



ASSESSMENT OF QUALITY OF LIFE AMONG PATIENTS WITH SPINAL CORD INJURY UNDERGOING REHABILITATION

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ABSTRACT

Introduction: Spinal cord injury (SCI) is one of the most debilitating conditions, resulting in lifelong functional limitations and disruption of physical, psychological, and social well-being. Globally, an estimated 250,000–500,000 individuals sustain an SCI annually. Despite advances in acute care, quality of life (QoL) remains substantially impaired, highlighting the importance of rehabilitation.

Methods: A cross-sectional study was conducted among 113 patients with SCI, comprising 51 patients admitted to a Spinal Cord Injury Centre (SCIC) and 62 rehabilitated patients residing in a designated rehabilitation centre. Quality of life was assessed using the pre-validated WHOQOL-BREF questionnaire, which evaluates four domains: physical health, psychological health, social relationships, and environment. Responses were recorded using a 5-point Likert scale.

Results: The mean age of patients in the SCIC and rehabilitation centre was 31.43 ± 8.05 and 46.37 ± 11.42 years, respectively. Road traffic accidents were the leading cause of SCI (50%), followed by occupational hazards (20%), sports-related injuries (15%), falls (10%), and non-traumatic causes (5%). Rehabilitated patients demonstrated significantly higher QoL scores in the psychological (69.45 ± 15.08 vs. 54.18 ± 15.70) and environmental (87.21 ± 10.99 vs. 81.35 ± 12.93) domains than patients admitted to the SCIC ($p < 0.05$). Differences in the physical health and social relationship domains were not statistically significant.

Conclusion: Patients undergoing rehabilitation demonstrated significantly better quality of life, particularly in the psychological and environmental domains, than those receiving acute inpatient care. These findings suggest that multidisciplinary rehabilitation is associated with better quality of life among individuals with spinal cord injury.

KEYWORDS: Quality of Life (QoL), Spinal Cord Injury (SCI), Rehabilitation, WHOQOL-BREF.

Introduction

Globally, about 15 million people are living with spinal cord injury (SCI), as per the World Health Organisation (WHO)

[1]. In India, the average annual incidence of SCI is 15,000 with a prevalence of 0.15 million [2]. The major cause of long-term disability, accounting for over 4.5 million years of life lived with disability (YLDs) in the year 2021 was due to

SCI. People with SCI are at risk of developing debilitating and even life-threatening secondary conditions, which can cause premature mortality and also face physical, social, economic and environmental barriers[3,4]. The extent of Spinal cord-related impairment depends on injury severity and location in the spinal cord. SCI results in complete or incomplete loss of sensory and/or motor functions below the injury level. The term spinal cord injury (SCI) refers to damage to the spinal cord resulting from trauma (e.g. from road traffic injuries and falls) or non-traumatic causes like degenerative, tumours, infections, vascular conditions, toxins or birth defects. SCI can diminish the capacity to perform daily activities, including walking, using one's hands, physiological emptying of bowel/bladder or washing and dressing oneself[5].

Patients with SCI can experience a range of secondary physical and psychological effects, including anxiety and depression (experienced by approximately 22.2% of the population) and poor QoL. Stabilisation of the patient becomes the priority Immediately after the injury, and therefore the patient may face many challenges on the physical, social, environmental, and psychological levels. To adjust to their newly acquired disabilities, institutional rehabilitation provides a largely standardized supportive environment that helps SCI patients. Limitations are compounded by misconceptions, negative attitudes and physical barriers to basic mobility, restricting independence and full societal participation[6]. Spinal cord injuries (SCI) are amongst the most dreaded injuries, invariably causing debilitating effects and disrupting the usual way of life for most of the survivors[7,8]. They are high-cost disability requiring numerous personal lifestyle changes[9]. The survivors invariably suffer from the aftereffects of this in the form of lower participation in academics, economically and socially productive life[10]. Road traffic accidents, falls and sports-related injuries are listed as the main causes for SCI.

The patients with spinal cord injuries need considerable support for rehabilitation after the injury, but even after all the efforts, the quality of life (QoL) is never the same for these patients. The literature available on QoL for such patients is scarce[11]. With this background, the present study was conducted with the following objectives.

Objectives

The objectives of the study were to assess the QoL of spinal cord injury patients and to compare QoL between patients in the Spinal Cord Injury Centre (SCIC) and patients in a designated Rehabilitation Centre.

Operational Definitions

Quality of Life

Quality of Life is defined as an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their

goals, expectations, standards and concerns. (World Health Organisation)[12,13].

Rehabilitation

A set of interventions designed to optimise functioning and reduce disability in individuals with health conditions in interaction with their environment. (World Health Organisation)[14].

