# Epidemiology of Spinal Cord Injuries : A Study in the Spinal Unit, Siriraj Hospital, Thailand, 1997-2000

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**Abstract**

A prospective study of 83 patients with spinal cord injuries admitted to the Spinal Unit, Siriraj Hospital, Bangkok, Thailand from January 1997 to December 2000 was conducted. The average age was 33.2 ± 11.7 years (range from 10 to 68 years) with a male : female ratio of 4 : 1. Most subjects (83.2%) were aged between 16-45 years. About half of them had no associated injuries and no financial problems. Three-fourths of the spinal injuries were caused by traffic accidents (49.4 and 25.3% car and motorcycle respectively). The other two causes were falls (16.9%) and gunshot wounds (8.4%). The neurological classification was as follows: 34 (41.0%) patients had ASIA D grade of injury, 28 (33.7%) were paraplegic with ASIA A, B or C grade and 21 (25.3%) were tetraplegic with ASIA A, B, or C grade. Traffic accidents most frequently resulted in an incomplete ASIA D grade (40.3%). Males were more predominant for all causes of injury especially motorcycle accidents. The average Barthel Index score was 24.3 ± 24.7 and 51.9 ± 31.8 at admission and discharge respectively. The prevalence of depression was 24.1 per cent. The average length of stay for the depressed and non-depressed groups was 117.4 ± 59.1 and 73.4 ± 54.4 days respectively.

**Key word :** Spinal Cord Injury, Thailand, Depression, Length of Stay, Barthel Index Score

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Traumatic spinal cord injury (SCI) is a devastating medical condition that disrupts the lives of the injured and their families[1]. It constitutes a major area of disability in every country and results in profound and long-term disability or death[2].

The incidence of SCI is increasing especially in developing countries. It is one of the most catastrophic lesions, often leading to permanent paralysis. It affects victims who are usually young and at the most productive stage of life. This causes a burden of

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suffering not only to the patient but to their families, community and the health care system. Devivo studied the total direct costs for all causes of SCI in the United States and found it to be 7.736 billion US dollars[3].

Because the incidence of SCI is highest among young and productive patients, reducing the incidence of SCI will not only prevent social and family disruption but will substantially reduce direct health care costs and the social cost from lost productivity[1].

It is difficult to restore lost spinal cord function following SCI, so prevention is better than treatment[4]. Knowledge gained from an epidemiological study may lead to the development of intervention strategies capable of preventing permanent disability.

The objective of this study was to determine the demographics, neurological presentation, functional outcome and prevalence of depression of individuals with traumatic SCI admitted to the Spinal Unit, Siriraj Hospital, Bangkok.

## MATERIAL AND METHOD

All patients with traumatic SCI who were admitted for the first time to the Siriraj Spinal Unit (SSU), Bangkok, from January 1997 to December 2000, were included in this study. Demographic data, details as to the cause of the accident, financial support and associated injuries were collected. The neurological level was classified according to the American Spinal Injury Association[5]. The complications during hospitalization and length of hospital stay were also recorded. The subjects were interviewed concerning functional abilities using the Barthel Index Score of self care activities[6] and evaluated for depression by a psychiatrist according to the Diagnostic and Statistical Manual of Mental Disorder, fourth edition (DSM-IV)[7].

### Statistical analysis

Descriptive analysis was used for the demographic data. Chi-square test was used to compare categorical data. For quantitative data, *t*-test was analyzed for parametric and Mann-Whitney for non-parametric data. The p-value was significant at a level of $< 0.05$.

## RESULTS

Eighty-three subjects; 66 males and 17 females, aged from 10 to 68 years (average = 33.2 ± 11.7). The age group 16-45 years accounted for the largest number of subjects with SCI (83.2%) (Fig. 1). Half of them were married. Seventy per cent of the SCI patients were working and 45.8 per cent had graduated from university. Forty-seven per cent had no financial problems, they were government officers or had health insurance. With regard to the associated injuries, 55.4 per cent had no head injury or injuries to the extremities, chest or abdomen. Three-fourths (75.9%) had no complications during their hospital stay (Table 1).

