

## Traumatic spinal cord injuries in Turkey

F Dincer MD,<sup>1</sup> A Oflazer MD,<sup>2</sup> M Beyazova MD,<sup>3</sup> R Çeliker MD,<sup>1</sup> O Basgöze MD,<sup>1</sup> K Altıoklar MD<sup>2</sup>

<sup>1</sup>Department of Physical Medicine and Rehabilitation, Hacettepe University School of Medicine, Department of Physical Medicine and Rehabilitation, Ankara; <sup>2</sup>The Rehabilitation Centre of Ankara; <sup>3</sup>Department of Physical Medicine and Rehabilitation, Gazi University School of Medicine, Ankara, Turkey.

Spinal cord lesions have various aetiologies, and trauma is one of the leading causes. Patients with spinal cord injuries (SCI) often have motor, sensory and autonomic dysfunctions and require a multidisciplinary rehabilitation programme. In this study 1694 SCI patients were investigated, including the frequency, and the distribution by age, sex, profession, aetiology, clinical status and year of occurrence. Traumatic SCI is more frequent among males than females and among those between the ages of 15 and 39 years. Regarding the aetiology, traffic accident comprised 35.41% of the total cases, the second most common cause was falls with 29.51%, and the third was high velocity bullet wounds: 21.95%.

*Key words:* traumatic spinal cord injury; epidemiology; rehabilitation; Turkey.

### Introduction

Trauma has become one of the most dangerous causes threatening human health. Traffic accidents are one of the leading causes and, in Turkey and throughout the world, traffic accidents and high velocity bullet wounds are still the commonest causes of trauma. Other causes are knife wounds, falls from heights, and landslide accidents.<sup>1–9</sup> Most of the patients referred to the largest rehabilitation centre of our country have a serious traumatic spinal cord injury and are of great importance. For these reasons, patients from this group admitted to our hospital between 1974–1985 have been surveyed.

### Material and methods

In this study patients referred to our department between 1974–1985 were investigated. A total of 7474 patients were admitted as inpatients to the rehabilitation programme at the Ankara Rehabilitation Centre during this period, and 1694 of them had had a

traumatic spinal cord lesion. We evaluated these patients in a retrospective study. Of the 1694 patients, 1282 (75.68%) were male and 412 (24.32%) were female. The distribution of traumatic spinal cord injuries according to age, cause, profession, clinical status and year of occurrence are recorded.

### Results

The distribution of traumatic spinal cord lesions according to age is shown in Figure 1. The youngest patient was one year old and the eldest 70 years old, with a mean age of 26.8 years. The high percentage in the 15–39 years age group is striking. One thousand two hundred and twenty four (72.23%) of the cases are included in this group. The 15–19 age group with 316 (18.65%) patients is the highest risk group. The distribution of patients according to profession is shown in Figure 2. The main group were housewives 338 (19.95%); next came agricultural workers with 336 (19.83%), and then third private industry workers consisting of 330 (19.48%) patients. Most of the housewives were from agricultural regions, being unpaid but contributing to the work force on the farm. This group

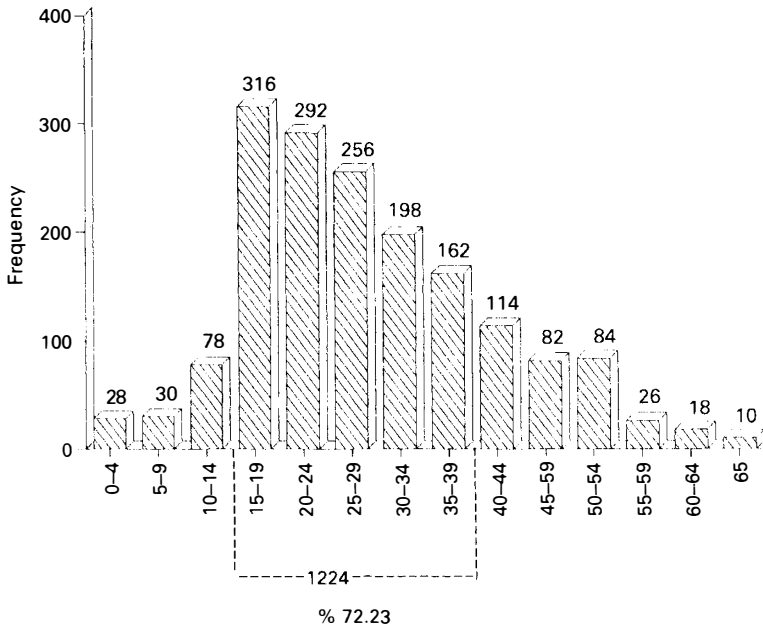


Figure 1 Distribution according to age.