Methodology

Study Design

A Cross-sectional study

Study Settings

This cross-sectional study was conducted on 51 patients admitted in a SCIC in Western Maharashtra and 62 rehabilitated spinal cord injury patients staying in a designated rehabilitation centre.

Study Population

Patients admitted to a spinal cord injury centre and rehabilitated individuals in designated paraplegic rehabilitation centres with documented Spinal cord Injury.

Study Sample

113 participants (51 spinal cord injury centre patients and 62 from the paraplegic rehabilitation centre)

Sampling method

All eligible patients were included in the study

Study Tool

A pre-tested interviewer-administered WHOQOL-BREF questionnaire comprising 26 items across four domains and rated on a five-point Likert scale was used.(12,15,16)

- Domain 1 (Physical Health) – assesses pain, energy, sleep, mobility, and daily activities.
- Domain 2 (Psychological Health) – assesses positive and negative feelings, self-esteem, and body image.
- Domain 3 (Social Relationships) – assesses personal relationships, social support, and sexual activity.
- Domain 4 (Environment) – assesses financial resources, safety, accessibility, health services, and home environment. All 4 domains of QoL viz physical health, psychological, social relationships and environment were assessed.

Inclusion Criteria

Patients admitted to the Spinal Cord Injury Centre or residing in the rehabilitation centre with documented spinal cord injury.

Exclusion Criteria

Patients having any difficulty in speech including patients with an Endotracheal tube or tracheostomy tube.

Ethical Considerations

Ethical clearance was obtained from the regional Institutional Ethical Committee (IEC). Permission was obtained from the relevant administrative authorities. The study objectives were explained to all the participants and written informed consent was obtained from all participants before enrolment. Confidentiality of the data was maintained.

Data Analysis

Data were entered into Microsoft Excel and SPSS (IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY, USA: IBM Corp.) and analysed. For inferential statistics, the independent samples t-test was used to compare QoL scores between patients admitted to the Spinal Cord Injury Centre and those in the rehabilitation centre. One-way analysis of variance (ANOVA) was used to compare QoL scores across different functional levels. A p-value <0.05 was considered statistically significant.

Results

Socio-Demographic Characteristics of the Patients

In the present study, 113 patients were enrolled; 51 patients were admitted to a Spinal Cord Injury Centre and 62 rehabilitated patients from the designated rehabilitation centre. The mean age of patients in SCIC was 31.43 ± 8.05 , and for DRC patients, it was 46.37 ± 11.42 . As shown in Figure 1, almost 55% of SCIC participants were aged ≤ 30 years, while 76% of DRC participants belonged to the 30–59-year age group.

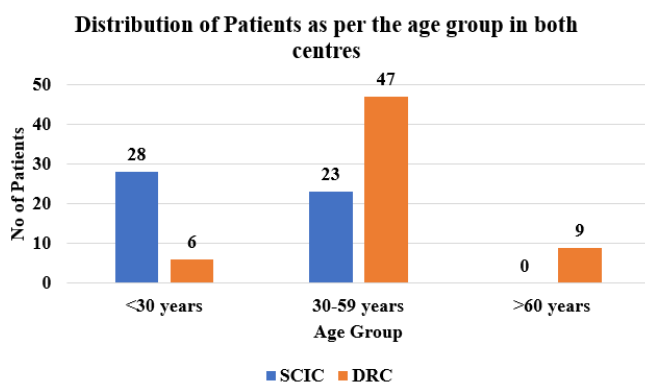


Figure 1. Distribution of participants as per the age group in both the centres

Mode of Spinal Cord Injury

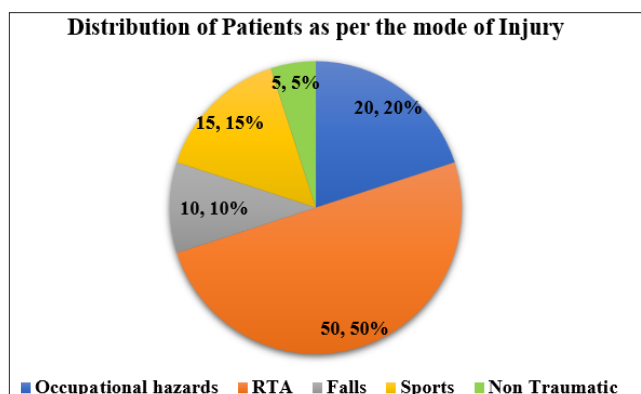


Figure 2. Distribution of participants as per the mode of Spinal Cord Injury

Mode of Spinal Cord Injury

The predominant cause of the spinal cord injury was road traffic accidents (RTAs) accounting for 50% of the cases, followed by occupational hazards (20%), sports-related trauma (15%), falls (10%), and non-traumatic causes (5%) accounted for the remainder (Fig. 2).

