Demographic Profile of Spinal Cord Injury (SCI): A Hospital-based Prospective study in Bangladesh

ATMA Razzak1*, Rajkumar Roy2, Shamim Khan3
1. Consultant, Advanced Orthopaedics and Spine Care Centre, Savar, Dhaka, Bangladesh
2. Assistant Professor, Department of Neurosurgery, Rangpur Medical College Hospital, Rangpur, Bangladesh
3. Resident, Department of Orthopaedics, Chittagong Medical College Hospital, Bangladesh

ABSTRACT

Purpose: To provide an overview of demographic characteristics of spinal cord injury (SCI) in Bangladesh.

Methods: The study was conducted between 1st January and 31st December 2012 at 5 hospitals: Centre for the Rehabilitation of the Paralysed (CRP) in Savar, National Institute of Traumatology & Orthopaedic Rehabilitation (NITOR), Bangabandhu Sheikh Mujib Medical University (BSMMU), Rangpur Medical College Hospital, and Chittagong Medical College Hospital. 600 SCI cases from these tertiary hospitals were enrolled, and data was collected from those who met the study criteria, using a structured questionnaire developed on the basis of SCI core data set. Data was processed and analysed by SPSS version 16.

Results: The male/female ratio was 4.5:1. Mean age at injury was 34.53 years (16–83 years). The cause of SCI was falls for 34.8% and RTA for 25.5% of the clients. 83.5% of SCI was traumatic and 16.5% was non-traumatic in origin. Only 9.5% of the clients were directly admitted to tertiary hospitals while 90.5% had intermediate admission before that. One-third (33.2%) of the clients used ambulance for intra-hospital transfer. 70.5% of the injury resulted in paraplegia and 29.5% in tetraplegia. Thoraco-lumbar junction (T11-L2) was the region most commonly involved, accounting for 38.7% of all cases. Overall 58.7% SCI cases were found with complete injury (ASIA-A) and 41.3% with incomplete injury during admission. 20.8% of the clients were admitted with pressure ulcer. The study found 27.2% of cases were operated on. The in-hospital mortality rate was 3.3%.

Limitation: The pre-hospital fatalities were not included in the study. During data collection, extent of SCI was found in only 507 cases instead of all 600 enrolled.

* Corresponding Author: ATMA Razzak, Consultant - Orthopaedics and Spine Surgery, Advanced Orthopaedics and Spine Care Centre, Savar, Dhaka, Bangladesh. Email: arazzak33@yahoo.com
Conclusions: This study could contribute to the establishment of an effective prevention programme and comprehensive SCI management in Bangladesh.

Key words: Paraplegia, ASIA scale, demography, spinal cord injury, Bangladesh, developing countries

INTRODUCTION

Spinal cord injury (SCI) can result in a change, either temporary or permanent, in normal motor, sensory, or autonomic function of the spinal cord (Segun, 2011). If SCI does not result in death, it can take a toll in terms of profound psychological, physical and financial affliction on affected families as well as on society. As a permanent cure for SCI is yet just in imagination (Donovan, 2007), prevention is seen as the only effective way to address the problem. Investigating the epidemiological pattern of SCI is the first step in planning for preventive strategies (McCammon and Ethans, 2011). These strategies provide baseline data to monitor the effectiveness of interventions (Segun, 2011). They help in prioritisation for resource allocation and thus should be especially helpful for developing countries, which have limited trained manpower, facilities and resources (Wyandaele and Wyandaele, 2006).

Various studies have been conducted globally on SCI incidence and prevalence (Ackery et al, 2004; Wyandaele and Wyandaele, 2006; Burns and O’Connell, 2012). Bangladesh is a densely populated developing country which has poor occupational safety measures, poor roads and mixed traffic, with vehicle users reluctant to use seat-belts. This makes the population vulnerable to SCI. However, little is known about the incidence, prevalence and epidemiology of SCI in the country as only four published articles were to be found (Hoque et al, 1999; Razzak et al, 2011; Islam et al, 2012; Razzak, 2013) on the characteristics of spinal cord injury (SCI). These were retrospective studies based on single centres and with a small sample size. Therefore, the current study has been conducted in multi-centres, to explore the demographic profile with a larger sample size.

