Quality of Life in Patients with Spinal Cord Injury: The Role of Depressed Mood

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Abstract

Background & Aim: Disabilities resulting from road accidents, especially spinal cord injury, which often occur in the early or middle ages of life, cause psychiatric symptoms and worsen the quality of life in these people. The present study aimed to determine the role of depressed mood in the quality of life of patients with spinal cord injury in Guilan Province (in the north of Iran).

Methods & Materials/Patients: The present research was a cross-sectional, descriptive study. The statistical population included all patients in Spinal Cord Injury Association of Guilan Province, 97 of whom were selected as the sample based on convenience sampling method. The required data were collected using an author-made demographics questionnaire, the Spinal Cord Injury Quality-of-Life-23 questionnaire, and Beck Depression Inventory- Short Form. After removal of demographic confounders, Pearson correlation coefficient, independent student t-test, and hierarchical regression model were used for statistical analysis of the obtained data in SPSS.

Results: Correlation coefficients showed that there is a significant and direct relationship between depressed mood and quality of life ($P<0.0001$). This means that the quality of life in spinal cord injury patients declines with the increase in depressed mood (higher scores in the Spinal Cord Injury Quality-of-Life-23 questionnaire imply the lower quality of life). Hierarchical regression analysis also indicated that, after the elimination of confounding variables (injury duration, gender, type of injury, having bedsore, and using catheter, nurse, diaper, and wheelchair), depressed mood led to predict 70% of the joint changes in quality of life score ($F=23.77$, $P<0.0001$).

Conclusion: The study findings emphasize the prevention and treatment of depressed mood to improve the quality of life in patients with SCI.

Keywords: Spinal Cord Injury; Disabled People; Quality of Life; Depressed Mood

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Introduction

The spinal cord is a highly vital part of the central nervous system and even a small injury to it may lead to severe disability. Spinal cord injury (SCI) accounts for 50% of deaths from trauma. Common causes of SCI include traffic accidents, falling, acts of violence, and sports-related injuries. In addition, SCI can be followed by physical, emotional, and social adverse effects [1]. Thousands of people annually are affected with SCI as a result of various events [2]. In the US, nearly 200,000 people live with disabilities caused by SCI and about 11,000 people are annually hospitalized due to these injuries [4]. In Iran, there are 5,000 patients with SCI, 2000 of whom are Iran-Iraq war victims and 3000 of them are the victim of other events such as accident and falling [4].

Disabled people with SCI may live a long time with this injury. Like their friends and colleagues, they can work, marry, and take part in sports competitions. Nevertheless, activities that seem easy and simple to do for healthy individuals are problematic for disabled people. These people face numerous problems such as financial problems, lack of social support, and health-related issues every day. Fortunately, medical advances have made it possible for them to lead a meaningful and productive life for years. Therefore, disabled people with SCI should view their body from a different point of view [5].

Clearly, the occurrence of these events in the early years of life not only has a destructive influence on one's daily life and productivity but also affects the quality of life of themselves, their family, and society. The term "quality of life" was used by Pigou in 1920 for the first time. Over time, researchers found that quality of life can be one of the major consequences in the health evaluation. This is also emphasized in the World Health Organization's definition of health [6]. In today's world, improving the quality of life of people with disabilities is considered as one of the objectives of rehabilitation. One of the groups with physical disabilities is SCI patients that are often affected with this condition in the early or middle ages of their life [7]. The quality of life is the subjective component of welfare which can be evaluated through the measurement of a certain mental feeling of pleasure or displeasure about life [8].

Studies have revealed that SCI patients, because of restrictions in the fields of health and personal autonomy, experience lower levels of quality of life [9], have a lower mental health level [10], and are more vulnerable to suicide, divorce, and drug abuse [11]. Silver et al. [12] showed that SCI patients believe that their reduced quality of life is mainly related to the inability to return to work or school, adaptation to new social roles, and acquisition of personal autonomy. Some studies in Iran have dealt with the demographic and psychological aspects of quality of life in patients with SCI and reported that 73.3% of them have an average evaluation of their quality of life [7].

The most prevalent psychological problem among SCI patients is depression. Krause et al. [13] concluded that 48% of people with SCI are also affected with depression. This figure has been reported to be ranged between 22% and 38% by other researchers [14]. More recent studies have estimated that the average prevalence of diagnosed depression after SCI is about 22.2% (with a minimum and maximum of 18.7% and 26.3%, respectively) [15]. After a SCI, the patients will experience many changes in their lives. Adaptation with these changes can be time-consuming and usually requires help from others. Depression in SCI patients can exacerbate pressure sores, urinary tract infections, chronic pains, prolonged stay in the hospital, problems in personal relationships, problems with health providers, drug addiction, and increased

healthcare costs. In addition, due to depression, SCI patients are at greater risk for suicide [16,17].

