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Original Research Article

Prevalence of Individuals with Traumatic Spinal Cord Injury in Nairobi, Kenya

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ABSTRACT

Objectives: To determine the prevalence of individuals with a traumatic spinal cord injury in Nairobi, Kenya.

Methods: Retrospective quantitative data was extracted from records of 1st January 2010 to December 2014, at the NSIH. (N=320) participants met the inclusion criteria of all TSCI patients injured archived medical files, out these (n=217) were men, and (n=103) women, collected data was analyzed by SPSS version 23.0. Pearson chi-square was applied to test for association between variables, Student t-test was used to compare mean difference between groups, study Significance level was at p-value <0.05.

Results: Mean age of the participants was 37.59 (SD= 15.038), the highest percentage age was 30-39 years old at (27.8%) followed aged 18-29 years at (26.6%). Male to female ratio was 2.1:1, highest prevalence occurred in 2010 and 2014 (20.5%), main cause of a TSCI transportation (49.1%), fall at (33.4%), assault (17.5%) common injury location was at lumber (53.1%), followed thoracic at (27.5%) cervical and sacral at (19.1%) and (0.3%) respectively. There were significantly more persons with paraplegia (54.1%) who had complete injuries than those with tetraplegia (19.6%). Other (27.3%) accounted for the TSCI patients with incomplete paraplegia and tetraplegia and no neurological deficits

Conclusions: TSCI is a devastating condition to individuals; it has a high impact on QOL and ADL in low-income countries where there is an increase in manual labor and poor infrastructure, which predispose individuals to TSCI. Further studies need to be done to understand and compare epidemiological results, to inform appropriate prevention strategies that will decrease the burden of TSCI globally.

KEYWORDS: Traumatic Spinal Cord Injuries, Activities of Daily Living, Gun Shot Wound, National Spinal Injury Hospital, American Spinal Injury Association impairment scale.

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INTRODUCTION

Traumatic Spinal Cord Injuries (TSCI) is listed among the world global burden of diseases which is a known disabling condition [1], Spinal cord injury is classified as traumatic or atraumatic, TSCI is the commonest type of SCI. Prevalence of TSCI is on the rise globally and has high morbidity and mortality rates [1,2]. SCI affects an individual's physical, functional, psychological, and social being as it requires many negative life adjustments for the individual and the affected family [3].

In 2001, the WHO categorized TSCI as complete or incomplete loss or impairment of motor and sensation of the cervical, thoracic, lumbar-sacral segments and other automatic regulations of the body. Common Etiology for TSCI are direct trauma, road traffic accidents, motorcycle injury, falls, GSW, and sharp/blunt penetrating objects. ischemia from damage or impingement from spinal arteries leading to vasospasm-edema, eventually cell death, followed by demyelination of surviving axon and apoptosis [4]. These pathophysiological processes will impact individual lifelong impairment, limitations and participation of ADL, reduced quality of life, and social well-being [5].

Global prevalence of TSCI ranges from 236-1009 per one million people, with a global incidence rate of 23 cases per one million people [1,2]. WHO in 2013 gave an annual incidence of 250,000 and 500,000 people sustaining a spinal cord injury. Little is known on the incidence and prevalence of TSCI in Africa -Kenya and other developing nations, for both children and younger generations. In developing countries, the approximated incidence of TSCI is at an average of 25.5 per million populations per year [6].

In Kenya –The national spinal cord injury referral hospital has insufficient research published and comprehensive database on TSCI patients. We retrospectively extract data from records to determine the prevalence of TSCI patients. If the prevalence is determined, it could result in baseline data for TSCI at NSIH; this will include the -characteristics of, causes of injury, as well as expected stay at the hospital, which would inform the Clinical health care of TSCI patients in the hospital. Health promotion will be made possible, hence improving the quality of life and the TSCI patient will cope better as well; it will be anticipated that the community will become aware of TSCI and change the world to become a better perception and place for all.

MATERIALS AND METHODS

Design: A quantitative study was completed to determine the prevalence of individuals with TSCI at NSIH. Data from all the inclusion criteria patients was extracted retrospectively by examining medical records stored in archives [7]. This type of research was appropriate to the study because it assisted the researchers in using a sample to represent a large population; the non-probability sampling method [8] was used to select all readily available clinical case files archived from the records department at NSIH.

The study's design was completed as part of the requirements for a persons living with SCI. The study employed a descriptive quantitative design [13]. To ensure that an sufficient number of participants that met the inclusion criteria for the study were recruited, and to achieve a broad understanding of person living with SCI, purposive sampling was used to recruit participants in the study.

