



## Clinical pattern of Spinal cord injury in a regional neurosurgical centre in North-west Nigeria

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### ABSTRACT

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**Background:** Spinal cord injury remains a global neurosurgical burden affecting young active members of the society. This study was designed to describe the clinical pattern of spinal cord injury in our centre.

**Methodology:** This was a retrospective study conducted at the Regional Neurosurgical Centre of Usmanu Danfodiyo University Teaching Hospital, Sokoto, Nigeria over 12 months period (January to December, 2024). Information such as bio demographics, causes, type and clinical presentation and ASIA grade was extracted from patient's case folders and analyzed using SPSS version 25.0.

**Results:** Over the study period, 41 patients with spinal cord injury were managed at our center. The age distribution showed a mean age of 34.2 years ( $\pm 14$  standard deviation), a median of 30.5 years, and a mode of 30 years. The gender distribution was markedly skewed toward males, with 34 male patients (82.9%) compared to only 7 female patients (17.1%), giving a male-to-female ratio of 3.9:1. Road traffic accidents dominated as the leading cause of spinal cord injury, responsible for 27 cases (65.9%). The anatomical distribution showed a clear predilection for the cervical spine, which was affected in 29 patients (70.7%). Incomplete spinal cord injuries were substantially more common, with 31 patients (75.6%) presenting with incomplete lesions.

**Conclusion:** Spinal cord injury in Northwest Nigeria predominantly affects young adult males, with road traffic accidents responsible for two-thirds of cases.

### KEYWORDS:

Spinal cord injury, road traffic accidents, North-west Nigeria, neurotrauma, neurosurgical, bio demographics

### INTRODUCTION

Spinal cord injury (SCI) is described as damage to neurons in the spinal cord as a result of mechanical or physical force.<sup>1,2</sup> The damage to the spinal cord leads to neurological dysfunction characterized by loss limb movement, impaired sensation, sphincteric dysfunction as well as autonomic

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dysfunction.<sup>3</sup> Spinal injury causes devastating disability and significant mortality to the individuals affected. Spinal cord injury remains a global neurosurgical burden affecting young active members of the society. Current estimate by the world health organization revealed about 15.4 million people bedeviled by the spinal cord injury worldwide<sup>3</sup>.

The burden of SCI differs across nations and continents with a report of 13.1 to 63.4 per year per million population in developed countries to 13.0 to 220.9 per year per million population in developing states.<sup>3</sup> Neurotrauma comprising both head and spine injury occurs more often in young individuals within the age range of 15 to 60 years.<sup>4-6</sup> While

across gender, males were more prone to spinal cord injury in adults as against equal distribution reported in children.<sup>7</sup> Depending the level of spinal cord involved as well as the spinal structures affected, patients with spinal cord injury present with pains, limb weakness, numbness or paraesthesia, sphincteric dysfunction, autonomic dysfunction, pressure sores. The culmination of symptoms of spinal cord injury brings a devastating disability to the affected individuals and serious burden to their relatives and the healthcare facility.<sup>1,8</sup> Numerous aetiological factors have been implicated in the causation of spinal cord injury ranging from road traffic crashes, falls, assaults, building and mining tunnels collapse and gunshots especially in areas affected by civil unrest.<sup>9,10</sup> Following clinical evaluation, further radiological evaluated is much warranted to define exact site and extent of injuries as well as guide surgical care. Where there is spinal cord compression or spinal instability or both, spine surgery is indicated to decompress the spinal cord and correct the instability to promote recovery and acceptable rehabilitation. Individuals with incomplete injury characterized by residual neurologic function below the level of injury have higher chance of recovery when prompt and proper care is instituted compared to complete injury lacking residual neurologic function inferior to the level of spinal cord injury.<sup>1,11-13</sup> This study was designed to describe the clinical pattern of spinal cord injury in our centre and suggest preventive measures on this common neurosurgical condition.

METHODOLOGY

This was a retrospective study conducted at the Regional Neurosurgical Centre of Usmanu Danfodiyo University Teaching Hospital, Sokoto, Nigeria over 12 months period (January to December, 2024). Information such as bio demographics, causes, type and clinical presentation and ASIA grade was extracted from patient’s case folders and analysed using SPSS version 25.0

RESULTS

Demographic Characteristics

Over the study period, 41 patients with spinal cord injury were managed at our center. The age distribution showed considerable variation, with a mean age of 34.2 years ( $\pm 14$  standard deviation), a median of 30.5 years, and a mode of 30 years. This suggests that the majority of our patients were relatively young adults in their most productive years [Table 1].

