Epilepsy & Behavior 41 (2014) 179–182

Contents lists available at ScienceDirect

Epilepsy & Behavior

journal homepage: www.elsevier.com/locate/yebeh

Disobedience and driving in patients with epilepsy in Greece

Panagiotis Zis [a,*], Anna Siatouni [b], Vassilios K. Kimiskidis [c], Anastasia Verentzioti [b], Georgios Kefalonitis [a], Nikolaos Triantafyllou [d], Stylianos Gatzonis [b]

[a] Department of Neurology, Evangelismos Hospital, Athens, Greece
[b] 1st Department of Neurosurgery, Epilepsy Surgery Unit, University of Athens, Evangelismos Hospital, Athens, Greece
[c] Laboratory of Clinical Neurophysiology, AHEPA Hospital, Aristotle University of Thessaloniki, Thessaloniki, Greece
[d] 1st Department of Neurology, University of Athens, Eginition Hospital, Athens, Greece

ARTICLE INFO

Article history:
Received 19 August 2014
Revised 20 September 2014
Accepted 28 September 2014
Available online 26 October 2014

Keywords:
Driving
Epilepsy
Seizures
Safety
Risk
Employment
Male gender

ABSTRACT

Objective: Regulations and guidelines regarding driving privileges of patients with epilepsy vary greatly worldwide. The aim of our study was twofold: firstly, to evaluate disobedient drivers in Greece and to elucidate their awareness of the law, emotional responses, and seizure profile and, secondly, to identify determinants of disobedience regarding driving among patients with epilepsy.
Methods: All consecutive patients with epilepsy who visited the epilepsy outpatient clinic of two tertiary epilepsy centers were invited to participate in the study. One hundred ninety patients met our inclusion criteria.
Results: Fifty-two percent of our study population was aware of the driving restrictions. More than one out of three patients were disobedient (35.8%). Being a male was associated with a 6.07-fold increase in the odds of being disobedient (95% CI: 2.73–13.47, $p < 0.001$); being employed was associated with a 4.62-fold increase in the odds of being disobedient (95% CI: 2.20–9.68, $p < 0.001$); and each extra antiepileptic drug (AED) was associated with a decrease in the odds of disobedience by a factor of 0.41 (95% CI: 0.26–0.63, $p < 0.001$).
Conclusion: Male gender, employment, and number of AEDs are important determinants of disobedience regarding driving among patients with epilepsy.

1. Introduction

Regulations and guidelines regarding driving privileges of patients with epilepsy vary greatly worldwide [1,2]. Since 2012, Greece included the driving licensure standards as defined by the European Commission in the Greek legislation. The basic points include that (1) only patients who had received antiepileptic treatment in the past and after its discontinuation and for a period of 3 years are seizure-free can receive or renew a driving license and (2) only patients who still receive antiepileptic treatment and have been seizure-free for a period of 2 years and have a normal electroencephalogram (EEG) can receive or renew their driving license [3].

Before obtaining a driving license, each candidate for a driving license has to go through a medical examination by an independent committee, which includes an examination by a physician and an ophthalmologist. At this point, it is the candidate's responsibility to report any medical problems and all medications he/she may receive. Therefore, a history of epilepsy is self-reported, and the neurologist of individuals with epilepsy, apart from informing the patient of the law, cannot report patients to the relevant authorities. Unfortunately, until now, there are no reporting rules, even in the case that the neurologist finds out that one of his or her patients with epilepsy illegally drives. The only "safety net" is that the insurance companies only insure patients who are legally driving, and in case of an accident, they may have access to the medication regime of the driver (through a newly developed electronic database) and, subsequently, not cover the expenses if they find out that the patient was illegally driving.

Several studies worldwide have tried to capture the behavior of patients with epilepsy regarding driving, and, interestingly, results differ from country to country [4–9]. This may not only reflect the cultural differences but also highlights the necessity of investigating these behaviors in different countries in order to raise awareness.

In a recent study conducted in the USA, Tatum et al. used a 12-item questionnaire in order to identify illegal and disobedient driving practices among patients with epilepsy [4]. They found that, overall, a small number of patients with seizures were disobedient and illegally driving, and they suggested that a targeted approach to high-risk drivers with repeated verbal and supplemental driving information may help avoid unnecessary universal physician reporting for patients with seizures [4].

The aim of our study was twofold: firstly, using the same methodology as Tatum et al. [4], to evaluate disobedient drivers in Greece and to elucidate their awareness of the law, emotional responses, and seizure

* Corresponding author at: Evangelismos General Hospital, Department of Neurology, 45-47 Ipsilantou Street, 10676 Athens, Greece. Tel.: +30 697 4105446; fax: +30 213 2041403.
E-mail address: takiszis@gmail.com (P. Zis).

http://dx.doi.org/10.1016/j.yebeh.2014.09.079
1525-5050/

profile and, secondly, to identify determinants of disobedience regarding driving among patients with epilepsy.

2. Methods

2.1. Participants

All consecutive patients with epilepsy who visited the epilepsy outpatient clinics of two tertiary hospitals, the Evangelismos General Hospital in Athens and the AHEPA Hospital in Thessaloniki, were invited to participate in the study.

To be enrolled, the patients had to meet the following inclusion criteria: (1) having a confirmed diagnosis of any type of epilepsy according to the International League Against Epilepsy (ILAE) criteria [10,11], documented clinically and confirmed with EEG studies; (2) having age equal to or greater than 18 years; (3) having no gross cognitive deficits or intellectual disability; (4) being a native Greek speaker; and (5) being willing to provide written informed consent. Approval was gained from the local Research Ethics Committees to conduct the studies.