QoL score:

The mean QoL score for SCIC patients in domain 1 (Physical Health) was 62.51, in domain 2 (Psychological) was 54.18, in domain 3 (Social Relationships) it was 41.39 and for domain 4 (Environment) it was 81.35. The scores for patients in the rehabilitation centre were 64.74, 69.45, 44.50 and 87.21 for domains 1, 2, 3 and 4 respectively.

Patients in the rehabilitation centre had significantly higher psychological and environmental QoL scores than patients admitted to the SCIC. Differences in the physical health and social relationship domains were not statistically significant.

Association between Functional Level and QoL

Functional status showed a significant association with the physical domain of QoL ($p = 0.031$), indicating that patients with incomplete paraplegia reported higher physical QoL compared to those with complete quadriplegia as shown in Table 2. Although differences in psychological, social, and environmental domains were observed, they were not statistically significant. This may be attributed to effective coping mechanisms, social support, and adaptation irrespective of functional level.

Table 1: Comparison of QoL scores of SCIC and DRC patients

S. No.	QoL Domain	Spinal Cord Injury Centre (n=51) Mean $\pm$ SD	Rehabilitation Centre (n=62) Mean $\pm$ SD	Difference between Means (95% CI)	p-value
1.	Physical Health	62.51 $\pm$ 13.54	64.74 $\pm$ 12.93	2.23 (–2.72, 7.18)	0.38
2.	Psychological Health	54.18 $\pm$ 15.70	69.45 $\pm$ 15.08	15.28 (9.50, 21.10)	<0.001
3.	Social Relationships	41.39 $\pm$ 16.92	44.50 $\pm$ 11.88	3.11 (–2.27, 8.49)	0.26
4.	Environment	81.35 $\pm$ 12.93	87.21 $\pm$ 10.99	5.86 (1.32, 10.39)	0.013

Table 2: Association between QoL and current level of function

S. No.	Current Level of Function	Physical Health	Psychological Health	Social Relationships	Environment
1.	Incomplete paraplegia	68.89±10.04	63.44±12.80	38.11±19.54	88.33±8.05
2.	Complete paraplegia	66.62±12.27	61.42±17.70	44.53±12.67	86.19±10.92
3.	Incomplete quadriplegia	60.38±13.41	62.92±17.42	42.77±14.42	84.08±12.53
4.	Complete quadriplegia	58.00±15.12	65.75±17.48	41.58±17.87	76.17±16.19
	p value	0.031	0.877	0.630	0.054

Traumatic vs Non-Traumatic Patients

As depicted in Table 3, patients with traumatic injuries (n=106) demonstrated slightly higher mean scores across all QoL domains compared to those with non-traumatic causes (n=7), but none of the differences were statistically significant. This suggests that the underlying cause of injury may have a limited impact on QoL once the initial rehabilitation and adjustment phases are complete.

Table 3: Comparison of QoL scores between patients with traumatic injury vs the non-traumatic injury

S. No.	QoL Domain	Patients with Traumatic Injury (n = 106) Mean ± SD	Patients with Non-Traumatic Injury (n = 7) Mean ± SD	Difference between Means (95% CI)	p-value
1.	Physical Health	63.75 ± 13.16	63.57 ± 14.78	0.17 (-10.08, 10.42)	0.97
2.	Psychological Health	62.84 ± 17.01	58.29 ± 19.16	4.55 (-8.69, 17.80)	0.50
3.	Social Relationships	43.23 ± 14.60	41.14 ± 11.35	2.08 (-9.09, 13.25)	0.71
4.	Environment	84.54 ± 11.76	85.00 ± 19.04	-0.46 (-18.08, 17.16)	0.96

(Values are expressed as mean ± standard deviation. P-values were obtained using the independent samples t-test. A p-value <0.05 was considered statistically significant).

Patients undergoing rehabilitation demonstrated significantly higher quality of life scores, particularly in the psychological and environmental domains. These findings suggest that rehabilitation is associated with better quality of life among individuals with spinal cord injury.

Discussion

The present study demonstrated that rehabilitated patients had higher QoL scores across all WHOQOL-BREF domains than patients admitted to the SCIC, with statistically significant differences observed in the psychological and environmental domains. These findings highlight the positive association between structured rehabilitation and improved psychosocial well-being and environmental adaptation. Similar observations have been reported by Lude et al. (2014) and Gurcay et al. (2010), who demonstrated improved life satisfaction and psychological adjustment following comprehensive rehabilitation.

