



Influence of Socio-Demographic and Clinical Factors on Emotional Disturbance and Quality Of Life of Patients with Spinal Cord Injury in Kano City

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Abstract

Purpose: The study evaluated the influence of socio-demographic and clinical factors on emotional disturbance (anxiety and depression) and quality of life (QOL) of patients with Spinal Cord Injury (SCI) in Kano city. **Method:** In the cross-sectional survey, patients with SCI were recruited from secondary and tertiary hospitals in Kano City using purposive and snowball sampling techniques. Anxiety, depression, and QOL were assessed using the Hamilton anxiety scale, Beck depression inventory, and QOL index for SCI injury respectively. Data were analyzed with descriptive statistics, Chi-square test, and Logistic regression using SPSS version 20. The level of significance was set at $p < 0.05$. **Results:** A total of 42 participants took part in the study. Their mean age was 39.07 ± 12.17 years (range 18-64 years). Thirty-seven (88.1%) of the participants are males, 25 (59.5%) had minimal anxiety, 29 (69%) had moderate depression and 27 (64.3%) had good QOL. Occupation ($\chi^2 = 11.67$, $p < 0.005$) and marital status after injury ($\chi^2 = 8.05$, $p < 0.009$) were significantly associated with depression, while none of the other socio-demographic and clinical variables was significantly associated with anxiety, depression, or QOL ($P > 0.05$ for all). Marital status after the injury has a significant influence on depression ($\beta = 3.24$, $OR = 25.47$, $CI = 1.48 - 438.78$; $P < 0.05$) but none of the socio-demographic and clinical factors have a significant influence on anxiety ($P > 0.05$ for all). Incontinence ($\beta = -4.19$, $OR = 0.02$, $CI = 0.00 - 0.89$; $P < 0.05$) and depression ($\beta = 4.76$, $OR = 116.7$, $CI = 1.45 - 937$, $P < 0.05$) have significant influence on QOL.

Conclusions and Implications: Participants experienced minimal to moderate emotional disturbances but enjoyed moderate QOL. Emotional disturbance was influenced by Socio-demographic factors such as loss of job and being single after the injury while QOL was influenced by clinical factors such as depression and incontinence. The ability to retain jobs and marriages could help patients cope with the psychological trauma often associated with SCI.

Keywords: Quality of life, Anxiety, Depression, Spinal cord injury, Emotional disturbance

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Introduction

Damage to the spinal cord due to an insult that results in the transient or permanent loss of spinal motor, sensory and autonomic function is called spinal cord injury (SCI) (Bonner and Smith, 2013). SCI is one of the most distressing events that can occur in someone's life (Kumar and Gupta 2016). The incidence rate for traumatic SCI in Sub-Saharan East and Central Africa was 21 and 29 cases per million respectively (Lee *et al.*, 2014). The highest prevalence rate for SCI of 906 cases per million was in the United States of America and the lowest rate of 250 cases per million was in the Rhone-Alpes region, France (Singh *et al.*, 2014). The major causes of traumatic SCI are road traffic accidents (Grossman *et al.*, 2012; World Health Organization [WHO], 2013), violence, sports (WHO, 2013) or falls (Grossman *et al.*, 2012; WHO, 2013; Islam *et al.*, 2016) while the non-traumatic causes are inflammatory diseases (e.g Transverse myelitis), multiple sclerosis, tumors, vascular disease, spina bifida, spinal stenosis, degeneration, syringomyelia and infection (e.g. Pott's disease) (New *et al.*, 2002; Pellatt, 2013).

Acute complications of SCI may include impairments of motor, sensory, autonomic, broncho-pulmonary, thermoregulatory, and cardiovascular systems functions (Grossman *et al.*, 2012; Hagen, 2015). A patient with SCI is likely to present with abnormal temperature control, sexual dysfunction, incontinence, hypotension, and autonomic dysreflexia (Hagen, 2015). Chronic complications may include urinary tract infection, pressure ulcer, pain (New *et al.*, 2002; Sezer *et al.*, 2015), spasticity, osteoporosis, fractures, and other musculoskeletal complication (e.g. contractures) (Sezer *et al.*, 2015). These complications could harm the physical, social, and psychological well-being of patients with SCI (McCammon and Ethans, 2011; Singh *et al.*, 2014). Impairment of psychological functioning could manifest in the form of emotional disturbance (ED) such as anxiety and depression (Craig *et al.*, 2013; Hagen, 2015).

