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Prevalence and risk factors for depression among patients with spinal cord injury attended at Kilimanjaro Christian Medical Centre from August 2021 to May 2022

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Abstract

Background: Depression after SCI inhibits physical rehabilitation and exacerbates physical health complications, which results in more extended lengths of stay for inpatient care, less independence following discharge, poor compliance with self-care, higher medical expenses, and increased risk of suicide.

Objective: To determine the prevalence and risk of depression among patients with SCI who attended Kilimanjaro Christian Medical Center from August 2021 to June 2022.

Methodology: This is a hospital-based analytical cross-sectional study conducted at KCMC orthopedic and physiotherapy departments whereby 129 patients with SCI were captured, and those who were below 18 years, with less than 2 weeks of history of spinal cord injury, polytrauma patients, patients with a history of psychiatric illness and SCI patients with cognitive speech problems were excluded from the study .74 patients were interviewed using questionnaire and Swahili version of PHQ-9 depression assessment questionnaire. The associations were measured using the Fischer exact test and Odds ratio with 95% CI with a significance level set at $p<0.05$.

Results: 74 participants were included in this study, the median age of the study participants being 36 years, ranging (from 21 to 74) years, and predominantly males being 55 (74.3%). The prevalence of Depression after SCI was found to be 35.1%. Factors such as SCI duration of ≥ 6 months (OR=3.50, 95% CI: 2.44 – 28.0, p=0.001), having pressure sore (OR=8.40, 95% CI: 1.02 – 6.92, p<0.001), having bowel dysfunction (OR= 3.20, 95% CI: 2.02 – 6.75, p=0.001), having sexual dysfunction (OR=3.80, 95% CI: 3.50 – 4.80, p=0.001) and non-surgical management of SCI (OR=11.40, 95% CI: 1.41 – 91.86, p=0.023), have more odds of developing depression after SCI and were statistically significance.

Conclusion: More than a third of patients with SCI had depression. The risk factors of depression after SCI included patients with Complete SCI (ASIA A), Cervical spine injury, patients managed conservatively, those with prolonged hospital stay, patients without health insurance and patients with complications after SCI such as pressure ulcers, neurogenic bowel, neurogenic bladder, and sexual dysfunction.

Keywords: Spinal cord injury, Depression, KCMC

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Introduction

The spinal cord serves as the conduit for information between the brain and peripheral, so cord Injury is a devastating condition that results from an insult to the spinal cord and causes damage that will affect the conduction of sensory and motor signals across the site(s) of the lesion(s). The annual global incidence of spinal cord injury ranges between 8.3-10.4 per million people, with variation seen in developed and developing countries (Knowledge, 2010)

90% of spinal cord injuries are caused by trauma, mainly Motor traffic crashes. Falling from height is the second cause of SCI, but it has been reported to increase the number of falls in recent years in developing countries. (Moshi *et al.*, 2020).

Young males of economic and reproductive age are more affected than others. As a result, mortality after SCI is five times higher compared to people without an SCI, with worse survival rates in low and middle-income countries. Men to women (2:1). (WHO, 2015). Trauma to the vertebrae may occur at a different level of the spine: Cervical C1-C7, Thoracic T1-T12, Lumbar L1-L2, and sacral spine S1-S2. The patient may develop body weakness after trauma that could be quadriplegia when the injury occurs at the cervical or higher thoracic and paraplegia when it occurs at the lumbar vertebra (Jr, 2017).

After trauma, the Severity of spinal cord injury is checked by assessing neurological deficit by clinical examination of a critical group of muscles and sensory functions below the level of spine injury. The commonly used score system is the ASIA scale to score neurological deficit after injury, and the patient may have Complete spine injury (Asia A), incomplete spine injury (BCD) or normal sensory and motor function below injury level (Asia E) after assessment. (Jr, 2017).

Management of spinal cord injury starts with advanced trauma life support (ATLS), resuscitation, then initial management by stabilizing the spine using neck colour, halo-vest, and skull traction for cervical injury and thoracolumbar corset for thoracic and lumbar spine injury to prevent secondary damage and disease progress from less severe to Severe form of spine cord injury and prevents complication. Radiological examination, usually by X-rays and CT scan, is used for osseous assessment of the spine vertebra and its stability, and an MRI is performed for soft tissue (disc, cord, nerve, and nerve roots) pathology. (Fehlings, 2017).

Definitive management after spinal cord injury could be surgical or non-surgical, depending on the severity and stability of the spine after injury. Surgical management is associated with fewer hospital stays, and patients will start early ambulation, which helps to minimize complications after SCI. Management of SCI patients involves a multi-disciplinary approach with Psychotherapy, daily social support, physiotherapy, and rehabilitation. (Fehlings, 2017).