METHOD

Setting
This hospital-based prospective study was conducted between 1st January and 31st December 2012, in 5 different tertiary hospitals of Bangladesh. Three of the
hospitals are situated in Dhaka, the capital city, and the other two cover two districts of Bangladesh. In each of the hospitals, the concerned neuro/orthopaedic surgeon conducted this study. Ethical clearance from the respective hospital authority was taken before data collection.

Study Sample
Majority of the SCI clients from all over the country are treated at these tertiary hospitals, as per data of the annual scientific conference (Bangladesh Spine Society, 2012). Clients with spinal injuries admitted in orthopaedic, neurosurgery or spine units of these hospitals during the study period were included as the sample population. Those who died before reaching hospital and a case of re-admission during the study period were not included.

Data Collection
Using a structured questionnaire, trained personnel of the respective hospital recorded the socio-demographic data, mode of injury, type of injury, skeletal level, neurological level and completeness of injury of suspected SCI clients at admission. Final clinico-radiological examination was performed by the spinal/neurosurgeon of the concerned hospital to ascertain the presence of any spinal injury. After this evaluation, only SCI cases were recorded and preserved for data entry, while the others were taken off the list.

The level and extent of SCI was defined according to the International Neurological Classification of Spinal Injury using the American Spinal Injury Association Impairment (ASIA) scale (Maynard et al, 1997).

Statistical Analysis
Data was collected in a pre-tested structured questionnaire developed on the basis of the core data set of SCI (De Vivo et al, 2006). Descriptive data was presented as n (%), mean, median and standard deviation (SD). Differences in proportions were measured between selected variables by Fisher’s exact test. Statistical mean differences were determined by independent Student’s t-test. Statistical significance was set at P<0.05. All statistical analyses were performed using the SPSS software (Statistical Package for the Social Sciences, v. 16.0, Chicago, IL, USA).
RESULTS

Gender and Age Distribution

A total of 600 SCI cases were enrolled in this study. Males were 81.8% (N: 491) and females 18.2% (N: 109). Male/Female ratio was 4.5:1. Mean age at injury was 34.5 years (16–83 years) with standard deviation ±13.5. The median age was 32 years and mode 40 years. The age distribution had a peak at 16-30 year group, accounting for 45.7% (N=274).

Figure 1: Age Distribution of SCI Clients

Socio-economic Characteristics of Clients

Two-thirds (72.8%) of the clients were from rural areas, with nil or minimum education. 71% of them were married. 62.7% of the families were of the nuclear type and mean family members were 6.04 (Table 1). The mean monthly income of the clients or their families was only 9196.3 taka and expenditure was 7960.0 taka (1 $=80 Taka).

Table 1: Socio-economic Characteristics of the Clients (N=600)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residence of Client:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>437</td>
<td>72.8</td>
</tr>
<tr>
<td>Urban</td>
<td>112</td>
<td>18.7</td>
</tr>
<tr>
<td>Semi-urban</td>
<td>51</td>
<td>8.5</td>
</tr>
</tbody>
</table>

www.dcidj.org
Marital Status:

<table>
<thead>
<tr>
<th>Status</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married</td>
<td>426</td>
<td>71.0</td>
</tr>
<tr>
<td>Unmarried/single</td>
<td>142</td>
<td>23.7</td>
</tr>
<tr>
<td>Divorced/separated/widow</td>
<td>13</td>
<td>2.2</td>
</tr>
<tr>
<td>Not applicable</td>
<td>19</td>
<td>3.2</td>
</tr>
</tbody>
</table>

Religion of Client:

<table>
<thead>
<tr>
<th>Religion</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Islam</td>
<td>545</td>
<td>90.8</td>
</tr>
<tr>
<td>Hinduism</td>
<td>42</td>
<td>7.0</td>
</tr>
<tr>
<td>Others</td>
<td>13</td>
<td>2.2</td>
</tr>
</tbody>
</table>

Education of Clients:

<table>
<thead>
<tr>
<th>Education</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No education</td>
<td>156</td>
<td>26.0</td>
</tr>
<tr>
<td>Primary</td>
<td>146</td>
<td>24.3</td>
</tr>
<tr>
<td>Junior school</td>
<td>146</td>
<td>24.3</td>
</tr>
<tr>
<td>SSC</td>
<td>85</td>
<td>14.2</td>
</tr>
<tr>
<td>HSC</td>
<td>44</td>
<td>7.3</td>
</tr>
<tr>
<td>Graduate and above</td>
<td>23</td>
<td>3.8</td>
</tr>
</tbody>
</table>

Family Type:

<table>
<thead>
<tr>
<th>Type</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nuclear</td>
<td>376</td>
<td>62.7</td>
</tr>
<tr>
<td>Joint</td>
<td>224</td>
<td>37.3</td>
</tr>
</tbody>
</table>

**Occupation before Injury**

One-third (36.30%) of the clients were farmers or day labourers at the time of their injury (Figure 2) and 55.7% were involved in various kinds of work. Most of them (89.2%) were unaware of occupational safety.

**Figure 2: Occupation of Clients before Injury**
Causes of Injury

Figure 3: Causes of Spinal Injury

It was found that 83.5% of the SCI was traumatic (TSCI) and 16.5% was non-traumatic in origin (Figure 3). Falls were the most common cause of SCI, accounting for 34.8%. This included low falls (<1 metre) for 9.5% of the clients, high falls (1-5 metres) for 7.6% and high-energy falls (>5 metres such as falling from a tree, construction site, electric pole, etc.) for 82.9% (Figure 4). However, most of the falls led to paraplegia (80.0%) and the rest developed into tetraplegia (20%). For age-specific causes of injury, it was found that most of the falls (80.86%), RTA (86.9%) and being struck by object (90.56%) occurred in the 16-45 year age groups. TB spine found the highest prevalence (6.8%) in the non-traumatic group. It was prevalent among clients over 31 years of age (70.73%) and among females (51.21%). Majority of the TB spine cases (92.6%) led to paraplegia.

Figure 4: Mode of High-Energy Fall
Road traffic accident (RTA) was the second most common cause of SCI, accounting for 25.5% of clients. It affects all the age groups, but most often those between 31-45 years of age (43.7%) and males. RTA caused 66.0% paraplegia and 34% tetraplegia, of which 56.16% was complete and 41.8% incomplete injury (Table 2).

Table 2: Age Groups (years), extent of SCI related to major causes of injury (N=507)

<table>
<thead>
<tr>
<th>Cause</th>
<th>Age group</th>
<th>N</th>
<th>Paraplegia Complete</th>
<th>Paraplegia Incomplete</th>
<th>Tetraplegia Complete</th>
<th>Tetraplegia Incomplete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>16-30</td>
<td>98</td>
<td>50</td>
<td>35</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>31-45</td>
<td>71</td>
<td>31</td>
<td>22</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>45+</td>
<td>40</td>
<td>10</td>
<td>14</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>RTA</td>
<td>16-30</td>
<td>66</td>
<td>26</td>
<td>19</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>31-45</td>
<td>67</td>
<td>30</td>
<td>14</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>45+</td>
<td>20</td>
<td>6</td>
<td>6</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Load carrying on head</td>
<td>16-30</td>
<td>24</td>
<td>6</td>
<td>2</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>31-45</td>
<td>15</td>
<td>2</td>
<td>1</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>45+</td>
<td>12</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Stuck by object</td>
<td>16-30</td>
<td>28</td>
<td>13</td>
<td>10</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>31-45</td>
<td>20</td>
<td>10</td>
<td>5</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>45+</td>
<td>5</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>TB spine</td>
<td>16-30</td>
<td>12</td>
<td>6</td>
<td>5</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>31-45</td>
<td>16</td>
<td>7</td>
<td>7</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>45+</td>
<td>13</td>
<td>5</td>
<td>7</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

