ORIGINAL PAPER

A study of the spinal cord injured population of the Chios island of Greece

Ioannis Koutsodontis, BSc, MSc, RN, **Chios General Hospital, Chios, Greece**

Maria Lavdaniti, BSc, MSc, PhD, RN, **Clinical Professor, Nursing Department, Alexander Technological Educational Institution of Thessaloniki, Greece**

Despina Sapountzi-Krepia, BSc, MSc, PhD, RN, RHV,
Professor, Nursing Department, Frederick University, Nicosia, Cyprus
Professor Emeritus, Alexander Technological Educational Institution of Thessaloniki, Greece

Georgios Giaglis, MD, MSc, PhD
Neurologist, 2nd Neurology Department, AHEPA University Hospital, Thessaloniki, Greece

Spyros G. Fountoukis, BSc, MSc, PhD
Department of Informatics with Applications in Biomedicine, University of Central Greece

Andreas Pavlakis, PhD
Open University of Cyprus, Faculty of Humanities, Health Care Management, Nicosia, Cyprus.

Maria Psychogiou, BSc, MSc, PhD (c), RN, RHV
Researcher, Department of Nursing Sciences, University of Eastern Finland, Kuopio, Finland

Ismini Serpanou, BSc, PT, **Private Primary Care Practice, Athens, Greece**

Markos Sgantzos MD, PhD, **Physiatrist, Assistant Professor of Anatomy, Medical School, University of Thessaly, Larissa, Greece**

Corresponding Author: Despina Sapountzi-Krepia. Nursing Department, Frederick University, Cyprus, Address: 7 Y. Frederickou Street, Pallouriotisa, Nicosia 1036, Cyprus. E-mail address: desapoun@yahoo.com

Abstract

Objective: The objective of this study was to explore the epidemiological profile of the spinal cord injured population living on the Greek island Chios.
Methods: We interviewed the regional spinal cord injured population. Participants were recruited from the island's capital and its 52 villages. The target population was all the SCI individuals living on Chios Island (n=38), out of which 34 (response rate was 89%) patients were interviewed in their homes using an especially designed questionnaire.
Results: The mean age of the subjects at the time of the injury was 43 and the majority (n=23, 67.6%) were male. The employment status of the participants changed after the injury from 64.7% (n=22) to 32.4% (n=11). Traffic accidents were the cause of the SCI for 44.8%, with a significant difference from the other causes of injury ($p<0.004$). The most common level of injury was thoracic-lumbar (23.5%, n=8). The duration of hospitalization was on average 4.6 ± 3.9 months followed by treatment in rehabilitation centres. Most participants faced secondary complications which correlated significantly with age ($r=0.372$ $p=0.03$).
Conclusions: The findings revealed that traffic accidents were the main reason for SCI. More research is needed on SCIs in Greece and the development of a surveillance system for SCIs is suggested.

Key Words: Spinal Cord Injuries, Epidemiology, Public Health, Greece

Introduction

Spinal cord injuries (SCI) are devastating traumas and are considered as one of the most traumatic type of afflictions a person can endure. Severe changes that occur due to the injury affect the injured person and his/her family, who are asked to cope with the new

situation. SCI frequently results in a disabling condition that has a major medical and financial impact on the individual and on his/her psychosocial well-being and quality of life (Couris et al 2010).

SCIs due to traffic accidents, which occur primarily in young males, are thought by many authors to be the main aetiology of the injury (Sapountzi-Krepia et al 1998, Wyndaele & Wyndaele 2006, Rahimi 2009, Pirouzmad 2010). However, there are also studies reporting falls as the first cause of SCI (Hagen et al 2010, Couris et al 2010).

SCI individuals encounter many health problems related to SCI such as urinary tract infections, decubitus ulcers and neurogenic-type pain (van loo MA et al 2010, Saikkonnen et al 2004).

A recent study which estimated SCI incidence and evaluated the epidemiological profile of the population with SCI in the Thessaloniki region of Greece found that the annual crude incidence was 33.6 per million for the Thessaloniki area and the leading cause of injury was transportation accidents (51%) (Divanoglou & Levi 2009).

The present paper presents the findings of a study which investigated the epidemiological profile of the SCI individuals who live on the Greek island Chios. Chios is situated in the north-east Aegean Sea; it extends 842 square kilometres and has a population of about 54.000 people.