Table 2 shows the distribution of etiology and neurological classification. Three-fourths of the injuries were caused by traffic accidents (49.4 and 25.3% car and motorcycle accidents respectively). The other two causes were falls (16.9%) and gun shot wounds (8.4%). With regard to neurological classifi-

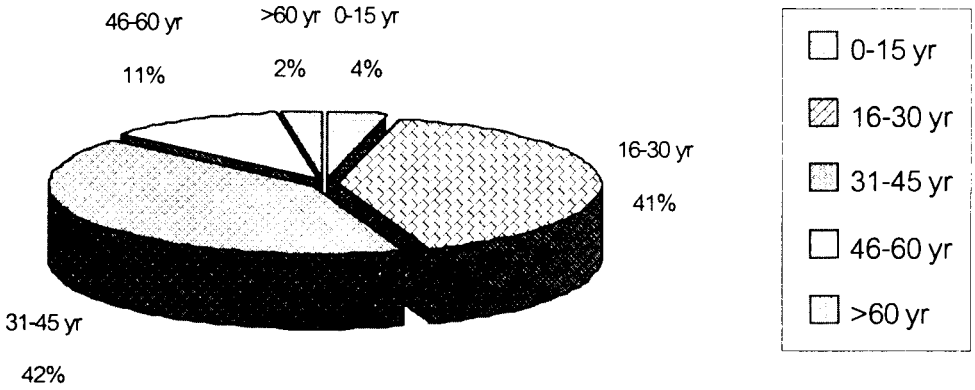


**Fig. 1. Age at injury.**

**Table 1. The demographic data of SCI subjects.**

| | No. | % |
|---|---|---|
| Age (yr) | 33.2 ± 11.7 | |
| Sex | | |
| Male | 66 | 79.5 |
| Female | 17 | 20.5 |
| Marital status | | |
| Married | 43 | 47.6 |
| Not-married | 39 | 52.4 |
| Education level | | |
| Primary school | 22 | 26.5 |
| Secondary school | 23 | 27.7 |
| University | 38 | 45.8 |
| Occupation | | |
| Employed | 58 | 69.9 |
| Unemployed | 25 | 30.1 |
| Financial problems | | |
| Yes | 44 | 53.0 |
| No | 39 | 47.0 |
| Associated injuries | | |
| Yes | 37 | 44.6 |
| No | 46 | 55.4 |
| Complications during hospitalization | | |
| Yes | 20 | 24.1 |
| No | 63 | 75.9 |

cation, most subjects (41.0%) were ASIA D and the rest were paraplegic ASIA A, B, C and tetraplegic with ASIA A, B, C (33.7 and 25.3%). Traffic accidents most frequently resulted in incomplete ASIA D, followed closely by tetraplegic and paraplegic ASIA A, B or C. Eighty-five point seven per cent of falls resulted in paraplegic ASIA A, B or C and incomplete ASIA D.

The etiology categorized by gender is shown in Table 3. Not surprisingly, males were more predominant for all causes, especially motorcycle accidents. The average Barthel Index score was 24.3 ± 24.7 and 51.9 ± 31.8 on admission and discharge respectively. There was statistical significance between the scores on admission and discharge for all neurological levels (Fig. 2). The average length of stay was 83.6 ± 58.2 days. Twenty patients (24.1%) were diagnosed as having depression according to DSM-IV criteria. The average lengths of stay for the depressed and non-depressed groups was 117.4 ± 59.1 and 73.4 ± 54.4 days respectively which were statistically significant.