Table 1: Demographic Profile of the Study Cohort (N=41)

Variable	Statistics
Mean Age	34.2 $\pm$ 14.4 years
Median Age	30.5 years
Mode Age	30 years
Gender	Male: 82.9% (n=34); Female: 17.1% (n=7)
Primary State of Residence	Sokoto (65.8%), Zamfara (17.1%), Kebbi (17.1%)

The gender distribution was markedly skewed toward males, with 34 male patients (82.9%) compared to only 7 female patients (17.1%), giving a male-to-female ratio of 3.9:1 [Figure 1].

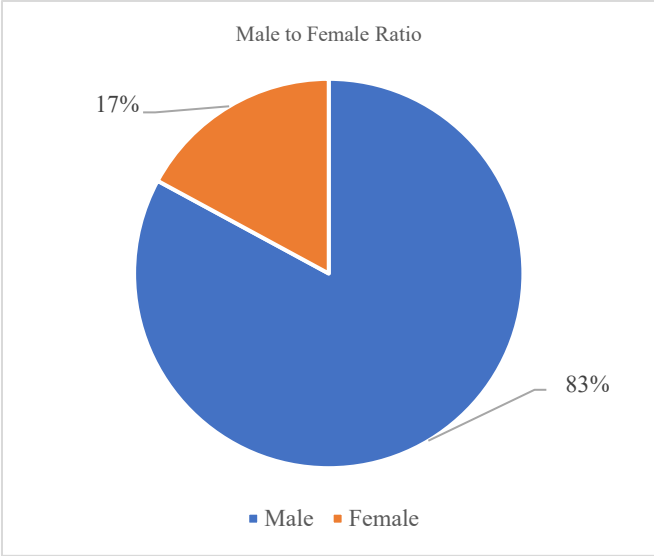


Figure 1: The gender distribution

Geographic Distribution

The geographic origin of patients reflected the referral patterns to our regional neurosurgical center. The majority of cases came from Sokoto State, accounting for 27 patients (65.9%). Kebbi and Zamfara States each contributed 7 patients (17.1% each). This distribution underscores the facility’s role as a major referral center for the northwest region [Figure 2].

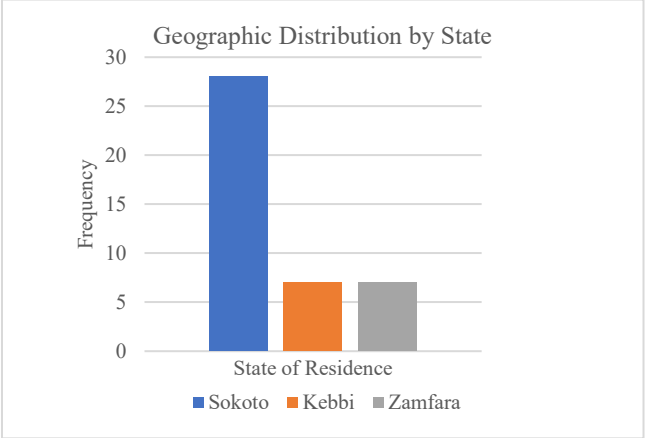
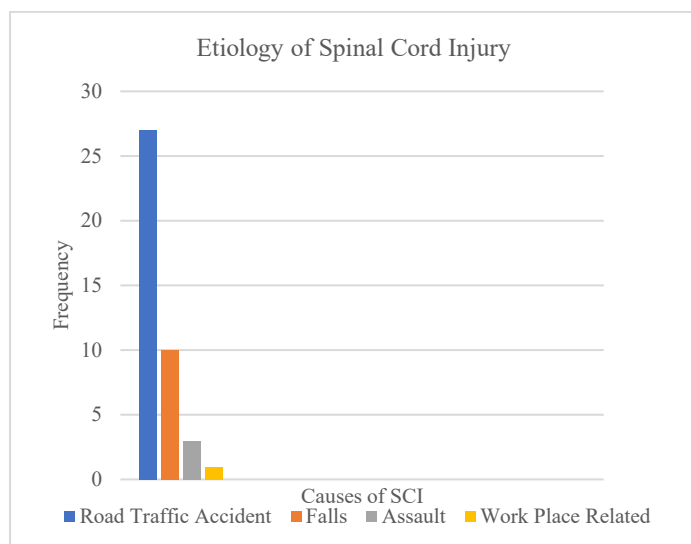