The underlying assumption in the study of depressed mood is that SCI patients may experience a considerable level of negative and depressed mood because of their physical disability which can lead to reduced quality of life [13-15]. In the past, many studies were conducted on the quality of life in patients with SCI [9-12]. Nonetheless, there is little information about the role of depressed mood in the quality of life among these patients. The present study can raise awareness of physicians who are involved in the drug therapy of SCI patients about mental disorders and promote psychologists' understanding of SCI patients who are simultaneously experiencing mental health problems.

Methods and Materials/Patients

The statistical population included all members of SCI Association of Guilan Province (N=133). Based on Krejcie and Morgan Table [18], the sample size was determined to be 97. All of the participants signed informed written consent before participation. This study has been approved by Guilan University institutional review board. As mentioned in the results' section, power analysis in general linear model was used to assess the adequacy of the sample size in regression analysis. The patients aged over 16 suffering from SCI at least in the previous six months were selected as the sample, and those who were born with SCI were excluded from the study. To collect demographic information, an author-made instrument was used. This instrument consisted of age, gender, educational attainment, the time elapsed from the injury occurrence, type of injury, bedsore, the use of a urinary catheter, and the use of diapers, nurse, and wheelchair. Other data collection instruments used in the present study are as follows:

-The spinal cord injury quality-of-life-23 questionnaire (SCIQL-23): This 23-item questionnaire has been developed to assess health-related quality of life in SCI patients [19]. This instrument has presented an excellent reliability and its alpha coefficient has been reported to be more than 0.80 [20]. The Farsi Version of this questionnaire, with an acceptable content validity, has been tested on a sample of SCI patients in Iran [21]. The last item of SCIQL-23 deals with the measurement of Global Quality of Life (GQOL). The other 22 items are divided into three subscales of function (FUBC) (physical and social limitations), mood (MOOD) (psychological status of patients), and injury-associated problems (PROB) (level of autonomy and other issues related to the injury). All scores of these parts, except for GQOL, are converted to achieve a scale with a range of 0 to 100. Higher scores on FUNC, PROB, and MOOD parts indicate weaker levels of quality of life [19,21].

-Beck Depression Inventory-Short Form (BDI-SF): This questionnaire includes 13 sets of items that each of them represents a state in patients. The score of each item ranges between 0 and 3 and the total score will be between 0 and 39 [22]. However, it should be noted that a score of less than 4 indicates possible denial of depression, good pretense, so do scores less than the usual level even for healthy people. In addition, very high scores, even among severely depressed ones, suggest a possible exaggeration of depression. The main advantage of the short-form of this inventory is that it takes about five minutes to fill it out. Beck et al. [23], by reviewing the studies which had used this instrument, found that its reliability coefficient using the test-retest method ranges between 0.48 and 0.86 depending on the interval between the frequency of the test runs and the studied population. On the other hand, based Hamilton Psychiatric Rating Scale for Depression (HRSD), Zung Self-Rating Scale, MMPI Depression Scale, and SCL-90, it has been shown that the mean correlation of BDI-SF is more than 0.60 [24]. Reliability and validity coefficients of this inventory in Iran have been reported to be 0.78 and 0.70-0.90, respectively [25].

Procedure

Out of the 97 subjects of this study, 38 patients were evaluated in SCI Association of Guilan Province in Rasht, 27 patients who were not able to visit the Association were examined at their homes, and others were invited to Welfare Administration of Rasht to complete the sample size and evaluating them. First, SCI patients were visited by a physician and then referred to a psychologist in order to fill out the questionnaires. Before the beginning of the study, the subjects were assured that their information will be kept confidential and anonymous.

Statistical analyses

The obtained data were statistically analyzed using SPSS-20 at a significance level of $P<0.05$. In order to assess the relationship between distance variables, Pearson correlation coefficient was used. In addition, independent student t-test was used to compare scores of quality of life in terms of demographic variables, damages, and demographic features. Finally, after removal of demographic confounders, hierarchical regression analysis was used to determine the role of depressed mood in the prediction of quality of life scores.

