



Assessment Of Quality of Life After Complete Spinal Cord Injury at T1-L5 Level

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Original Article

ARTICLE INFORMATION

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ABSTRACT

Background: Complete Spinal Cord injuries were the extreme forms of survivable injuries. It may affect the mental, physical, social, socio-economic and psychological health of patients.

Objective: To find quality of life in patients with spinal cord injury (T1-L5 paraplegics) and to determine correlation between domains of life with time since spinal cord injury.

Methods: The cross-sectional study was conducted from January to May 2023. 98 patients with 2 years post spinal cord injury aged (17-72 years) were recruited. Data was collected from neuro centers: outdoor patient department of Allama Iqbal memorial teaching hospital Sialkot, Lahore general hospital, Services Hospital Lahore and Jinnah Hospital Lahore. Health-related quality of life- BREF was used as an outcome-measuring tool. SPSS version 22 was used to analyzed the data. Descriptive statistics, one sample t-test and Spearmen correlation were used to interpret the results.

Results: Mean age of participants was (38.52±14.0years). (N=37,37.8%) patients had T6-T12, (N=32,32.7%) L1-L5 and (N=29,29.6%) had T1-T6 spinal cord injury levels. Mean time since SCI was 32.37± S.D 4.89 months. The HRQOL-BREF results showed patients had mean score in health domains; environmental (48.53±12.03), psychological (47.83±13.95), physical (42.46±11.71) and social (34.52 ± 13.95) respectively. One sample-t test showed physical health and social relationships had significant statistical difference as (p= 0.00≤0.05). Spearmen correlation showed a significant relation between social relationship (p=0.00 ≤ 0.01) and environment domain as (p=0.02 ≤ 0.05) with time since SCI among patients.

Conclusion: Quality of life was more affected in physical and social health domains among patients with complete SCI at (T1-L5 level) furthermore time since SCI was correlated with environment and social domains.

Introduction:

Spinal cord injury [1] was the most frequent reason young adults become disabled [2]. Globally SCI was expected to be 40 cases per million, and there were between 2,38,000 and 3,32,000 persons living with the disorder [3]. The term "spinal cord injury" refers to damage to the spinal column that might or might not result in permanent damage to the spinal cord that was beyond for a body to repair. SCI were uncommon, yet they permanently alter life and result in high medical costs [4]. SCI could be a severe, chronic condition that frequently comes with paralysis, secondary complications, functional limitations and constant pain [5]. The effects of SCI might cause areas of the body supplied by the spinal cord below the level of the lesion or injury to lose sensation, muscle control or autonomic function of the body. Transaction levels at the spinal cord were used to categorize injury as complete or incomplete. People with SCI must deal with a variety of health issues including

neurogenic bladder and bowel due to loss of urinary and sphincter control, respiratory symptoms, complications of cardiovascular system, bed sores due to restricted functional movements, relapsing and re-occurrence of bowl and bladder infections due to autonomic dysreflexia, nociceptive and neuropathic pain with chronicity, osteoporosis due to non-weight bearing as limb control was deficit and fractures. These issues affected individuals of SCI; physical and psychological well-being as well as their ability to reproduce and engage in sexual activity. The risk of complications requiring hospitalization and rehabilitation was affected by the patient's age and the degree of their spinal cord injury. Although improvements in SCI care might enhance patients' quality of life, they still must deal with shifting social roles and psychiatric comorbidities such as mental illnesses like depression and anxiety disorder [6]. SCI was more common in



men than in women and as the population ages, the average age of SCI patients was also ageing [7]. Ageing might cause a person with SCI to lose their independence, function, and health sooner than expected, increasing the need for medical services [8].