## DISCUSSION

A multidisciplinary approach is the important concept of comprehensive treatment of patients with spinal cord injury. It is essential for successful rehabilitation and reintegration of the patient into society. Rehabilitation should not only be separated from the initial treatment of SCI patients, but also integrated with treatment from the start. The Siriraj Spinal unit is a 15-bed inpatient ward of the Department of Orthopedic Surgery that has a multidisciplinary team approach. Staff from the Rehabilitation Department (Physiatrists, Physical therapists, Occupational therapists, Rehabilitation Psychologists and Social workers) work together from the beginning. Patients who are transferred to this unit come from different hospitals throughout the country.

The total number of the patients in the present study was small because there are only 15 beds in this ward. Some could not be discharged due to different facilities of care and the social support system in Thailand. They were put on a Bennett respirator. The hospitals they were going to be admitted to in rural areas had no Bennett and no visiting nurses, physical therapists or home health aids as in other developed countries.

**Table 2. Etiology and neurological classification[a].**

| Etiology | Tetraplegic ASIA A, B, C | % | Paraplegic ASIA A, B, C | % | ASIA D | % | Total no | % |
|---|---|---|---|---|---|---|---|---|
| Traffic accident | | | | | | | | |
| Car | 16 | | 10 | | 15 | | 41 | 49.4 |
| Motorcycle | 3 | | 8 | | 10 | | 21 | 25.3 |
| Fall | 2 | | 6 | | 6 | | 14 | 16.9 |
| Gun shot wound | - | | 4 | | 3 | | 7 | 8.4 |
| Total (p = 0.11) | 21 | 25.3 | 28 | 33.7 | 34 | 41.0 | | |

[a] ASIA classification as follows: A = complete motor and sensory injury, B = incomplete preserved sensation only, C = incomplete preserved motor (nonfunctional), D = incomplete (preserved motor function below level of injury)(6).

**Table 3. Etiology and gender.**

| Etiology | Gender | | | |
|---|---|---|---|---|
| | Male | % | Female | % |
| Traffic accident | | | | |
| Car | 31 | | 10 | |
| Motorcycle | 19 | | 2 | |
| Fall | 11 | | 3 | |
| Gun shot wound | 5 | | 2 | |
| Total (p = 0.684) | 66 | 79.52 | 17 | 20.48 |

With regard to the sex ratio, most of the study group (79.5%) were male; the male to female ratio was 4 : 1 which is lower than in previously reported results (8,9). This ratio is similar to that reported in the literature from Fiji(2), Taiwan(10) and South Africa(11). A study from Portugal(12) reported of male predominance with the ratio of 3.4 : 1. The proportion of males has decreased significantly in recent years due to changes in the life-style of Thai people. Most modern women get involved in societal activity.

The age of the study sample ranged from 10 to 68 years with a mean of 33.2 ± 11.7 years. In the study from Fiji(2), the ages ranged from 6 to 76 years with a mean of 38.3 ± 17.3 years, whereas in Japan(4), the age ranged from 6 to 96 years with a mean of 48.3 ± 19.5 years. The life expectancy in each country influences the overall age range. In addition, the age group 16 to 45 years accounted for the largest group in the present study (83%). The minority of injuries occurred before the teenage years or after the age of 60. From a report by Nobunaga et al(13), the overall mean age was 32.3 years and 77.4 per cent of the injuries occurred between the ages of 16 to 45 years. In addition, in the Fiji study(2), the age group 16-45 years comprised the largest group (59.3%). Thus, this age group seems to be at the highest risk, so prevention campaigns should be directed at this age group.