ED is common in patients with SCI (Overholser and Schubert, 1993; Bombardier *et al.*, 2004; Islam *et al.*, 2016; Le and Dorstyn 2016). These patients are likely to experience symptoms of anxiety or depression compared with those having other health conditions (Lim *et al.*, 2017) and these symptoms are likely to persist post-hospital discharge (Anderson *et al.*, 2009; Kraft and Dorstyn, 2015; Lim *et al.*, 2017).

There is consistency in research reports indicating that both personal factors like the use of negative coping strategies (Martz *et al.*, 2005) and poor self-efficacy (Craig *et al.*, 2013) and injury-related factors such as injury severity, poor health status post-discharge (Lim *et al.*, 2017) poor functional recovery (Anderson *et al.*, 2009) and shorter duration of injury were associated with increased ED (Anderson *et al.*, 2009). It is also clear that SCI is associated with diminished quality of life (QOL) (Boakye *et al.*, 2016; Ekechukwu *et al.*, 2016; Islam *et al.*, 2016; Kumar and Gupta 2016) and that increase in ED (Anderson *et al.*, 2009; Islam *et al.*, 2016; Mousavi, 2017) and injury-related factors such as having tetraplegia (Boakye *et al.*, 2016) and complete SCI (Hammed and Luqman 2019) all have negative influence on QOL.

There were however conflicting research findings on the influence of socio-demographic factors on ED following SCI. It was reported that level of education, family income (Zurcher *et al* 2019) race, sex, and age (Anderson *et al*, 2009) do not influence ED. Other studies have on the contrary reported that patients with SCI who are females, young (Lim *et al*, 2017) and middle-aged (Arango-Lasprilla *et al*, 2011) and those with a low level of education (Arango-Lasprilla *et al*, 2011; Khazaeipour *et al*, 2015) have significant impairment of their psychological function. As such, the impact of socio-demographic factors on the ED among patients with SCI is however not clear in the literature. The extent to which patients could cope with the aftermath of SCI may be influenced by their culture, value systems, and to some extent economic and religious factors; and every society is likely to be unique in that regard. These socioeconomic factors may have accounted for differing research outcomes on the impact of socio-demographic factors on ED after SCI.

Aim

The primary objective of this study was to evaluate the influence of socio-demographics on ED and QOL while the secondary objective was to determine the influence of clinical factors on ED and QOL in patients with SCI in Kano city

Methods

The study was a cross-sectional survey. Patients with SCI were recruited from Murtala Muhammad Specialist Hospital, Kano, National Orthopaedic Hospital Dala, Kano, and Fazma specialist hospital, Kano using purposive sampling technique other participants who have been discharged were recruited using snowball sampling.

Inclusion Criteria

All patients with SCI who were between the ages of 18-70 years were recruited.

Exclusion Criteria

Patients with SCI that have other chronic illnesses that can cause ED and deterioration in QOL such as severe heart disease, cancer, stroke and HIV etc. were excluded from the study.

Data Collection Procedure

Ethical approval was sought and obtained from ethics committees of the Kano State Ministry of Health and National Orthopedic Hospital Dala. Thereafter, the study procedure study was explained to the research participants and their informed consent was obtained.

Assessment of QOL

QOL was assessed using the QOL index SCI version – III. It has high internal consistency for both the total score (alpha = 0.93) and the four domains (alphas = 0.77-0.90) (Ferrans and Powers, 1992). The questionnaire comprised two parts - importance and satisfaction scales. It requires the respondents to choose the answer that best describes how satisfied or how important an area of life is to them. The questionnaire has 37 items and each item was scored on a 6-point ordinal score from 1 = 'very dissatisfied' to 6 = 'very satisfied' or from 1 = 'very unimportant' to 6 = 'very important'.