Study setting: The study was conducted at National Referral Spinal Injury Hospital is a National Level 6 hospital in Nairobi, Kenya. It is located in Kilimani, Nairobi, along Lenana Road. The hospital specializes in the treatment and management of spinal cord injuries. The hospital offers comprehensive medical services, including an emergency unit, casualty outpatient department, rehabilitation services, surgical /orthopedic services, and specialized counseling services. Management aims to save lives and rehabilitate an individual to optimal functional and participation in society. The hospital was chosen for the study because it is in Nairobi, and mainly it caters to long-term patients living with or sustaining SCI.

Inclusion criteria: The study population was all case medical record files from 1st January 2010 to 31st December 2014. 350 clinical case files of individuals with TSCI, including multiple TSCI patient's injured case files, were included.

Exclusion criteria: All files with a diagnosis of TSCI and a Traumatic brain injury and those with insufficient data were excluded.

Data collection and procedure:

After permission was granted from the University of the Western Cape. Two research

assistants were recruited and trained in the processes of data collection. Additionally, permission from the NSIH hospital management, the core researcher, and the research assistants were introduced to the head of the Health Records Department at NSIH through the hospital administrator. After that, the researcher and researcher assistants began to extract information from patients' files admitted from 1st January 2010 to December 2014. To ensure all subjects were included in the study, with the assistance of the health care records personnel, admission books were scrutinized and cross-checked with physiotherapy, occupation therapy, social workers, and nursing departments.

Statistical Data analyses: Double entering the data was completed on Microsoft Excel and Statistical Package for Social Sciences version 23.0 for analysis. Descriptive and inferential statistics were used to analyze the data. Characteristics of the study participants, such as age, gender, causes of injury and vertebral injuries, and the injury characteristics, such as location of injury and completeness of injury were descriptively analyzed. Continuous variables were expressed as mean with standard deviation and with range. Categorical variables like age and different categories were created (ranging from 1-18 years to 61+ dd). Inferential statistics was used to determine the association between variables. Pearson chi-square was applied to test for the association of different categorical variables, such as the association between the age groups of patients versus causes of injuries injury level. Student t-test was used to compare the mean difference between groups, examining the association between variables such as the (injury date and admission date) versus the admission date and discharge date. The significance level was set at p-value <0.05. The results were presented in tables and figures.

RESULTS

Demographic study characteristics: Demographic characteristics of the study population(n=320), as seen in Table 1. The mean age of the study samples was 37.59 (SD= 15.038), highest percentage of the 30-39-year age group (27.8%) followed by the 18-29-year age group (26.6%). Male to female ratio was 2.1:1, with 67.8% of the study sample being male. The majority of individuals were employed at the time of injury (59.1%), including formal employment and informal employment. At the time of injury, 12.8% of the sample was students. Most of the samples were residing in rural areas (54.7%). A small percentage (2.2%) was from other countries in East Africa.

Table 1. Demographic characteristics of the study population (n=320).

Age Group in years.		0-17	18-29	30-39	40-49	50-59	60 & Above
Frequency %		22	85	89	58	36	30
		6.9	26.6	27.8	18.1	11.3	9.4
Gender M/F	M%	n=217			67.8%		
	F%	n=103			32.2%		
Residential area	Rural	n=175			54.7%		
	Urban	n=138			43.1%		
	Others	n=7			2.2%		
Occupation	Formal	n=39			12.2%		
	Informal	n=150			46.9%		
	Unemployed	n=90			28.1%		
	Student	n=41			12.8%		

Prevalence of Traumatic spinal cord injuries

Table 2. shows the prevalence of TSCI patients (n=320) admitted for each year from 2010 to 2014. The highest prevalence occurred in 2010 and 2014 (20.5%).

Year of injury/onset	<2010	2010	2011	2012	2012	2014
%	9	18	20	16	17	20
Total	100%					

YEAR OF ONSET TSCI

Table 2: shows the prevalence of TSCI patients (n=320), *Although records were reviewed from 2010, some patients were re-admitted to the hospital after sustaining the initial injury before 2010.

Causes of Traumatic Spinal Cord Injury: The causes of a TSCI are illustrated in **Table 3**; the leading cause of a TSCI was due to transportation (49.1%), followed by falls from a height (33.4%) and assault (17.5%) respectively.

Table 3, Causes of Traumatic Spinal Cord Injury(n=320).

Causes	Transportation	Fall	Assault
%	49.1	33.4	17.5
Total	100%		

A significantly higher percentage of males (61.1%) than females (38.9%) sustained their TSCI due to transportation ($P<0.05$, $X^2=10.08$, d f =2). As seen in **Figure 1**.

