Minah Kinanu Guantai, Department of Physiotherapy, Jomo Kenyatta University of Agriculture and Technology, P. O. Box 62000-00200 Nairobi, Joseph Mwangi Matheri, Department of Physiotherapy, JKUAT, P. O. Box 62000-00200, Nairobi, Wallace Mugambi Karuguti, Department of Physiotherapy, JKUAT, P. O. Box 62000-00200, Nairobi, James Kamau Kanyoro, Forensic Medicine Department, Mathare Mental Teaching and Referral Hospital, P. O. Box 30030-00100 Nairobi.

Corresponding author: Minah Kinanu Guantai, Department of Physiotherapy, JKUAT, P. O. Box 62000-00200, Nairobi, Email; guantaiminah@gmail.com

PREVALENCE OF PSYCHOLOGICAL SYMPTOMS AMONGST SPINAL CORD INJURY SURVIVORS IN SELECTED COUNTIES IN KENYA

M. K. Guantai, J. M. Matheri, W. M. Karuguti and J. K. Kanyoro

ABSTRACT

Objective: **The aim of this study was to determine the prevalence of psychological symptoms amongst spinal cord injury survivors, in Nairobi, Nakuru and Machakos Counties in Kenya.**
Design: **A cross-sectional study**
Setting: **Community**
Main outcome measure: **Depression, Anxiety and Stress Scale (DASS) version 21 was used to measure the dimensions of depression, anxiety, and stress (DAS).**
Subjects: **186 rehabilitated spinal cord injury survivors (SCI).**
Methods: **The data regarding socio-demographic characteristics were obtained using a standardized questionnaire. The data were then analysed using SPSS version 25 for the descriptive and inferential statistics.**
Results: **A prevalence rate of 69.35% (n=129) of psychological symptoms (Depression, Anxiety and Stress) was recorded. Majority were male, young and lowly educated. Correlation analysis indicated that males 46.77% (n=87; p-value=0.117) had a higher prevalence of psychological symptoms after SCI rehabilitation compared to women 22.58 % (n=42; p-value=0.148). Regression analysis revealed that there was moderate and statistically significance (r=0.531, p-value=.000) relationship between age and depression, similarly between anxiety (r=0.611, p-value=.000) and stress (r=0.602, p-value=.000). Socio-demographic characteristics play significant influence on psychological symptom status for the participants with 94.7% variation (R^2=.947).**
Conclusion: **Psychological symptoms were common amongst the participants and poor young male adults with low education. This study highlights the need for psychological care during and after rehabilitation.**

INTRODUCTION

Spinal cord injury is a highly destructive condition which leads to intense life changes and the perception that it renders the person totally incapacitated.[1,2] Psychological symptoms including depressive disorders are more frequent amongst persons with SCI compared to the able bodied.[3] For example, in Australian study involving forty participants both paraplegic and tetraplegia spinal cord injury survivors, reported that 45% of them experienced elevated levels of anxiety.[4] WHO estimates that the global incidence of SCI, both traumatic and non-traumatic is between 40 - 80 cases per million population but does not provide the global estimated prevalence.[5] After SCI, survivors experience low self-esteem, poor self-image and negative mood that impede interpersonal interactions and relationships [6]. People with SCI also experience, on average, higher levels of distress and lower levels of life satisfaction compared with the general population.[7] More importantly, female SCI survivors experience lower mental health scores and lower physical health scores especially those with tetraplegia.[8] Researchers have linked psychological morbidity in patients with SCI to increased hospital stay, reduced functional improvement, and difficulties in adjustment after rehabilitation.[9,10]

Previous research has also shown that male SCI survivors have preserved interests in maintaining fertility although they have high rates of severe erectile and ejaculatory dysfunctions[11]. Most of these studies have been conducted in developed countries such as Australia [6],China [9] ,India [1],USA [3] and Belgium [2].Very few studies have documented the burden of psychological symptoms amongst SCI survivors, in low-middle income countries (LMIC). In Sub-Saharan Africa, Kenya specifically, there is paucity of literature regarding the magnitude of psychological symptoms amongst SCI survivors. Therefore, the aim of this research was to determine the prevalence of psychological symptoms amongst community dwelling SCI survivors in selected Counties. Research-based evidence on the burden of psychological symptoms may form a reliable baseline for community reintegration strategy. Additionally, the absence of psychological symptoms post-rehabilitation of SCI survivors is a positive indicator of the effectiveness of the community reintegration strategy.[10]

MATERIAL AND METHODS

Area of Study: The study area was in three randomly selected counties (Nairobi, Nakuru and Machakos) from 47 Counties based on Human Poverty Index (HPI) of 2009. The counties were classified as low, medium and high according to HPI respectively. Table 1 summarises the clusters of Counties by HPI.