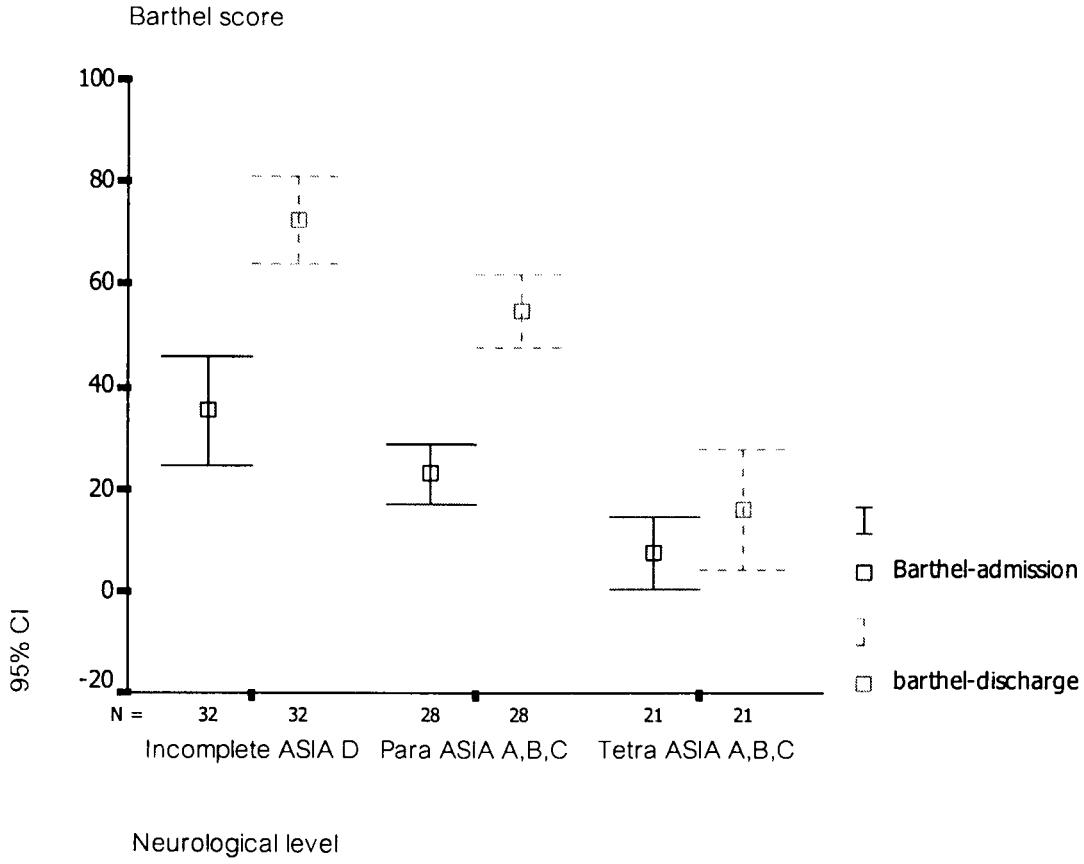


**Fig. 2. Neurological classification and Barthel Index Score compared at admission and discharge.**

The main cause of injury in the present study was from a traffic accident (74.7%) with a fall as the next greatest cause (16.9%). Studies from Japan (4) (traffic accidents 44.6%, falls 29.2%) Brazil(14) (traffic accidents 41.7%, falls 14.8%), Taiwan(10) (traffic accidents 61.6%, falls 23.3%) and Utah, USA (15) (motor vehicle crashes 49.3%, falls 21.1%) showed motor vehicle accidents as the leading cause of traumatic SCI followed by falls. The present study had no causes from violence, sport or assault. In the study of Kovindha(8) performed in Chiang Mai, a rural area in the northern part of Thailand, falls from a height were the most common cause (43%) followed by traffic accidents. The reason could be due to differences in occupation and lifestyle between rural and urban areas. Strategies to prevent SCI should be emphasized on car and motorcycle drivers to build up responsibility to prevent accidents such as no alcohol, and not using a mobile phone while driving.

The average Barthel Index score for self-care activities increased in the discharge period especially in ASIA D with a score above 60 (level of independent ability). The reason was due to severity of neurological damage; complete tetraplegic patients had limited ability to recovery.