SCI results significantly in reduced functional independence and difficulties with socialization. Many individuals with SCI will experience severe medical complications, including pressure ulcers, pneumonia, deep venous thrombosis, neurogenic bladder and bowel dysfunction, spasticity, and pain.(Sezer, Akkuş and Uğurlu, 2015)

Also, SCI patients experience severe psychological, psychosocial, and neurobehavioral issues. For example, they are at increased risk of developing anxiety disorders, substance abuse, feelings of helplessness, poor coping skills, low self-esteem, and Depression.

Depression is a mental disorder that presents sadness, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, feelings of tiredness, and poor concentration(World Health Organization, 2017). Depression tends to affect the quality of life of affected individuals, and it depends on disease severity. Sometimes, it may lead to suicide(Kanter *et al.*, 2008). Depression is among the high-ranked causes of disability globally. Depression is a common mental disorder, and more than 300 million people worldwide suffer from an episode of Depression(WHO, 2015). WHO ranked Depression the fourth leading cause of disability worldwide.

Duration of depressive symptoms is an essential criterion in making a diagnosis in patients suspected to have Depression with loss of interest or pleasure in nearly all activities as key core features of the illness. Depressive symptoms should be present most of the time for at least two consecutive weeks to make a diagnosis, distinguishing Depression from ordinary mood changes (Saito *et al.*, 2010). Risk factors for depression after SCI include age, pattern and severity of SCI injury, duration of injury, physical complications after SCI, extended hospital stay, expenses in management and level of social family support. (Lohoff, 2010).

Methodology

Study design

This hospital-based analytical cross-sectional study involved all patients with spinal cord injuries who attended the KCMC orthopaedics and physiotherapy department from August 2021 to June 2022.

Study area

This study was conducted at KCMC Hospital in northern Tanzania. The hospital serves about eleven million people from neighbouring regions and sometimes outside the country. It is a referral hospital in Tanzania in the Moshi Rural district of the Kilimanjaro Region. According to the 2012 national census, the region and district had a population of 1,640,087 and 201,150 respectively.

Study population

From August 2021 to June 2022, all patients with SCI were admitted to orthopaedic wards and attended the orthopaedic and physiotherapy clinics at KCMC Hospital.

Study variables

Independent variable

Age, Sex, level of education, occupation, marital status, Mechanism of injury, duration of injury, the severity of the injury, duration of hospital stays, and Complications of injury.

Dependent variables: Depression after SCI

Eligibility Criteria

Inclusion and Exclusion criteria: All patients above 18 with SCI attended KCMC hospital during the study period.

Exclusion criteria

Patients with a previous history of psychiatric illness and Patients with severe cognitive speech impairment. Patients with incomplete or missing information on files or hospital electronic systems.

Sample Size and Sampling Technique.

Sampling methods

All patients admitted during the study period who met the inclusion criteria were considered, and a convenient sampling technique was used to select candidates.

Sample size

The minimum sample size was calculated according to the following formula:
Prevalence was estimated to be 5%.(Bombardier *et al.*, 2012)
This was a cross-sectional study done from data from 2008 to 2010

$$n = \frac{Z2\ P\ (1 - P)}{(SE)\ 2}$$

Where- by;
Z =standard deviation = 1.96
P= proportion.
SE= is the standard tolerable error (0.05).
n =is a minimum required sample size
From the calculation, the minimum sample size was approximately 73 patients.

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Data Collection Tools, Methods, and Procedures

Data collection tools

Data were collected using a structured questionnaire and PHQ-9 checklist for depression symptoms assessment. The questionnaire comprised socio-demographic information, the mechanism of injury, the duration of injury, the severity of the injury, the duration of hospital stay, complications after SCI injury, and initial and definitive treatment modalities after spinal cord injury. Depression after Spinal cord injury was assessed using PHQ-9.

Data collection methods and procedure

All SCI patients admitted to the orthopaedic ward and those who attended physiotherapy and orthopaedic follow-up clinics were identified, and patients who met the inclusion criteria were approached. The scope of the study was explained, and consent was sought. A structured questionnaire was used to collect data. The details of the socio-demographic data, mechanism of injury, duration of injury, level of injury, severity of the injury, mode of treatment, complications of injury, and duration of stay at the hospital were initial and final treatments of SCI obtained from patients and the files system.

Depression was measured using the Patient Health Questionnaire Score (PHQ-9). The PHQ-9 contains nine questions about depressive symptoms over the past two weeks. Patients were then asked to respond to nine depressive symptoms that appeared on the PHQ-9 checklist. Each question has four possible responses, scoring 0 to 3. Then the reaction of Items was summed, ranging from 0-27. A score above 10 was used as a cut-off to indicate possible Depression. The extracted data were exported into Excel and transferred into a secured hard drive for the study utility.

