Original Article

Demographic Profile of Spinal Cord Injury Patients Admitted in a Rehabilitation Center: An Observational Study from Bangladesh

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Abstract

Background: Spinal cord injury (SCI) is a life-threating condition which has a profound impact in the morbidity and mortality. SCI causes lifetime sufferings and mostly occurs among the young adults. Not only in Bangladesh but also worldwide, SCI is a devastating and burdensome condition. This research was conducted to see the demographic profile of SCI patients in Bangladesh. **Methods:** This is a retrospective analysis where data were collected from medical records of all SCI patients admitted in between January 2012 and December 2014 from Center for the Rehabilitation of the Paralysed, Savar. **Results:** A total of 1172 SCI patients were analyzed. Most of the patients were in their second and third decades of life which consisted 28.8% (*n* = 338). Among total respondents, 86.2% (*n* = 1010) were male and 13.8% (*n* = 162) were female. Most of the participants, 61.1% (*n* = 716), were from rural area. The main cause of SCI was fall from height (FFH) {45.8% (n = 537)} followed by the road traffic accidents (RTA) {24.7% (n = 288)}. Overall, 52.3% (n = 613) of participants suffered from traumatic paraplegia while 60.9% (n = 714) had complete lesion. Among the total participants, 30.70% (n = 359) of participants had skeletal level C1-C7 injury. Division-wise distribution shows that FFH is a major cause of SCI {14.84% (n = 174)} followed by the RTA which is a second most common cause in 8.95% (n = 105) of participants in Dhaka division while SCI due to bull attacks and bullet injury are a major cause in Khulna division {1.02% (n = 12)} and Chittagong division respectively. **Conclusion:** The data are collected from a tertiary level of rehabilitation center where extensive demographic data were not previously represented. In many developing countries, SCI is neglected, poorly managed, and deprived from society. In addition, the present study suggests that demographic factors may affect the characteristics of SCI.

Keywords: Bangladesh, cause of injury, Centre for the Rehabilitation of the Paralysed, demography, Savar, spinal cord injury

Introduction

In South-Asia region, Bangladesh is a developing country, with a burden of a large population which is about 160 million.[1-3] Population growth rate of Bangladesh per year was 1.59% which includes 27% in urban area and 73% in rural . Bangladesh is a densely over populated country where literacy rate of about 61.0% among the age of 15 years and above.[4,5] Not only in Bangladesh but also worldwide, spinal cord injury (SCI) is a devastating and burdensome life-threating condition which has a profound impact on the morbidity and mortality.[1,6,7] SCI affects mostly young- and middle-age adults, and recovery depends on the type and severity of lesion, rehabilitation time, and individual performance how effectively he/she completes every day task.[8,9] Globally, a trend has been observed that most of the traumatic spinal cord injuries

occurred by fall from height (FFH) or either road traffic accident (RTA).[1,3,5] SCI from traumatic or non-traumatic both has a profound impact on many factors such as physical, mental, domestic, and social life of an individual.[1,5] There are different types of secondary complications usually suffered by spinal cord injured patients, among them, pressure sore, urinary complications, sexual dysfunctions, and bowel bladder problems are main, among them some are preventable and some are need re-hospitalization, and eventually, it leads to a great deal of disability, morbidity, degree of dependence, and mortality.[5] Different study has been conducted in developing and developed country to find the cause and characteristics of SCI, and it seems that it depends on geographic area and socioeconomic status. Life expectancy after SCI is markedly reduced due to secondary complication, severity of injury, social deprivation, and lack of proper rehabilitation[6,7] Evidence from 2011, Cripps *et al.* showed that global prevalence of SCI was 236 and 1009 per million which was similar to a result found in 1995 by Blumer and Quine (about 110-1120 per million of population).[10] The current study was aimed to look into the demographic profile of SCI patients and also try to find the impact factor of the cause of injury in different division of Bangladesh which will help us to identify the etiology, risk factor, and preventive measure.

Materials and Methods

Ethical considerations

Formal permission was taken from the Physiotherapy Department of Bangladesh Health Professions Institute as it was an academic institute of Centre for the Rehabilitation of the Paralysed (CRP). At the beginning of data collection, permission was obtained from the concerned authorities ensuring the safety of the participants. All information was kept in secure. Confidentiality of the person and the information was maintained and observed, and unauthorized persons did not have any access to the collected data.

