Predictors of quality of life among individuals with paraplegic spinal cord injury after discharge from hospital to community in Pakistan

Faizan Jameel Khanzada, OT, BOT[1,2], Mohammad Ghazali Masuri, OT, PhD[1], Zulkifli Abdul Rahim, OT, PhD[3], Ahmad Zamir Che Daud, OT, PhD[1,4]

[1]Centre for Occupational Therapy Studies, Faculty of Health Sciences, Universiti Teknologi MARA, Malaysia, [2]Sindh Institute of Physical Medicine and Rehabilitation, Department of Occupational Therapy, Govt of Sindh, Karachi Pakistan, [3]Disability Transformation Unit, School of Health Sciences, Universiti Sains Malaysia, Kubang Kerian, Malaysia, [4]Special Population Research, Innovation and Knowledge (SPaRK), Faculty of Health Sciences, Universiti Teknologi MARA, Malaysia

ABSTRACT

Introduction: This study aimed to determine the predictors of quality of life (QOL) among persons with paraplegic spinal cord injury (SCI) after discharge from the hospital to the community in Pakistan, based on the International Classification of Functioning (ICF) components, including participation, impairments of body function/structures, personal factors, and environmental factors.

Materials and Methods: A cross-sectional study was conducted with, one hundred and forty individuals with paraplegic SCI, who met the inclusion and exclusion criteria and attended an outpatient rehabilitation clinic. The impairment of body function/structures of participants was assessed using the American Spinal Injury Association (ASIA) Scale, which classified them as A, B, C, D, or E. A set of questionnaire survey forms was used to collect socio-demographic information, occupational participation, environmental factors, and QOL by using a demographic questionnaire, World Health Organization Disability Assessment Schedule 2.0 (WHODAS-II), Craig Hospital Inventory of Environmental Factors (CHIEF) scale and World Health Organization Quality of Life (WHOQOL) BREF form respectively.

Results: The results showed that occupational participation was the strongest predictor of QOL among persons with paraplegic SCI (β=-0.586, *p*<0.001). In the second step, variables representing body function/structure factors (ASIA-A, B, C, D, E) were added, and the overall model explained 40.7% of the variance in QOL. In the third step, personal factors (age groups, gender, marital status, level of education, and rehabilitation duration) were added, and the overall model explained 51.4% of the variance in QOL. In the final step, environmental factors (CHIEF 12 Items scale) were added, but they did not significantly explain the model.

Conclusion: The findings suggest that occupational participation was found to be the most significant predictor of QOL among individuals with paraplegic SCI. Body function/structure factors, personal factors, and environmental factors were also significant predictors, but to a lesser extent. The findings of this study can inform healthcare professionals and policymakers in developing interventions and, policies targeting occupational participation, and personal factors that may be effective to improve the QOL of individuals with paraplegic SCI in Pakistan.

KEYWORDS:
Quality of life, paraplegic spinal cord injury, International Classification of Functioning, disability and health, comprehensive rehabilitation

INTRODUCTION

Paraplegic spinal cord injury (SCI) is a devastating event that can result from traumatic or non-traumatic incidents affecting the thoracic, lumbar, and sacral spine segments.[1] This type of injury typically leads to the loss of motor, sensory, and autonomic function in the affected areas, causing significant changes in the individual's life. After being discharged from the hospitals, individuals with paraplegic SCI undergo multi-disciplinary rehabilitation aimed at addressing the sequels of this condition. These include preventing pressure sores, avoiding urinary tract infections, overcoming emotional distress, restoring body function to enable independent living and performing daily activities, participating in community life, and improving the overall quality of life (QOL).[2] Thus, individuals with paraplegic SCI have to deal with a complex set of challenges that require a comprehensive approach.

The World Health Organization (WHO) defines QOL as a broad concept that encompasses an individual's perception of their position in life, taking into account cultural and value systems, as well as their goals, expectations, standards, and concerns.[3,4]

In individuals with paraplegic SCI, QOL is drastically affected, particularly in cases where a young, healthy breadwinner becomes a prisoner of their own body, losing complete control over their movements, leading to a decreased quality of life and increased dependence on family members.[5] It is, therefore, essential to examine QOL in these individuals, as it is considered the best determinant of the

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Corresponding Author: Ahmad Zamir Che Daud
Email: zamir5853@uitm.edu.my

success of multidisciplinary rehabilitation for SCI, reintegrating individuals into the community, and overall satisfaction with life. Understanding the QOL is crucial for addressing the complex challenges associated with paraplegic SCI and improving the lives of those affected by this condition.