Chios island has spinal cord injured inhabitants although it is a small geographic area and has a relatively low number of inhabitants. This fact combined with the observation that there are a few population–based studies about spinal cord injuries in Greece lead the researchers to investigate the spinal cord injuries in this island.

Material and Methods

Participants

The target population were SCI individuals who live on the Greek island Chios. Data collection was carried out from December 2008 to June 2009. The inclusion criteria were: 1) traumatic spinal cord injury, 2) 18 years of age or older, and 3) at least one year post-injury.

In order to reach potential subjects the researchers went in each one of the 52 villages of the island and arranged meetings with the teachers, the priest, the local authorities and the local doctor for gathering information. In the capital of the island contacts were established with the associations of Disabled People, the social security organisations, the health services and the hospital as well as with the Lawyer's Association (lawyers observe files of road accidents that are heard in court). A search was also done in the file of the branch of the National Center of Emergency Services of the island which is responsible for the discharge of spinal cord injured people by airplane to Athens, Greece. After collecting the required information, we determined that the target population consisted of 38 SCI individuals who were later approached by the researchers.

Ethical Issues

One of the researchers contacted the 38 potential subjects in order to determine their willingness to participate in the study. The purpose of the study was described to potential subjects, they were assured that their participation was confidential, and it was stressed to them that their participation was voluntary. Four individuals refused to participate for personal reasons. For the remaining 34 (response rate 89%) convenient times for the interviews were arranged. Subjects were individually interviewed in their homes using a questionnaire. The participants who agreed to participate were asked to provide informed consent.

The questionnaire

The instrument for data collection was a questionnaire especially designed for this study. The questionnaire's development was based on an extensive review of the pertinent literature and the advice of a panel of experts. The first twelve questions were eliciting information on demographics and employment characteristics as well as on the participants' daily activities. The next twenty questions were eliciting information about the cause of the spinal cord injury, hospitalization, rehabilitation, follow-up, complications, medications and home care. Content-related validity of the questionnaire was obtained from experts who were called to review the questionnaire after which the questionnaire was revised in accordance with

their suggestions. The Cronbach's of the scale was 0.90.

Data analysis

The Statistical Package for Social Sciences (SPSS, version 16.0) was used to analyze the data. Quantitative variables are presented with mean and standard deviation, while qualitative with percentages. Furthermore the t- Student test, ANOVA Spearman rho test, Pearson's χ^2, Pearson correlation, McNemar and Mann-Whitney tests were used for data analysis. Statistical significance was set at 0.05.

Results

Table 1 shows the demographic and social characteristics of the subjects. The majority of the participants were men (n=23, 67.2%, χ^2=4.235, p=0.04) with a mean age of 43 years old at the time of injury and 51.5 years old at the time of the data collection. There was no significant difference regarding age between male and female subjects.

Eleven (32.4%) of the participants were married. At the time of the study only 32.4% (n=11) were working, 7 of them in the public sector (20.6%). Before the injury the percentage of working participants was 64.7% (n=22). This difference in occupational status is statistically significant (McNemar test p=0.003).

Daily life activities such as smoking, drinking alcohol and driving before and after the spinal cord injury are presented in Table 2.

The majority of the participants smoke (n=18, 52.9%), usually >40 cigarettes (n=8, 23.5%) and about a third of them drink 3 glasses of alcohol per day (n=10, 29.4%).

There was a significant difference between the population that drank daily and those who didn't (x^2 =19.882, p<0.001) and between the occurrence of driving before and after the injury (Mc Nemar Test p<0.001).

Table 3 presents information about the spinal cord injury. The most common age-group was the group of 30-39 that is statistically different from other age-groups (x^2=12.941, p=0.044).

The most common cause of injury was road traffic accidents (n=15, 44.8%) that occurred occurred in an automobile (53.3%) or motorbike (40%).