Data collection

Data were collected from all admitted patients to the CRP in between January 2012 and December 2014. Patient with complete information is included in this study. Patients with incomplete information and those who are discharge on request bond (DORB) are excluded from the study. Data that were recorded consisted of age, sex, mode of injury, diagnosis, skeletal level, and American Spinal Injury Association (ASIA) Impairment Scale (AIS).[11] Recovery was categorized as a complete and incomplete lesion. Etiology of injury was categorized into different groups such as FFH, RTA, and heavy object fall over head/back, which are the leading cause and shallow diving water, scarf injury, bull attack, and physical assault are the diverse cause. Non-traumatic causes such as tuberculosis of spine (TB) and transverse myelitis are associated causes of spinal cord injuries.

Setting and participants

In Bangladesh, there are very few spinal injury centers. Among them, CRP is recognized as the tertiary level of spinal injury center, it receives all types of spinal injury patients either directly, through referral, after surgery for rehabilitation, or admitted with complex secondary complication such as pressure ulcer. CRP is a well-known not for profit organization[7,12] in Bangladesh for rehabilitation of the SCI patients. As a mother organization, CRP receives referrals from different hospitals and from all over Bangladesh for rehabilitation of the SCI patients. CRP provides acute care for SCI patients and admits approximately 390 SCI patients in each year.[12] In CRP, patients pay very small amount as their income source ability but care is primarily funded by the government and not-for-profit organizations.

Analysis

After managing data properly, it was analyzed in the Statistical Package of Social Science 16 version and Microsoft Excel Software 2007 version.

Results

Among 1172 respondents, most of the patients were in their second and third decades of age which consisted 28.8% (n = 338), followed by 24.5% (n = 287) in between 31 and 40 years and 17.8% (n = 209) in between 41 and 50. In this study, 86.2% (n = 1010) were male and 13.8% (n = 162) were female. Of 716 respondents, 61.1% were from rural areas and 456 were from urban areas (38.9%) [Table 1].

Of 1172 respondents, 52.3% (n = 613) had the diagnosis of traumatic paraplegia (TP) and 43.5% (n = 510) had traumatic tetraplegia (TT), whereas non-TP and non-TT were the other diagnosis having the distribution of 3.3% (39) and 0.9% (10), respectively [Table 2].

537 participants (45.8%) had fallen from the height (FFH), and RTA was the second common cause having the distribution of 288 patients (24.7%). 112 (9.6%) gave a history of fall of object overhead and back was 106 (9%). Spinal TB was observed in 38 (3.2%), while bull attacks and physical assault were seen in 24 (2%) and 23 (2%) patients respectively. Interestingly, scarf injury and shallow diving water were observed in 13 (1.1%) and 11 (0.9%) patients respectively [Table 3].

According to this assessment, Table 4 shows that FFH is the leading cause of SCI, and FOH was the second most common cause according to the 1995–2009 assessments, but after 2009, FFH is the leading cause of SCI, and RTA was the second most common cause for SCI in Bangladesh [Table 4].

Regarding the extent of injury, 60.9% (n = 714) of participants had complete lesion on admission, whereas 53.2% (n = 624) on discharge that are Category A in ASIA scale. Categories B, C,

D, and E had the distribution of 19.6%, 11.3%, 7.3%, and. 8% on admission and 12.5%, 13%, 19.2%, and 2.1% on discharge, respectively [Table 5].

Table 1: Distribution of demographic variables of the respondents (*n* = 1172)

Demographic Variable	Frequency (%)
Age (years)	
0–10	15 (1.3)
11–20	187 (16.0)
21–30	338 (28.8)
31–40	287 (24.5)
41–50	209 (17.8)
51–60	98 (8.4)
61–70	28 (2.4)
71–80	10 (0.9)
Gender	
Male	1010 (86.2)
Female	162 (13.8)
Living area	
Rural	716 (61.1)
Urban	456 (38.9)

Table 2: Distribution of diagnoses of spinal cord injury among the respondents (*n* = 1172)

Diagnosis	Frequency (%)
TP	613 (52.3)
TT	510 (43.5)
NTP	39 (3.3)
NTT	10 (0.9)

TP: Traumatic paraplegia, TT: Traumatic tetraplegia, NTP: Non-traumatic paraplegia, NTT: Non-traumatic tetraplegia

Table 3: Distribution of cause of spinal cord injury among the respondents (*n* = 1172)

Cause of injury	Frequency (%)
Fall from height	537 (45.8)
Road traffic accident	288 (24.7)
Fall heavy object over head	112 (9.6)
Fall heavy object over the back	106 (9.0)
Spinal tuberculosis	38 (3.2)
Bull attack	24 (2.0)
Physical assault	23 (2.0)
Scarf injury	13 (1.1)
Shallow water diving	11 (0.9)
Transverse myelitis	11 (0.9)
Bullet injury	8 (0.7)
Sports injury	1 (0.1)

FFH: Fall from height, RTA: Road traffic accident, TM: Transverse myelitis

Among the 1172 participants, 30.70% (*n* = 359) had skeletal level C1-C7, 30.10% (*n* = 353) had skeletal level T1–T12, 22.10% (*n* = 259) had skeletal level L1-L5, and 17.10% (*n* = 201) had no impression was seen in magnetic resonance imaging and X-ray view [Figure 1].

