

Severity and Complications of Injury, Levels of Activity and Participation in Individuals with Spinal Cord Injury

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Abstract

The cross-sectional survey investigated the prevalence of complications of spinal cord injury (SCI), levels of activity and participation and the associations among them. The American Spinal Injury Association (ASIA) impairment scale, Impact on Participation and Autonomy Questionnaire, Barthel's index and Numeric Pain Rating Scale were used to assess participation, activity and pain respectively. Pain was the most prevalent complication among the 25 participants. 68% of them had high level of activity and 72% had moderate level of participation and autonomy. There was a significant association between level of activity and presence of pressure ulcer and bladder dysfunction but there was no significant association between pain and level of activity. There was significant association between level of participation and presence of pressure ulcer, bladder dysfunction and pain. There was no significant association between level of activity and participation. The level of activity and participation among individuals with SCI appeared to be influenced by presence of complications.

Keywords: Spinal Cord Injury, Complications, Level of Activity, Level of Participation

1. Introduction

Spinal cord injury (SCI) is a devastating condition, causing severe disability and contributing to the global health burden (GBD, 2019; traumatic Brain Injury and Spinal Cord Injury Collaborators, 2019). Spinal cord injury is commonly caused by flexion, compression, hyperextension or flexion-rotation mechanisms, which are responsible for the primary damage (Sipski & Richards, 2006). The signs and symptoms of SCI depend on the extent of the injury but the most apparent consequence of SCI is paralysis (Dolbow et al., 2015; Harvey, 2016). The consequences of SCI not only cause restriction to physical function and independence, but also cause complications such as neurogenic bladder and bowel, urinary tract infections, pressure ulcers, orthostatic hypotension, fractures, deep vein thrombosis, contractures, pain, pulmonary and cardiovascular disorders and so forth (Hitzig et al., 2008; Paker et al., 2006). In addition, SCI patients are hospitalized for a long period and experience a variety of limitations in daily activities due to these complications (Yuen & Hanson, 2002). The complications of SCI negatively affect the

patient's physical condition and as a result, can lead to limitations in activities and participation restrictions typically related to mobility, self-care activities, difficulties in regaining work, maintaining social relationships, participating in leisure activities and being active members of the community (Atobatele et al., 2018; Lidal et al., 2007).

A high incidence of complications is associated with a lower level of physical capacity, activities and functional outcome (Haisma et al., 2007). Additionally, complications are a common cause of mortality following SCI (Meyers et al., 2000) but there is limited knowledge on the impacts of complications on level of activity and participation among patients with SCI. There is, yet, a need to conduct further of studies on the impact of complications on levels of activity and participation among individuals with SCI. The complications prevalent among individuals with SCI may vary with the practice environment and level of facilities available to manage both the conditions and the complications (preventive management inclusive). This study was aimed at investigating the prevalence of complications in persons being managed for SCI in a teaching hospital and the association among SCI complications, age, duration of injury, levels of activity and participation. The hypothesis was that the presence or absence of complications and the level of severity would not have significant association with the levels of activity and participation of individuals with SCI.

2. Method

A cross-sectional study was conducted among SCI patients who were receiving care on outpatients' basis at the University College Hospital, Ibadan, Nigeria. Ethical approval was sought and obtained from the University of Ibadan/University College Hospital Health Research Ethics Committee before the commencement of the study. A purposive sampling technique was used to recruit participants into this study. Participants were at least 18 years and must have had an injury duration of 3 months and above. Individuals with SCI who may have difficulty understanding instructions (moderate to severe cognitive impairment) were excluded from this study.

Data was collected using self-administered (for sections the participants could fill on their own) and interviewer administered questionnaires (for sections that required the researchers to complete). A form was used to document the sociodemographic and injury profile. In addition, the American Spinal Injury Association (ASIA) impairment scale was used to determine the level and severity of injury. Impact on Participation and Autonomy questionnaire, Barthel's index and Numeric Pain Rating Scale were used to assess the level of participation, level of activity and pain intensity respectively. Statistical Package for Social Sciences version 26 software (SPSS, Chicago, IL, United States) was used for data analysis. Descriptive statistics of frequency, mean, percentage and standard deviation were used to summarize the data collected. Chi square test (χ^2) was used to investigate the association among the presence of complications of SCI, level of activity, level of participation, age, gender and injury duration. The level of significance was set at 0.05.

