

Prevalence of Spinal Cord Disorders in Al-Quseir City, Red Sea Governorate, Egypt

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Key Words

Prevalence · Spinal cord disease · Survey

Abstract

The knowledge of the prevalence of spinal cord disorders (SCD) is important to understand specific causes in each part of the world and to allow to potentially adapt health care and public policy including law enforcement to the main causes. SCD have important personal, biopsychological, socio-economic, short-term and long-term consequences. An SCD is the underlying cause for 1 of every 40 patients admitted to a major trauma centre. The affected population consists primarily of young male adults. The aim of the present study was to determine the prevalence and cause of SCD in Al-Quseir City, using a door-to-door method. The total of inhabitants was 33,285 in Al-Quseir City screened by 3 specialists of neurology. Suspected cases were subjected to full clinical assessment and MRI or CT of the spine. The prevalence rate of SCD was 63/100,000 for the total population. Traumatic spinal cord injury had a prevalence of 18/100,000, while non-traumatic SCD was found in 45/100,000. Degenerative cervical disc prolapse was the most common aetiology of SCD with a prevalence rate of 27/100,000.

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Introduction

Spinal cord injury (SCI) is a devastating neurological injury, resulting in varying degrees of paralysis, sensory loss and sphincter disturbances which are permanent and irreversible in some cases [1]. There are no established national trauma or SCI registries in the developing countries. Similarly there is no population-based data on SCI available from the majority of the developing countries. This is complicated by the fact that medical record keeping is poorly managed in most of the hospitals [2].

The National Spinal Cord Injury Statistical Centre database estimated the number of people in the USA who had SCI in 2010 to be approximately 265,000 with a range from 232,000 to 316,000 [3].

In Canada, the incidence estimate for SCI is 3.5 per 100,000 per year, which works out to about 900 Canadians experiencing an SCI per year. The estimated global incidence of SCI is between 1.04 and 8.3 per 100,000 per year when individuals who died before hospital admission were excluded [4–6].

Non-traumatic SCI is not as well studied as traumatic SCI; however, the consequences can be serious and costly. The incidence of non-traumatic SCI has been estimated to be 8 per 100,000 population per year in the

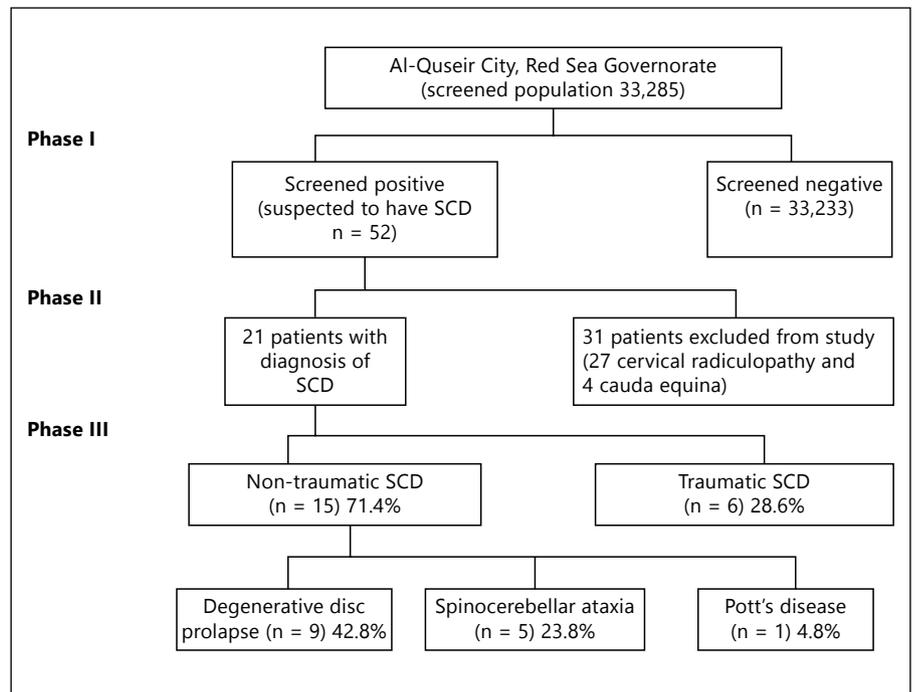


Fig. 1. Flow chart for screening and diagnosis of SCD.