Results

The gender distribution of subjects showed that 71 patients (73.2%) were male and 26 patients (26.8%) were female. In terms of marital status, 33 (34%), 51 (52%), 5 (5%), and 1 (3.1%) subjects were single, married, divorced, and widowed, respectively. Other subjects did not answer the question related to marital status. The highest and the lowest frequency of educational attainment were related to high school diploma (29.9%) and academic or elementary degree (6.1%), respectively. In terms of occupation, 64 subjects (65.9%) were unemployed and 11 (11.3%), 9 (9.3%), and 4 (4.1%) subjects were self-employed, housewife, and clerk, respectively. Table 1 shows the frequency distribution of SCI patients to the global quality of life level.

The study of the last item of SCIQL-23 showed that 18.5% of patients were dissatisfied with their quality of life and only 5% of them expressed their satisfaction in this regard. In this study, to determine the main role of depressed mood symptoms on the quality of life, it was necessary to control all demographic confounders and the disease characteristics which were significantly associated with the criterion variable in hierarchical regression analyses. Hence, Pearson correlation analyses were performed to examine the relationship between distance variables (Table 2).

According to table 2, the mean age of subjects was 39.03±11.09. In addition, the mean duration of injury and hospitalization were obtained as 126.39±104.01 and 47.82±50.55 days, respectively. Correlation coefficients between the studied variables indicated that quality of life score is only related to the duration of injury ($P<0.05$). This means that the score of quality of life increases (lower levels of quality

Table 1. Frequency Distribution of Satisfaction with Quality of Life among SCI Patients (n=97)

Variable	Satisfaction	Frequency	%
Global Quality of Life (GQOL)	Very Dissatisfied	18	18.5
	Dissatisfied	36	37.1
	Satisfied	38	39.2
	Very Satisfied	5	5.1

Table 2. Correlation Coefficients Matrix of Some Demographic Variables and Quality of Life in SCI Patients (n=97)

Variables	Mean	Sandard Deviation	1	2	3	4	5	6	7	8
1-T_score (total) for SCIQL-23	50.00	10.00	1							
2-QoL _FUNC	13.88	7.33	0.923**	1						
3-QoL_MooD	7.45	4.74	0.880**	0.698**	1					
4-QoL_PROB	12.02	4.35	0.855**	0.664**	0.699**	1				
5-Current Age (year)	39.03	11.09	0.105	0.126	0.060	0.075	1			
6-Lesion Age (year)	28.34	11.55	0.150	0.136	0.137	0.128	0.677**	1		
7-Lesion Duration (month)	126.39	104.01	-0.202*	-0.168	-0.209*	-0.170	0.329**	-0.343**	1	
8-Length of Hospitalization (days)	47.82	50.55	0.244	0.275	-0.025	0.311	0.085	-0.276	0.389	1

* p<0.05, **p<0.01

of life) as the duration of injury prolongs. On the other hand, no significant relationship was found between quality of life and age, age at the injury occurrence, and duration of hospitalization. However, an inverse correlation was observed between the current age of the patient and age at the time of injury (r=-0.67) and injury duration (r=-0.32), which is statistically significant (P<0.05). An inverse correlation was also found between age at the time of injury and injury duration (r=-0.34). Table 3 presents the comparison of total scores of quality of life among SCI patients in terms of demographic variables and the disease characteristics. In this part, the subjects who had provided unknown responses to demographic questions were excluded from the analysis.

According to the results of tables 2 and 3, it was shown that there is a significant difference between the studied groups in terms of injury duration, gender, the state of paralysis, and the use of nurse, wheelchair, catheter, and diaper (P≤0.05). As shown in table 3, it can be found that female and tetraplegic patients, patients with bedsores, and those who use nurse, wheelchair, catheter, and diaper experience a poorer quality of life. Therefore, these variables which presented a significant relationship with the total score of SCIQL-23 in univariate analyses were regarded as confounding variables and their values were controlled in hierarchical regression analysis. Before doing the main statistical analyses, the normality of the criterion variable in regression analysis of the total score of SCIQL-23 was examined using the histogram diagram and comparing it with the normal curve (Figure 1). Before performing this analysis, the data related to eight subjects were excluded from statistical analysis because of the missing information and the loss of more than 20% of their questionnaire's information.

Figure 1 shows that standardized regression residuals of the quality of life scores follow a normal distribution. Normal P-P diagram (Figure 2) also indicates that observed cumulative probability or the points representing standardized residuals of the criterion variable are close to the normal line. Thus, it can be concluded that the criterion variable data are slightly deviated from the normal distribution.

The results of Durbin-Watson test (DW=1.988) also demonstrated that the assumption of independence of errors for the regression analysis is established. In addition, power analysis was used in order to determine the adequacy of the sample size (n=97). The results of the general linear model showed that the test power for the main variable (depressed mood) is over 0.80 which suggests the adequacy of sample size for regression analysis. Table 4 presents a summary of regression model before and after controlling the confounding variables within models 1 and 2.