Intermediate Admission and Transport

It was found that 9.5% of clients were admitted directly in a tertiary hospital. One-third (31.5%) of them had single intermediate admission, 34% had double and 25% had triple or more intermediate admissions before being admitted in a tertiary hospital. Only one-third (33.2%) of the clients were transferred by
ambulance from one hospital to another; the rest used different conventional modes of transport (Figure 5).

Figure 5: Transport used in Intra-hospital SCI Client Transfer

![Transport used in Intra-hospital SCI Client Transfer](image)

Neurological Level and Severity of Injury
Thoraco-lumbar junction (T11-L2) was the most common neurological level of injury, which accounted for 31.67% of all cases and 38.7% of thoraco-lumbar cases. The most common cervical spine injuries involved C4 and C5 segments, accounting for 81.81% of cervical SCI cases and 15% of total cases. The neurological level and injury severity of SCI in this study is presented in Table 3.

Table 3: Neurological Level (N. level) and ASIA Impairment Scale during admission

<table>
<thead>
<tr>
<th>N. Level</th>
<th>ASIA-A</th>
<th>ASIA-B</th>
<th>ASIA-C</th>
<th>ASIA-D</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1-C4</td>
<td>79 (13.2)</td>
<td>30 (5.0)</td>
<td>5 (0.8)</td>
<td>8 (1.3)</td>
<td>122 (20.3)</td>
</tr>
<tr>
<td>C5-C8</td>
<td>25 (4.2)</td>
<td>16 (2.7)</td>
<td>3 (0.5)</td>
<td>11 (1.8)</td>
<td>55 (9.2)</td>
</tr>
<tr>
<td>T1-S5</td>
<td>248 (41.3)</td>
<td>77 (12.8)</td>
<td>39 (6.5)</td>
<td>59 (9.8)</td>
<td>423 (70.5)</td>
</tr>
<tr>
<td>Total</td>
<td>352 (58.7)</td>
<td>123 (20.5)</td>
<td>47 (7.8)</td>
<td>78 (13.0)</td>
<td>600 (100.0)</td>
</tr>
</tbody>
</table>

According to the American Spinal Injury Association (ASIA) Impairment Scale (AIS), overall 58.7% of SCI was found to be complete (ASIA-A) and the rest (41.3%) were various grades of incomplete injury during admission. Thoracic/lumbar
(paraplegia) injury accounted for 70.5%, of which 41.3% was complete and 29.2% was incomplete injury. Cervical injury (tetraplegia) was 29.5%, of which 17.3% was complete and 12.2% was incomplete injury. Majority of the carrying load on head (60.8%) and struck by object (62.3%) causes produced complete injury.

**Associated Conditions and Surgery**

41.5% of the SCI cases were associated with other conditions at admission. The most frequent associated condition was pressure ulcer (20.8%). Only 2.7% of spinal injury cases had non-contiguous vertebral injury (Table 4).

Table 4: Showing Associated Conditions (N=600)

<table>
<thead>
<tr>
<th>Associated Condition</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fractures</td>
<td>51</td>
<td>8.5</td>
</tr>
<tr>
<td>Pressure ulcer</td>
<td>125</td>
<td>20.8</td>
</tr>
<tr>
<td>Head injury</td>
<td>38</td>
<td>6.3</td>
</tr>
<tr>
<td>Cut injury</td>
<td>9</td>
<td>1.5</td>
</tr>
<tr>
<td>Non-contiguous vertebral lesions</td>
<td>16</td>
<td>2.7</td>
</tr>
<tr>
<td>Others</td>
<td>10</td>
<td>1.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>249</strong></td>
<td><strong>41.5</strong></td>
</tr>
</tbody>
</table>

**Spinal surgery** - This study found that 27.2% of the cases were operated on. The most commonly performed surgery was pedicle screw fixation (20.0%) for thoraco-lumbar injuries. Other types of surgical procedures were anterior decompression and fusion (ACDF) for cervical injury (2.2%), lateral mass fusion (0.5%), laminectomy (1.2%) and others (3.2%).