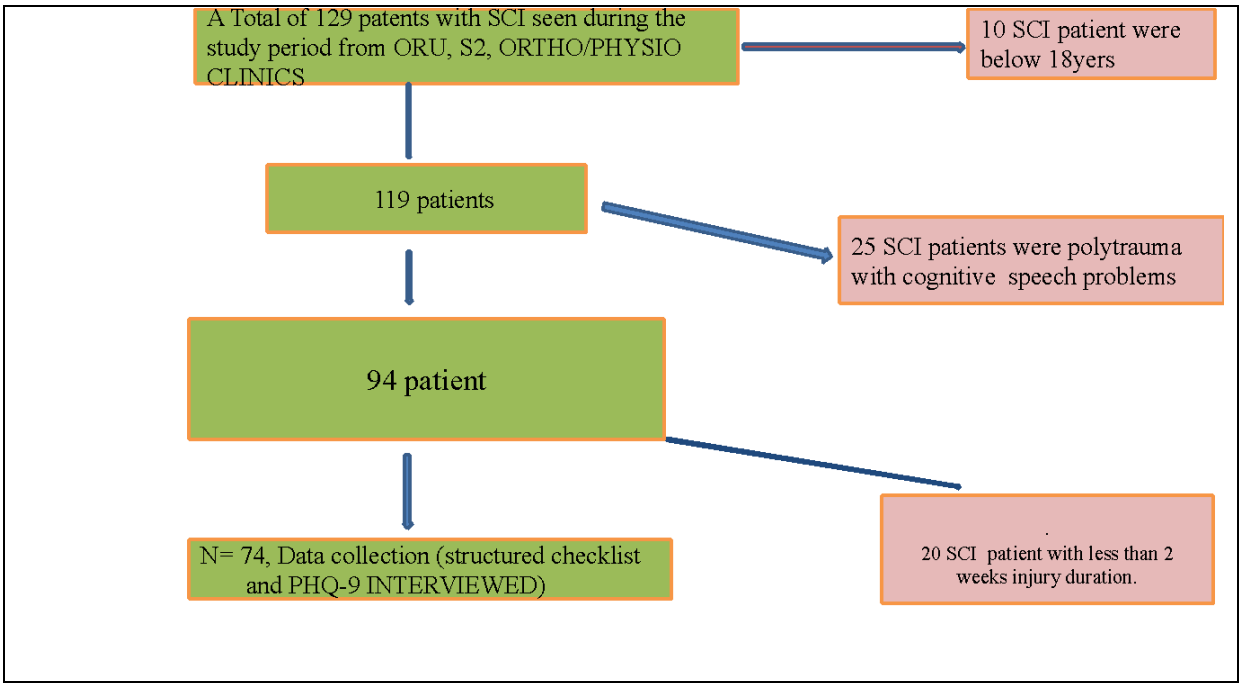

Figure 1: Data recruitment a logarithm.

Data Management and Analysis

The data from the registry was reviewed and checked for completeness before being transferred to the statistical package for analysis purposes. Data was coded and entered into the computer using SPSS program version 25. Mean and standard deviation (SD) were used to summarize the numerical data, such as the age of the patients in years. In contrast, frequency and proportions

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were employed to summarize categorical variables using tables and figures. The relationship between variables was tested using Chi-square or Fisher's exact test where appropriate. Cross-tabulation was done to estimate the proportion of spinal cord injury. Classical Logistic regression models were used to assess the association between independent variables and Depression; the Odds ratio (OR) and their respective 95% confidence interval were used to report the strength of the association. A p-value of less than 0.05 was considered statistically significant.

Ethical consideration

Permission to perform this research was obtained from the Director of KCMC and the Research Ethical Committee of Kilimanjaro Medical University College. Permission was also sought from the Department of Orthopedics and Physiotherapy at KCMC Hospital. Then, informed consent was obtained from clients before filling out the questionnaire; patient records were kept confidential, and only patient initials were recorded during data collection. There is no conflict of interest in conducting this study. Access to this information was only for research purposes. Privacy and confidentiality were ensured using an encrypted password.

Results

Demographic characteristics of the study participants

This study included a total of 74 study participants. The study participants' median (range) age was 36 (21 – 74) years. However, almost half of the study participants, 33 (44.6%), were aged 18 – 34. Also, the majority, 68 (91.9%) were males, 55 (74.3%) were residing in rural areas, 43 (58.1%) had primary education, 38 (51.4%) were married, 66 (89.2%) were not employed, 60 (81.1%) cover hospital bills by using family cash, median (range) number of children was 1 (0-7) children, and 24 (32.4%) had more than 2 children. This is shown in Table 1.