3. Processing

A total of 25 (65.8%) participants with SCI, who met the inclusion criteria and consented to participate, were recruited into this study from the Physiotherapy outpatient clinic and the Surgery outpatient unit of the University College Hospital. Sixteen (64%) of the participants were males and 9 (36%) were females. The mean age of the participants was 49.9 ± 16.0 years with more than 36% of the participants lying within the 50–59 age group, the group with the highest number of participants. Tertiary education was the highest level of education obtained (64%), 72% of the participants were married and 76% of the participants employed. Twelve (48%) of the participants had traumatic injury while 13 (52%) had nontraumatic injury. Majority (64%) of the participants had an injury duration of less than 24 months. The most common level of injury was the cervical spine (64%) with majority (40%) of the participants presenting with ASIA D injury classification. The summary of the sociodemographic and clinical characteristics of participants are shown in Table 1. Pain was the most prevalent complication among participants with SCI (68%).

A higher level of dependency (total and/or severe dependency) indicates lower level of activity among participants while a lower level of dependency (slight dependency) indicates higher level of activity. Majority of the participants (44%) had moderate dependency, 24% had slight dependency, 20% had severe dependency and 12% had total dependent in activities of daily living. Table 2 shows the various activities and the responses of the participants while Table 3 shows the domains of the level of participation among participants and the frequency of responses. The work domain was where most participants had major problems (44%) while financial situation was the domain had the least number % of the participants (8%) recording major problem. The level of participation among participants was categorized into high, moderate and low. Majority (72%) of the participants had a moderate level of participation while the remaining 28% had a low level of participation.

Table 4 shows the association between presence of complications of SCI and level of activity among participants. There was a significant association between the presence of pressure ulcer and level of activity (dependency) ($p = .03$); participants without pressure ulcer tended to be less dependent compared to those with pressure ulcer. The results further revealed that a higher proportion (81%) of those without bladder dysfunction reported slight and moderate dependency level compared to those with bladder dysfunction (0%). There was a significant association between the presence of bladder dysfunction and level of activity (dependency) ($p = .001$). However, there was no significant association between pain intensity and level of activity (dependency) ($p = .27$).

The association between presence of complications of SCI and level of participation among participants is shown on Table 5. There was a significant association between the presence of pressure ulcer and level of participation ($p = .003$); participants without pressure ulcers tended to participate more compared with those with pressure ulcers.

There was a significant association between the presence of bladder dysfunction and level of participation ($p = .001$); participants without bladder dysfunction tended to participate more compared to those with bladder dysfunction. Majority (80%) of participants who had low level of participation were those with severe pain, only 3 (18.8%) of the participants who had moderate pain reported low level of participation. There was a significant association between the pain intensity and level of participation ($p = .03$); participants who had no pain, mild pain and moderate pain tended to participate more compared to those with severe pain.

The results of the association between selected variables and level of activity among the participants showed that there was no statistically significant association between level of activity and any of gender ($p = .27$), duration of injury ($p = .20$), and age ($p = .27$). Similarly, there was no statistically significant association between level of participation and any of gender ($p = .21$), duration of injury ($p = .63$), and age ($p = .14$). Lastly, there was no significant association between level of activity and participation among individuals with SCI ($p = .05$).

Table 1: Sociodemographic and Clinical Characteristics of Participants

Variables	(N = 25)	Frequency (n)	Percentage (%)
Age (years)			
<30		3	12
30–39		4	16
40–49		3	12
50–59		9	36
>60		6	24
Primary		3	12
Secondary		6	24
Tertiary		16	64
Marital status			
Single		6	24
Married		18	72
Widowed		1	4
Time from onset of injury (Months)			
≤24		16	64
>24		9	36
Level of injury			
C1-C8 (tetraplegia)		16	64
T1-T12 (paraplegia)		2	8
L1-L5 (paraplegia)		7	28
Severity of injury			
ASIA A		1	4
ASIA B		4	16
ASIA C		8	32
ASIA D		10	40
ASIA E		2	8

Abbreviations: ASIA American Spinal Injury Association.