In addition, the authors also found the prevalence of depression among SCI subjects to be 24.1 per cent which was similar to that reported in previous studies (range from 20%(16) to over 30%(17,18)). In addition, the length of stay for depressed subjects was longer than for the non-depressed group (117 compared to 73 days). Depression in SCI patients has been associated with prolonged hospitalization, impaired social functioning and an increased incidence of medical complications after acquired physical disability (19,20). Therefore, early detection and treatment of depression should be carried out to prevent these poor outcomes.

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# ระบาดวิทยาในผู้ป่วยบาดเจ็บไขสันหลัง : การศึกษา ณ ศูนย์อุบัติเหตุผู้บาดเจ็บทางกระดูกสันหลัง โรงพยาบาลศิริราช ประเทศไทย : 2540–2543

*วิไล คุปต์นิรัติศัยกุล, พบ**

ศึกษาผู้ป่วยบาดเจ็บไขสันหลัง ณ ศูนย์อุบัติเหตุผู้บาดเจ็บทางกระดูกสันหลัง โรงพยาบาลศิริราช ตั้งแต่ปี พ.ศ. 2540–2543 จำนวน 83 ราย เป็นชาย 66 และหญิง 17 ราย (สัดส่วนชาย : หญิง = 4 : 1) อายุ 33.2 ± 11.7 ปี (พิสัย 10–68 ปี) ส่วนใหญ่ (ร้อยละ 83.2) ได้รับบาดเจ็บในช่วงอายุ 16–45 ปี ประมาณครึ่งหนึ่งของกลุ่มตัวอย่างไม่มีปัญหาเศรษฐกิจและไม่พบบาดเจ็บร่วมของอวัยวะระบบอื่น สาเหตุของการบาดเจ็บพบว่าผู้ป่วยสามในสี่เกิดจากอุบัติเหตุจราจร (รถยนต์และรถมอเตอร์ไซค์ ร้อยละ 49.4 และ 25.3 ตามลำดับ) สาเหตุรองลงมาได้แก่ตกจากที่สูง (ร้อยละ 16.9) และถูกยิง (ร้อยละ 8.4) ระดับที่ได้รับบาดเจ็บผู้ป่วย 34 ราย (ร้อยละ 41) เป็นชนิด ASIA D ผู้ป่วย 28 ราย (ร้อยละ 33.7) เป็นอัมพาตครึ่งท่อนล่างชนิด ASIA A, B หรือ C และ 21 ราย (ร้อยละ 25.3) เป็นอัมพาตทั้งตัวชนิด ASIA A, B หรือ C อุบัติเหตุจราจรทำให้เกิดการบาดเจ็บชนิด ASIA D เป็นส่วนใหญ่ เพศชายพบได้บ่อยกว่าเพศหญิงอย่างเด่นชัดในทุกสาเหตุของโรค โดยเฉพาะอุบัติเหตุจากรถมอเตอร์ไซค์ ค่าเฉลี่ยคะแนนความสามารถในการช่วยเหลือตนเองในกิจวัตรประจำวัน (Barthel Index) ในช่วงแรกรับและออกจากโรงพยาบาลมีค่าเท่ากับ 24.3 ± 24.7 และ 51.9 ± 31.8 ตามลำดับ นอกจากนี้ยังพบค่าความชุกของการซึมเศร้าในผู้ป่วยบาดเจ็บไขสันหลังเท่ากับร้อยละ 24.1 และระยะเวลานอนโรงพยาบาลเฉลี่ยในกลุ่มผู้ป่วยที่มีภาวะซึมเศร้าร่วมด้วย และกลุ่มที่ไม่มีภาวะซึมเศร้ามีค่าเท่ากับ 117.4 ± 59.1 วันและ 73.4 ± 54.4 วันตามลำดับ

**คำสำคัญ** : บาดเจ็บไขสันหลัง, ประเทศไทย, ภาวะซึมเศร้า, ระยะนอนโรงพยาบาล, คะแนนบาร์เทล

**วิไล คุปต์นิรัติศัยกุล**
**จดหมายเหตุทางแพทย์ ฯ 2546; 86: 1116–1121**

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