Table 1 : Demographic characteristics of the study participants (N=74)

Characteristics	n (%)
Age (years) (median (range)	36 (21 - 74)
Age (years)	
18 – 34	33 (44.6)
35 – 55	29 (39.2)
56 – 74	12 (16.2)
Sex	
Male	68 (91.9)
Female	6 (8.1)
Residence	
Urban	19 (25.7)
Rural	55 (74.3)
Education level	
None / Primary	46 (62.2)
Secondary	28 (37.8)
Marital status	
Single	23 (31.1)
Married	38 (51.4)
Cohabiting	10 (13.5)
Divorced/separated	3 (4.1)
Occupation	
Employed	8 (10.8)
Unemployed	66 (89.2)
Health expenses coverage	
Health insurance	14 (18.9)
Family cash	60 (81.1)
Number of children (median (range)	1 (0 - 7)
Number of children	
No children	29 (39.2)

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1 to 2	21 (28.4)
> 2	24 (32.4)

Clinical characteristics of the study participants

Regarding clinical characteristics of the study participants, 40 (54.1%) had fallen from a height, and the median (range) duration of SCI was 8 (1 – 96) months, whereby 45 (60.8%) had ≥ 6 months of SCI. The median (range) hospital stay was 2 (1 – 12) months, whereby 51 (68.9%) had ≥ 2 months of hospital stay, and 12 (16.2%) had associated injuries. This is shown in Table 2.

Table 2: Clinical characteristics of the study participants (n=74)

Characteristics	n (%)
Mechanism of injury	
Falling	40 (54.1)
Road traffic accident	32 (43.2)
Violence	2 (2.7)
SCI duration (months) (median (range)	8 (1 - 96)
SCI duration (months)	
< 6	29 (39.2)
≥ 6	45 (60.8)
Hospital stay (months) (median (range)	2 (1 - 12)
Hospital stay (months)	
< 2	23 (31.1)
≥ 2	51 (68.9)
Associated injuries	
No	62 (83.8)
Yes	12 (16.2)

The pattern and severity of SCI among spine-injured patients who attended KCMC

A large proportion of the study participants, 32 (43.2%), had cervical spinal cord injury, followed by thoracic 26 (35.2%), and the least was the lumbar 16 (21.6%). On the other hand, most of the study participants, 37 (50.0%), had ASIA A followed by ASIA E 13 (17.6%). This is shown in Figures 1 and 2.

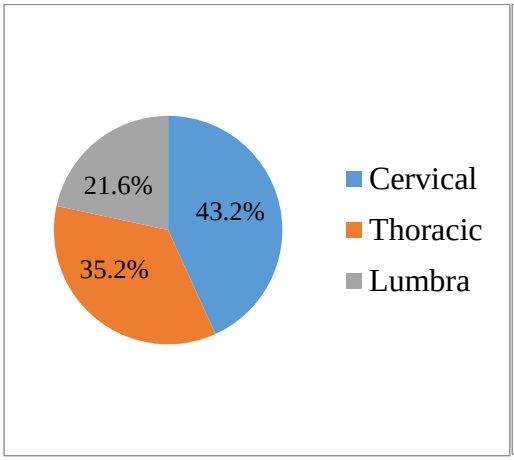

Figure 2: The pattern of SCI

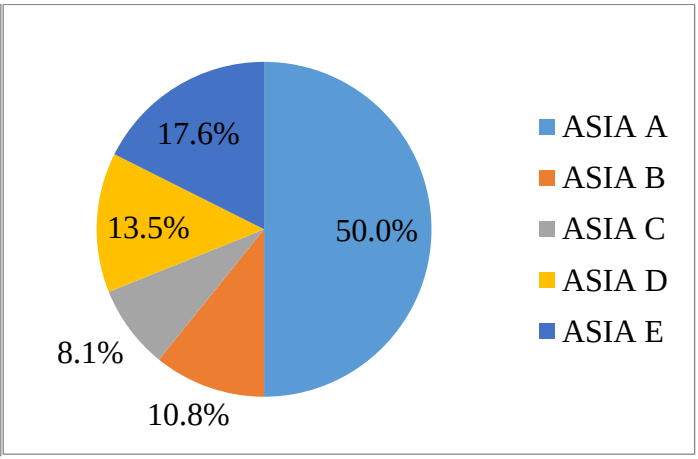

Figure 3: The severity of SCI

Management characteristics of the study participants

Regarding management, 36 (48.6%) were immobilized as initial management, and 16 (21.6%) had surgery as their final management. The mean (SD) rehab after SCI was 27.2 (16.7) days, whereby 61 (82.4%) started rehabilitation in ≥ 7 days. On the other hand, 33 (91.7%) had bedside

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dressing of the pressure sores, 60 (81.1%) were catheterized as management of the bladder dysfunction, 51 (68.9%) were assisted with bowel dysfunction, 51 (68.9%) were assisted by the caregiver to change position, and 33 (44.6%) had an explanation about SCI complications. This is shown in Table 3.