Health was defined by World Health Organization (WHO) as a 'well aware state of physical, psychological and social existence not merely just the absent status of pathology or infirmity'. There was a perceptible consensus among researchers that quality of life was multidimensional and could be evaluated from both subjective and objective measures. WHO defines a person's quality of life as their perspective on life, set against the backdrop of their culture; value systems in contrast to their expectations, routines, and concerns. Different measures, both general and pathology-specific could assess qualitative aspects of life. A tool to determine the quality of life universally was WHOQOL [9]. Numerous factors depending on the culture affect people's quality of life. Previous research has shown that these elements could include age, age since spinal cord injury, time since discharge with SCI, gender, employment strain, marital status, education level, health efficiency and socioeconomic status. SCI affects many areas of life encompassing six main domains physical, psychological, level of independence, social relationships, environment and religious or personal beliefs of the individuals [10]. Following the time since SCI patient suffers great damage to their physical health as the patient might lose their limbs and becomes hemiplegic, paraplegic or tetraplegic [11]. The psychological effects of having a SCI were obvious in follow up phases since discharging from hospital to the living hood with spinal cord injury manifestations. These include psychological characteristics (such as personality, self-efficacy beliefs, well-being, coping mechanisms, and motivation). Moreover, financial grants for medical check-ups and follow up visits, transportation, accessibility of medical and non-medical facilities, governmental policies, paid employment opportunities, social supporting networks and societal perceptions and acceptance of SCI add up to a compromised living hood [1]. Home, family responsibilities, productive and active roles of individuals (such as employment, school, and volunteering for community benefit type of works), social networks' recreational activities, mobility and economic stability were important aspects of social participation and well-being. Many persons with SCI would be dependent on welfare benefits for extended periods of time and might get substantially less than their claim because of the administrative process's complexity. These individuals typically struggle with bathing, dressing without aid, laundry work, going shopping and engaging in social activities[12]. However healthcare providers need to understand how time since SCI affects chances for improvement in cognitive health and overall well-being of spinal cord injury patients as little is known about the risk categories for low involvement and health related quality

of life in cases of complete spinal cord injuries and paraplegics [7]. Addressing the critical necessity of patient centered interventions to cope up with new challenges after SCI were needed like return to work strategies based on their functional abilities (Rework- SCI), patient awareness for self-management (safe transfers), educating about effective use of assistive technology (neural prosthetics) to gain person's independence [13]. In Pakistan, there were not many populations base studies conducted that targeted exploring the domains of quality of life among patients of complete SCI and ageing with it. Patients with complete SCI at (T1-L5 had sparing of upper limbs and involvement of lower limb paralysis with varying extent of trunk movements, exploring HRQOL at this level for research could add in depth insights to set achievable long term goals in understanding the challenges with SCI and cope ups. The aim of this study was to assess the HRQOL in patients with complete SCI at the T1-L5 level and to correlate these HRQOL domains with time since spinal cord injury.

METHODOLOGY

A cross-sectional study was conducted after the ethical approval from 'The institutional ethical review committee of Imran Idrees Institute of Rehabilitation Sciences, Sialkot (IIIRS/DPT/PRI/IRB-602) from January to May 2023. The study population was patients of complete spinal cord injury at T1-L5 level reporting in the outdoor-patient neurological departments of Allama Iqbal teaching memorial hospital Sialkot, Lahore general hospital and Services Hospital Lahore during the study period. The sample size was calculated using online epi-tool software. The estimated proportion was 0.3%, desired precision of estimate was 0.05% and the confidence level was 0.95%; the sample size was computed as n=103 [14]. The sample size was obtained using a random sampling technique, a total of 98 participants were recruited as per inclusion criteria. The inclusion criteria were set as patients of complete spinal cord injury, nature of injury; traumatic, T1- L5 level paraplegics; ASIA impairment scale (Grade A) patients, aged 15-75 years, post spinal injury duration (2 years) [15]. Patients with structural deformities (congenital scoliosis), spine tumors (Osteosarcomas, Hemangiomas and multiple myelomas in the spinal cord), incomplete spinal cord injury and Brown Sequard syndrome were excluded from the study. After the informed consent Health-related Quality of Life (BREF)' questionnaire was used to record their responses, patients were communicated as per their language proficiency in Urdu, English and Punjabi languages. HRQOL-BREF had 26 items which address four quality of life domains: (Domain 1) physical health, (Domain 2) psychological health, (Domain 3) social relationships and (Domain 4) environment [16]. HRQOL-BREF (item no.21) was not inquired from the patients of spinal cord injury as it was subjected to sexual life satisfaction; not applicable to most of the participants in this study (Domain 3). The scoring of each domain was found by