Table 2: Level of Activity Among Participants (N = 25)

Variables	Frequency (n)	Percentage (%)
Feeding		
Unable	2	8
Needs helps	3	12
Independent	20	80
Bathing		
Dependent	6	24
Independent	19	76
Grooming		
Needs helps	6	24
Independent	19	76
Dressing		
Dependent	2	8
Needs help but can do half unaided	14	56
Independent	9	36
Bowels		
Incontinent	2	8
Occasional accident	2	8
Continent	21	84
Bladder		
Incontinent	3	12
Occasional accident	2	8
Continent	20	80
Toilet use		
Dependent	4	16
Needs help but can do something alone	4	16
Independent	17	68
Transfer (bed to chair and back)		
Unable	2	8
Major help	3	12
Minor help	10	40
Independent	10	40
Mobility (On level surfaces)		
Immobile	6	24
Wheelchair independent	2	8
Walks with help of one person	7	28
Independent	10	40
Stairs		
Unable	8	32
Needs help	9	36
Independent	8	32

Table 3: Level of Participation Among Participants (N = 25)

Variables	Frequency (n)	Percentage (%)
Autonomy indoors		
Very poor	5	20
Poor	6	24
Fair	13	52
Good	1	4
Family role		
Very poor	1	4
Poor	13	52
Fair	10	40
Good	1	4
Autonomy outdoors		
Poor	5	20
Fair	8	32
Good	10	40
Very good	2	8
Social life and Relationships		
Poor	2	8
Fair	12	48
Good	11	44
Work and education		
Very poor	2	8
Poor	11	44
Fair	10	40
Good	2	8
Mobility problems		
No problem	3	12
Minor problems	14	56
Major problems	8	32
Self-care problems		
No problem	8	32
Minor problems	12	48
Major problems	5	20
Family role Problems		
No problem	2	8
Minor problems	14	56
Major problems	9	36
Financial situation Problems		
No problem	16	64
Minor problems	7	28
Major problems	2	8
Leisure problems		
No problem	8	32
Minor problems	10	40
Major problems	7	28
Social relation problems		
No problems	7	28

Minor problems	13	52
Major problems	5	20
Work problems		
No problem	4	16
Minor problems	10	40
Major problems	11	44
Education problems		
No problem	7	28
Minor problems	10	40
Major problems	8	32

Table 4: Association between Complications of Spinal Cord Injury (SCI) and Level of Activity Among Participants

Variables	Total	Severe	Moderate	Slight	χ^2	p-value
Pressure ulcer						
Yes	3(42.9%)	1(14.3%)	2(28.6%)	1(14.3%)	8.781	0.032 [†]
No	0(0.0%)	4(22.2%)	9(50%)	5(27.8%)		
Bladder dysfunction						
Yes	3(75%)	1(25%)	0(0%)	0(0%)	19.05	0.001 [†]
No	0(0%)	4(19%)	11(52.4%)	6(28.6%)		
Pain intensity						
No pain	0(0%)	1(100%)	0(0%)	0(0%)	11.02	0.274
Mild pain	0(0%)	1(33.3%)	2(66.7%)	0(0%)		
Moderate pain	1(6.3%)	2(12.5%)	8(50%)	5(31.3%)		
Severe pain	2(40%)	1(20.0%)	1(20.0%)	1(20.0%)		

[†]Statistically significant at $p < .05$.

Table 5: Association between Complications of Spinal Cord Injury (SCI) and Level of Participation

Variables	Moderate participation	Low participation	χ^2	p-value
Pressure ulcer				
Yes	2(28.6%)	5(71.4%)	9.1	0.003 [†]
No	16(88.9%)	2(11.1%)		
Bladder dysfunction				
Yes	0(0.0%)	4(100%)	12.25	0.001 [†]
No	18(85.7%)	3(14.3%)		
Pain intensity				
No pain	1(100%)	0(0.0%)	8.94	0.03 [†]
Mild pain	3(100%)	0(0.0%)		
Moderate pain	13(81.3%)	3(18.8%)		
Severe pain	1(20.0%)	4(80.0%)		

[†]Statistically significant at $p < .05$.