Table 3 : Management characteristics of the study participants (N=74)

Characteristics	n (%)
Initial management of SCI	
Immobilized	36 (48.6)
Not immobilized	38 (51.4)
Final management	
Surgical	16 (21.6)
Non-surgical	58 (78.4)
Rehab after SCI (days) (mean (SD)	27.2 (16.7)
Rehab after SCI (days)	
< 7	13 (17.6)
≥ 7	61 (82.4)
Pressure sore management (n=36)	
Bedside dressing	33 (91.7)
Surgical	3 (8.3)
Bladder dysfunction management	
Urethral catheterization	60 (81.1)
Normal emptying	14 (18.9)
Bowel dysfunction management	
Alone	23 (31.1)
Assisted	51 (68.9)
Manage change position	
Manage alone	23 (31.1)
Assisted by the care-giver	51 (68.9)
Explanation of SCI complication	
No	41 (55.4)
Yes	33 (44.6)

The complications of SCI among spine-injured patients attended at KCMC

Most of the study participants 50 (67.6%) had bladder dysfunctions followed by bowel dysfunction 46 (62.2%). This is shown in Figure 3.

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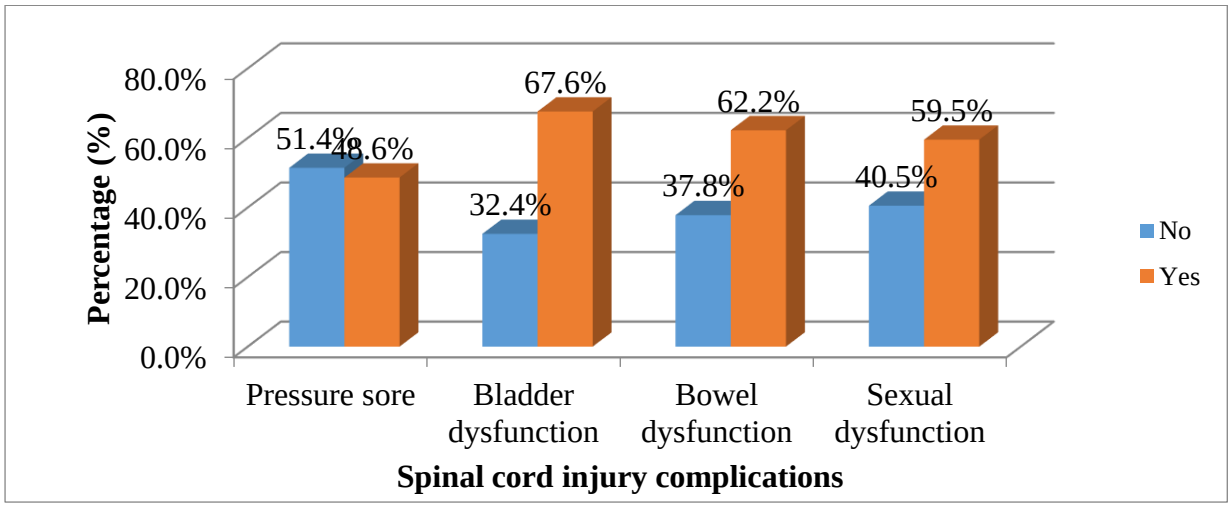

Figure 4: The complications of SCI among spine-injured patients attended at KCMC

Depression status of study participants

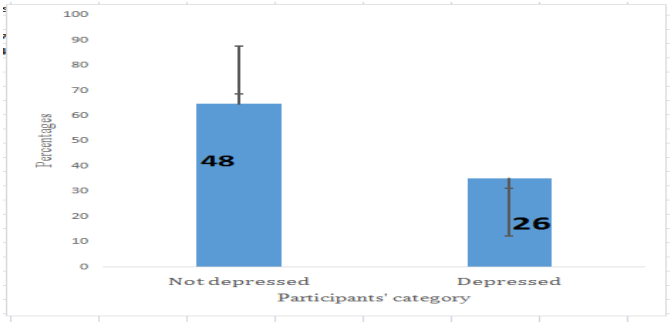

Figure 5: Depression score;10>depressed,<Non-depressed

Risk factors of Depression after SCI among spine-injured patients who attended at KCMC

Factors such as SCI duration of ≥ 6 months (OR=3.50, 95% CI: 2.44 – 28.0), ASIA B (OR=0.20, 95% CI: 0.01 – 0.99), ASIA CDE (OR=0.02, 95% CI: 0.00 – 0.18). Having pressure sore (OR=8.40, 95% CI: 1.02 – 6.92), having bowel dysfunction (OR= 3.20, 95% CI: 2.02 – 6.75), having sexual dysfunction (OR=3.80, 95% CI: 3.50 – 4.80), non-surgical management (OR=11.40, 95% CI: 1.41 – 91.86). Having ≥ 7 days rehab after SCI (OR= 8.33, 95% CI: 1.01 – 18.25), bowel dysfunction management (OR=2.11, 95% CI: 2.01 – 16.80), being assisted by a caregiver to change position (OR=2.12, 95% CI: 1.60 – 16.9), and explanation about SCI (OR=0.70, 95% CI: 0.30 – 0.90). This is shown in Tables 4, 5 and 6.