The International Classification of Functioning, Disability, and Health (ICF) is a widely recognized healthcare conceptual framework developed by the WHO. It provides a comprehensive understanding of the disability or functioning of paraplegic SCI in individuals' lives and daily activities.6 The ICF comprises four components including participation, impairments of body function/structures, personal factors, and environmental factors.[6] These factors are interlinked and can restrict long-term participation in their everyday activities, creating challenges for individuals with SCI.[7] Participation is a complex term that encompasses various characteristics and dimensions essential to an individual's overall well-being.[8] It plays a critical role in the comprehensive rehabilitation of people with SCI, as it is a key indicator of their QOL. The relationship between participation and QOL is closely intertwined and is often used to measure an individual's overall well-being.[9]

When an individual can participate in meaningful and enjoyable activities and daily functioning, they are likely to experience higher levels of satisfaction, happiness, and overall QOL.[10] Conversely, limitations or restrictions in participation can disturb an individual's QOL.[11] However, the ICF framework does not account for the concept of QOL, as it only depicts various interrelated elements that influence participation to varying degrees. Previous studies have used the concept of QOL and the ICF to understand the health and well-being of persons with disabilities from an integrated perspective. It has been found that QOL is lower in the population of people with SCI than in the population without SCI.[12-14] Furthermore, many studies have identified the association of ICF domains with QOL among people with SCI, and all predictors have an inconsistent effect on QOL. For instance, community participation was found to have no effect on any QOL dimensions following SCI, while impairment of body function, high education, and being married were determined to be high levels of QOL.[15] Conversely, environmental barriers and five psychological variables were associated with low levels of QOL.[16,17] Several studies systemic reviews, critical reviews, meta-analyses, and conceptual frameworks have reported a strong relationship between participation and QOL in people with SCI.[18,19,20,21] However, none of the studies was conducted in the Pakistani community. Therefore, this study aimed to investigate whether the ICF model can accurately predict the QOL of individuals with paraplegic SCI after their discharge from the hospital and to the community. The results of this study may provide significant new evidence to assist health professionals in developing comprehensive rehabilitation plans and gaining a deeper understanding of the challenges faced by people with paraplegic SCI particularly in the Pakistani community.

MATERIALS AND METHODS

Study Design and Sampling

A cross-sectional study was conducted to identify the predictors of QOL in individuals with paraplegic SCI based on the ICF. This study design was chosen because it is a convenient and inexpensive method for understanding the relationship and association of variables.[22] Purposive sampling was used to recruit participants who were undergoing follow-up therapy services at the Rehabilitation Outpatient Departments of Jinnah Postgraduate Medical Centre and Paraplegic Rehabilitation Centre in Pakistan. A target sample size of one hundred forty (n=140) was calculated using G*Power 3.1 software with an alpha level of 0.05, a power level of 0.8, and a medium effect size of 0.15.23 Participants who had been diagnosed with paraplegic SCI and discharged from the hospital, but were still receiving comprehensive rehabilitation therapies as outpatients, were identified from the record and contacted to offer an opportunity to participate in the study.

Data Collection Instruments

The study utilized a comprehensive set of questionnaires to assess various aspects related to paraplegic SCI. Participants were required to spend 40 to 60 minutes completing the assessment, which included providing their demographic information, undergoing structure examination of body impairment and using the ASIA Scale, and assessing activity and participation using the WHODAS-II Scale. The environmental predictors were evaluated using the CHIEF 12-item scale, and quality of life was assessed using the WHOQOL BREF Scale.

Data Analysis

The data were analysed analysis using Statistical Package for the Social Science (SPSS) version 28. Descriptive statistics were used to summarize the demographic data, while hierarchical multiple linear regression was employed to identify the predictors of QOL among individuals with paraplegic SCI Before running the hierarchical multiple regression analysis, the categorical variables such as personal factors and impairment of body function/structures were recorded from 0 to 1 and transformed into dummy quantitative variables. Tests for multicollinearity and normality were carried out between the dependent and independent variables. A *p*-value of 0.05 and 0.01 was considered statistically significant for all calculations.

Ethics Approval and Informed Consent

Before the commencement of the research study, each participant was required to provide informed consent. Approvals to conduct the study were obtained from the Research Ethics Committee of Universiti Teknologi MARA in Malaysia (Ref no: 600-TNCPI (5/1/6)) and the National Bioethics Committee for Research at the National Institute of Health, Ministry of Health in Pakistan (Ref no: NBC-922/23/1546).