Scoring of the Questionnaire

The score of 3.5 was subtracted from each of the scores on the satisfaction scale giving a new range of scores from -2.5 , to $+2.5$ for each item. The new scores on the satisfaction scale were multiplied by the raw score of the corresponding pair of each of the items on the importance scale to obtain a weighted score for each of the items. All the weighted scores were then added up and the sum obtained was then divided by the total number of items answered by the respondent to obtain a total score that ranged from -15 to $+15$. The negative value was removed by adding $+15$ to the total score and the final possible range of scores of QOL was between 0 and 30. The general idea is that high QOL would be obtained when high importance is multiplied by high satisfaction and low QOL results when high importance is multiplied by low satisfaction. Scores from 0-10 have been rated poor, 11-20 moderate, and 21-30 good QOL.

Assessment of Anxiety

Hamilton anxiety scale (HAM-A) was used to assess anxiety. The inter-rater reliability of the Hamilton anxiety scale was $ICC=0.74$ for the total score while the subscales have reliabilities ranging from $ICC = 0.23$ (autonomic symptoms) to $ICC = 0.73$ (psychic anxiety). The questionnaire has concurrent validity of $r = 0.63$ with the total score of the Covi Anxiety Scale (Maier *et al*, 1988). The questionnaire consists of 14 items and each of the items was scored on a 5-point scale ranging from 0 (not present) to 4 (severe). The minimum total score was zero (0) and the highest score was 56, the higher the score the more severe the anxiety level. Scores ≤ 7 were rated minimal anxiety, 8–14 mild; 15–23 moderate, and scores ≥ 24 were rated severe anxiety (Matza *et al*, 2010).

Assessment of Depression

Beck depression inventory was used to assess for level of depression. The internal consistency of the scale was $\alpha = 0.86$ and $\alpha = 0.81$ for psychiatric and non-psychiatric subjects respectively. It has concurrent validity of $r = 0.72$ and $r = 0.73$, with Hamilton Psychiatric Rating Scale for Depression for psychiatric and non-psychiatric subjects respectively (Beck, 1988). The internal consistency was $\alpha = 0.9$ and the retest reliability ranged from $r = 0.73$ to $r = 0.96$ (Wang and Gorenstein, 2013). According to Palmer *et al*, (2014), the internal consistency was excellent ($\alpha = 0.93$). The Beck depression inventory consists of 21 items and each item was scored on a 4-point scale ranging from 0 to 3. BDI has a total score ranging from 0 to 63 with minimal depression scores ranging from 0–13, mild depression from 14–19, moderate depression from 20–28, and severe depression from 29–63 (Smarr 2003).

Sample Size Determination

The sample size was calculated for linear regression using *g. power* software based on eleven predictors of emotional disturbance that included age, level of education, sex, occupational status, marital status after injury, economic status after injury, duration of injury, incontinence, mobility status, sexual function after injury, and type of paralysis. The effect size $f^2 = 0.35$, $\alpha = 0.05$, $1-\beta = 0.8$, predictors = 11, gives a total sample size = 59.

Data Analysis

Spearman rank order correlation was used to find the relationship between anxiety, depression, and QOL. The chi-square test was used to find the association between ED and each of the socio-demographic and clinical factors while Logistic regression was used to find factors influencing ED and QOL. The level of significance was set at $p \leq 0.05$.

For the purpose of logistic regression, continuous data were dichotomized using the mean score, age (mean=39.07 years; ≤ 39 years = 0, > 39 years = 1), duration of injury (mean = 5.24 years; ≤ 5 years = 0, > 5 years = 1). Also other demographic factors that had more than 2 categories were collapsed into 2 categories for example employment status (unemployed = 0, self-employed or civil servant = 1). The dependent variables such as QOL and emotional disturbance (anxiety and depression) were dichotomized as follows, moderate QOL = 0 and Good QOL=1, mild depression = 0 moderate and severe depression =1, minimal and mild anxiety =0 and moderate and severe anxiety =1

Results

Socio-demographic factors of the participants

A total of 50 questionnaires were distributed to the participants, out of which 42 were retrieved back. The mean age of the participants was 39.07 ± 12.17 years (age range 18-64 years). Thirty-seven (88.1%) of the participants are males and only 5 (11.9%) are females. The rest of the socio-demographic characteristics of the research participants are presented in Table 1.

