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Epidemiological Study of Spinal Cord Injuries in Basrah

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Abstract

Background: Spinal cord injury (SCI) is one of the major insults to the central nervous system (CNS) that results in persisting physical and psychological sequel. The study aimed to investigate the epidemiologic and demographic characters of cases with SCI who were admitted to a department of neurosurgery.

Methods: A descriptive cross-sectional study of cases with SCI from traumatic or non-traumatic reasons who were hospitalized for rehabilitation to a dedicated hospital between 2022 and 2024. Data on demographic, injury and medical characteristics were obtained from case records. Descriptive analyses of SCI are suggested with stratification by key demographic characteristics and SCI specific characteristics (e.g., sex, age at injury, American spinal injury association impairment scale (AIS) score at admission and discharge, SCI type, and etiology) according to the international spinal cord society guidelines.

Results: In total, 200 cases of SCI were included in the study. Of these, 161 were traumatic and 60 were non-traumatic. In the traumatic SCI group, 132 (83.2%) were males and 28 (16.8%) were females; in the non-traumatic SCI group, 21 (56.7%) were males and 20 (43.3%) were females. The mean age of the overall cohort was 50.7 ± 18.8 years, and that of the traumatic and the non-traumatic SCI groups were 48.7 ± 19.1 and 55.8 ± 17.4 years, respectively. Most common AIS scale was D. tetraplegia disability more common reported. Falling off was the most common cause of traumatic SCI (n = 60, 37.3%), followed by motor accidents (n = 57, 35.4%). Incomplete pattern of trauma is frequent.

Conclusion: The mean age of SCI patients was higher than that of previous studies. Falls were the single most common cause of traumatic SCI. However, non-traumatic reasons are mostly attributed to neoplasm.

Keywords: Spinal cord injuries, Motor accident, Falls from high, Paraplegia, Tetraplegia

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Introduction

SCI is one of the major insults to the CNS that results in persisting physical and psychological sequel, thereby incurring tremendous socioeconomic costs related to health care therapy, rehabilitation and loss of productivity [1, 2]. Educational programs that are designed based on epidemiologic studies have shown to be successful in reducing the incidence of traumatic SCI [3-6]. In the United States, epidemiologic changes in age, gender and completeness of SCI injury are continuously being monitored by the NSCISC and a gradual increase in the prevalence of the people with old age, female sex, and incomplete injury has been reported [7-10].

The study by the national rehabilitation center in 2014 [11] showed that the percentage of SCI caused by traffic accidents had decreased from 64% in 1994 - 2000 to 45% in 2008 - 2014. The proportion of falls had risen from 23% to 43% during the same time intervals, implying a change in trends regarding the etiology of traumatic SCI. There are many explanations and hypotheses in interpreting the changes in SCI epidemiology worldwide, and understanding each country's demographic characters and cultural specificity in connection with etiology is important in interpretation. About 63.0% of SCI in Bangladesh, those injuries mostly occur among those aged between 10 years and 40 years and are mainly attributed to falling from trees or carrying heavy objects on the head. Meanwhile, in eastern Canada, which is a developed country with a high-income economy and a large urban population, the mean age at the time of SCI was 55.4 years, and falls accounted for only 19.1% of SCI etiology. However, falls were the leading cause of SCI in the elderly (i.e., age ≥ 60 years), accounting for 47% [12].

Methods

Study design and subjects

A descriptive cross-sectional study of cases with SCI from traumatic or non-traumatic reasons who were hospitalized for rehabilitation to a dedicated hospital between 2022 and 2024. Data on demographic, injury and medical characteristics were obtained from case records. This study was approved by the department of Neurosurgery. SCI was defined as the event of a traumatic or non-traumatic lesion of neural elements in the spinal canal that resulted in temporary or permanent sensory and/or motor deficit [13]. Descriptive analyses of SCI are suggested with stratification by key demographic characteristics and SCI specific characteristics (e.g., sex, age at injury, American spinal injury AIS score at admission and discharge, SCI type, and etiology) according to the international spinal cord society guidelines, where possible [14].

Statistical analysis

All analyses were performed using the IBM statistical package for

the social sciences, software version 22.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics (mean, SD, frequency, and percentage) were used to describe the characters. Student t-test and chi-square test, as appropriate, were used to assess the differences between the etiology groups at a statistical significance level of $p < 0.05$.

Results

In total, 200 cases of SCI were included in the study. Of these, 161 were traumatic and 60 were non-traumatic. In the traumatic SCI group, 132 (83.2%) were males and 28 (16.8%) were females; in the non-traumatic SCI group, 21 (56.7%) were males and 20 (43.3%) were females. The mean age of the overall cohort was 50.7 ± 18.8 years, and that of the traumatic and the non-traumatic SCI groups were 48.7 ± 19.1 and 55.8 ± 17.4 years, respectively. Most common AIS scale was D. tetraplegia disability more common reported (Table 1).

With respect to etiology, falling off was the most common cause of traumatic SCI (n = 60, 37.3%), followed by motor accidents (n = 57, 35.4%). Incomplete pattern of trauma is frequent (Table 2).

The number of cases of non-traumatic etiology are shown in table 3. The most common cause of non-traumatic SCI was neoplasm, accounting for 35.0%.

