilities [8, 9].

To rehabilitate persons with SCIs comprehensively, a multidisciplinary team approach is very much necessary [10, 11]. This multidisciplinary team approach enables members of different specialties to discuss the patient's condition and achieve rehabilitation goals [12-14]. Neuro surgeons/spine surgeons do fixation of spine, nursing staff help in management of pressure sores, bowel & bladder care while medical physicians treat other medical complications [15]. Similarly, Physical therapist focuses on gross mobility & chest therapy while Occupational therapist focuses on fine movements [16]. Psychologists prepare patients for rehabilitation and help them in understanding disability-related issues [17]. Nutritionist, social worker, vocational trainer etc. guide and manage patients according to their specialties [18,

19]. To sum up, the management of SCI patients is only possible with a comprehensive approach with input from different team members [20].

Goal-oriented repeated activities are the basis of gross mobility training while incorporating movements into functional tasks is the basis of improving fine movements [21, 22]. To improve gross mobility, each and every movement is broken into parts and patients do these tasks repeatedly. These movements are then converted into functional movements [17].

Even though it is well-known fact that repeated activities improve gross mobility but literature regarding comprehensive physical rehabilitation of SCI patients in developing countries is scarce. Therefore this study was designed to determine functional outcomes of comprehensive physical rehabilitation in SCI patients in Pakistan. The outcomes of rehabilitative services vary from the organization to organization and also depend upon the time of onset and availing of rehab services [23]. Furthermore, the functional recovery also depends on health status, neurological level, psychological status, complications and presence other comorbidities [24]. Paraplegic Center Peshawar is the only facility of its kind in the country providing comprehensive rehabilitation services to persons with SCIs. This study aims to determine the outcomes of physical rehabilitation interventions carried for person with spinal cord injuries at Paraplegic Center, Peshawar.

### Materials and Methods

This was a quasi-experimental study conducted at Paraplegic Center, Peshawar. Using consecutive sampling technique, the patients with traumatic spinal cord injuries were included in the study; however, patients with ASIA-E level (SCI with normal motor and sensory functions) were excluded. The patients were given comprehensive services (physical therapy, occupational therapy, nursing care, medical and surgical intervention). Rehabilitation interventions were applied for 4 days per week for a month. The outcomes were evaluated using tested tool the "Spinal Cord Independence Measure (SCIM) scale". A total of 306 persons with SCIs were part of the present study. Data were analyzed using SPSS version 20 and T-test was used to compare the pre and post intervention scores, where p-value <0.05 was considered as significant.

Results: A total of 306 patients with spinal injuries with mean age of 32.56± 14.3 (ranged 10 months to 70years). Among them, 65(21.2%) were female while 241(78.8%) were male.

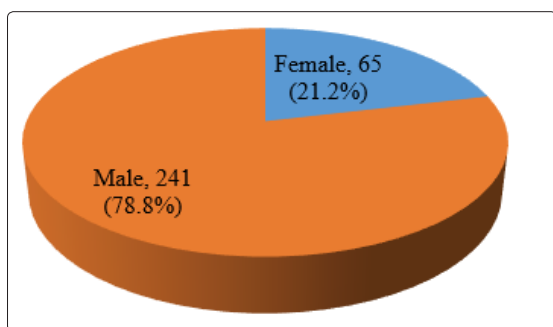


Figure 1: Patient distribution by Gender

The patients were given a series of physical rehab interventions over a period of 6 weeks where functional recovery was assessed at baseline followed by 3<sup>rd</sup> and 6<sup>th</sup> week respectively. Outcomes of physiotherapy interventions indicate that after a series of physiotherapy over a period of 6 weeks all parameters of gross

mobility were improved significantly. The functional recovery as result of physical therapy indicates that the mean score of mobility on the bed was 0.2 ± 1.0 at baseline which was improved to 2.4 ± 2.1 at the third week and 4.3 ± 2.0 at sixth week indicating significant difference (p<0.01). Mean score of transfers from bed to wheelchair was 0.1 ± 0.72 at baseline which was improved to 1.8 ± 0.3 at last week (p<0.01). Similarly, the mean score about indoor and outdoor motilities of both Moderate and long-distance was also significantly improved. A statistically significant improvement was observed in stair management, transfers from wheelchair to car. A similar pattern of improvement was also noted in transfer from ground to wheelchair (p<0.01) (table 1).