The results shown in table 4 indicate that R2 and adjusted R2 coefficients of the model improved after controlling the confounding variables, as about 70% of changes in quality of life can be explained by depressed mood in the second or adjusted model. In addition, regression coefficient (R) for the relationship between total score of quality of life and depressed mood in the adjusted model was obtained to be at least 0.65 which, in any case, represents a strong correlation between these two variables.

The results of hierarchical regression analysis in table 5 demonstrated that, after controlling the confounding variables, depressed mood has a significant relationship with the total score of quality of life and predicts its values (F=23.77, P<0.0001). Signs of beta coefficients can be interpreted like the matrix of correlation coefficients obtained in this study. Nevertheless, it can be stated that standard deviation of SCIQL-23 score of SCI patients increases by 0.66 with one unit of increase in standard deviation of depressed mood score. This means that quality of life of SCI patients declines with the increase in depressed mood scores.

Discussion

The present study aimed to determine the role of depressed mood in the quality of life among SCI patients. The results of correlation between depressed mood and quality of life scores

Table 3. Comparison of Total Score of SCIQL-23 in terms of Demographic Variables and the Disease Characteristics

Characteristics	n	Mean (SD)	t-value	P-value
Gender				
Male	71	48.64 (9.77)	2.56	0.01
Female	19	55.06 (9.40)		
Marital Status				
Married	51	48.34 (10.39)	1.17	0.20
Single	33	50.91 (8.74)		
Lesion Type				
Tetraplegia	10	58.41 (6.93)	2.91	0.005
Paraplegia	79	48.98 (9.91)		
Bedsore				
Yes	34	55.32 (8.82)	4.31	0.001
No	56	46.76 (9.32)		
Nurse Use				
Yes	72	51.23 (9.61)	2.41	0.02
No	18	45.05 (10.25)		
Wheelchair				
Yes	59	52.03 (9.29)	2.76	0.007
No	31	46.12 (10.29)		
Urinary Catheter Use				
Yes	49	52.42 (9.61)	2.59	0.01
No	41	47.10 (9.78)		
Diapers				
Yes	32	53.13 (11.01)	2.26	0.02
No	58	48.27 (9.03)		
Having Child				
Yes	7	46.43 (5.84)	0.93	0.30
No	83	50.30 (10.24)		
Having Insurance				
Yes	79	49.52 (9.96)	1.21	0.20
No	11	49.52 (10.00)		

indicate that quality of life in these patients declines with increasing in depressed mood score. After controlling the confounding variables, the results of hierarchical regression analysis showed a significant relationship between depressed mood and quality of life. In addition, the regression model suggested that standard deviation of quality of life in SCI patients increases by 0.66 with one unit of increase in standard deviation of depressed mood score (in other words, quality of life reduces), because scoring in this instrument is done inversely.

The findings of the present research are consistent with the results of previous studies which reported that higher levels of depression are associated with poorer quality of life [26-28]. According to previous studies, it can be concluded that treatment of SCI-caused depression can be considered as an important resource in improving the quality of life in these patients. For example, in a randomized controlled trial, it was shown that prescription of an antidepressant for people with SCI in a 12-week period causes an increased level of overall satisfaction with the quality of life (including physical and mental aspects) among these patients [29]. In another study, a rehabilitation program for SCI patients including six workshops focusing on the management of life (e.g. sexual health, stress management, physical activity, nutrition, and prevention of secondary complications) improved cognition, behavior, health, and nutrition and reduced secondary complications and depression [30].

Studies have shown that stresses resulting from SCI make patients isolated and withdrawn and cause many mood disorders such as depression, resulting in declined quality of life (16,17,27,30). Because of such consequences, these patients are more vulnerable to social isolation and lack of enjoyment of life. Depression and lower quality of life in patients with SCI have a great impact on the psychological status and social and family relationships among them, and finally affect on dimensions of their psychosocial adaptation. Considering the significant relationship between depression and quality of life found in this study, early rehabilitation and providing training programs in cognitive and behavioral fields and depression treatment can improve dimensions of mental