Table 4: Demographic factors associated with Depression after SCI among spine patients (N=74)

	Depression				
	Not Depressed <10 n (%)	Depressed ≥ 10 n (%)	Total		
Characteristics	**48 (64.9)**	**26 (35.1)**	**n (%)**	**OR (95 % CI)**	**p-value**
Age (years)					
18 – 34	19 (39.6)	14 (53.9)	33 (44.6)	1	
35 – 55	20 (41.7)	9 (34.6)	29 (39.2)	0.61 (0.21 - 1.73)	0.356

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56 – 74	9 (18.7)	3 (11.5)	12 (16.2)	0.45 (0.10 - 1.98	0.293
Sex					
Male	42 (87.5)	26 (100.0)	68 (91.9)		
Female	6 (12.5)	0 (0.0)	6 (8.1)		0.085
Residence					
Urban	13 (27.1)	6 (23.1)	19 (25.7)	1	
Rural	35 (72.9)	20 (76.9)	55 (74.3)	1.24 (0.41 - 3.77)	0.707
Education level					
None / Primary	27 (56.2)	19 (73.1)	46 (62.2)	1	
Secondary	21 (43.8)	7 (26.9)	28 (37.8)	0.47 (0.17-1.34)	0.158
Marital status					
Single	14 (29.2)	9 (34.6)	23 (31.1)	1	
Married	28 (58.3)	10 (38.5)	38 (51.4)	0.55 (1.18 - 1.68)	0.297
Cohabiting	4 (8.3)	6 (23.1)	10 (13.5)	2.33 (0.51 -10.6	0.274
Divorced/separated	2 (4.2)	1 (3.8)	3 (4.1)	0.77 (0.06 - 9.88)	0.846
Occupation					
Employed	7 (14.6)	1 (3.9)	8 (10.8)	1	
Unemployed	41 (85.4)	25 (96.1)	66 (89.2)	4.27 (0.49 - 36.77)	0.187
Health expenses coverage					
Health expenses	10 (20.8)	4 (15.4)	14 (18.9)	1	
Family cash	38 (79.2)	22 (84.6)	60 (81.1)	1.45 (0.41 - 5.168)	0.569
Number of children					
No children	18 (37.5)	11 (42.3)	29 (39.2)	1	
1 to 2	13 (27.1)	8 (30.8)	21 (28.4)	1.01 (0.32 - 3.20)	0.991
> 2	17 (35.4)	7 (26.9)	24 (32.4)	0.67 (0.21 - 2.14)	0.503

Table 5: Clinical factors associated with Depression after SCI among spine patients (n=74)

	Depression				
	Not Depressed <10 n (%)	**Depressed ≥ 10 n (%)**			
Characteristics	**48 (64.9)**	**26 (35.1)**	**Total n (%)**	**OR (95 % CI)**	**p-value**
Mechanism of injury					
Falling	26 (54.2)	14 (53.9)	40 (54.1)	1	
Road traffic accident	21 (43.8)	11 (42.3)	32 (43.2)	0.97 (0.37 - 2.59)	0.956
Violence	1 (2.1)	1 (3.9)	2 (2.7)	1.86 (0.11 - 32.00)	0.671

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SCI duration (months)					
< 6	28 (58.3)	1 (3.9)	29 (39.2)	1	
≥ 6	20 (41.7)	25 (96.1)	45 (60.8)	3.50 (2.44 - 28.0)	0.001
Hospital stay (months)					
< 2	23 (47.9)	0 (0.0)	23 (31.1)	-	
≥ 2	25 (52.1)	26 (100.0)	51 (68.9)		<0.001
Associated injuries					
No	42 (87.5)	20 (76.9)	62 (83.8)	1	
Yes	6 (12.5)	6 (23.1)	12 (16.2)	2.1 (0.60 - 7.3)	0.245
Neurological status					
ASIA A	14 (29.2)	23 (88.5)	37 (50.0)	1	
ASIA B	6 (12.5)	2 (7.7)	8 (10.8)	0.20 (0.01 - 0.99)	0.049
ASIA C/D/E	28 (58.3)	1 (3.9)	29 (8.1)	0.02 (0.00 - 0.18)	<0.001)
Level of SCI					
Cervical	19 (39.6)	13 (50.0)	32 (43.2)	1	
Thoracolumbar	29 (60.4)	13 (50.0)	42 (56.8)	0.66 (0.25 - 1.72)	0.389
Pressure Sore					
No	37 (77.1)	1 (3.9)	38 (51.4)	1	
Yes	11 (22.9)	25 (96.1)	36 (48.6)	8.40 (1.02 - 6.92)	<0.001
Bladder dysfunction					
No	24 (50.0)	0 (0.0)	24 (32.4)	-	
Yes	24 (50.0)	26 (100.0)	50 (67.6)		<0.001
Bowel dysfunction					
No	27 (56.3)	1 (3.9)	28 (37.8)	1	
Yes	21 (43.7)	25 (96.1)	46 (62.2)	3.20 (2.02 - 6.75)	0.001
Sexual dysfunction					
No	29 (60.4)	1 (3.9)	30 (40.5)	1	
Yes	19 (39.6)	25 (96.1)	44 (59.5)	3.80 (3.5 - 4.8)	0.001