In contrast, the physical health and social relationship domains showed modest improvements without statistical significance. These findings resonate with those of Gurcay et al. (2010), who observed that even with prolonged rehabilitation, limitations in mobility and dependence on caregivers often persist, restricting complete recovery in these domains. Persistent barriers such as architectural inaccessibility, limited employment opportunities, and social

stigma continue to affect social reintegration.

In a systematic review by Davide Cardile et al (2024) reported that different psychological and physical aspects can positively or negatively influence the QoL of SCI patients. Similarly, in a study by Inacia Satiro Xavier de Franca (2011), the domains scores were physical (58.59), psychological (63.82), social (68.79), and environmental (55.20). The correlation between domain scores and the perception of QOL: physical (p <0.187), psychological (p <0.399), social (p <0.000), and environmental (p <0.008). Most participants (55.3%) are unsatisfied with their QOL. (17)

The association between functional level and QoL revealed that individuals with incomplete paraplegia had better physical functioning and overall QoL scores compared to those with complete quadriplegia, consistent with Wilson et al. (2011)[18] and Mathur et al. (2015)[7]. This reinforces that higher residual motor function translates into greater independence and life satisfaction.

The significant improvement in the psychological domain may be explained by structured counselling, peer interaction, improved coping mechanisms, and gradual adaptation to disability during rehabilitation. Similarly, better environmental scores among rehabilitated patients may reflect improved accessibility, assistive devices,

rehabilitation-friendly infrastructure, and greater availability of social and healthcare support.

Interestingly, the cause of injury (traumatic vs. non-traumatic) did not significantly influence QoL. This may indicate that, beyond the acute phase, the impact of injury on QoL is determined more by coping strategies, social support, and rehabilitation access than by etiology itself.

Recommendations

Many effective interventions are available to prevent many causes of traumatic SCI. These include improvements in road infrastructure, vehicles and people's road behaviours to avoid road traffic accidents, window guards to prevent falls, policies to thwart the harmful use of alcohol and access to firearms to reduce violence, and domestic violence and suicide prevention strategies (including equitable mental health services). Early diagnosis and treatment of the underlying health condition is the key modality to prevent non-traumatic SCI.

An early and comprehensive rehabilitation should begin following stabilization of the patient. A multidisciplinary team approach should be followed that would include Psychiatrists, Physiotherapists, Occupational therapists, Psychologists, Community Medicine specialists, Rehabilitation Nursing staff, Speech and language therapists, prosthetists, orthotists, and medico social workers should be institutionalized at all tertiary centres managing SCI. Regular psychological counselling and peer support programs should be integrated into rehabilitation to address depression, anxiety, and adjustment issues, which were shown to significantly influence the psychological domain of QoL. Efforts should be made to create barrier-free environments in hospitals, rehabilitation centres, workplaces, and public spaces. Provision of assistive devices and home modifications should be prioritized to improve mobility and independence. Workshops and Health education sessions must be provided for using the assistive technology optimally. Structured vocational training and community reintegration programs should be implemented to help SCI patients regain economic independence and social participation. Collaboration with NGOs and government agencies can facilitate job placement and inclusive employment opportunities. Since road traffic accidents were the leading cause of SCI in this study, road safety education, stricter enforcement of helmet and seatbelt laws, and public awareness campaigns are essential preventive measures that should be undertaken. Routine use of standardized QoL assessment tools such as the WHOQOL-BREF in SCI management should be encouraged to monitor progress during rehabilitation and guide individualized care plans. There is a need to further expand the number of dedicated spinal cord injury rehabilitation centres, especially in underserved regions, to ensure equitable access to quality care and long-term follow-up. Longitudinal studies should be conducted to evaluate QoL trajectories over time and the effectiveness of various

rehabilitation interventions. Policymakers should prioritize SCI as a public health concern and integrate rehabilitation into national disability and health policies.

Conclusions

Patients who had undergone rehabilitation demonstrated higher quality of life scores, particularly in the psychological and environmental domains. These findings suggest that comprehensive multidisciplinary rehabilitation is associated with better quality of life among individuals with spinal cord injury. Public health policies should strengthen access to early rehabilitation and long-term community reintegration services.

Limitations

The cross-sectional design precluded the establishment of a temporal or causal relationship between rehabilitation and quality of life. Self-reported data are susceptible to recall bias. The limited sample size of the study from two centres limits the generalizability of the findings to other regions and also to different centres with different rehabilitation protocols. Confounding factors such as duration since injury, level of social support, socioeconomic status, and presence of comorbidities were not analysed in detail and could have influenced the QoL outcomes. Participants were enrolled from tertiary-level centre and rehabilitation facilities, possibly excluding patients who were unable to access such centres due to socioeconomic or geographic barriers which may have led to selection bias.

Conflict of Interest

The authors have none to declare.

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