USA [7], but it is difficult to quantify the actual incidence because NT-SCI are not tracked. It has been estimated that approximately 80% of those older than 40 years with an SCI have a non-traumatic SCI [8]. The aim of the current study was to determine the prevalence and the aetiology of spinal cord disorders (SCD) among the population of Al-Quseir City, Red Sea Governorate, Egypt.

Population and Methods

The present work is a population-based door-to-door study among the population of Al-Quseir City, Red Sea Governorate. The study was conducted during the period from July 1, 2009, to January 31, 2012. The sampling unit was all persons, of nuclear families or extended families, at any age in a door-to-door survey (fig. 1).

The study area Al-Quseir City is a representative of cities lying on the Red Sea. Al-Quseir City is the second city in the Red Sea Governorate as regards population numbers and has a very long military and commercial history in Upper Egypt. Al-Quseir City lies in the western part of the Red Sea Governorate [9].

The total population of Al-Quseir City was 42,000 persons; out of them 35,000 are living actually in Al-Quseir City and 7,000 persons are temporarily working there (seasonal workers). The actual population number of Al-Quseir City (at the time of the study) was 33,818 subjects; out of them 33,285 (98.4%) accepted to participate in the study while the remaining 533 (1.6%) refused (workers who travel abroad for long duration, i.e. more than 2 years, excluded

from the study). Subjects were reached at their homes; if they were not at there at the time of the first visit, they were revisited at a later time (capture-recapture method).

The high participation rate was obtained by the following measures:

- (1) regular meetings with the community leaders in Al-Quseir City before launching this study and regularly throughout;
- (2) the inclusion of 15 female social workers (recruited from local inhabitants) to be part of the screening team of the study encouraged participation of most households; they collected demographic data of the included subjects;
- (3) the cooperation and continuous communication with the doctors of Al-Quseir General Hospital was of the utmost value in minimizing the refusal rate.

Ethics

Informed written consent was obtained from each patient according to the ethical committee of Assiut University, and consent was obtained from the Ministry of Health for the whole project at the Red Sea Governorate.

Methods

This study was conducted through 3 stages as described below.

Phase I (Screening Phase). Data collection was performed by 3 qualified neurologists, by a standardized screening questionnaire [10] to pick up any suspected cases of SCD. Members of each family were reached at their home by a team including 3 neurologists and 3 accompanying social workers. The duration of each visit was around 1–2 h (to be enough to have demographic data and to apply the screening questionnaire for neurological disorders).

Phase II (Diagnostic Phase). In phase II, all subjects who were suspected to have SCD were invited to attend at Al-Quseir Gen-

eral Hospital where they were fully evaluated by 3 specialists of neurology, each one separately. All data for each patient was registered in a specialized sheet prepared specifically for this study.

The patients were classified according to the ASIA Impairment Scale [11].

Phase III (Investigatory Phase). Radiological investigations (CT and or MRI of the spine) were carried out for all patients at Safaga City and Luxor Governorate. Any other needed investigations were done according to each case, i.e. any needed investigations for the diagnosis of the underlying aetiology were done e.g. for patients with Pott's disease; tuberculin tests, sputum cytology and PCR were also done.

Statistical analysis was done using ANOVA. The χ^2 test was used to illustrate the relations or comparisons in nominal data. A p value less than 0.05 was considered significant.

Statistical analysis was done using SPSS version 13. Mean and standard deviation were calculated.

Results

The overall population involved in this study was 33,285 subjects, 16,428 (49.4%) were males and 16,857 (50.6%) were females. The age distribution of the studied sample was 75.3% less than 40 years, out of them 36.3% less than 18 years and only 24.7% older than 40 years (18.3% for the age group 40 to less than 60 years and 6.4% for ≥ 60 years).

Number, frequency and prevalence of spinal cord disorders for both sexes in Al-Quseir City, Egypt, are given in table 1.

Aetiological classification and prevalence of patients with SCD in Al-Quseir City are given in table 2.

The classification of patients with traumatic SCI according to the ASIA Impairment Scale is given in table 3.

The mean age for different aetiologies of SCD is given in table 4.

The classification of patients with traumatic SCI according to age groups is given in table 5.

The classification of patients with focal spinal cord lesions according to the level of the lesion is given in table 6.

Discussion

This is the first Egyptian investigation that was conducted as a door-to-door study and involved all inhabitants (n = 33,285) to evaluate SCD.