Table 1
Counties by Clusters

S/No.	Level of HPI	Counties
1	Low (HPI≤30.0)	Kiambu, Kirinyaga, Murang'a, Nairobi, Nyandarua, Nyeri
2	Medium (HPI >30.1<33.0)	Mombasa, Kwale, Kilifi, Tana River, Lamu, TaitaTaveta, Uasin Gishu, Trans-Nzoia, Elgeyo-Marakwet, Nandi, Baringo, Laikipia, Nakuru, Narok, Kajiado, Kericho, Bomet, West Pokot, Samburu, Turkana
3	High (HPI>33.1)	Marsabit, Isiolo, Meru, TharakaNithi, Embu, Kitui, Machakos, Makueni, Siaya, Kisumu, HomaBay, Migori, Kisii, Nyamira, Garissa, Wajir, Mandera

Study Design: This was a quantitative cross-sectional study to determine the prevalence of psychological symptoms amongst spinal cord injury survivors.

Sampling procedure: Since SCI survivors were a hard-to-reach population and there are incomplete records of members, a snowballing strategy was preferred. The national spinal cord injury hospital in Nairobi and the level 5 and 6 hospitals located in Nakuru and Machakos counties where the SCI survivor's records were kept was visited. A scooping of the records was undertaken to identify the potential SCI survivors who then were recruited into the study.

Inclusion Criteria and Exclusion Criteria: Those included were survivors aged 18-65 years, diagnosed with SCI from a recognized medical doctor irrespective of cause, living in the community and gave informed consent, irrespective of race, gender or religion. Those living in the selected counties during the study. Potential participants who did not meet the criteria or were hospitalized at the time, and without medical records were excluded from the study.

Instrumentation: Depression, Anxiety, Stress Scale (DASS) version 21.0 was used to measure the dimensions psychological symptoms.[12] This scale has 21 items to Depression (seven items), Anxiety (seven items) and Stress (seven items).

Procedure: Authority to conduct the study was granted by NACOSTI and ethical approval from Jomo Kenyatta University of Agriculture and Technology Ethical Review Committee. Permission was sought from participating hospitals in writing. All participants were provided a written explanation and oral brief about the study before being allowed to participate in the study. Guardians of those unable to write signed on their behalf.

Data collection and analysis: Each participant completed the instrument assisted by the principal researcher and research assistants where necessary. Completed questionnaires were then collected, coded and secured by the principal researcher in a safe. The SPSS version 25.0 software was used to analyse clean data. General descriptive statistics, Pearson Correlation, ANOVA, linear regression and Chi Square tests were done.

RESULTS

Out of 186 participants, 101, 51 and 34 were from Nairobi, Nakuru and Machakos

counties respectively. Regarding gender distribution, majority were male compared to females. Regarding age distribution majority of the participants in Nairobi were between the ages of 26-35 years followed by those 36-45 years. Similarly, in Machakos majority were aged 26-35 years followed by those between 36-45 years. In Nakuru, majority were between 36-45 years. Regarding education level, majority were primary educated. Regarding marital status, majority were married followed by the single. Regarding family income level distribution, majority had income level below $500(KES 50,000). The study further revealed that majority were injured less than 5 years ago. Table 2 summarized in distribution of selected socio-demographic characteristics amongst rehabilitated SCI survivors by county of residence.

Table 2

Distribution of selected socio-demographic characteristics amongst rehabilitated SCI survivors by county of residence

Characteristic	Nairobi		Machakos		Nakuru		Total	
	n	%	n	%	n	%	n	%
Gender (n=186)								
Male	63	62.38	25	73.53	30	58.82	118	63.44
Female	38	37.62	9	26.47	21	41.18	68	36.56
Total	101	100	34	100	51	100	186	100
Age (n=186)								
18-25 Years	16	15.84	8	23.53	6	11.76	30	16.13
26-35 Years	39	38.61	9	26.47	11	21.57	59	31.72
36-45 Years	30	29.70	8	23.53	19	37.25	57	30.65
46-55 Years	13	12.87	4	11.76	6	11.76	23	12.37
56-65 Years	3	2.97	5	14.71	9	17.65	17	9.14
Total	101	100	34	100	51	100	186	100
Education Level (n=186)								
No formal Education	11	5.91	9	4.84	11	5.91	31	16.67
Primary School	47	46.53	10	29.41	20	39.22	77	41.40
Secondary School	1	0.99	5	14.71	4	7.84	10	5.38
Vocational Training	25	24.75	5	14.71	8	15.69	38	20.43
College/Diploma	15	14.85	4	11.76	8	15.69	27	14.51
University	2	1.98	1	2.94	0	0	3	1.61
Total	101	100	34	100	51	100	186	100