summing the individual score of each item being marked on a 5-item Likert scale ‘not at all’ to ‘completely’, scores were inverted for items No.3,4 and 26; divided with total items of the domains. Domain 3 raw score was obtained by summing item 20 and 23 scores and dividing it by the total items of respective domain. Raw scores were converted into transformed scores on a scale of 100. The interpretation of scoring was made as low (<50) and high (>50) quality of life by taking ‘50’ as the cut-off value. The data was analysed using SPSS version 22. Descriptive statistics were used to present the results in the form of frequency, mean and standard deviation tables. The reliability analysis was found using Crohn bach’s alpha coefficient for the outcome measuring tool. One sample-t test was used to compare the means score of each domain with a cut-off value of 50 at significance level (p-value 0.05) respectively. The Spearman correlation was used in between the variables; time since spinal cord injury and domains of HRQOL.

RESULTS

The reliability analysis of the outcome measuring tool was determined as Cronbach’s alpha ($\alpha = 0.80 > 0.67$); high reliability. Out of 98 participants mean age was (38.52±14.0years). Most of the patients (N=63, 64.3%) were male and (N=35, 35.7%) were female. The socio-economic status of the patients was lower class (N=65,66.3%), middle class (N= 33,33.7%) whereas upper class (N=0,0%). The mean time since spinal cord injury was 32.37± S.D 4.89 months. The nature of injury among patients showed that most of them

(N=40,40.8%) had fallen from a height whereas (N= 2,2.0%) had SCI during contact sports (Table 1)

Table 1. Demographics and characteristics of the participants

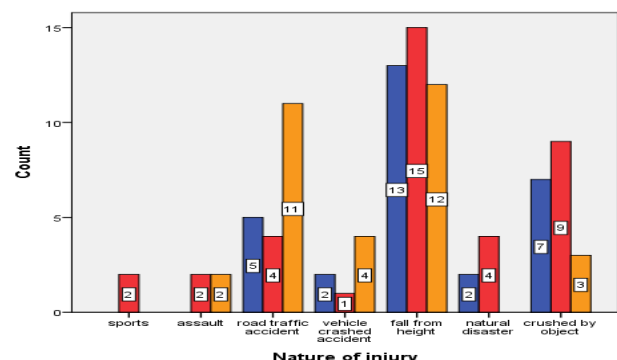
Age of the participants	
15-29 years	30,30.6%
30-44 years	34, 34.7%
45-59 years	24,24.5%
60years and above	10,10.2%
Mean time (since SCI)	32.37± S.D 4.89 months
Employment status	
Employed	20,20.4%
Not-employed	78,79.6%
Marital status	
Single	36,36.7%
Married	45,45.9%
Divorced	17,17.3%
Nature of SCI	
Fall from height	40,40.8%
Road traffic accident	20,20.4%
Crushed by object	19,19.4%
Vehicle crushed accident	7,7.4%
Natural disaster	6,6.1%
Assault	4,4.1%
Contact sports	2,2.0%

Table 2. One Sample-T Test and correlation between HRQOL and time since spinal cord injury among participants

DOMAINS	N	MEAN	Std. Deviation	Std. Error Mean	Test value= 50				Spearman rho (HRQOL and time since SCI)	
					Sig. (2-tailed)	Mean Difference	95% confidence interval of the difference		Correlation co-efficient	Sig.2-tailed
							Lower	Upper		
Physical Health	98	42.46	11.71	1.18	0.00*	-7.54	-9.89	-5.19	-.027	0.793
Psychological Health	98	47.83	13.95	1.41	0.12	-2.16	-4.97	0.63	.077	0.450
Social Relationship	98	34.52	13.95	1.41	0.00*	-15.47	-18.27	-12.68	-.331*	0.00*
Environment	98	48.53	12.03	1.21	0.23	-1.46	-3.88	0.95	-.233**	0.02**

(Significance level 0.01*, 0.05**)

Figure 1. Nature of Injuries among complete spinal cord injury patients (T1-L5)





showed the demographics and characteristics of the participants. The classification for 'spinal cord levels of injury' showed that (N=37,37.8%) patients had T6-T12 spinal cord injury, (N=32,32.7%) patients had L1-L5 spinal cord injury and (N=29,29.6%) had T1-T6 spinal cord injury levels. (Figure 1) showed the frequency of levels and nature of spinal cord injury among the patients.