Because of the high participation rate (>98.4%) of the population in this study and the small number of drop-outs due to death or refusal to complete the study, the observed prevalence rate of SCD could be judged as very close to the real prevalence rate in this locality.

Table 1. Number, frequency and prevalence of SCD for both sexes in Al-Quseir City, Egypt

Variable	Traumatic		Non-traumatic		Total		Prevalence n/100,000
	n	%	n	%	n	%	
Male	5	83.3	12	80	17	81	103.48
Female	1	16.7	3	20	4	19	23.73
Total	6	100	15	100	21	100	63

Table 2. Aetiological classification and prevalence of patients with SCD in Al-Quseir City, Egypt

Aetiology	Number n	Percent	Prevalence n/100,000
Traumatic	6	28.6	18
Non-traumatic	15	71.4	45
Focal			
Degenerative disc prolapse (with focal spinal manifestations)	9	42.8	27
Pott's disease	1	4.8	3
Systemic			
Spinocerebellar ataxia	5	23.8	15

Table 3. Classification of patients with traumatic SCI according to the ASIA Impairment Scale

Degree	Number	Percent
A	1	16.7
B	0	0.0
C	1	16.7
D	4	66.7

A = Complete, i.e. no motor or sensory function is preserved in the sacral segments S₄-S₅; B = incomplete, i.e. sensory but not motor function is preserved below the neurological level and includes the sacral segments S₄-S₅; C = incomplete, i.e. motor function is preserved below the neurological level, and more than half of the key muscles below the neurological level have a muscle power grade less than 3; D = incomplete, i.e. motor function is preserved below the neurological level, and at least half of the key muscles below the neurological level have a muscle power grade of 3 or more.

The estimated prevalence rate of all types of SCD recorded in this study was 63/100,000 for the total population. The prevalence rate of traumatic SCI was 18/100,000 while that of non-traumatic SCD was 45/100,000 for the total population.

Table 4. The mean age for different aetiologies of SCD

Aetiology	Mean age \pm SD years
Traumatic (n = 6)	40 \pm 16
Non-traumatic (n = 15)	37 \pm 19
Degenerative cervical disc prolapse (with focal spinal manifestation; n =9)	46 \pm 10
Spinocerebellar ataxia (n = 5)	15 \pm 7
Pott's disease (n = 1)	64

Table 5. Classification of patients with traumatic SCI according to age groups

Age groups	Number of patients/ number of population	Prevalence n/100,000
<20 years	6/13,438	44.7
20–39 years	4/11,664	34.3
40–59 years	8/6,077	131.6
\geq 60 years	3/2,106	142.5

Table 6. Classification of patients with focal spinal cord lesion according to the level of the lesion

Level	Total		Traumatic		Non-traumatic	
	n	%	n	%	n	%
Cervical	12	57	3	50	9	60
Dorsal	2	9.5	1	16.7	1	6.7
Lumbar	2	9.5	2	33.3	0	0
Total	16	76	6	100	10	66.7

The results of this study are slightly lower than that of Dahlberg et al. [12] in Helsinki, who reported that the prevalence rate of traumatic SCI was 28/100,000, and of Hagen et al. [13] in Western Norway, who reported that the prevalence rate of traumatic SCI was 36.5/100,000, and they are much lower than the results of the National Center for Injury Prevention and Control that estimated 200,000 inhabitants of the USA to have an SCI in 2001, with a prevalence rate of 70/100,000 population [14], and those of O'Connor [15] in Australia, who reported that the prevalence rate of SCI was 68.1/100,000 inhabitants.

The low prevalence rate of traumatic SCI in the current study may be due to the fact that most traffic injuries are moderate to severe with a high mortality rate in addition to a lack of medical service in Al-Quseir City.

Hagen et al. [16] reported that the variations between the countries might partly be explained by reference to different causal patterns, although the availability of treatment, geographical and financial aspects may have contributed to a general underreporting of traumatic SCI in a number of countries. Because of socio-economic conditions and severity of the lesions, patients with cervical injuries will have reduced chances of reaching a hospital alive in many countries.

In Australia, New et al. [17] reported that the total population prevalence rate of non-traumatic SCD was 36.72/100,000. The prevalence rate was higher among males (19.78/100,000) than females (16.91/100,000).