Marital Status (n=186)							
Single	40	39.60	7	20.59	12	23.53	59	31.72
Married	46	44.55	22	64.71	29	56.86	97	52.15
Separated	8	7.92	2	5.88	5	9.80	15	8.06
Divorced	6	1.98	1	2.94	3	5.88	10	3.23
Widowed	1	0.99	1	5.88	2	1.96	4	2.15
Cohabiting	0	0	1	0.54	0	0	1	0.54
Total	101	100	34	100	51	100	186	100
Family Income Level (n=186)							
Less Than 50,000	39	38.60	25	73.53	33	64.71	97	52.69
50,001 - 100,000	14	13.86	8	23.53	13	25.49	35	18.81
100,001-200,000	3	2.97	0	0	0	0	3	1.61
200,001 - 300,000	1	0.99	0	0	1	1.96	2	1.08
300,001 or More	1	0.99	0	0	1	1.96	2	1.08
Refused to say	43	42.57	1	0	3	5.88	47	25.28
Total	101	100	34	100	51	100	186	100
Time Since Injury (n=186)							
<5 years	76	75.25	24	70.59	42	82.35	142	76.34
6-15 years	22	21.78	8	10.89	8	15.69	38	20.43
>15 years	3	2.97	2	5.88	1	1.96	6	3.22
Total	101	100	34	100	51	100	186	100
SOURCE: Primary data							

Prevalence of psychological symptoms amongst rehabilitated SCI survivors: Prevalence rate of 69.35% (n=129) of psychological symptom amongst rehabilitated SCI survivor was recorded. The results revealed that males 46.77 % had a higher prevalence of DAS after SCI rehabilitation compared to women 22.58 %. Regarding age distribution age there was high prevalence among person of age 36-45 years 23.12 % and 26-35 years 22.04% whereas person of age between 56-65 years 6.99% had the lowest prevalence rate. In addition, regarding education level rehabilitated SCI survivor with primary education 30.11 % had the highest prevalence of DAS compared to rehabilitated SCI survivor with postgraduate 1.08% who recorded low prevalence rate. Regarding marital status of rehabilitated SCI survivor, single and married had higher DAS prevalence rate of 22.04 % and 37.10 % respectively. Widows 1.08% and persons cohabiting had the lowest prevalence of DAS. Regarding family income level there was high prevalence rate of DAS 37.10% amongst rehabilitated SCI survivor earning less than $500 (KES 50, 000). Based on county of residence there was high prevalence rate of DAS 40.32% amongst rehabilitated SCI survivor living in

Nairobi County compared to Machakos and Nakuru counties which recorded prevalence rate of DAS at 14.52% and 14.51%) respectively. Regarding time since injury there was high prevalence among person injured 5years and below 63.44%. Table 2 present the result of prevalence of psychological symptoms amongst rehabilitated SCI survivors by selected socio-demographic characteristics.

Table 3

Analysis of psychological symptoms status (DAS) amongst rehabilitated SCI survivors by selected socio-demographic characteristics

Characteristics	Psychological Symptoms Status						Statistical Mean	P-value
	With DAS		Without DAS		Total			
	n	%	n	%	n	%		
Gender (n=186)								
Male	87	46.77	31	16.67	118	63.44	0.513	.0117
Female	42	22.58	26	13.44	68	36.56	0.366	.0148
Total	129	69.35	57	30.65	186	100		
Age (n=186)								
18-25 Years	18	9.68	12	6.45	30	16.13	0.129	.0191
26-35 Years	41	22.04	18	9.68	59	31.72	0.317	.0114
36-45 Years	43	23.12	14	7.53	57	30.65	0.302	.0199
46-55 Years	14	7.52	9	4.84	23	12.37	0.124	.0106
56-65 Years	13	6.99	4	2.15	17	9.14	0.112	.0129
Education (n=186)								
No Formal Education	25	13.44	6	3.23	31	16.67	0.170	.0151
Primary School	56	30.11	21	11.29	77	41.40	0.414	.0275
Secondary School	5	2.69	5	2.69	10	5.38	0.054	.0114
Vocational Training	26	13.98	12	6.45	38	20.43	0.204	.0119
College/Diploma	15	8.06	12	6.45	27	14.51	0.113	.0103
University	2	1.08	1	0.54	3	1.61	0.011	.0132
Marital status (n=186)								
Single	41	22.04	18	9.68	59	31.72	0.317	.0198
Married	69	37.10	28	15.05	97	52.15	0.499	.0217
Separated	10	5.38	5	2.69	15	8.06	0.081	.0141
Divorced	8	4.30	2	1.08	10	3.23	0.061	.0201
Widowed	2	1.08	2	1.08	4	2.15	0.022	.0346
Cohabiting	1	0.54	0	0	1	0.54	0.014	.0519