Table 1: Comparison of gross mobility outcomes over a series of physical therapy

Outcome Variables of Rehabilitative Interventions	Mean Score at 1 <sup>st</sup> week	Mean Score at 3 <sup>rd</sup> week	Mean Score at 6 <sup>th</sup> week	P-Value
	$\bar{x} \pm \text{Std}$	$\bar{x} \pm \text{Std}$	$\bar{x} \pm \text{Std}$	
Mobility (room and toilet)				
Mobility in bed to prevent pressure sores	0.2 ± 1.0	2.4 ± 2.1	4.3 ± 2.0	< 0.01
Transfers: bed-wheelchair	0.1 ± 0.72	0.54 ± 0.7	1.8 ± 0.3	< 0.01
Indoor mobility	0.29 ± 0.8	1.3 ± 1.0	2.7 ± 1.0	< 0.01
Mobility for moderate distances (10-100 meters)	0.15 ± 0.7	1.9 ± 0.7	3.12 ± 1.0	< 0.01
Mobility outdoors (more than 100 meters)	0.25 ± 0.8	1.5 ± 1.0	2.7 ± 1.2	< 0.01
Stair management	0.19 ± 0.7	0.8 ± 1.08	1.9 ± 1.2	< 0.01
Transfers: wheelchair-car	0.08 ± 0.3	0.51 ± 0.8	1.51 ± 1.0	< 0.01
Transfers: ground-wheelchair	0.01 ± 0.1	0.3 ± 0.6	1.1 ± 1.0	< 0.01

All parameters of occupational therapy were significantly improved on 6th week after consecutive interventions. Mean score of self-care improved form 2.7 ± 0.9 to 3.4 ± 0.7; p<0.01. Similarly, feeding and bathing score were 2.7 ± 0.9 and 0.45 ± 1.0 at the time of admission while it became 3.4 ± 0.7 and 2.63 ± 0.8 at six weeks, revealing significant improvement (p< 0.001). Mean score for dressing and grooming reached to 3.3 ± 1.5 and 2.8 ± 0.9 as it was 0.78 ± 1.5 and 1.8 ± 1.4 at the beginning of the intervention.

Table 2: Outcomes of Occupational therapy

Outcome Variables of Rehabilitative Interventions	Mean Score at 1 <sup>st</sup> week	Mean Score at 3 <sup>rd</sup> week	Mean Score at 6 <sup>th</sup> week	P-Value
	$\bar{x} \pm \text{Std}$	$\bar{x} \pm \text{Std}$	$\bar{x} \pm \text{Std}$	
Self-care				
Feeding	2.7 ± 0.9	2.9 ± 0.8	3.4 ± 0.7	< 0.01
Bathing	0.45 ± 1.0	2.43 ± 1.0	2.63 ± 0.8	< 0.01
Dressing	0.78 ± 1.5	2.84 ± 1.7	3.3 ± 1.5	< 0.01
Grooming	1.8 ± 1.4	2.6 ± 0.9	2.8 ± 0.9	< 0.01

Outcomes of nursing care as part of rehab services of persons with spinal car injuries include respiratory function, bladder and bowel sphincter management. Mean score for the respiratory function was 9.19 ± 1.5 at the beginning and was 10.6 ± 1.9 at the end of the

6th week. Similarly, bladder and bowel functions were markedly improved ( $p < 0.01$ ). Regarding self-care in the toilet the mean score was improved from  $0.28 \pm 1.2$  to  $5.0 \pm 1.1$ ,  $p < 0.001$ . (table 3)