HRQOL-BREF among patients showed (Domain 4; environment) had a mean score of $48.53 \pm S.D 12.03$. (N=51,52.0%) patients with complete spinal cord injury (T1-L5) had low quality of life whereas (N=47,48.0%) had high quality of life whereas responses of patients in (Domain 2; psychological health) showed a mean score of $47.83 \pm S.D 13.95$. (N= 47,48.0%) patients had low quality of life and (N=51,52.0%) patients had a high quality of life respectively. Furthermore, in (Domain 1; physical health) patients had a mean score of $42.46 \pm S.D 11.71$. (N= 65,66.3%) patients had low quality of life whereas (N= 33,33.7%) patients had high quality of life. (Domain 3; social relationships) showed a mean score of $34.52 \pm S.D 13.95$, among the patients most of them (N= 82, 83.7%) had low quality of life and (N=16,16.3%) patient had high quality of life with complete SCI (T1-L5) respectively. The results showed that in physical and social domains, HRQOL was more affected among patients with complete spinal cord injury at T1-L5.

One Sample-t test showed domains 1 and 3 (physical health and social relationships) had significant statistical differences (p-value 0.00) from the cut-off mean score 50 at significance level (p-value 0.05); CI 95% respectively (Table 2).

Spearman correlation showed that domains 1 and 2 had no significance correlation with quality of life ($p=0.793, 0.455$) whereas domains 3 and 4 were significantly correlated at ($p=0.00,0.02$) with low quality of life at 0.01 and 0.05 level respectively. As the mean time since spinal cord injury increases; the quality of life gets more compromised among patients in the domains of social relationships and environment (Table 2).

DISCUSSION

This study assessed the 'health related quality of life' in patients with complete traumatic spinal cord injury at the T1-L5 level; paraplegics. The study was conducted on 98 patients with a mean age of $38.52 \pm S.D 14.0$ years. A previous study documented the findings that increasing age in spinal cord injury causes more severity in the post-SCI complications; 92.9% of patients aged (>60 years) had comorbid conditions in contrast to 46.7% of patients surviving with SCI aged (less than 60 years) [17]. The current study showed that participants' quality of life (QOL) was assessed in four broadly specified domains: Physical, Psychological, Social, and Environmental. The mean score was found in the psychological domain ($47.83 \pm S.D 13.95$), the social domain ($34.52 \pm S.D 13.95$), and the environmental domain ($48.5 \pm S.D 12.03$) respectively. Furthermore, the mean score of HRQOL in physical domain

was ($42.46 \pm S.D 11.71$) similarly the study findings reported by D. Burke et.al on spinal cord injury patients (N=643, 41%) were females and (N=447,70%) patients were males. Mean time since spinal cord injury was found as 17 ± 12.4 years. Neuropathic and pain of high intensity had a negative impact on the quality of life among patients [18].

In this study one sample t-test showed that patients with SCI had statistically significant differences for means of domain 1 and domain 3 ($p=0.00$), at significance level (0.05). Findings of the study by Vural et al suggest that participants reported a low level of satisfaction with their physical functioning and social interactions [19] whereas in this study Domain, 2 (Psychological) showed a relatively closer-to-average quality of life which was similar to the findings of previous studies [20]. Domain 4 (Environmental) showed a relatively closer-to-average quality of life was similar to the findings of previous studies which suggested that the participants reported a relatively higher level of satisfaction with the environmental aspects of life and psychological well-being [21].

Findings of a study conducted by Parajuli et.al showed that in the age range of (46-60 years) the individuals were more prevalent to spinal cord injuries [22]. There was a slight predominance of one gender in this study. Males were more affected by traumatic SCI than females indicating more susceptibility of males than females to traumatic SCI, which were similar to the findings of previous studies [23].