RESULTS

Table: I show the demographic information of individuals with paraplegic SCI. who participated in this study. The sample consisted of 140 individuals, with the majority being

Table I: Demographic Information of Individuals with Paraplegic SCI (n=140)

Demographic Information	Frequency (n)	Percent (%)
Genders		
Male	137	97.9%
Female	3	2.1%
Age groups		
21-41 (Young Adults)	113	80.7%
41-51 (Middle Adults)	25	17.9%
51-60 (Older Adults)	02	1.4%
Marital Status		
Married	80	57.1%
Un-married	60	42.9%
Education Level		
Primary Education	62	44.1%
Secondary Education	50	35.9%
Higher Education	28	20%
Employment Status		
Working Full Time	34	24.9%
Working Part-Time	26	18.6%
Unemployed/Dependent	80	56.5%
Nature of Injury		
Traumatic Injury	120	85.7%
Bolt Injury/Violence	20	14.5%
Bomb Blast Injury	10	7.1%
Vehicle Accident Injury	40	28.5%
Falls Injury	35	25%
Sign Board Fall Injury	05	3.5%
Work Place Injury	10	7.1%
Non Traumatic Injury	20	14.7%
Tumour	08	5.7%
Transverse Myelitis	12	8.5%
Severity of Injury		
Complete	99	70.7%
Incomplete	41	29.3%
Level of Injury		
T1-T12 Level of Injury	100	71.5%
L1-L5 Level of Injury	40	28.5%
ASIA Classification		
A-Complete	74	52.9%
B-Incomplete	17	12.1%
C-Incomplete	25	17.9%
D-Incomplete	20	14.2%
E-Normal	04	2.9%
Rehab Program		
Attended	102	72.9%
Missed	38	27.1%

males (97.9%), and a small proportion were identified as female (2.1%). Age groups were categorized into three functional categories within the range of 21 to 60 years. The first age category 21-41 was classified as young adults (n= 113), accounting for (80.7% of) the sample, the second age category 41-50 was classified as middle adults (n=25), accounting for (17.9%) and lastly, the third age category 51-60 was classified as older adults (n=2), accounting for (1.4%) of the sample. The majority of individuals were married (57.1%) and had received secondary education (35.7%). In terms of post-injury employment status, the majority of participants were unemployed or dependent (56.4%), while (24.2%) were working full-time and (18.5%) were working part-time. The nature of their injuries varied, with traumatic injury being the most common (85.7%), caused by, gunshots, motorcycle, and rickshaw accidents, falls from heights, bomb blast fragments, waves, accidents involving scraping machine belts, and falls from the iron signboards. It was followed by non-traumatic injury (14.3%) cases caused by tumours and transverse myelitis diseases. The majority of individuals had a complete degree of injury (70.7%) and the injury level was primarily at T1 to T12 (71.4%). Based on the ASIA classification score, most individuals had a complete injury or AIS A (52.9%), while AIS E only (2.9%) had a normal score. The majority of individuals had received comprehensive rehabilitation services (72.9%), and the length of follow-up since injury ranged from 15 days to 8 years.

The results of hierarchical multiple regression analysis for predictors of QOL among individuals with paraplegic SCI after discharge from the hospital to the community are presented in Table: II the independent variables included occupational participation, impairments of body function/structure, personal factors, and environmental factors.

Table II: Predictors of QOL in Persons with Paraplegic SCI (n=140)

Hierarchical Multiple Regression Model Independent Variables		Unstandardised Coefficients		Standardised Coefficients		
		B	Std. Error	β	t	Sig.
1	WHODAS-II Scale	-0.497	0.059	-0.586	-8.493	0.000
2	ASIA impairment scale (AIS-A)	0.146	0.159	0.064	0.919	0.360
	(AIS-B)	-0.137	0.131	-0.073	-1.045	0.298
	(AIS-C)	0.318	0.150	0.152	2.118	0.036
	(AIS-D)	0.740	0.268	0.188	2.763	0.007
	Level of injury	-0.359	0.110	-0.225	-3.266	0.001
3	Ages (Young Adults 21-41)	0.009	0.110	0.006	0.085	0.932
	(Middle Adults 41-51)	-0.019	0.155	-0.010	-0.122	0.903
	(Older Adults 51-60)	-0.123	0.419	-0.020	-0.293	0.707
	Gender					
	(Male)	-0.498	0.332	-0.099	-1.502	0.136
	Marital status					
	(Married)	-0.102	0.109	-0.069	-0.937	0.351
	Level of Education					
	(Higher)	0.190	0.108	0.128	1.755	0.082
	(Secondary)	0.414	0.170	0.203	2.441	0.016
	(Primary)	0.649	0.221	0.194	2.939	0.004
	Rehabilitation Duration(Days)	0.121	0.118	0.075	1.028	0.306
	(Weekly)	-0.049	0.140	-0.027	-0.351	0.726
	(Monthly)	0.166	0.131	0.094	1.267	0.208
	Employment status	-0.117	0.116	-0.079	-1.007	0.316
4	CHIEF 12 Items scale	0.033	0.148	0.015	0.223	0.824

Dependent variable: QOL

In the first step of the analysis, occupational participation, as measured by the WHODAS-II scale, was found to be a significant predictor of QOL (Beta=-0.586, $p<0.001$). This variable accounted for 34.3% of the variance in QOL. In the second step, the impairments of body function/structure, as measured by the ASIA impairment scale, were added to the model. Only the level of injury (complete) was found to be a significant predictor of QOL (Beta=-0.225, $p=0.001$). This step added 6.4% of the variance in QOL.