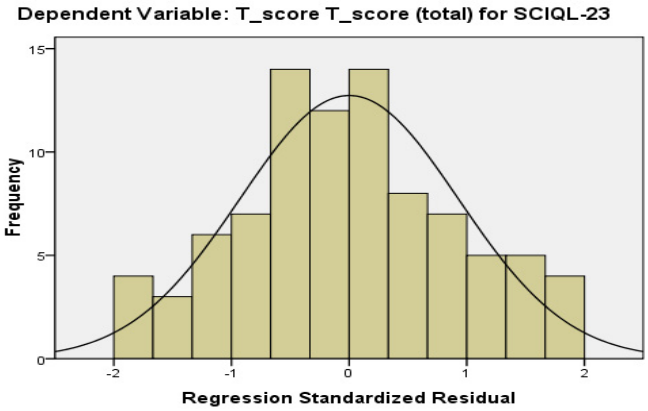

Figure 1: Histogram of the Residual of SCIQL-23 Total Scores and Matching them with the Normal Curve

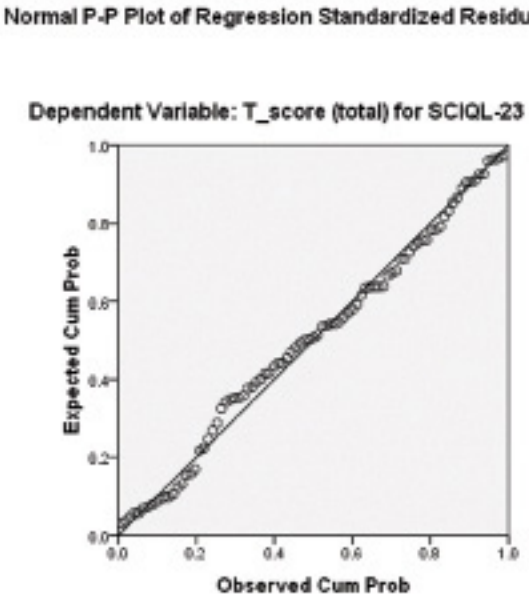

Figure 2: Standardized Regression Residuals of Quality of Life Scores

health and quality of life in SCI patients.

All data of the present study were classified in self-report type and collected by a psychologist interviewer. This may increase the probability of response bias and distortion among multiple instruments. However, it should be taken into account that the role of psychological factors can be measured and studied only through the use of self-report instruments. With regard to the strong relationship between depressed mood and quality of life in this study, even after removal of confounding factors, it is recommended that interventional studies be conducted on the treatment of depressed mood and its impact on quality of life after the occurrence of SCI.

Conclusion

In this study, a strong relationship between depressed mood and quality of life was observed in patients with SCI. The present research showed that quality of life in SCI patients can be explained by depressed mood, even after controlling demographic confounders.

Recommendation

It is recommended that clinical social workers, therapists, and consultants who are engaged in rehabilitation centers to apply psychotherapy in the early stages of SCI in order to largely prevent the occurrence of depression symptoms or exacerbation in SCI patients and maintain the quality of life in this group of victims.

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none.

Conflicts of Interest

The author has no conflicts of interest.

Author's Contribution

Dr. Seyyed vali-allah Mousavi did all parts of writing the manuscript.

Table 4: A Summary of Hierarchical Regression Model for Quality of Life before and after Controlling Demographic Confounders

Model	R	R Square	Adjusted R Square	Standard Error of the Estimate	Durbin-Watson
1	0.652	0.425	0.367	7.98064	1.988
2	0.855	0.730	0.700	5.49850	

Table 5: Results of Regression Analysis for Quality of Life in SCI Patients in terms of Depressed Mood after Controlling the Confounding Variables

Variable in Second Hierarchical Model	Unstandardized Coefficients		Standardized Coefficients	t-value	P-value	95% Confidence Interval	
	B	*Standard. Error*	*Beta*			*Lower Bound*	*Upper Bound*
(Constant)	44.909	4.389	-	10.232	0.0001	36.173	53.646
Lesion Duration	-0.011	0.006	-0.112	-1.827	0.071	-0.023	0.001
Gender	1.957	1.620	0.079	1.208	0.231	-1.267	5.182
Lesion Type	-3.705	1.909	-0.125	-1.941	0.056	-7.505	0.094
Bedsore	3.067	1.306	0.149	2.348	0.021	0.467	5.666
Urinary Catheter Use	0.535	1.526	0.027	0.350	0.727	-2.503	3.572
Nurse Use	3.393	1.698	0.134	1.998	0.049	0.013	6.772
Diapers	-1.509	1.492	-0.073	-1.011	0.315	-4.480	1.461
Wheelchair	2.561	1.553	0.121	1.649	0.103	-0.530	5.652
Depressive Mood	0.686	0.073	0.662	9.462	0.0001	0.542	0.831

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