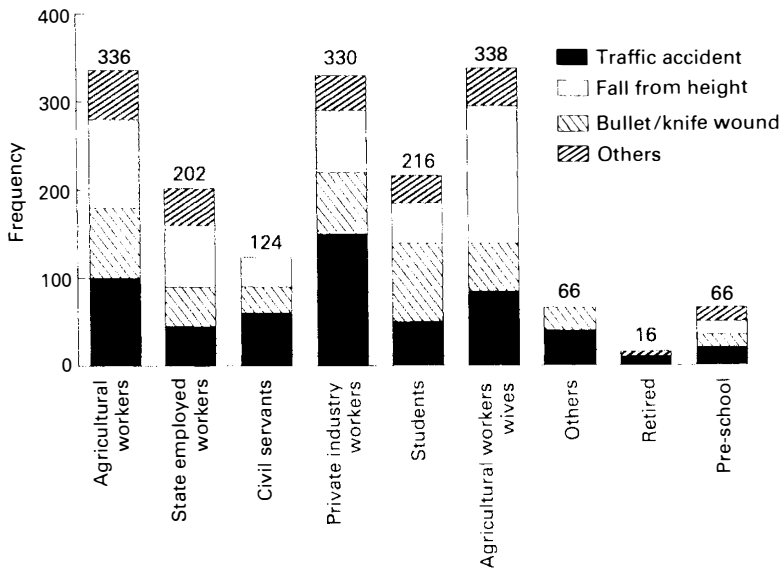


Figure 2 Distribution according to occupation.

together with agricultural and private industry workers are clearly the groups most exposed to spinal cord injury. As is shown in Figure 2, private industry workers have the highest frequency of traffic accidents; the

student groups of bullet or knife wounds, and housewives of falls from a height. In our study the distribution of aetiology of trauma in males is: 37.3% for traffic accidents, 26.4% for falls, and 24.2% for gunshot

injuries. In the female population these ratios are 44.7% for falls, 29.6% for traffic accidents and 15.0% for gunshot injuries.

Distribution analysis of traumatic spinal cord injuries according to the clinical status shows that 1442 (85.12%) cases have complete paraplegia, 116 (6.85%) have incomplete paraplegia, 82 (4.84%) have complete quadriplegia and 54 (3.19%) have incomplete quadriplegia. The distribution of patients according to cause is shown in Figure 3. The type of trauma can be divided into 5 groups: traffic accidents, bullet wounds, knife wounds, falls from a height, and

others. Falls from trees constitute most of the falls group. In the 'others' group, causes such as landslide accidents, crushing, compression and lifting heavy loads are included. Traffic accidents are the chief cause with 600 (35.41%) patients, followed by falls from heights 500 (29.51%) cases, and high velocity bullet wounds 372 (21.95%) cases. The distribution of patients according to the year of occurrence is shown in Figure 4. The 1978-79 period is first with a 23.96% frequency, second is the 1976-77 period with 23.84% and third the 1980-81 period with 21.01%. In the 1980-81 period SCI

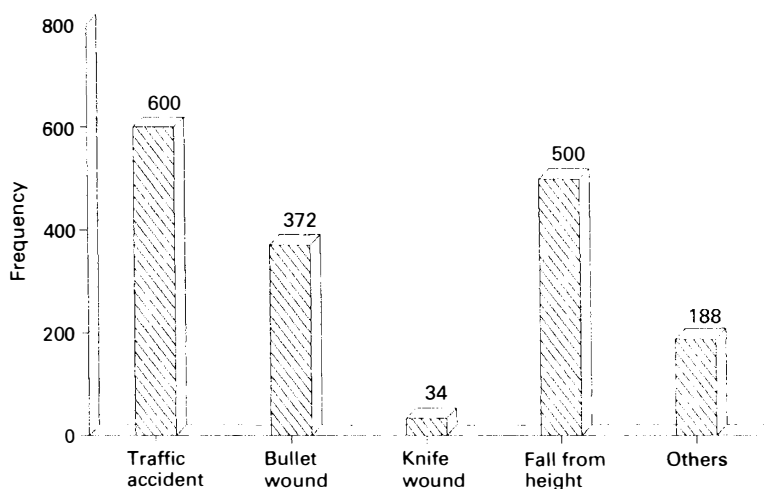


Figure 3 Distribution according to aetiology.