In this study falls from height were the most common nature of injury among participants (N=40,40.8%) while road traffic accidents were the second common as the findings showed (N=20,20%) of SCI patients were affected which was similar to the findings of a previous study conducted by Utiyama et.al, their study concluded that firearm injuries and road traffic accidents (RTA) were commonly reported causes of traumatic spinal cord injuries, fall from height had prevalence of 32.31% [24], [25].

The current study showed that most frequent individual levels of injury identified in this study were T12 and L5. These specific spinal cord injury levels could have had distinct characteristics compared to other levels as of paraplegia; sparing of high spinal cord levels. Furthermore, this study found that injuries in the lower thoracic (T6-T12) region were more common among the participants which corresponds with the findings of previous studies [26].

The current study showed that quality of life domains; social relationships and environment were correlated with time since injury similar findings were reported by S Geyh et.al on 243 patients with spinal cord injury from six countries including Australia, Brazil, the United States, Canada, South Africa and Israel were recruited. The study concluded shorter time since injury and unpaid employment were potent predictors of low quality of life and patients. They also concluded that living in a country like Brazil was also a factor to affected QOL [27].



The limitation of this study was that the sample size was small, potential recall biasness during reporting HRQOL domains may affect the generalizability of the research findings and the factors like nature of the injury and socioeconomic status were not explored with respect to gender for domains of HRQOL. For future studies, it has been recommended to study the HRQOL domains with longitudinal, retrospective study designs and the nature of injuries for non-traumatic spinal cord injury at the T1-L5 level providing insights into changes over time, patient centred interventions in SCI could be explored.

Conclusion:

In physical and social domains health related quality of life was more affected. Time since SCI was correlated with environmental and social domains among patients with complete spinal cord injury at T1-L5.

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Conflict of interest: None to declare.

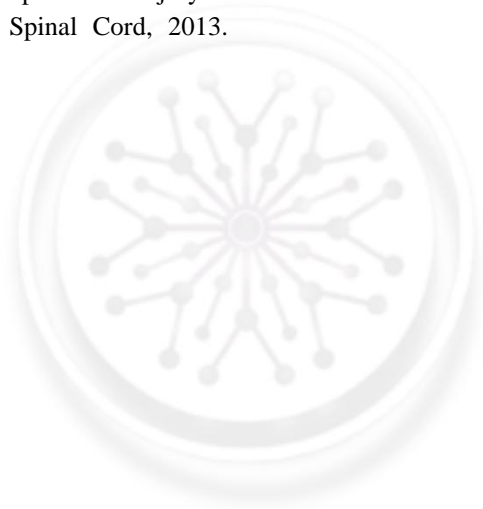
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References:

1. Zürcher, C., et al., Mental health in individuals with spinal cord injury: The role of socioeconomic conditions and social relationships. *PLoS one*, 2019. 14(2): p. e0206069.
2. Quadri, S.A., et al., Recent update on basic mechanisms of spinal cord injury. *Neurosurgical Review*, 2020. 43: p. 425-441.
3. Sarfraz, M., et al., Assessment of Functional Independence in different levels of traumatic spinal cord injury (SCI) patients of Pakistani Population; A Cross-Sectional Survey: Traumatic Spinal Cord Injury (SCI) Patients of Pakistani Population. *Pakistan BioMedical Journal*, 2022: p. 106-109.
4. Rofi'i, A.Y.A.B. and R. Maria, Quality of life after spinal cord injury: An overview. *Enfermeria clinica*, 2019. 29: p. 1-4.
5. Aaby, A., et al., The associations of acceptance with quality of life and mental health following spinal cord injury: a systematic review. *Spinal Cord*, 2020. 58(2): p. 130-148.
6. Banita, M., et al., Factors associated with quality of life among spinal cord injury survivors: A cross-sectional survey.
7. Halvorsen, A., et al., Participation and quality of life in persons living with spinal cord injury in Norway. *Journal of Rehabilitation Medicine*, 2021. 53(7).
8. Middleton, J.W., et al., Australian arm of the International Spinal Cord Injury (Aus-InSCI) Community Survey: 2. Understanding the lived experience in people with spinal cord injury. *Spinal Cord*, 2022: p. 1-11.
9. Lodhi, F.S., et al., Assessing the quality of life among Pakistani general population and their associated factors by using the World Health Organization's quality of life instrument (WHOQOL-BREF): a population based cross-sectional study. *Health and quality of life outcomes*, 2019. 17: p. 1-17.
10. AZEEZ, A.L. and A.I. Hammed, Socio-demographic correlates of quality of life in spinal cord injured patients. *Turkish Journal of Kinesiology*, 2019. 5(2): p. 92-101.
11. Chay, W. and S. Kirshblum, Predicting outcomes after spinal cord injury. *Physical Medicine and Rehabilitation Clinics*, 2020. 31(3): p. 331-343.
12. Frasuńska, J., B. Tarnačka, and P. Wojdasiewicz, Quality of life in patients with tetraplegia and paraplegia after traumatic spinal cord injury. *Advances in Psychiatry and Neurology/Postępy Psychiatrii i Neurologii*, 2020. 29(3): p. 143-153.
13. Holmlund, L., et al., Evaluating the feasibility of ReWork-SCI: a person-centred intervention for return-to-work after spinal cord injury. *BMJ open*, 2020. 10(8): p. e036000.
14. <epi tool.sample size.sci.pdf>.
15. Shah, S.Z.A. and S.M. Ilyas, Assessment of the quality of life of spinal cord injury patients in Peshawar. *J Pak Med Assoc*, 2017. 67(3): p. 434-437.
16. Chang, F.-S., et al., Preliminary validation study of the WHO quality of life (WHOQOL) scales for people with spinal cord injury in Mainland China. *The Journal of Spinal Cord Medicine*, 2022. 45(5): p. 710-719.
17. Rivers, C.S., et al., Health conditions: effect on function, health-related quality of life, and life satisfaction after traumatic spinal cord injury. A prospective observational registry cohort study. *Archives of physical medicine and rehabilitation*, 2018. 99(3): p. 443-451.
18. Burke, D., O. Lennon, and B.M. Fullen, Quality of life after spinal cord injury: The impact of pain. *European Journal of Pain*, 2018. 22(9): p. 1662-1672.
19. Vural, M., et al., Assessment of quality of life in relation to spasticity severity and socio-demographic and clinical factors among patients with spinal cord injury. *The Journal of Spinal Cord Medicine*, 2020. 43(2): p. 193-200.
20. Moshi, H., et al., Quality of life of persons with traumatic spinal cord injury in rural Kilimanjaro, Tanzania: a community survey. *Disability and rehabilitation*, 2021. 43(20): p. 2838-2845.
21. Abu-Baker, N.N., N.m.H. Al-Zyoud, and A. Alshraifeen, Quality of life and self-care ability among individuals with spinal cord injury. *Clinical Nursing Research*, 2021. 30(6): p. 883-891.



22. Parajuli, B., et al., Traumatic thoracic and lumbar spine injury in adult population presenting to a tertiary care hospital. *Journal of Nepal Health Research Council*, 2022. 20(2): p. 392-398.
23. Jindal, R., et al., Quality of life after traumatic thoracolumbar spinal cord injury: a North Indian perspective. *Spinal Cord*, 2023: p. 1-9.
24. Utiyama, D.M.O., et al., Results from the International Spinal Cord Injury Community Survey: The Lived Experience of People with Spinal Cord Injury in South-Eastern Brazil. *Journal of Rehabilitation Medicine*, 2022. 54: p. jrm00342-jrm00342.
25. Du, J., et al., Epidemiological characteristics of traumatic spinal cord injury in Xi'an, China. *Spinal Cord*, 2021. 59(7): p. 804-813.
26. Alves, M.A., S. Pilusa, and M.K. Mashola, The prevalence and profile of spinal cord injury in public healthcare rehabilitation units in Gauteng, South Africa. *Spinal Cord Series and Cases*, 2023. 9(1): p. 15.
27. Geyh, S., et al., Quality of life after spinal cord injury: a comparison across six countries. *Spinal Cord*, 2013. 51(4): p. 322-326.





CONFLICT OF INTEREST

Authors declared no conflict of interest, whether financial or otherwise, that could influence the integrity, objectivity, or validity of their research work.

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DATA SHARING STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request



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