In the third step of the analysis, personal factors, including age groups, gender, marital status, level of education, rehabilitation duration, and job/work status, were added to the model. None of these variables was found to be significant predictors of QOL, except for the level of education (higher) (Beta=0.203, $p=0.016$). This step explained an additional 17.0% of the variance in QOL.

In the final step of the analysis, environmental factors, as measured by the CHIEF 12 Items scale, were added to the model. This variable was not found to be a significant predictor of QOL (Beta=0.015, $p=0.824$). Overall, the hierarchical multiple regression analysis revealed that occupational participation, level of injury (complete), and educational level were significant predictors of QOL among individuals with paraplegic SCI after discharge from the hospital to the community. The other variables, including personal factors and environmental factors, did not significantly predict QOL in this population.

DISCUSSION

This study is the first conducted in Pakistan to examine the predictors of QOL among individuals with paraplegic SCI after discharge from the hospital to the community, based on the ICF components. The ICF components include occupational participation, impairments of body function/structures, personal factors, and environmental factors. Findings of this study revealed that occupational participation is a significant predictor of QOL among individuals with SCI which is consistent with previous research studies. [24-26]

Therefore, health professionals need to design interventions and policies targeting occupational participation that can effectively improve the overall QOL of individuals with paraplegic SCI in Pakistan. Occupational participation can reduce disability and sedentary lifestyles, allowing individuals to perform activities, and decrease their challenges, leading to greater social integration within the community.[27,28] The study finding suggests that impairments of body function and structure, such as the level of injury, were relatively minor predictors in the improvement of QOL for individuals with paraplegic SCI. This is consistent with previous research, which has shown that these factors have an indirect relationship with QOL.[29] On the other hand, secondary impairments, such as neuropathic pain, fatigue, urinary tract infections, and pressure sores, were found to have the greatest direct relationship with QOL, activity limitations, and participation restrictions in previous studies.[29,30] This study however did not include these variables in the analysis.

The findings of this study revealed that personal factors, such as age groups, gender, marital status, rehabilitation duration, employment status, and environmental factors, did not significantly predict QOL among individuals with paraplegic SCI. This is likely due to the complex relationship between these factors and QOL, which can vary depending on individual conditions and situations, and require advanced statistical methods and longitudinal study design for further analysis.[31,32] The regression model also showed that

the level of education is a positive predictor of QOL. Interestingly, some studies have suggested that educational level can have different impacts on individuals depending on their specific circumstances. For example, some individuals with low levels of education may experience a protective and positive effect on their psychological health, ultimately leading to better QOL. On the other hand, some patients with higher levels of education may experience a positive effect on their QOL. These findings highlight the complexity of the relationship between education level and QOL.[33,34]

The findings of this study emphasise the importance of a holistic approach to SCI rehabilitation that considers multiple factors that influence QOL when individuals return to their community. This includes physical and psychological functioning, social support, and environmental barriers. Such an approach can help health professionals to design more effective interventions and policies that target occupational participation and other factors that can improve the overall QOL of individuals with paraplegic SCI in Pakistan.

LIMITATIONS

This study has certain limitations that should be taken into account. Firstly, the sample size was relatively small, which may limit the generalizability of the findings. Secondly, the study was cross-sectional, which limits the ability to draw causal inferences about the predictors of QOL among individuals with paraplegic SCI. Future research should consider incorporating longitudinal designs to better understand the complex and dynamic relationship between the predictors and QOL in individuals with paraplegic SCI in Pakistan.

CONCLUSION

Occupational participation, level of injury (complete), and educational level were significant predictors of QOL in individuals with paraplegic SCI. In contrast, personal factors, including age, gender, marital status, rehabilitation duration, and employment status, did not significantly predict QOL. Furthermore, environmental factors were also not found to be a significant predictor of QOL in this study.

This study highlights the importance of occupational participation and the extent of impairment of body function/structure in predicting QOL among individuals with paraplegic SCI after discharge from the hospital to the community. The lack of significance of personal and environmental factors in the findings suggests that interventions aimed at improving QOL in individuals with paraplegic SCI should prioritise the; interventions that target occupational participation and address impairments in body function/structure. Further research is needed to explore other potential predictors of QOL in this population and to develop effective interventions to improve QOL outcomes in individuals with paraplegic SCI.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest.

AUTHORS CONTRIBUTION

All authors contributed to the design and implementation of the study, analysis of the results, and writing of the manuscript.

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