Table 6: Management factors associated with Depression after SCI among spine patients (n=74)

	Depression				
	Not Depressed	**Depressed**			
	<10	≥ 10			
	n (%)	n (%)	Total		
Characteristics	48 (64.9)	26 (35.1)	n (%)	**OR (95 % CI)**	**p-value**
Initial management of SCI					
Immobilized	23 (47.9)	13 (50.0)	36 (48.6)	1	
Not immobilized	25 (52.1)	13 (50.0)	38 (51.4)	0.56 (0.28 - 1.16	0.864
Final management					
Surgical	15 (31.2	1 (3.9)	16 (21.6)	1	
Non-surgical	33 9(68.8)	25 (96.1)	58 (78.4)	11.40 (1.41 - 91.86)	0.023

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Rehab after SCI (days)					
< 7	12 (25.0)	1 (3.9)	13 (17.6)	1	
≥ 7	36 (75.0)	25 (96.1)	61 (82.4)	8.33 (1.01 - 18.25)	0.048
Pressure sore management (n=36)					
Bedside dressing	10 (90.9)	23 (92.0)	33 (91.7)	1	
Surgical	1 (9.1)	2 (8.0)	3 (8.3)	0.87 (0.07 - 10.70)	0.916
Bladder dysfunction management					
Urethral catheterization	34 (70.8)	26 (100.0)	60 (81.1)		
Normal emptying	14 (29.2)	0 (0.0)	14 (18.9)		<0.001
Bowel dysfunction management					
Alone	22 (45.8)	1 (3.9)	23 (31.1)	1	
Assisted	26 (54.2)	25 (96.1)	51 (68.9)	2.11 (2.01 - 16.80)	0.004
Manage change position					
Manage alone	22 (45.8)	1 (3.9)	23 (31.1)	1	
Assisted by the care-giver	26 (54.2)	25 (96.1)	51 (68.9)	2.12 (1.60 - 16.90)	<0.001)
Explanation of SCI complication					
No	25 (52.1)	16 (61.5)	41 (55.4)	1	
Yes	23 (47.9)	10 (38.5)	33 (44.6)	0.70 (0.30 - 0.90)	0.043

Discussion

This study was carried out to determine the patterns and management of SCI associated with risks of Depression among spine-injured patients attended at Kilimanjaro Christian Medical Center from August 2021 to June 2022. 74 participants were included, and the median was 36, similar to the study in Canada ('dryden2005.pdf', no date). Most of the study participants were males residing in rural areas who had primary education but were mainly not employed. Similar findings were observed in a study done in Nigeria by ((Ishaku *et al.*, 2021)) which found that the majority were males aged between (18-39) Areas of residence, education level, and marital status were found in research done in northern Tanzania by((Moshi *et al.*, 2020), and (Rashid *et al.*, 2017)) they both found that most of their study participants were from a rural area, had primary education, married and were not employed. Another study done in Moshi, Tanzania by ('obayemi2019.pdf', no date) showed similar results: most participants did not have insurance to cover their hospital bills.

Regarding patterns of spinal cord injury, this study found that most participants had fallen from height as the mechanism of injury and had cervical spine injury as a level of spinal cord injury. After neurological examination, most had 37 (50.0%), Asia, A score (complete SCI) as the severity of spinal cord injury, studies done in Canada, Nigeria and Northern Tanzania by ('dryden2005.pdf', no date), (Ishaku *et al.*, 2021), (Moshi *et al.*, 2017), and (Rashid *et al.*, 2017) showed similar findings most of their study participants had cervical spine injuries. But on mechanisms of injury, both studies were done in Canada and Nigeria by (Dryden *et al.*, 2005) and (Ishaku *et al.*, 2021). Results showed that this is the leading cause of SCI, and the difference in

findings is because most of the study participants were from an urban area with a huge number of traffic and motor vehicles, while in this study, most participants are from a rural area.

Studies in Nepal, Iran, Canada, and Nigeria (Adhikari *et al.*, 2020), ('GHJAZADEL.pdf', no date), (Dryden *et al.*, 2005), and (Ishaku *et al.*, 2021) found that incomplete SCI Asia score(BCD) were most encountered severity of SCI after neurological examination while this study found that many participants had complete SCI Asia A score and this difference in findings is because in their studies they group sum the results of Asia score B, C and D as incomplete SCI while this study each Asia score has separate results so in all these studies Asia A is most encountered without summation of results similar to this study.