Table 1: Demographic characteristics of the sample

	N	%
Gender		
Male	23	67,60
Female	11	32,40
Age		
20-29	4	11,80
30-39	4	11,80
40-49	10	29,40
50-59	4	11,80
60-69	6	17,60
>70	6	17,60
Marital status		
Married	11	32,40
Unmarried	8	23,50
Divorced/separated	7	20,60
Widowed	8	23,50
Profession at data collection		
Public servant	7	20,60
Private employee	4	11,80
Unemployed	23	67,60
Education		
Primary	6	17,60
Secondary (gymnasium)	7	20,60
Secondary (lyceum)	5	17,40
Vocational School	2	5,90
Technological Educational Institute	5	17,40
University	5	17,40
Master	2	5,90
Doctorate	2	5,90
Do you work before the injury		
Yes	22	64,7
No	12	35,3
Do you work after the injury		
Yes	11	32,40
No	23	67,60

Road traffic accidents have a significant difference from other causes of injury (x^2 =15.412 p<0.004). The most common levels of injury in spinal cord are thoracic-lumbar (23.5%, n=8) and thoracic (20.6%, n=7).

The mean length of hospitalization was 4.6 ± 3.9 months. There was a statistically significant correlation between road traffic accidents and duration of hospitalization [F(2.19)=7.362, p= 0.004], which on average was 7.6 ± 3.7 months.

Seventy five per cent (75%) of the participants were hospitalized in intensive care unit with mean length of stay 3.3 ± 2.7 months.

Table 2. Daily life activities

	N	%
Smoking		
Yes	18	52.9
No	16	47.10
How many cigarettes		
1-10	1	2.,90
11-20	1	2.90
20-40	8	23.50
>40	8	23.50
Do you drink alcohol		
Yes	30	88.20
No	4	11.80
If yes how many		
1 glass every day	9	26.,50
2 glasses every day	7	20.60
3 glasses every day	10	29.40
>4 glasses every day	4	11.80
Do you drive before the injury		
Yes	27	79.40
No	7	20.60
If yes what kind of vehicle do you drive		
Car	18	52.9
Motorbike	9	26.5
Do you drive after the injury		
Yes	6	17.6
No	28	82.4

The duration of hospitalisation in intensive care unit was correlated with the hospitalisation in the hospital (r = 0.5, p= 0.016). The road traffic accidents had higher time of hospitalization in intensive care unit, on average 4.3 ± 2.9 months, but this is not significant. After the end of hospitalization, 79.4% (n= 27) a rehabilitation programme followed in specialised centres (n=15 in Greece and n=12 abroad). The mean length of stay in a rehabilitation centre was 10.5±6.9 months. The patients that had higher level of injury needed higher time of rehabilitation (*r*= -0.616, *p*= 0.001).

The participants' most common problems were constipation (82.4%), urinary tract infections (76.5%), headaches (70.6%) and respiratory infections (61.8%). These problems correlated significantly with age (spearman r=0.372, p=0.03). Table 4 presents the participants' medical status at the time of the study.

Table 3: information about spinal cord injury

	N	%
What age happened the injury		
0-19	1	2.94
20-29	6	17.,65
30-39	11	32.35
40-49	5	14.71
50-59	4	11.76
60-69	5	14.71
The spinal cord injury was from		
Road accident	15	44.80
Work related accident	6	17.60
Tumor	5	14.70
Ischemia	1	2.90
Other cause	7	20.60
Level of spinal cord injury		
Cervical	3	8.80
Cervical –Thoracic	2	5.90
Thoracic	7	20.60
Thoracic -Lumbar	8	23.50
Lumbar	5	14.70
Lumbar –sacral	5	14.70
Sacral	4	11.80

Table 4. Medical status of patients

Health problems	N	%
Bedsores	15	44.10
Constipation	28	82.40
Urinary tract infections	26	76.50
Respiratory infections	21	61.80
Vertigo	14	41.20
Chronic vihas	9	26.50
Dispnoea	15	44.10
Cardiovascular	15	44.10
Headaches	24	70.60
Medications		
Analgetics	23	67.60
Anticoagulation	26	82.40
Antidepressants	22	64.70
Antibiotics	21	61.80
Cortisone	11	32.40
Opiods	12	35.30
Chemotherapy	5	14.70
Follow-up by doctors		
Psychiatric	21	61.80
Medical	29	85.30
orthopedic	14	41.20
oyrologist	15	44.10
Neurologist	18	52.90
Surgeon	13	38.20
Gastrenterologist	13	38.20

The most common medications used by the participants were anticoagulants (n=26, 82.4%), analgesics (n=23, 67.6%) and antidepressants (n=22, 64.7%). The vast majority of the participants (94.1%, n=32) received home care from nurses, physiotherapists, psychologists or practical help related to home cleaning/cooking. The most commonly received care was care from nurses.