Discussion

We found a significantly higher proportion of male patients than female patients. This result is similar to that epidemiologic study by Shin et al. [15] in 2013, which showed that 74.1% of patients with all-cause SCI were men, with a male-to-female ratio of 2.86:1 [15].

This sex imbalance was more profound in traumatic SCI patients, which is consistent with or more significant than that in previous epidemiologic studies [15, 16]. This tendency of dominance of male cases in traumatic SCI is also consistent with previous epidemiologic studies in other developed countries [13]. Meanwhile, non-traumatic SCI showed smaller difference in the sex ratio at 1.30:1 (34 males, 26 females) in our study, which is closely consistent (1.47:1) with recent study by Shin et al. [15].

With respect to the etiology of traumatic SCI, our study showed that falls, counting low and high falls together, was the single most common cause, accounting for 56.5% of all traumatic causes, followed by motor accidents at 35.4%. The dominance of falls as a cause of traumatic SCI in our study is consistent with the trend of recent studies on traumatic SCI epidemiology [13, 17, 18].

From end of last century to beginning of this century, the proportion of motor accidents and falls both increased from 57.6%, 26.4% to 60.3%, 33.9%, relatively [15]. Comparing our study results with the previous study of Shin et al. [15], the proportion of people older than 60 among traumatic SCI patients raised from 20.0% to 33.5%.

Changes in the mean age at overall SCI and proportion of the patients older than 60. Shin et al. [15] reported that falls were the most common cause of injury in people older than 60 years, with falls accounting for 54.2% of all traumatic causes in this age group. In our study the proportion of falls was highest among all causes of traumatic SCI in the patients aged 60 years or older, accounting for 68.5%. A similar trend is observed in other developed countries. In the US, falls are the leading cause of SCI among persons aged over 60 years accounting for 55.8% [10]; in Norway, falls accounted for 65% of all injuries in persons older than 60 years [17]. In the US, the mean age at SCI onset tended to be consistent and then gradually raised [10].

Our study counted low fall and high fall separately to place them into low-energy trauma and high-energy categories. In total, 60 and 31 cases of traumatic SCI were attributed to high fall and low fall, respectively. Compared with other age groups, the elderly had the highest frequency of low falls on the same level, from the stairs, and slipping and stumbling [18]. The incidence of fall-related traumatic SCIs appeared to be age dependent, particularly for low fall injuries. In traumatic SCIs, the proportion of SCI from falls increased with age; 14.4%, 38.7%, 55.8% in 0 - 45, 46 - 60, >61 age groups, respectively [10]. Among non-traumatic etiologies, neoplasm was the single most common cause of SCI, accounting for 35.0%, followed by demyelinating disease and infectious disease as the second most common causes (16.7% each). Vascular disease accounted for 10% and degenerative disease followed at 8.3%. Other causes including herniated vertebral disc, spinal stenosis accounted for 13.3% of non-traumatic SCI.

With respect to disability types and severity of injury, the epidemiologic study by Shin et al. [15] in 2013 showed incomplete tetraplegia as the most common type, accounting for 36.9% of all SCI. According to annual reports of NSCISC [10] and as Jain et al. [19] suggest, the proportion of cervical SCI and incomplete injury has increased gradually in the US. In our study, 127 (54.3%) patients had tetraplegia, and only 27 (21.3%) among them presented complete injury. Gradual increase in the proportion of incomplete injury from 1987 - 1996 to 2012 - 2018 according to previous study and our study results [15]. A notably low proportion of complete injury might be attributed to not only developments in prompt medical and surgical management after SCI, but also the increase in low-energy trauma injuries. In our study, the mean age of patients was higher than that in previous studies, and incomplete tetraplegia was the most common result after low-energy trauma.

Conclusion

Table 1: Study characters.

Variable		Traumatic	Non-traumatic	p value
		No. (%)		
Sex	Male	130 (83.2)	22 (56.7)	0.001
	Female	28 (16.8)	20 (43.3)	
Age	10 - 49	81 (50.9)	14 (32.5)	0.001
	50 - 90	80 (49.1)	38 (67.5)	
American spinal injury AIS	A	54 (33.5)	2 (3.3)	0.01
	B	9 (5.5)	1 (1.7)	
	C	24 (18)	7 (12.3)	
	D	65 (41.5)	44 (80.7)	
Type of disability	Tetraplegia	103 (64)	24 (40)	0.01
	Paraplegia	58 (36)	36 (60)	

Table 2: Type and severity of injury of traumatic SCI.

Etiology		Motor accidents	Fall off	Sports trauma
		No. (%)		
Cases number		57 (35.4)	60 (37.3)	38 (23.6)
Severity	Incomplete	41 (71.9)	29 (48.3)	27 (79.4)
	Complete	16 (28)	31 (51.7)	7 (20.6)

Table 3: Non-traumatic SCI etiology.

Causes	No.	%
Demyelinating disease	10	16.7
Neoplasm	21	35
Degenerative disease	5	8.3
Vascular disease	6	10.5
Infectious disease	10	16.2
Non-specific	8	12.4

The epidemiology of SCI might be characterized by high mean age at time of trauma and dominance of falls, especially low falls, as a cause of traumatic SCI, however, non-traumatic reason mostly attributed to neoplasm.

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None.

Conflict of Interest

None.

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