Clinical characteristics of research participants

The majority of the participants 26 (61.9%) have SCI within the last 1-15 years. Twenty-three (54.8%) did not have incontinence, 22 (52.4%) were wheelchair dependent while 28 (66.7%) have paraplegia as presented in Table 2.

Table 1: *Socio-demographic characteristics of study participants (N=42)*

Factors	N	%
Sex		
Male	37	88.1
Female	5	11.9
Level of education		
None	4	9.5
Non formal	7	16.7
Primary	6	14.3
Secondary	12	28.6
Tertiary	13	31.0
Occupation		
Self Employed	10	23.8
Civil Servant	21	50.0
Un-Employed	11	26.2

Marital Status before the injury		
Single	10	23.8
Married	32	76.2
Marital Status after injury		
Single	14	33.3
Married	28	66.7
Economic status before injury		
Low	16	38.1
Middle	23	54.8
High	3	7.1
Economic status after injury		
Low	21	50.0
Middle	20	47.6
High	1	2.4

Key; n=frequency, %= percentages, N=sample size

Table 2: *Clinical characteristics of the participants (N=42)*

Clinical factors	N	%
Duration of Injury		
Less than 1 year	12	28.6
1-15 years	26	61.9
Greater than 15 years	4	9.5
Incontinence		
Both	7	16.7
Fecal	3	7.1
Urinary	9	21.4
None	23	54.8
Mobility		
Fully dependent on a wheelchair	22	54.8
Partially dependent on a wheelchair	9	21.4
Walking frame	4	9.5
Crutches	4	9.5
Independent	3	7.1
Sexual function before an injury		
Sexually active	39	92.9
Sexually inactive	3	7.1
Sexual function after injury		
Sexually active	19	45.2
Sexually inactive	23	54.8
Type of paralysis		
Quadriplegia	3	7.1
Quadriparesis	11	26.2
Paraplegia	28	66.7

Key; n=frequency, %= percentages, N=42

Emotional status and QOL

One 1 (2.4%) participants had minimal depression, 29 (69%) moderate depression, and 12 (28.6%) severe depression. Twenty-five 25 (59.5%) participants had minimal anxiety, 6 (14.3%) mild anxiety, 9 (21.4%) moderate anxiety, and 2 (4.8%) severe anxiety. Fifteen 15 (35.7%) participants have moderate QoL and the majority, 27 (64.3%) have good QoL.

Relationship between Anxiety Depression and QOL of Patients with SCI

There were significant negative correlations between anxiety and QOL ($Rho=-0.19$; $P=0.024$) and depression and QOL ($Rho=-0.50$; $P=0.001$) and a positive correlation between anxiety and depression ($Rho=0.32$; $P=0.04$).

Association between Depression and Characteristics of Participants

Depression was significantly associated with occupation ($x^2=11.67$, $p<0.005$), and marital status after injury ($x^2=8.05$, $p<0.009$) while there was no significant association between depression and each of age ($x^2=4.48$, $P=0.28$), sex ($x^2=5.53$, $p=0.12$), level of education ($x^2=5.34$, $p=0.93$), economic status after injury ($x^2=4.33$, $p=0.58$), duration of SCI ($x^2=5.51$, $p=0.21$), continence ($x^2=8.64$, $p=0.17$), mobility ($x^2=10.22$, $p=0.26$), sexual function ($x^2=2.58$, $p=0.23$), and type of paralysis ($x^2=5.05$, $p=0.27$).

Factors Influencing Depression

The only significant determinant of depression in this study is the marital status after injury ($\beta=3.24$, Odds ratio = 25.47, CI=1.48 - 438.78; $P<0.05$). Other socio-demographic and clinical factors have no significant influence on depression ($p>0.05$ for all) as presented in Table 3.

Association between Anxiety and Characteristics of Participants

There was no significant association between anxiety and any of the socio-demographic ($P>0.05$ for all) and clinical characteristics of participants ($P>0.05$ for all). Also, the whole model summary of logistic regression for anxiety was not significant ($R=20-27\%$, $X^2=9.4$, $Df=12$, $P=0.67$). None of the socio-demographic and clinical characteristics has a significant influence on anxiety ($P>0.05$ for all).