The male subjects received significantly more care at home compared to the care received by women (t=2.077, p= 0.046). One third of the participants never leave their home, twenty one (61.8%) use wheelchair and seven (20.6%) ambulate with assistive devices.

Discussion

The participants' mean age at the time of spinal cord injury was 43 years. This is consistent with other Greek studies (Sapountzi-Krepia et al 1998, Divanoglou et al 2009) but it is in contrast with a worldwide literature survey which stated that the mean age of patients sustaining their injury is 33 years old (Wyndalee & Wyndaele 2006).

The majority of the participants were men and this is a similar finding with other studies (Sapountzi-Krepia et al 1998, Divanoglou 2009, Wyndalee & Wyndaele 2006). The subjects' occupational status changed after the injury and an increase was noted in the participants who became unemployed. This is in consistence with the finding of an earlier Greek study (Sapountzi-Krepia et al 1998).

The most common cause of injury was "road traffic accidents". This finding is similar with other studies (Sapountzi-Krepia et al 1998, Divanoglou 2009, Rahimi et al 2009, Pizourad 2010). It is worthwhile to note that Greece has one of the highest rates of accidental vehicular death in the European Union (Markogianakis et al 2006). The finding that the road accidents were primarily caused by automobiles is not surprising, because according to the National Statistical Service of Greece, the prefecture of Chios has the third highest ratio of automobiles to population in the country.

Regarding the level of SCI, our results contrasted with other studies (Hagen et al 2010, Couris et al 2010, Rahimi 2009). This difference may be explained by the fact that the other studies have different methodological design and studied larger populations. Also, in some studies the leading cause of injury was falls (Couris et al 2010, Hagen et al 2010), so the level of injury is potentially different. Nevertheless, further research is needed in Greece in order to more precisely determine the level and other characteristics of spinal cord injury.

The mean time of hospitalization was higher in our study compared with the mean length of stay in acute care published by Couris et al. (2010). This difference is explained by the different leading cause of SCI between the two studies. Also, the two countries have different health care systems and in Greece a longer length of stay in hospital is encouraged. In addition, the significant correlation between road traffic accidents and duration of hospitalization is explained by the fact that usually automobile occupants sustain more severe injuries (Markogianakis et al 2006) and therefore need longer hospitalization.

The length of stay in rehabilitation center is longer than is reported in other studies (Paggliacci et al 2003, Tooth et al 2003). Differences could be attributed to different study designs as well as different sample sizes and sample characteristics. The present study did not assess time from the event to admission to rehabilitation centre, whereas Pagliacci et al reported a period of 34 to 64 days. Moreover, the latter study included more subjects with traumatic SCIs. More research is needed in Greece that focuses on assessment of length of stay considering different kinds of spinal cord impairment/injury. The correlation between the level of injury and the length of hospitalization is similar with the finding of Tooth et al. that reported the median rehabilitation length of stay differed by the kind of impairment.

The secondary health problems in this study are primarily constipation, urinary tract infections, and headache. This finding is in contrast with the study of Saikkonnen et al, which found that the most common secondary problems were urinary tract infections, decubitus ulcers and neurogenic-type pain (2004). A possible explanation for this difference is what Krause et al. (2010) stated "secondary health conditions are less directly

tied to SCI, the probability of occurrence varies among individuals, even those with similar types and severity of injury." Furthermore, the finding that age was significantly correlated with the medical health problems is similar with the finding of Krause et al (2010).

Limitations of the study

There are some limitations to this study. First of all, our data provided limited clinical information and did not permit description of the severity of the injury and further correlation between severity and other characteristics of the sample. Secondly, our study includes a small number of cases thereby limiting the ability to generalize the findings to the entire Greek population.

Conclusions

Studies providing information on the epidemiological profile of SCI individuals in Greece are scarce. This study presents recent data and highlights that the main reason for SCI was "road–traffic accidents". More research is required to determine the patterns and other clinical characteristics of the SCI in Greece. The development of a surveillance system is suggested in order to capture a full epidemiological profile of the Greek SCI population followed by a program of appropriate preventive interventions to confront and more fully address this health problem.

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