Key.

χ^2 = chi square

4. Discussion

This cross-sectional study was conducted to determine the prevalence of complications of SCI, the association among presence of complications of SCI (bladder dysfunction, pressure ulcer, pain), sociodemographic variables (age, sex, injury duration), level of activity and level of participation of individuals with SCI being managed at the University College Hospital. A total of 25 patients with spinal cord injury participated in the study. There were more male participants than female, a gender distribution that is consistent with findings from previous studies (Mahan et al., 2009; Obalum et al., 2009; World Health Organization, 2013). The current study showed that there might be an increasing trend in the incidence of SCI in the older age. Majority of the participants (64%) had a tertiary education, a possible reflection of the data reported by the World Bank (2021) that stated that Nigeria had a 62% literacy rate. The high level of literacy meant a good number of the participants were able to complete the questionnaire on their own. A higher percentage (72%) of the participants were married which was highly expected considering that the mean age of the participants was 49.9 years. Majority of the participants were employed but some of them were not actively involved in their occupations which could be due to the impact of SCI on their functional mobility. This is consistent with previous reports that disability has the potential to restrict community participation (i.e., experiencing problems during involvement in life situations) (Perenboom et al., 2012; Stucki, 2005). The most common level of injury was at the cervical spine (64%), which was similar to the report by Kang et al. (2018).

The finding that pain was the most prevalent complication in SCI corroborated the finding of a retrospective study by Pilusa et al. (2021). Rekand et al. (2012) identified pain as the most prevalent complication perceived by SCI individuals to cause limitation in their activities. Severity of pain, however, did not significantly affect the level of activities of the participants in this study unlike the level of participation where high pain severity significantly led to low participation. Pain impacts the employment status of individuals, results in loss of employment or complete change of jobs entirely (Breivik et al., 2006). Most participants with pressure ulcers were totally dependent in activities of daily living. This might have been due to the long-time frame needed for healing when pressure sores set in. Langemo et al. (2000) reported that the time frame for healing of pressure ulcer was unpredictable and perceived as frustrating, depressing and restrictive on activities of daily living for patients. Bladder dysfunction was associated with total dependence in activities of daily living and this could be because all the participants with bladder dysfunction had injury at the cervical spine level (tetraplegia) and ASIA C (Hitzig et al., 2008). This study was similar to a report by Langemo et al. (2000) that participant with paraplegia and Stage IV sacral pressure ulcer indicated restrictions in activity participation as the pressure ulcer prevented outdoor engagements and participation as well as led to confinement. Bladder symptoms ranked as one of the most distressing symptoms, as people find them difficult to talk about and they significantly impact on lifestyle, activities and quality of life.

According to Charlifue et al. (2010) and Savic et al. (2010) people living with SCI experienced some degrees of participation restrictions in everyday life—a similar observation in this study. This could have resulted in limitation in functional mobility thus leading to dependence on activities of daily living (Van Leeuwen et al., 2012). The observation that there was no significant association between level of activity and participation among individuals with SCI meant that involvement in activities of daily living did not necessarily translate into increased participation. However, Hammal et al. (2004) had a different the outcome as they reported that participation was influenced by activities such as walking ability, communication and feeding ability.

5. Conclusion

Complications such as pressure ulcer, bladder dysfunction and pain are common among patients with SCI being managed at University College Hospital, Ibadan, Nigeria; pain was the most prevalent complication. Most of patients with SCI had moderate levels of activity and participation. Pressure ulcer and bladder dysfunction had a significant impact on the levels of activity and participation while pain had no significant impact on the level of activity. Pain had a significant impact on the level of participation. Age, gender and injury duration had no significant impact on the levels of activity and participation of the participants. The level of activity had no significant association with the level of participation.

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