Figure 2 depicts the geographical location of persons with SCI in the study. A total of 38.9% (456) of the persons with SCI were from the urban areas, whereas 61.1% (716) were from rural areas. In this study, among eight divisions, most vulnerable was Dhaka 33.2% (389) then Khulna 20.4% (239). FFH is the major cause of SCI, and the second most common is RTA [Figure 2].

Discussion

Demographic studies have been conducted but the information from these studies may not be representative of the country. There is no structured health-care delivery system for spinal injuries in Bangladesh. Bangladesh has not had any registry or proper demography study so far. People having spinal injury can go to any hospital of their choice for management. In this study, gender, age, place of habitat, and marital status were taking into consideration as demographic variables. Our study found that 86.2% (*n* = 1010) were male and 13.8% (*n* = 162) were female and this is usual because majority of women work remain in the home while men are exposed to work in outside activities and this result is similar with previously reported in both local[5,13] and global[13-15] studies. Most of our SCI patients are young adult injured in the second decade and third decade of life which was different from Hossain *et al.*'s study where the mean age was 47.44 years[16] and Goel *et al.*'s study where the average age was 46.65 ± 16 years[6] and similar with Ulrich *et al.*'s study who found the mean age to be 36.1 years.[17] In our country, the main cause of SCI is the fall from a significant height, whereas in other countries like India, the main cause is RTA.[18] Our study reveals that SCI is more prone to rural area rather than in urban area about 61.1% of the respondent was from rural area which is similar to Rahman *et al.* and Hoque *et al.*[1,19] Majority of the participants of this study had

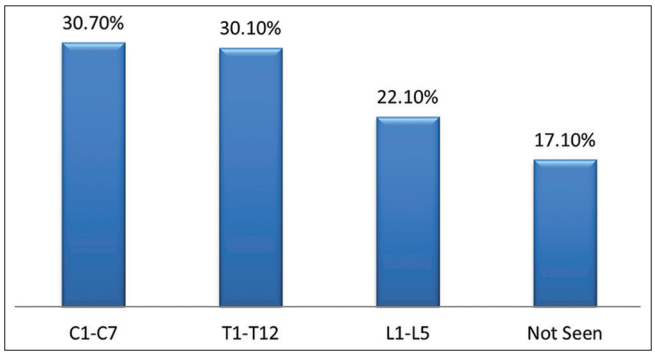

Figure 1: Distribution of skeletal level on admission of the respondents (*n* = 1172)