Figure 2: The Geographic Distribution

Etiology of Spinal Cord Injury

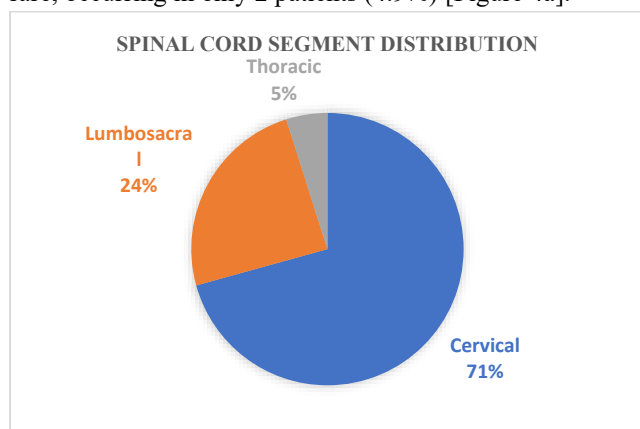
Road traffic accidents dominated as the leading cause of spinal cord injury in our series, responsible for 27 cases (65.9%). This overwhelming predominance reflects a broader pattern of trauma in the region. Falls from height came in as the second most common mechanism, accounting for 10 patients (24.4%). Violence-related injuries from assault occurred in 3 cases (7.3%), while work-place related injuries were relatively uncommon, with only a single case (2.4%) [Figure 3].



**Figure 3: Causes of Spinal Cord Injury**

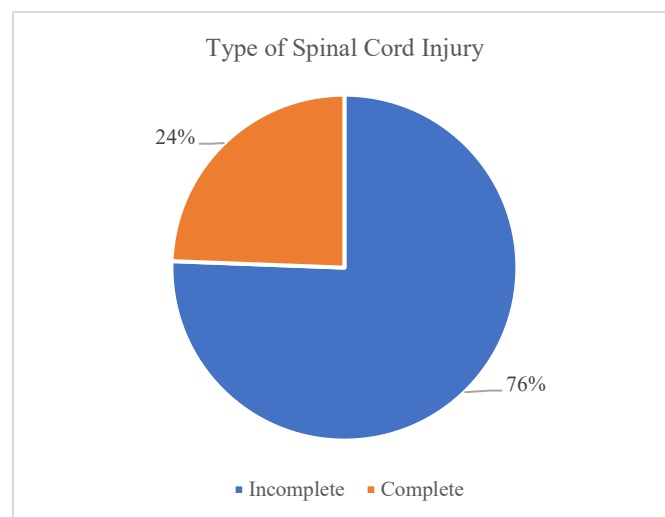
### Clinical Presentation and Injury Characteristics

The anatomical distribution of spinal cord injuries showed a clear predilection for the cervical spine, which was affected in 29 patients (70.7%). This is particularly significant given that cervical injuries tend to result in more devastating functional outcomes. Lumbosacral injuries were documented in 10 patients (24.4%), while thoracic injuries were notably rare, occurring in only 2 patients (4.9%) [Figure 4a].



**Figure 4a: Spinal Cord Segment Distribution**

When classified according to the ASIA impairment scale, incomplete spinal cord injuries were substantially more common than complete injuries. Thirty-one patients (75.6%) presented with incomplete lesions, while complete lesions were observed in 10 patients (24.4%). The higher proportion of incomplete injuries is encouraging from a prognostic standpoint, given that these patients retain some potential for neurological recovery [Figure 4b].



**Figure 4b: Impairment level distribution**

### Statistical Associations

Chi-square analysis was performed to explore potential associations between gender and various injury characteristics. However, none of the tested associations reached statistical significance at the  $\alpha = 0.05$  level. The relationship between gender and type of spinal cord injury (complete versus incomplete) showed a p-value of 0.512, indicating no significant association. Similarly, gender did not show a statistically significant relationship with the cause of spinal cord injury ( $p = 0.072$ ) or with the segment of spinal cord affected ( $p = 0.842$ ).

### Discussion

This study examined the bio-demographic and clinical characteristics of spinal cord injury patients managed at a regional neurosurgical center in Northern Nigeria. Our findings reveal that SCI in this setting predominantly affects young adult males, with a mean age of 34.2 years and a male-to-female ratio of 3.9:1. Road traffic accidents emerged as the overwhelming cause, responsible for nearly two-thirds of cases, followed by falls from height. The cervical spine was the most commonly affected segment, accounting for over 70% of injuries and incomplete lesions were more frequent than complete ones. Notably, we found no statistically significant associations between gender and injury type, cause or anatomical location, suggesting that injury patterns in our cohort were distributed relatively independently of gender.