**Table 3: Outcome of Nursing Intervention as part of Rehab services**

Outcome Variables of Rehabilitative Interventions	Mean Score at 1 <sup>st</sup> week	Mean Score at 3 <sup>rd</sup> week	Mean Score at 6 <sup>th</sup> week	P-Value
	$\bar{x} \pm \text{Std}$	$\bar{x} \pm \text{Std}$	$\bar{x} \pm \text{Std}$	
Respiration	$9.19 \pm 1.5$	$9.6 \pm 1.0$	$10.6 \pm 1.9$	$< 0.01$
Bladder Sphincter Management	$2.8 \pm 5.6$	$5.7 \pm 5.6$	$9.9 \pm 4.8$	$< 0.01$
Bowel Sphincter Management	$0.36 \pm 2.1$	$1.16 \pm 2.8$	$2.59 \pm 3.0$	$< 0.01$
Use of Toilet: Hygiene and adjustment of clothes	$0.28 \pm 1.2$	$1.7 \pm 0.6$	$5.0 \pm 1.1$	$< 0.01$

### Discussion

The impact of spinal cord injuries is long-lasting which affects basic body functions and quality of life (QOL). The number of SCI cases is increasing in Pakistan day by day, but there are no dedicated facilities of comprehensive rehabilitation. Paraplegic center is the only organization of its kind in Pakistan which offers 100% free of cost comprehensive rehabilitation services to persons with spinal cord injuries. These services include; Medical/surgical and nursing care, Physical therapy, Occupational therapy, orthotic & psychosocial management and follow up home program. The present study was conducted at Paraplegic Center to determine the effectiveness of rehab services.

The result of the present study indicates that outcomes in terms of functional recovery are significantly improved. The parameters of functional recovery include; mobility on bed, transfers from bed to wheelchair, indoor and outdoor motilities, stair management, transfers from wheelchair were significantly improved at 6th week of intervention ( $p < 0.01$ ). The same finding is also reported by Ji-Sung et al. which indicate that comprehensive rehab intervention focusing on standard transfer exercise is more effective for improving the gross mobility<sup>25</sup> It is further reported that regardless of patients condition (whether in intensive care unit or admitted in the general ward) strength-training physical interventions are recommended, however the protocol changes with the grade and types of muscle involved. Neurologically induced Limited strength exercise (walking) is recommended to a person with quadriceps muscle weakness, while for upper limb muscle in patients with paraplegia are needed to give the floor to wheelchair transfer training [23].

Outcomes for occupational therapy included feeding and bathing, dressing and grooming were significantly improved during the course of intervention ( $P < 0.01$ ). Finding of the present study is consistent with Foy T, et al, who has reported that occupation therapy brings statistically significant improvement in the activities of daily living (ADLs), however, the outcomes were associated with the extensiveness of workout, time spend on each intervention [26].

It is obvious that spinal cord injuries cause impairment in the autonomic nervous system leading to a broad range of autonomic malfunctioning including bowel and bladder dysfunctions [27]. Nursing care in this regard plays an important role. Parameters of nursing care at paraplegic Center are; respiratory functions,

bladder and bowel sphincter management. The mean score for individual parameters was markedly improved ( $P < 0.01$ ). It has been evident that proper nursing care especially health assessment along with timely medication for respiratory problems, timely emptying of the bladder and proper exercise to detrusor muscles have improved the patient's independence [28, 29].

### Conclusion

Multi-disciplinary comprehensive physical rehabilitation services at Paraplegic Center are most effective in the improvement of functional recovery and quality of life among patients with spinal cord injuries. Similar multidisciplinary rehab Centers should be established at each district level.

### Conflicts of interest

The authors declared no conflict of interest and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All authors contributed substantially to the planning of research, questionnaire design, data collection, data analysis and write-up of the.

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