**In-hospital mortality** - Totally 20 clients (3.3% of admissions) died during treatment at hospital. Of these, 16 had traumatic cervical injury and died because of respiratory failure or severe electrolyte imbalance. The remaining 4 clients had thoraco-lumbar injury with severe sepsis and anemia due to severe pressure ulcer.

**DISCUSSION**

SCI clients are predominantly male, though the ratio varies considerably within developed and developing countries. The male/female ratio ranges from 2.5:1 -
4.3:1 among developed countries, and 2.34:1 - 9:1 among developing countries (Ackery et al, 2004; Wyandaele and Wyandaele, 2006; Alshahri et al, 2012; Burns and O’Connell, 2012; Vasiliadis, 2012). The current study found male/female ratio was 4.5:1 among the SCI clients though there was almost equal gender composition in the populations of Bangladesh (World Bank, 2015). However, different published articles showed that this male/female ratio in Bangladesh has been reducing over time: 7.5:1 in 1999 (Hoque et al, 1999), 4.95:1 in 2011 (Islam et al, 2011) and 4.5:1 in the current study. This decreasing trend in the male/female ratio suggests that nowadays the number of women with SCI is on the rise in Bangladesh. As the sex ratio reflects the socioeconomic and cultural status of a society (Khun et al, 1983), a few possible factors for this change in ratio may be: more women are being involved in economic activities (Bangladesh Bureau of Statistics, 2011) as women’s education has increased during the last two decades (UNICEF, 2011), national progress in various macroeconomic and social development occurs (Helal and Hossain, 2013), changing concept in health seeking disparity between male-female, increased identification of non-traumatic SCI with improved medical equipment (women suffer more in nTSCI). This scenario was also observed in various studies (Kuhn et al, 1983; DeVivo, 2012; Shin et al, 2013; WHO, 2013) though the reasons may differ in different countries or regions.

In the current study, the mean age at injury was 34.5 years. This matches with studies from Bangladesh - Hoque et al (2012), Islam et al (2011) and Razzak (2013); regional studies - Kuptniratsaikul (2003) and Agarwal et al (2007); and studies from other places - Ackery et al (2004) and Rahimi-Movaghar et al (2013). The mean age of SCI clients seems to be higher in developed countries (Ackery et al, 2004; Ning et al, 2011; Tee et al, 2013), possibly due to their longer life expectancies, a higher mean age of population and better medical care system (Ackery et al, 2004). However, it is a universal fact that SCI affects the most active and productive age group of society. In most cases these victims are the only wage earners of their family, so when they become unproductive the affected family is in a precarious position. In Bangladesh, social security is less or nonexistent and victims experience tremendous suffering.

SCI is broadly classified as either traumatic or non-traumatic in nature. This study found 83.4% traumatic SCI (TSCI) cases and 16.6% non-traumatic SCI (nTSCI) cases, which was in consonance with the study of Agarwal et al (2014) and the WHO report on SCI (2013). Falls and RTA comprise two major causes of SCI
(60.3%) in the present study. However, falls were found to be the most common cause of SCI in Bangladesh (34.8%), in keeping with findings of other studies in the country (Hoque et al, 1999; Islam et al, 2011; Razzak et al, 2011), studies from some Asian countries such as Nepal (68.2% according to Lakhey et al, 2005) and Pakistan (63% according to Cripps et al, 2014), as well as studies from Finland (64.9% according to Koskinen et al, 2014).