The age distribution in our study, with a mean of 34.2 years and median of 30.5 years, aligns closely with patterns reported in other studies.<sup>4,14</sup> The occurrence of spinal cord injury in young productive part of the population becomes a cause for concern as the impact of the injuries can be felt far beyond the affected people but their family members as well as the workforce of the globe with potential for a significant economic and social downturn<sup>15</sup>. Although, spinal cord injury can affect any gender, male preponderance was observed in the index study, this was not unexpected as males especially in our setting were more engaged in outdoor activities such

road travels, climbing trees and rooftop, mining activities as well in civil unrest. In addition, male gender was more likely to be involved in risky activities could predispose to injuries.<sup>16-18</sup>

Road traffic accidents dominated as the etiology in our study, accounting for 65.9% of cases. This finding resonates with multiple reports from similar settings.<sup>19</sup> observed that most patients with incomplete lesions had suffered traffic accidents, accounting for 45.07% of cases in their series. In a Malaysian study where the mean patient age was 38 years, motor vehicle accidents accounted for 61.3% of spinal cord injuries<sup>5</sup>. The burden of spinal cord injury in our center likely reflects the precarious state of road safety in Northern Nigeria, where poorly maintained roads, inadequate vehicle safety standards, lack of enforcement of traffic regulations, and limited pre-hospital care infrastructure converge to create a perfect storm for serious trauma<sup>20</sup>.

The predominance of cervical spine injuries in our cohort affecting 70.7% of patients is noteworthy and carries significant prognostic implications. This pattern is somewhat higher than reported in some other settings. Motorised collisions have been associated with a higher prevalence of spinal fractures<sup>21</sup>. The high-energy mechanisms involved in road traffic accidents, particularly motorcycle crashes common in our region, may explain why cervical injuries predominate, as riders and passengers are often thrown forward with significant force. Similar studies on spinal cord injury revealed cervical spine being the most affected in traumatic event<sup>22</sup>. The high proportion of cervical injuries in road traffic accident victims can be understood through the biomechanics of high-energy trauma. Motorcycle accidents, which are common in our region, often result in the rider being ejected and landing head-first, producing axial loading and flexion-compression forces on the cervical spine,<sup>23</sup>. Unlike occupants in enclosed vehicles who have some protection, motorcycle riders and passengers are essentially unprotected, making severe cervical trauma more likely,<sup>24</sup>. The finding that 75.6% of our patients presented with incomplete lesions is encouraging from a prognostic standpoint. Complete lesions rarely experience full recovery, while incomplete lesions have a higher potential for recovery,<sup>25</sup> Click or tap here to enter text..

This study is that it provides data on spinal cord injury from a regional neurosurgical center serving multiple states in Northern Nigeria, an area where such information has been scarce. The overwhelming burden of road traffic accidents as a cause of SCI demands urgent attention to road safety measures. This isn't merely a healthcare issue it's a public health crisis requiring multi-sectoral intervention. Improved road infrastructure, enforcement of traffic regulations, helmet laws for motorcycle riders, and public education campaigns could potentially prevent a substantial proportion of these devastating injuries,<sup>26</sup>.

The young age of affected individuals carries profound socioeconomic implications. When a 30-year-old

breadwinner sustains a cervical spinal cord injury, the impact reverberates through entire families and communities,<sup>27</sup>. The experience and perception of pain in SCI patients may be intense and can interfere with mobility, functioning, activities of daily living, social participation, cognitive function, and cause emotional distress, depression, and financial problems,<sup>28</sup>.

Research into the specific circumstances of road traffic accidents leading to SCI would be valuable for targeted prevention efforts. What are the most common scenarios motorcycle crashes, pedestrian injuries, or vehicle collisions? What time of day do these occur? Are there specific high-risk locations or activities? Answers to these questions could guide evidence-based prevention interventions.

## CONCLUSION

Spinal cord injury in Northwest Nigeria predominantly affects young adult males, with road traffic accidents responsible for two-thirds of cases. The high prevalence of cervical spine injuries and incomplete lesions highlights both the severity of trauma and potential for recovery with timely intervention. Urgent implementation of road safety measures, improved pre-hospital care, and enhanced access to specialized neurosurgical services are essential to reduce the devastating burden of spinal cord injury in our region.

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