In this study, degenerative cervical disc prolapse (with focal spinal manifestations) was the commonest cause of non-traumatic SCD with a prevalence rate of 27/100,000 followed by spinocerebellar ataxia with a prevalence rate of 15/100,000. These results are in agreement with Moore and Bloomhardt [18], who reported that, in the UK, the most common cause of spastic paraparesis or quadriplegia was cervical spondylotic myelopathy, followed by tumour, multiple sclerosis and motor neuron disease, while Chaurasia et al. [19] in India reported that tuberculosis was the commonest cause of compression paraplegia and the second commonest cause was cervical spondylosis. The prevalence of hereditary spinocerebellar ataxia in south-east Norway was estimated to be 6.5/100,000 population [20] which is less than that reported in the current study. That could be explained by the higher rate of consanguineous marriage in the locality of our study which in turn increases the susceptibility to hereditary troubles.

In this study the prevalence of SCD was higher among males (83.3%) than females (16.7%), with a male:female ratio of 5:1. These results were in agreement with previous studies in developed countries like that of Cripps [21] in Australia, who reported that traumatic SCI were more frequent among males (83%) than females (17%), with a male:female ratio of 5:2, and Hagen et al. [13] in Norway, with a male:female ratio of 4.7:1, Wyndaele and Wyndaele [4], who reported that the male:female ratio was 2.5–5.8:1, and Lenehan et al. [22] in Canada, with a male:female ratio of 4.4:1. In developing countries nearly similar results were reported like those of Ning et al. [23] in China with a male:female ratio of 5.63:1, Gosselin and Coppotelli [24] in Sierra Leone and Solagberu [25] in Nigeria, who reported male:female ratios of 11–12:1; in contrast, Yang et al. [26] in Taiwan and Rahimi-Movaghar et al. [27] in Iran reported that SCI occur with equal frequency among both genders. This gender difference in the prevalence of SCD is related to the culture of the various communities and the

nature of occupations. In Egypt males are more liable to trauma than females due to occupational trends, and these results were in agreement with many studies worldwide.

The mean age for traumatic SCI was 40 ± 16 years and that for non-traumatic SCD was 37 ± 19 years (the mean age of the Al-Quseir population was 26.7 ± 18.3 years). Cosar et al. [28] reported that the mean age for traumatic SCI was 37.81 ± 13.65 years and that for non-traumatic SCD was 53.97 ± 14.48 years. De Vivo and Chen [29] reported that the mean age of patients with traumatic SCI alive in December 2008 who were enrolled in the combined US data set was 45.4 years, compared to 40.2 years for persons alive in 2000. In the USA, Jackson et al. [30] reported that between 1973 and 1979, the average age of SCI was 28.7 years, with most of the injuries occurring between the ages of 16 and 30 years. The increased prevalence of injuries amongst those aged 35–41 years could be explained by the fact that this age group is most active and travels most, and these results were in agreement with many previous studies worldwide.

As regards the level of the lesion, the study showed that the cervical level was recorded in 50% of patients. These results were in agreement with Cripps [21] in Australia, who reported that half of the cases of traumatic SCI were at the cervical level, and with Burke et al. [31], who reported that 49.7% of SCI were cervical and 50.3% were thoracic and lumbar. In the USA, 55.7% of new injuries enrolled in the combined US data set since 2000 were cervical injuries [14].

In Finland, the proportion of cervical injuries increased from 48 to 57% over a 30-year period between 1976 and 2005 [32].

As regards the severity of injury, this study showed that the majority of the patients had incomplete quadriplegia or paraparesis (group D) according to the ASIA Impairment Scale. In Australia, Cripps [21] reported that the most common neurological category was incomplete tetraplegia, followed by incomplete paraplegia and complete paraplegia. In Australia, in 2007–2008, a greater proportion of incomplete SCI cases were recorded (65%) [33]. Similar results have been found in Europe [12], although this differs from the USA where reports describe greater proportions of complete SCI cases, associated with a higher proportion of penetrating gunshot injuries [30].

Conclusion

The prevalence rate of SCD was 63/100,000 for the Al-Quseir population; it was higher among males (103.48/100,000) than females (23.73/100,000). The commonest cause for non-traumatic SCD was degenerative cervical disc prolapse. Those results will help the local health authorities in this locality to detect the true extent of this health problem and prepare facilities to face it successfully.

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