Family Income (n=186)							
Less Than 50,000	69	37.10	28	15.05	97	52.69	0.539	.0017
50,001 - 100,000	20	10.75	15	8.06	35	18.81	0.242	.0715
100,001-200,000	2	1.08	1	0.54	3	1.61	0.016	.0314
200,001 - 300,000	2	1.08	0	0.00	2	1.08	0.003	.0119
300,001 or More	0	0.0	2	1.08	2	1.08	0.011	.0106
Refused to Say	37	19.89	10	5.91	47	25.28	0.258	.0238
County of Residence							
Nairobi	75	40.32	26	13.98	101	54.30	0.543	.0111
Machakos	27	14.52	7	3.76	34	18.28	0.183	.0341
Nakuru	27	14.51	24	12.90	51	27.42	0.274	.0214
Time Since Injury (n=186)							
<5 years	118	63.44	24	12.90	142	76.34	0.534	.0116
6-15 years	25	13.44	13	6.99	38	20.43	0.153	.0119
>15 years	4	2.15	2	1.08	6	3.22	0.147	.0012

SOURCE: Primary data: significant at P<0.05

Relationship between selected social demographic characteristics and psychological symptoms status: The study further sought to determine the correlation between psychological symptoms status, and selected socio-demographic characteristics. According to the results in Table 4, there was moderate and statistically significance (r=0.531, p-value=.000) relationship between age and depression. Similarly, relationship between anxiety (r=0.611, p-value=.000) and stress (r=0.602, p-value=.000). There was moderate and statistically significance relationship between gender and depression (r=0.691 p-value=.000) as well as stress (r=0.642, p-value=.000). However, there was strong and statistically significance (r=0.712, p-value=.000) relationship between gender and anxiety. In addition, there was moderate and statistically significance relationship between level of education and depression (r=0.651, p-value=.000) as well as anxiety (r=0.549, p-value=.000) and stress (r=0.670, p-value=.000).

Marital status, had was strong and statistically significance (r=0.728, p-value=.000) relationship between marital status and depression as well as anxiety (r=0.798, p-value=.000), however, there was moderate and statistically significance relationship between time since injury and stress(r=0.652, p-value=.000). Lastly, there was strong and statistically significance relationship between time since injury and depression (r=0.837, p-value=.000), anxiety (r=0.896, p-value=.000) and moderate statistically significance with stress (r=0.621, p-value=.000).

Table 4

Relationship between psychological symptoms (DAS) and selected socio-demographic characteristics

		Psychological symptoms		
		Depression	Anxiety	Stress
Age	Pearson correlation	.531	.611	.602
	Sig(2-tailed)	.000	.000	.000
	N	186	186	186
Gender	Pearson correlation	.691	.712	.642
	Sig(2-tailed)	.000	.000	.000
	N	186	186	186
Education	Pearson correlation	.651	.549	.670
	Sig(2-tailed)	.000	.000	.000
	N	186	186	186
Marital Status	Pearson correlation	.728	.798	.652
	Sig(2-tailed)	.000	.000	.000
	N	186	186	186
Family Income Level	Pearson correlation	.837	.896	.621
	Sig(2-tailed)	.000	.000	.000
	N	186	186	186
Time Since Injury	Pearson correlation	.837	.896	.621
	Sig(2-tailed)	.000	.000	.000
	N	186	186	186

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level

Statistical interpretation r<0.5 Weak; r≤0.5-0.6 Moderated; r≥0.7-0.9 strong

Table 5

Regression analysis of psychological symptoms (DAS) and selected socio-demographic characteristics

a) **Goodness of fit**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.973[a]	.947	.0016	.386	.0112	1.310	9	174	.003

a. *Predictors: (Constant), Socio-demographic characteristics*
Significant at p<0.05

b) **Overall significance**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	21.167	9	2.352	3.827	.011[b]
	Residual	162.521	176	.9234		
	Total	**183.688**	**185**			

a. *Dependent Variable: Psychological symptoms (DAS)*

b. *Predictors: (Constant), Socio-demographic characteristics*

c) Individual significance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		
		B	Std. Error	Beta			Lower Bound	Upper Bound	VIF
1	(Constant)	1.212	.522		1.014	.001	.523	1.098	
	Depression	.130	.173	.701	.812	.014	.172	.289	1.016
	Anxiety	.102	.255	.090	.613	.023	.172	.065	1.186
	Stress	.119	.121	.071	.685	.020	.476	.078	1.134