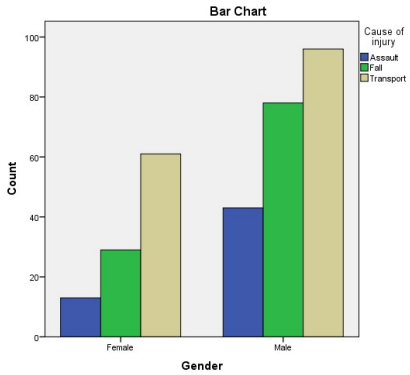

Figure 1.

Distribution of the Causes of Injury According to Different Genders (n=320)

The age groups 18-29 and 30-39 years + 40-49 years sustained their TSCI primarily due to transportation, as illustrated in **Figure 2** below.

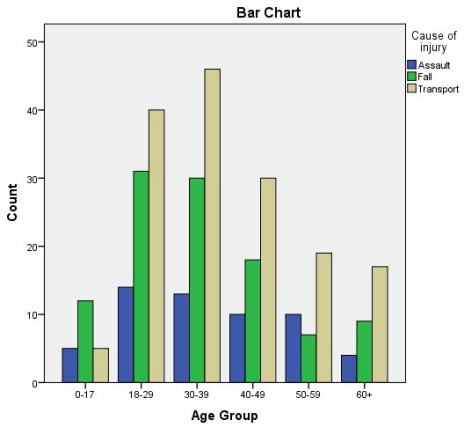

Figure 2 Distribution of the Causes of Injury According to Different Age Groups (n=320)

Location of Injuries: Spinal injury to the lumbar area (L1-5) was the most common type of injury (53.1%), followed by the thoracic area (T1-T12) at (27.5%), as illustrated in **table 4** below.

Table 4: Location of Injuries(n=320),

Vertebral level	Cervical	Thoracic	Lumber	Sacral
0%	19.1	27.5	53.1	0.3
Total	100%			

Distribution of the causes of injury according to location of injury (n=320)

ASIA classification was impossible because it was scarcely used when assessing a patient at the health facilities; hence, scanty information was available during data collection. Comparing two categories for classification (tetraplegia versus paraplegia) and severity (complete versus incomplete), *(P<0.05),* there were significantly more persons with paraplegia (54.1%) who had complete injuries compared to those persons with tetraplegia (19.6%). (27.3%) accounted for the TSCI patients with incomplete paraplegia and tetraplegia and no neurological deficits.

Characteristics associated with Traumatic Spinal Cord Injury: In this study, most of these TSCI patients had no significant associated injury with the TSCI, (78.8%), while 21.3% had a history of an associated injury with TSCI. Of the patients with associated injuries, 47.1% had unspecified fractures, 20.1% had chest injuries, and 12.8% had head injuries. Also, 41.9% accounted for all the TSCI patients in the study who had surgery, while the rest had no surgery. Similarly, 17.8% had ventilation assistance after the injury, as illustrated in **table 5.**

OF the 68 TSCI patients with associated injuries, 41.9% underwent surgery, and the rest had no surgery. Of these patients with associated injury, 42.6% underwent surgery such as spinal stabilization, whereas the others underwent other treatments. Of the 50% of patients who underwent other treatments, 14.4% had medical treatment only, whereas 85.6% had medical treatment, conservative and rehabilitation treatment. Of the TSCI patients with associated injury, 43.6% had Ventilatory assistance because they developed complications such as cardio-respiratory distress. Most of the patients with Ventilatory

assistance were those with cervical and thoracic injuries, accounting for 61.4% of the cohort.

Table 5: Characteristics associated with traumatic spinal cord injuries.

Variables	Frequency (n)	Percentage (%)
Associated injury		
Yes	252	78.80%
No	68	21.30%
Surgery done		
Yes	134	41.90%
No	186	58.10%
Ventilatory assistance		
Yes	57	17.80%
No	263	82.20%

Patients with Associated Injuries According to Age Distribution: The age groups 18- 49 ≥51 had the highest associated injuries, accounting for 70.6%. Of this cohort, males accounted for (73.5%), and the rest were females. **Figure 3** below illustrates the associated injury to traumatic spinal cord injury for different age groups.