The mode and reasons for falls as a cause of TSCI vary all over the world. For uniformity and to compare data, falls were subdivided into low, high and high-energy falls. High and high-energy falls were more common (82.9%) than low falls (17.1%) in the current study. Falls from a significant height were also noted in many low and lower-middle income countries like India (Chhabra and Arora, 2012), Nepal (Lakhey et al, 2005), Pakistan (Rathore et al, 2008), and Nigeria (Nwankwo and Uche, 2013). Contrarily, low falls occurred more in middle and high-income countries where elderly people (>65 years) are a growing concern: China (Cheng et al, 2008), Australia (Tee et al, 2013), Finland (Koskinen et al, 2014), and Japan (Katoh et al, 2014).

Most falls in Bangladesh occur while working, either at home while doing housework/house maintenance, or at the workplace while plucking fruit, collecting firewood from trees, electric work, construction work, etc (Chhabra and Arora, 2012; Hoque et al, 2012; Cripps et al, 2014). Some other modes of falling were also observed: fall while carrying load over shoulder/ back/ head; fall from overloaded bus/train/tractor; fall due to women’s neck-scarf getting entangled in the wheels of two or three-wheeled running vehicles; and, fall while running to catch a pet animal. This signifies lack of awareness and occupational safety in the country.

The current study found RTA was the second most common cause (25.5%) of SCI in Bangladesh, whereas it ranked third (18%) in 1999 (Hoque et al, 1999). Similar increased trends of SCI caused by RTA have also been noticed recently in Jammu (Manjeet et al, 2009) and other places in India (Chhabra and Arora, 2012). A few factors that could be responsible for the increase in transport accidents in recent years are: increased urbanisation and the number of motorised vehicles, less public awareness, insufficient number of roads and highways, and poor road infrastructure, unskilled drivers, incompetent traffic systems, weak legislation, rise in number of faulty and non-standard vehicles on the road in Bangladesh (Weerts, 2009; Biswas et al, 2012; WHO, 2004).
It is interesting that the number of transport-related injuries is stable or decreasing in developed countries (Cripps et al, 2014) due to prevention strategies, whereas fall-related injuries are increasing (van den Berg et al, 2010; Noe, 2015) over time due mainly to ageing problems.

The WHO report on SCI (World Health Organization, 2013) stated that spinal cord injury is preventable. Since falls and RTA are the two major causes of SCI, preventive measures should be employed not only in Bangladesh but also in many developing countries. The government and the concerned international non-government organizations should initiate such preventive programmes immediately.

The current study revealed that 16.6% of SCI was non-traumatic in origin. This was consistent with other studies in the region (Agarwal et al, 2007; Shin et al, 2013). TB spine was found to be the most prevalent in the non-traumatic group (6.8% overall and 41% in nTSCI) in this study, which is in consonance with the findings of Hoque et al (1999) in Bangladesh and Razdan et al (1994) in Kashmir, India. Like many other Asian countries, tuberculosis is an endemic disease in Bangladesh. The spine is the skeletal site most often affected, because of its favourable environment, followed by the hip and knee. Spinal tuberculosis accounts for almost 50% of cases of skeletal tuberculosis (Gautam et al, 2005). For that reason TB spine is more common in developing countries whereas degeneration of spine, neoplasm, inflammatory conditions etc., are reported as the frequent causes of nTSCI in developed countries (Scivoletto et al, 2011; New et al, 2013 ). Hence early detection and prompt treatment of pulmonary tuberculosis can reduce the incidence of spinal tuberculosis in Bangladesh.