The Median (range) duration of SCI was 8 (1 – 96) months whereby 45 (60.8%) had ≥ 6 months duration of SCI and this study found that the median (range) hospital stay was 2 (1 – 12) months whereby 51 (68.9%) had ≥ 2 months of hospital stay, the similar results about hospital stay were found by research done in Moshi Tanzania by (Moshi *et al.*, 2017) and (Rashid *et al.*, 2017) showed that most participants stayed hospital more than 2 months their the mean length of hospital stay was (64.2 ± 54.3 days) and 71.6 (±76.2) days with a median duration of stay 46 days respectively. Similar results about the duration of spinal cord injury were observed in a study done in Nepal by (Adhikari et al., 2020), which showed that the median duration of spinal cord injury was 8(2.25).

Regarding management after spinal cord injury, most participants, 58(78.4%) were treated non-surgically as their final management. Similar findings were seen in a study done in northern Tanzania by (Rashid *et al.*, 2017), which found that only 2 (1.6%) patients out of 125 underwent surgical spinal cord decompression.

This study found that for most of the participant's complications after spinal cord injury, 67.6% had neurogenic bladder dysfunctions, followed by neurogenic bowel dysfunctions 62.2%, and 59.2% had sexual dysfunctions. Lastly, 51.4% develop pressure ulcers; a similar study was done in Turkey and Iran by ('GHJAZADEL.pdf', no date), ('SEZER TURKEYpdf.pdf', no date).

In this study, the prevalence of Depression after SCI among spine-injured patients who attended KCMC was found to be higher (35.1%) than that in the general population and similar results of prevalence were found in studies done in the USA(22.2%), Canada(28.9%), by (Williams and Murray, 2015), (Dryden *et al.*, 2005).

In this study factors such as SCI duration of ≥ 6 months (OR=3.50, 95% CI: 2.44 – 28.0, p=0.001), prolonged hospital stay(months) ≥ 2 p-values <0.001, incomplete SCI {(ASIA B (OR=0.20, 95% CI: 0.01 – 0.99, p=0.049), ASIA CDE (OR=0.02, 95% CI: 0.00 – 0.18, <0.001)} had more odds of developing Depression after spinal cord injury and all are statistically significant, the similar findings were reported by studies done in Nepal and Nigeria and northern Tanzania by (Adhikari *et al.*, 2020), (Ishaku *et al.*, 2021), ('obayemi2019.pdf', no date).

Also, having pressure soreness (OR=8.40, 95% CI: 1.02 – 6.92, p<0.001), bowel dysfunction (OR= 3.20, 95% CI: 2.02 – 6.75, p=0.001), and patients who complain of sexual dysfunction (OR=3.80, 95% CI: 3.50 – 4.80, p=0.001) have more odds of developing Depression observed in this study and results were statistically similar to the study done in Iran by ('GHJAZADEL.pdf', no date).

Regarding management outcomes participants who underwent non-surgical management (OR=11.40, 95% CI: 1.41 – 91.86, p=0.023), who delayed rehabilitation ≥ 7 days after SCI (OR= 8.33, 95% CI: 1.01 – 18.25, p=0.048), who assisted in bowel emptying for bowel dysfunction management (OR=2.11, 95% CI: 2.01 – 16.80, p=.004), being assisted by caregiver to change position (OR=2.12, 95% CI: 1.60 – 16.9, p< 0.001) have more odds of developing depression in this study.

Also, in this study, nearly half of the participants who received cancelling and explanation of spinal cord injury progress and prognosis by attending caregivers who are not professional cancellers had less Depression (OR=0.70, 95% CI: 0.30 – 0.90, p=0.043) compared to those who were not cancelled about SCI prognosis.

Conclusion

This study found that the prevalence of depression after spinal cord injury was 35.1%, which we found that the predominant mechanisms of SCI were fall from height, complete SCI (Asia A) as the most form of severity, and cervical spine's most common level of SCI.

Moreover, this study shows that the most predominant complications after SCI were pressure ulcers, neurogenic bladder, and bowel and sexual dysfunctions. The risk factors of Depression after SCI were complete SCI (Asia A), cervical spine injury, long duration to have SCI, non-surgical management, Delay to start physiotherapy, extended hospital stay, lack of health insurance to cover hospital bills, pressure ulcers, bowel, bladder and sexual dysfunction and cancelling about SCI prognosis received from the caregiver who is not professional cancellers.

Limitation

Tools not able to assess Depression less than 2 weeks in SCI patients.

ABBREVIATION

ASIA: American Spinal Cord Injury Assessment scale; ATLs: Advance trauma life supports; DSM: Diagnostic and statistical manual of mental disorder; EHMS: Electronic health management system; EMD: Emergency Medical Department; KCMC**:** Kilimanjaro Christian Medical Centre; KCMUco :Kilimanjaro Christian Medical University College; MRI: Magnetic Resonance Imaging; ORU:Orthopaedic and rehabilitation unity; PHQ-9 :Patient health questionnaire NO 9 for depression assessment; RTAs : Road traffic accident; S2: Surgical ward number 2 (for orthopedic patient admission); SCID: Structured clinical interviews for DSM1V; SPSS: Statistical Package for the Social Sciences;
TSCI: Traumatic Spinal Cord Injury; WHO: World Health Organisation.

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