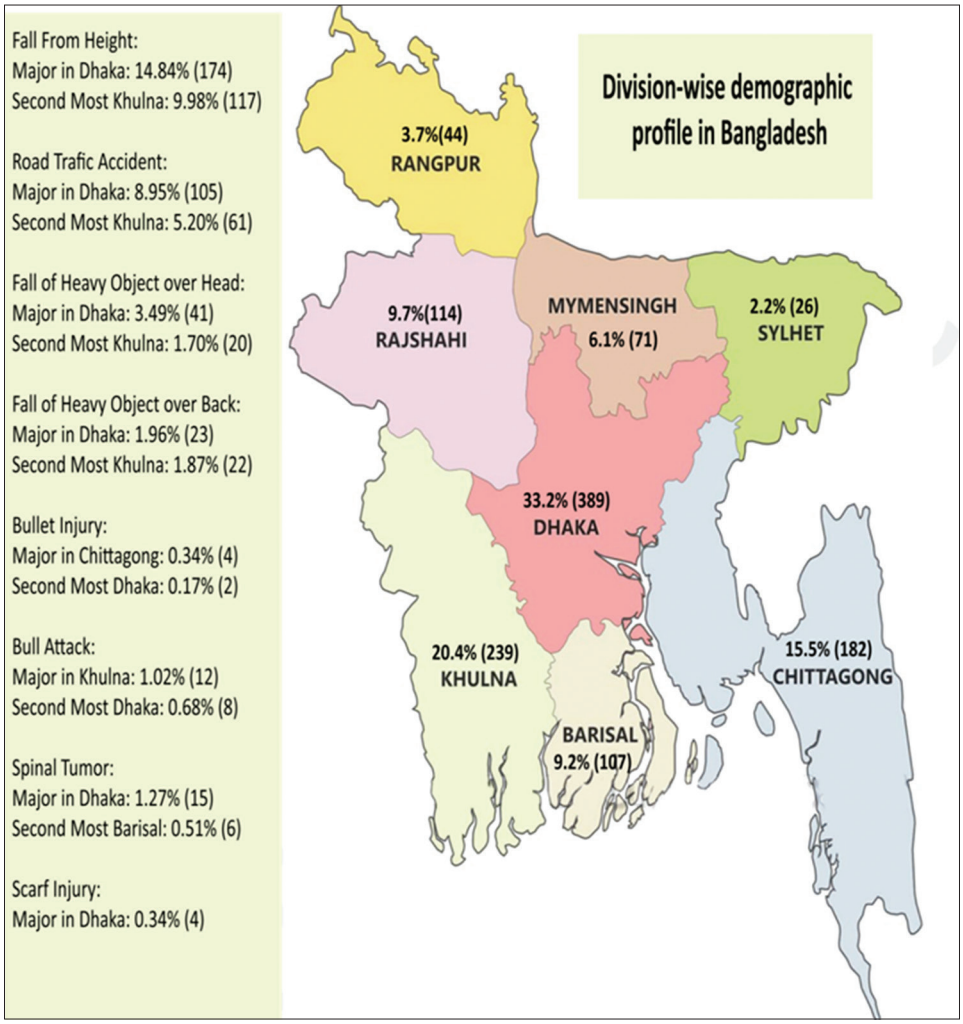

Figure 2: Division-wise distribution of the respondents (*n* = 1172)

Table 4: Mode of injury in different studies from Bangladesh literature (*n* = 1172)

Author	Assessment year	Cause of injury						
		FFH	RTA	FOH	FOB	Physical assault	Bullet injury	Bull attack
Hoque *et al.*[19]	1994–1995	43%	18%	20%	-	-	-	-
Abdur Razzak *et al.*[21]	1979–1999	40.3%	14%	16%	9%	-	-	-
Islam *et al.*[20]	Jan'2009–June'2009	50.5%	11.1%	15.2%	12.1%	-	-	-
Rahman *et al.*[1]	2011–2016	45.4%	25.9%	17.8%	-	-	1.8%	
Present study	2012–2014	45.8%	24.7%	9.6%	9.0%	2%	0.7%	2%

FFH: Fall from height, FOH: Fall heavy object overhead, FOB: Fall heavy object over back, RTA: Road traffic accident

TP (52.3%) and the principle cause was the FFH (45.8%) due to a large number of people connected with fruit harvesting which is important part of our agricultural economy in our country[19] and RTA (24.7%) which was found to be consistent with other global literature.[13] Scarf injury 1.1% (*n* = 13) and bull attack 2% (*n* = 24) are new cause of SCI where the scarf injury causes a severe type of sufferings for patients with SCI which was not previously reported. Most of the SCI patients with complete SCI evident by category A in ASIA scale was noted as 60.9% which is common with Sridharan *et al*., Hoque *et al.,* and Islam *et al.*[15,19,20] Most exposed trauma area of SCI noted as C1-C7 about 30.70% (*n* = 359) which is common with Hoque *et al*.[19] The division wise distribution of person with SCI in our study revealed that FFH was the major cause (14.84% [*n* = 174]), while the second most common cause was RTA (8.95% [*n* = 105]) in Dhaka Division, whereas injury due to bull attack was a major cause of SCI in Khulna (1.02%) while bullet injury was major in Chittagong (0.34%) which are also not reported previously in Bangladesh.

Table 5: Distribution of ASIA score on admission and during admission of the respondents (*n* = 1172)

ASIA	On admission	During discharge
	Frequency (%)	Frequency (%)
A	714 (60.9)	624 (53.2)
B	230 (19.6)	146 (12.5)
C	133 (11.3)	152 (13.0)
D	86 (7.3)	225 (19.2)
E	9 (0.8)	25 (2.1)

ASIA: American Spinal Injury Association

Conclusion

In many parts of the developing world, SCI is neglected, socially deprived, and poorly managed. The demographics pattern of SCI in the developing world is different from the developed world due to extensive research sparse, and data are missing. The data were collected from a tertiary level of rehabilitation center where demographic data were not previously represent and this data mostly represent Bangladeshi population. If it is possible to further exploration like national survey with the expansion of this, data can be the good statistics for government legislation and for prevention of SCI.

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