Table 3: *Factors Influencing Depression*

	β	S.E.	Wald	p-value	Exp (OR)	95% CI for EXP(OR)
Age	-0.32	0.84	0.15	0.70	0.72	0.14 - 3.74
Level of Education	2.41	1.30	3.44	0.06	11.15	0.87 - 142.63
Sex	-	2.82	0.00	0.99	0.00	0.00 - 000
Occupational Status	0.26	1.37	0.04	0.85	1.30	0.09 - 19.03
Marital Status after Injury	3.24	1.45	4.97	0.03*	25.47	1.48 - 438.78
Economic Status after	-1.70	1.10	2.37	0.12	0.18	0.02 - 1.588
Duration of Injury	-0.15	0.87	0.03	0.86	0.86	0.16 - 4.7
Incontinence	-1.33	0.90	2.16	0.14	0.27	0.05 - 1.56
Mobility Status	0.43	0.94	0.20	0.65	1.53	0.24 - 9.75
Sexual Function after	-0.65	1.11	0.34	0.56	0.52	0.06 - 4.56

Type of Paralysis	0.02	0.86	0.00	0.99	1.02	0.19 - 5.44
Anxiety level	-0.52	0.87	0.35	0.55	0.60	0.11 - 3.30

*=significant, β =beta value, Exp (β) = Odds Ratio, CI=confidence interval. Dependent variable: mild depression = 0 moderate and severe depression =1

Association between QOL and Characteristics of Participants

Chi-square revealed that there was no significant association between QOL and any of the socio-demographic ($P>0.05$ for all) and clinical factors ($P>0.05$ for all).

Factors Influencing QOL

Logistic regression revealed however that incontinence ($\beta = -4.19$, Odds ratio=0.02, CI=0.00-0.89; $P<0.05$) and depression ($\beta = 4.76$, Odds ratio=116.7, CI=1.45-937, $P<0.05$) are the factors influencing QOL. The overall model was significant ($R = 0.53-0.72$ [53-72%], $X^2=31.77$, $p=0.003$). (Table 4).

Table 4: *Factors Influencing QOL*

	β	S.E.	Wald	p-value	Exp (β)	95% CI for EXP(β)
Age	1.75	1.42	1.52	0.22	5.74	0.36 - 92.76
Level of education	-4.20	2.99	1.97	0.16	0.02	0.00 - 5.27
Sex	-1.20	2.67	0.20	0.65	0.30	0.002 -56.72
Occupational status	-3.09	2.61	1.41	0.24	0.05	0.00 -7.54
Marital status after injury	0.45	2.70	0.03	0.87	1.57	0.02 - 311.97
Economic status after injury	-3.55	2.15	2.72	0.099	0.03	0.00 - 1.95
Duration of injury	-1.22	1.48	0.69	0.41	0.30	0.02 - 5.32
Incontinence	-4.19	2.08	4.06	0.04*	0.02	0.00 - 0.89
Mobility status	-2.58	1.63	2.51	0.11	0.08	0.003 - 1.85
Sexual function after injury	2.25	1.95	1.33	0.25	9.46	0.21 - 430.12
Type of paralysis	1.60	1.91	0.70	0.40	4.93	0.12 - 208.81
Depression level	4.76	2.24	4.53	0.03*	116.72	1.454 - 94.
Anxiety level	1.67	1.39	1.45	0.23	5.31	0.00 - 80.63

*significant, β =beta value, Exp (β) = Odds Ratio, CI=confidence interval. Dependent variable: moderate QOL = 0 and Good QOL=1

Discussion

This study was carried out to investigate the influence of socio-demographic and clinical factors on ED and QOL of patients with SCI. In this study, the majority of the participants experienced moderate depression but had minimal anxiety disorder. The outcome above could imply that patients with SCI in this study suffered minimal to moderate ED. Persons with SCI have been reported to be at great risk for developing

anxiety and depression (Lim *et al.*, 2017). Previous studies have reported that patients with SCI often suffered from anxiety and depression (Migliorini *et al.*, 2008; Khazaeipour *et al.*, 2015). Furthermore, the significant positive relationship that was observed between anxiety and depression means that an increase in anxiety level could lead to an increase in depression and vice versa. There is therefore the possibility that anxiety may coexist with depression in most patients with SCI.