With respect to the neurological level of injury, this study found that 70.49% resulted in paraplegia and 29.51% in tetraplegia. These findings are consistent with various studies on Asian countries: in Bangladesh, Razzak et al (2011) found 79.75% paraplegic vs 20.25 % tetraplegic; in India, Chhabra and Arora (2012) reported 66.67% vs 33.33 %; and in Malaysia, Ibrahim et al(2013) found 63% vs 37 %. Contrarily, more tetraplegia than paraplegia was found in Japan, with Shingu et al (1995) reporting 62.4% tetraplegia vs 36.3% paraplegia. This is similar to China, where Ning et al (2012) found 71.5% tetraplegia vs 28.5% paraplegia. For most middle to high-income countries it is fact that tetraplegia is reported more than paraplegia (Hagen et al, 2010; Knutsdottir et al , 2012; Najendijk et al, 2014).
Some of the reasons for fewer tetraplegic cases in Bangladesh may be: different mode of injury, high pre-hospital mortality, non-existence of pre-hospital trauma care in the country, and lack of ICUs as well as competent and trained medical personnel. Moreover, the caregivers are unwilling to take tetraplegic clients to hospital because of high treatment cost for cervical spine injuries, no national health insurance, poor prognosis of such clients, and unavailability of nearby treatment facilities for cervical injury cases. Hence fewer cases of tetraplegia are found in Bangladesh, as compared to paraplegia.

Using the American Spinal Injury Association (ASIA) Impairment Scale (AIS), the current study found that during admission overall 58.7% of SCI cases were complete (ASIA-A) and the rest or 41.3% were various grades of incomplete injury (ASIA-B to D). Complete SCI has also been reported in India (71.18%) by Chhabra and Arora (2012), in Bangladesh (78%) by Islam et al (2011), and in Afghanistan (67%) by Michael and Roth (2012). The high rate of complete SCI in Bangladesh that the current study found could be due to the different causes and mechanism of injury, improper acute management, delay to initiate definitive treatment and lower number of tetraplegic cases. However, in resource-rich countries more incomplete injury than complete injury was observed: in Italy 68% vs 32% (Scivoletto et al, 2011), in China 74.8% vs 25.2% (Ning et al, 2011), and in Iceland 61% vs 39% (Knutsdottir et al, 2012). New and improved acute treatment modalities, trends in age and etiology are some factors (O’Connor, 2005; DeVivo, 2012) responsible for more incomplete injuries in these countries.

CONCLUSION

This is the first multi-centered prospective study on SCI in Bangladesh, focusing on a larger sample size. It found that young and active people from low-income society were most affected by SCI. Majority of them were victims of falls from a height and road traffic accidents. The primitive conditions of pre-hospital trauma care and lack of occupational safety increase their suffering. Therefore the priority should be to establish and strengthen preventive measures in Bangladesh so as to reduce the frequency of spinal cord injuries. Moreover, the public should be made aware of SCI, and provision of occupational safety measures need to be initiated and adhered to. To ensure better rehabilitation of SCI clients, the authors recommend that comprehensive SCI management be launched as soon as possible across the country.
Implications
This study indicates the need for intensive public awareness and increased government support for the prevention of SCI. Measures include: environmental modification, legislation for change in people’s behaviour, and education about occupational safety of persons at risk for injury.

Limitations
The study has several limitations. All pre-hospital fatalities were excluded, which makes it difficult to draw comparisons with international data. During data collection, the extent of SCI was found in only 507 cases instead of in the entire sample of 600. Moreover, since there was no follow-up work done after the study, the final outcome for the study participants is not known.

ACKNOWLEDGEMENT
This study was funded by Bangladesh Medical Research Council (BMRC) through the project Health, Population and Nutrition Sector Development Programme (HPNSDP) under the Ministry of Health and Family Welfare, Government of People’s Republic of Bangladesh, in the fiscal year 2012.

REFERENCES


www.dcidj.org


Razzak ATMA (2013). Early Care following Traumatic Spinal Cord Injury (TSCI) in a Rehabilitation Centre in Bangladesh - An Analysis. Disability, CBR and Inclusive Development (DCID); 24(2): 64-78. https://doi.org/10.5463/dcid.v24i2.211