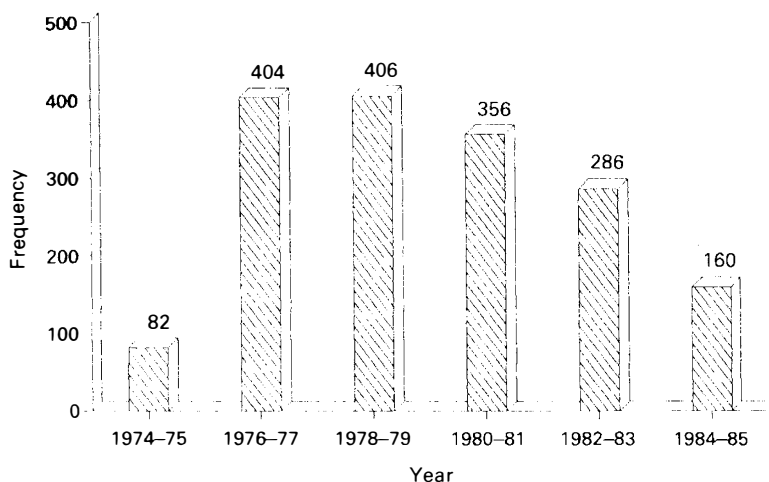


Figure 4 Distribution according to year of occurrence.

shows a fall in frequency to 16.88%. The types of trauma for each year are given in Figure 5.

### Discussion

In our study we found that men were far more exposed to spinal cord injuries than women, with a ratio of 3:11, and reports in the literature support this finding. The male/female ratio was 7.0 in Nigeria,<sup>10</sup> 4.8 in Norway,<sup>11</sup> 3.68 in France<sup>12,13</sup> and 3 in Spain.<sup>14</sup> In our series the mean age was 26.8 years, and the 15–39 year age group was noted to be a high risk group with a 72.73% frequency. The high risk group for traffic accidents is the 15–34 age group, for falls the 15–40 age group and for bullet wounds the 15–30 age group. In 1983, Iwegbu<sup>10</sup> carried out a survey in Nigeria in which the mean age was 24 years (15–60 years) and the 20–35 age group made up the highest risk group with a 83.3% frequency. In the 1983 survey carried out by Minaire *et al*<sup>13</sup> in France, the mean age was 32.5 years (6–91 years) and the 15–55 age group was the highest risk group with a 80% frequency. In another study from France covering the 1970–75 period, the mean age was 29.3 years and the 15–60 age group was the highest risk group with a 79% frequency.<sup>12</sup> In a study from Norway, the authors reported that the mean age was 37, and the 15–40 age group was the highest risk group with a 52% frequency.<sup>11</sup> In Spain, in the

report of Garcia-Reneses *et al*<sup>14</sup> the average age was 41.8 and a high incidence was found between 20–30 years of age. Comparing our findings with those in the literature, we found that there was a younger age group constituting the highest risk group for SCI (15–18).

In the distribution of frequency according to profession in our patients the highest was in housewives, followed by agricultural workers and private industry workers. The agricultural workers' wives group stands out among the different groups as the one where people are most exposed to the possibility of a spinal cord injury. Minaire *et al*<sup>12</sup> reported that the commonest group was farmers with a 30.5% incidence, the private sector being second with 27.7%. Similar surveys carried out in France, Burma and our country draws attention to the fact that agricultural workers and private industry workers are the groups most exposed to spinal cord injuries.

The frequency distribution of spinal cord injuries according to year in our survey shows that the 1978–79, 1976–77 and 1980–81 periods were the top 3. Although no characteristic feature is seen in the distribution of other trauma types according to year, the frequency of high velocity bullet wounds between 1976–81 was greatly decreased in 1980 and 1981. This was due to the military curfew and security measures taken during these years. Only traffic accidents and falls show a difference according to months; July, June and August take the first 3 places, then May and September. Increase in tourism during these months can be regarded as the reason for these differences. Falls from trees, which make up the majority of falls for heights, are most common during July, August and September, the reason being the increase in agricultural work during this period.