In addition, unemployment and being single appeared to be the major causes of depression in patients with SCI. It has been observed in this study that the majority of the unemployed participants had severe depression while those who are employed have moderate depression. Unemployed patients with SCI may have severe depression because; they have to be employed in order to earn income to be able to adequately cater for their healthcare and family needs. A previous study has on the contrary reported that family income has no significant influence on ED (Zurcher *et al.* 2019). Furthermore, marital status after the injury is the major determinant of depression in this study. Most of the participants who are single after the injury had severe depression while the married ones have mild to moderate depression. A caring spouse is a reliable companion and source of joy to a patient with SCI, helps to ameliorate all the pains associated with the injury and its complications, without which the patient with SCI is likely to have symptoms of depression. A happy marriage is a source of joy for everyone. However, the inability to fulfill some marital important obligations after the injury due to motor and sexual impairments, loss of employment, poor coping strategies, and lack of social support (from either government or relatives) could lead to marital problems, break-ups, and depression.

More so, the outcome of this study revealed that anxiety is not significantly associated with any of the socio-demographic and clinical factors of the participants and none of them has a significant influence on it. This result is not unlikely because most of the participants have only minimal to mild anxiety levels. Hence participants in this study suffered more depression than anxiety. Despite the low anxiety levels observed in this study, studies have reported that patients with SCI are prone to developing severe anxiety (Le and Dorstyn, 2016; Lim *et al.*, 2017).

Furthermore, though only occupation and marital status after injury are associated with depression in this study, previous studies have reported that other sociodemographic factors such as female gender (Arango-Lasprilla *et al.*, 2011; Khazaeipour *et al.*, 2015), young and middle-aged patients (Arango-Lasprilla *et al.*, 2011; Lim *et al.*, 2017) and low educational attainment (Arango-Lasprilla *et al.*, 2011; Khazaeipour *et al.*, 2015) as being associated with increased ED.

The outcome of this study showed that many of the participants have good QoL, though previous studies have found that patients with SCI experienced poor QOL (Boakye *et al.*, 2016; Ekechukwu *et al.*, 2016); this outcome was possible because most of the patients in this study have minimal to moderate ED. Also, the significant negative relationship that existed between QOL and each of anxiety and depression means that a decrease in either anxiety or depression could lead to improvement of QOL and vice versa.

Furthermore, it was found in this study that depression and incontinence have a significant influence on QOL. This implies that an increase in the level of depression and being incontinent both lead to the deterioration of QOL. A similar result was obtained in another study in which depression has a significant negative influence on QOL (Mousavi 2017). Patients with SCI who had moderate depression were reported to have poor QOL (Hossain *et al.*, 2016). Furthermore, the persistence of incontinence could predispose to foul smell, infections, and stigmatization leading to social isolation and increased spending on drugs, catheters, and diapers. A patient with incontinence could also be at risk of divorce or having marital problems due to issues related to difficulty in maintaining proper hygiene at all times.

Although it was observed in this study that QOL was not significantly associated with socio-demographic and other clinical factors aside from depression and incontinence, a number of studies have found that levels of injury and educational attainment (Kumar and Gupta 2016) low socioeconomic status (Hammed and Luqman 2019), having tetraplegia (Boakye *et al.*, 2016), complete SCI (Hammed and Luqman 2019) all have a negative influence on QOL.

Limitations

This study is however limited by a small sample size despite the use of snowball sampling the response rate was poor. Classification of SCI based on complete or incomplete has not been considered in this study.

Conclusion

Participants experienced minimal to moderate ED and moderate QOL. ED was influenced by socio-demographic factors such as loss of job and being single after the injury. QOL was influenced by clinical factors such as depression and incontinence. It is recommended that federal and state governments in Nigeria should enact laws that will prevent the retrenchment of employees on the bases of having SCI or any form of disability and create job opportunities and an enabling environment for them to work comfortably. This will help them earn incomes, keep their marriages, and maintain high-level social function and a good frame of mind. Physiotherapists and other health professionals should collaborate to provide comprehensive multi-disciplinary rehabilitation for patients with SCI who have incontinence.

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Conflict of Interest

The authors have no conflict of interest to declare

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