a.   Dependent Variable: Psychological symptoms (DAS)

b.   Significant at p<0.05

Influence of socio-demographic characteristics on psychological symptoms: From this study we noted that socio-demographic characteristics play a significant influence on psychological symptom status on participants with statistical variation of 94.7% n (R^2=.947). The overall model further reveals a statistically significant influence of socio-demographic characteristics on psychological symptom status (F=3.827, p-value=.011). The standardized regression coefficient also shows that psychological symptom (Depression, p-value =0.014; Anxiety, p-value =0.023; Stress, p-value =0.020) have significant influence by socio-demographic characteristics. Beta coefficient for psychological symptom domain was found to be positive and statistically significant.
(Statistician; Peter Juma - PhD Computational Biology & Bioinformatics)

DISCUSSION

Psychological symptoms are a common problem amongst SCI survivors living in the community. Our data indicate that there was a prevalence rate of 69.35 % of psychological symptoms amongst the 186 SCI survivors who participated in this study (Table 3) which was similar to a previous studies in Korea that reported prevalence rate of 63.9 %[13] and 74.1% [14]in a Iraq study. In contrast, a meta-analysis study among 19 studies found that the prevalence estimate of depression diagnosis after SCI ranged between 22.2% to 38%[15]. In addition, a nationwide population based cohort in Taiwan to access anxiety and depression in survivors with traumatic SCI indicated that they had a higher risk of anxiety or depression.[16] While in a study to investigate the relation among aging, gender, ethnicity, socioeconomic indicators, and depressive symptoms among SCI survivors reported that 48% were affected by depression.[17]Similar to our finding that more males (male 46.77% (n =87) compared to females 22.58% (n = 42) suffer from psychological symptoms, Rahman et al. [18] found that more males (86.2%) compared to females (13.8%) had psychological problems in Bangladesh.

Over the past decades, the gender difference in rates of psychological symptoms has become an accepted truth in clinical settings. This implies that males compare to females are more likely to engage in higher risk activities. There is implication for insurance policy to cover for higher risk jobs. Another Iraq study found that there was a strong correlation between degree of severity of depression and socio-demographic characteristics (duration of injury (P=0.003); gender P=0.001; education level P=0.038) of the SCI survivors.[19] This was similar to our study which found strong and statistical significance between time since injury and depression (r=0.837, p-value=.000) while gender and depression

had moderate and statistically significance (r=0.691, p-value=.000).Our present study found that there was a positive correlation between DAS and education. A recent study reported that low education was associated with a greater risk of depression.[20]

Our data further demonstrated that majority of the SCI survivors with psychological symptoms are more likely to be youthful (aged <45years), have low income and low level of education. This is similar to the findings by Krause et al.[17] that low education and low income accounted to elevated risk of depression. Ours findings were also similar to an earlier study that found DAS was higher among the SCI survivors at the age of <50 years and with low income.[16] This implies that young adults with low education engage in low paying high-risk jobs.

The results further demonstrate that level of income is significantly correlated the prevalence rate of DAS. This is similar to those of a longitudinal study of depression in SCI survivors in USA that found that socioeconomic factors (income, education) were significantly related to depression.[3] Another study argued that poverty increases the risk of exposure to the SCI.[16] This has implications for policy on the education/vocational training and health sectors human resources development and mobilization. Further, there is implication for social security to mitigate disability after SCI and psychological care during and after discharge from rehabilitation settings. Finally, the current study showed that SCI survivors with less than 5 years since injury had higher levels of DAS. This is similar to a Korean study that found post SCI with less than 2 years duration were more psychologically affected.[13] This may most likely due to adaptation and adjustment process of the injury.

Limitation: The limitation of this study was the snowballing sampling technique used to reach participants whose results cannot be generalised to the general population. In addition, individuals with a history of psychological symptoms prior to SCI were not excluded from the study.

Implication: Firstly, there is implication for follow-up screening and management of psychological symptoms among individuals with SCI living in the community. There is also an implication for social protection against marginalisation of SCI survivors who least likely to access mainstream services due to poverty. Further, there is need to establish a national database of SCI survivors and their profiles with regard to participation in core-domain activities and well-being periodically.

CONCLUSION

The current study shows that psychological symptoms are common amongst SCI survivors and that poor young adult males with low education are the most at risk of SCI. This study has highlighted the need for psychological care during and after rehabilitation. Future research should focus on the national burden of psychological symptoms amongst SCI survivors.

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