In our survey of 1694 patients, the leading cause of trauma was traffic accidents with a 35.41% frequency, being followed by falls from heights with 29.51% and bullet wounds with 21.95%. The most frequent causes of trauma were falls and traffic accidents for agricultural workers; falls and traffic accidents for state employed workers; traffic accidents and gunshot injuries for civil servants; traffic accidents and falls for

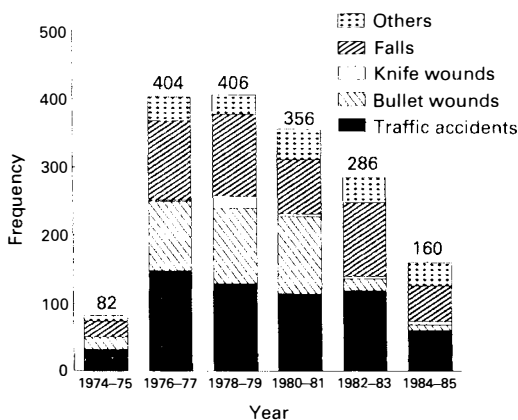


Figure 5 Type of trauma each year.

private industry workers; gunshot injuries and traffic accidents for students; and falls and traffic accidents for housewives. In the study from Nigeria traffic accidents were the leading cause with a 75% frequency, followed by falls from heights with 23%.<sup>10</sup> In Spain traffic accidents are the commonest cause of trauma, falls being next in frequency.<sup>14</sup> In France, traffic accidents are also the leading cause (50.7%), followed by falls from a height (31.5%) and bullet wounds (2.0%).<sup>13</sup> These ratios are 48.7% for traffic accidents, 26.6% for falls, 5.8% for gunshot injuries in Australia;<sup>12</sup> 46.8% for traffic accidents, 25.7% for falls, 0% for gunshot injuries in England; and 42.8%, 19.2% for falls and 12.3% for gunshot injuries in America.<sup>7,12,15,16,17</sup> According to the study from Burma, falls take priority with a 70% frequency, the second is traffic accidents with 14% and 3% for gunshot injuries.<sup>18</sup> Traffic accidents and falls are the commonest cause of spinal cord trauma in the literature and in our patients. However, the ratio of gunshot injuries is higher than in other countries. This is the result of anarchy and terrorism in our country pre 1980, and is evident in the trauma aetiology according to the year of occurrence.

The distribution of our patients with a SCI according to the clinical presentation are 8.1% complete and incomplete quadriplegia, and 91.9% complete and incomplete paraplegia. According to the studies of Minaire *et al*<sup>12,13</sup> these ratios are 30.8%–

33.2% for quadriplegia and 69.2%–66.8% for paraplegia. According to the study of Richardson and Meyer<sup>8</sup> in 1981 in America these ratios were 49.0% and 51.0% and according to the studies from Nigeria and South Africa, the ratios given were 11.1%–89.9% and 23.0%–77.0% respectively.<sup>10,19</sup> It is obvious that spinal cord trauma in the cervical region is seen less frequently. This ratio in our country is lower than is reported in other countries. Among spinal traumatic and non traumatic cord injuries, traumatic aetiology was found to cause the highest death rate during the first weeks, especially among those with high cervical lesions.<sup>14</sup> Complete lesions (89.96%) were more likely than incomplete lesions to have a fatal outcome. Complete/incomplete is 8/1 in Nigeria<sup>10</sup> and 1/1 in Norway<sup>11</sup> and America.<sup>7</sup> In our country and in Nigeria this ratio is high and shows that in developing countries emergency and first aid service and post-traumatic care is not sufficient. In addition delayed arrival at the centre and inadequate primary treatment are important factors in the low incidence of tetraplegics admitted to our centre.

We believe that many types of injuries especially traffic accidents can be prevented. A series of socioeconomic measures, including primarily mass education will have beneficial results. In addition, we consider it necessary to apply more effective preventive measures to reduce the number of traffic and industrial accidents.

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