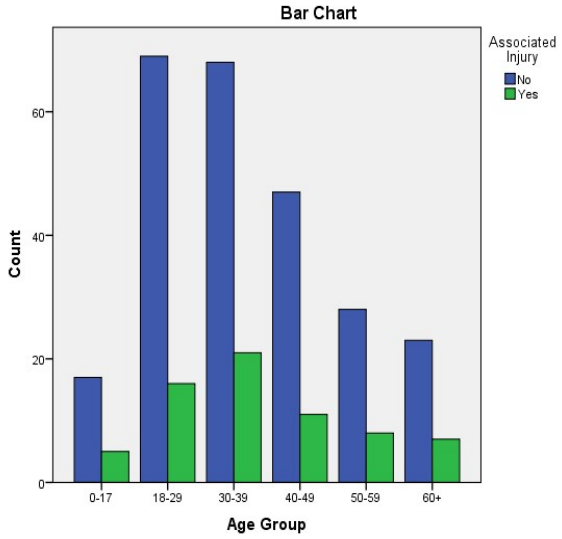

Figure 3: Patients with Associated Injuries According to Age Distribution (n=320)

Distribution of the Associated Injury to Traumatic Spinal Cord Injury for Different Vertebral Areas.

Lumbar areas and thoracic areas (79.4%) had significantly higher associated injuries that occurred together with the TSCI. **Figure 4** below illustrates the percentages of associated injury to Traumatic Spinal Cord Injury for different vertebral areas among the study sample.

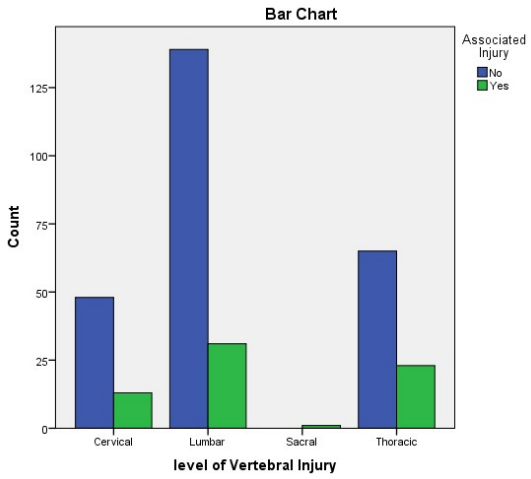

Figure 4: Distribution of the Associated Injury to Traumatic Spinal Cord Injury for Different Vertebral Areas (n=320)

DISCUSSION

The study aimed to determine the prevalence of individuals with traumatic spinal cord injury at the National Spinal Cord Injury Referral Hospital; our findings were almost similar to those of other low- and middle-income earning nations across eastern, central, southern, and west African nations and globally. The average mean age in our study samples was 37.59 (SD= 15.038). However, the most affected individuals at NSIH Kenya had the highest percentage were aged 30-39 years (27.8%). These studies were similar in Africa Nigeria University of Calabar Teaching Hospital (9). Most participants were aged 18-39, represented by (54.43%). The findings were similar to other global studies at Hacettepe University School of Medicine in Ankara, Turkey [10]. The highest prevalence occurred in 2010 and 2014 (20.5%); globally, most studies show the prevalence nearly the same across low-income and high-income countries.

The causes of a TSCI for the study show that the leading cause of a TSCI was due to transportation (49.1%) followed by falls from a height at (33.4%) and assault at (17.5%) respectively. Similar studies were inconsistent with those in Turkey [11].

Spinal injury to the lumbar area (L1-5) was the most common type of injury (53.1%), followed by the thoracic area (T1-T12) of (27.5%); other studies globally show variation [12].

In this study, most TSCI patients had no significant associated injury with the TSCI which was 78.8%, while 21.3% had a history of an associated injury with TSCI. Of the patients with associated injuries, 47.1% had unspecified fractures, 20.1% had chest injuries, and 12.8% had head injuries. Also, 41.9% accounted for all the TSCI patients in the study who had surgery done, while the rest had no surgery. Similarly, 17.8% had ventilation assistance after the injury; other studies show variation and polytrauma with poor prognosis [13].

CONCLUSION

SCI is a devastating condition for individual living with it. SCI has a high impact on quality of life and ADL, and etiological and anatomical spinal locations vary worldwide. Countries with high economic levels may display similar trends in etiology. Less-developed nations and lower-middle-income countries like Kenya have increased manual labs and poor infrastructure, predisposing individuals to TSCI. While conducting this study, there was a lack of scientific studies on TSCI, which made it difficult to compare data globally. However, there is a need for further studies to enable more understanding and comparison of epidemiological results; this helps understand appropriate prevention strategies that will decrease the burden of TSCI globally.

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Conflicts of interest: The authors have declared that no competing interests exist.

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