2.2. Procedures

An anonymous questionnaire was administered to all eligible candidates who were asked to return the completed questionnaires in a sealed envelope that was placed in a nontransparent empty box by the participant in order to ensure the anonymity of the questionnaire. As the participation in the study was voluntary, there was no interference in the study by anyone outside the team of researchers, which means that no pressure was applied to take part in the study.

We followed the same methodology that Tatum et al. used in their study in the USA [4]. Our questionnaire was divided into two parts. The first part included a survey that elicited the following demographic characteristics: age, gender, level of education, place of residence, marital status, professional status, and driving skills. The second part was an adapted version of the 12-item questionnaire that was used by Tatum et al. [4]. After obtaining the relevant permission from Professor Tatum, the original English version of the questionnaire was translated independently by two authors (AS and NV) into Greek. The two independent translations matched absolutely. The fifth author (GK), who is fluent in English and initially had no access to the original instrument, then back-translated the translated version into English. Pilot testing of the Greek version was implemented in 10 volunteer patients to ensure that participants would interpret each item as originally intended. No further adaptations were required. In summary, the questionnaire is designed to provide responses that would reflect information regarding medical, psychological, legal, and compliance issues. Six of these questions addressed the total number of lifetime seizures, time of last occurrence, emotional reaction to driving restriction, initial impulse to restricted driving, current driving lifestyle, and knowledge of the Greek regulation with respect to driving in a six-option multiple choice format. Six additional questions addressed attitudes toward compliance with the law, physician delivery of driving information, country of licensure and validity, number of antiepileptic drugs (AEDs) taken, and compliance with treatment in a yes–no or a write-in format.

Patients who were not driving, either having or not having a driving license, were considered to be obedient, while patients who were driving, either having or not having a driving license, were considered to be disobedient.

2.3. Statistical analyses

A database was developed using the Statistical Package for the Social Sciences (version 16.0 for Mac; SPSS). Frequencies and descriptive statistics were examined for each variable. Comparisons between obedient and disobedient patients were made using Student's t-tests for normally distributed continuous data, Mann–Whitney's U test for nonnormally distributed data, and chi-square test for categorical data.

Variables that showed either significant differences or trend for difference ($p < 0.10$) were entered into a logistic regression model to identify determinants of disobedience among patients with epilepsy. The variables were entered as independent variables, and disobedience was entered as the dependent variable.

The Wald statistical test was used to investigate the difference between the maximum likelihood estimates of the logistic regression of the parameters of interest compared with that of the null hypothesis assumptions.

A p-value of <0.05 was considered to be statistically significant.

3. Results

3.1. Study population

Between November 2013 and May 2014, 193 consecutive patients fulfilling inclusion criteria (1) to (4) were invited to participate in the study. Three patients did not provide written informed consent; thus, they were excluded. In total, 190 patients fulfilled all the abovementioned inclusion criteria. In total, 111 (58.4%) patients had a driving license. None of them had requested the special permission from the relevant authorities in order to make their license valid after being diagnosed with epilepsy. In total, 68 (35.8%) patients were driving and were considered disobedient, while 122 were not driving and were considered obedient regarding driving. Interestingly, 3 disobedient patients were driving despite the fact that they had never taken a driving license examination.

Table 1
Demographic and clinical characteristics of the total study population and the subgroups.

	Total (n = 190)	Disobedient patients (n = 68)	Obedient patients (n = 122)	p-Value
Demographic characteristics				
Male sex (%)	107 (56.3)	52 (76.5)	55 (45.1)	<0.001
Age, in years (SD)	37.7 (12.4)	38.2 (10.5)	37.4 (13.5)	0.685
Married (%)	12 (6.3)	5 (7.4)	7 (5.7)	0.661
Education level (%)				
Primary	18 (9.5)	4 (5.9)	14 (11.5)	
Secondary	98 (51.6)	30 (44.1)	68 (55.7)	0.052
Higher	74 (38.9)	34 (50)	40 (32.8)	
Employment status				
Paid employment	86 (45.3)	45 (66.2)	41 (33.6)	
Employed part-time (%)	19 (10.0)	7 (10.3)	12 (9.8)	
Employed full-time (%)	67 (35.3)	38 (55.9)	29 (23.8)	<0.001
Homemaker (%)	17 (8.9)	2 (2.9)	15 (12.3)	
Full-time student (%)	17 (8.9)	6 (8.8)	11 (9.0)	
Retired (%)	31 (16.3)	8 (11.8)	23 (18.9)	
Unemployed (%)	39 (20.5)	7 (10.3)	32 (26.2)	
Epilepsy-related characteristics				
Number of lifetime seizures (%)				
1	15 (7.9)	7 (10.3)	8 (6.6)	
<10	58 (30.5)	24 (35.3)	34 (27.9)	
10–20	29 (15.3)	12 (17.6)	17 (13.9)	
>20	32 (16.8)	13 (19.1)	19 (15.6)	0.181
>100	43 (22.6)	10 (14.7)	33 (27.0)	
Daily	13 (6.8)	2 (2.9)	11 (9.0)	
Time of last seizure				
Today	5 (2.6)	1 (1.5)	4 (3.3)	
This week	31 (16.3)	7 (10.3)	24 (19.7)	0.132
This month	31 (16.3)	7 (10.3)	24 (19.7)	
2–3 months ago	18 (9.5)	8 (11.8)	10 (8.2)	
4–6 months ago	19 (10.0)	7 (10.3)	12 (9.8)	
>1 year ago	86 (45.3)	38 (55.9)	48 (39.3)	
Number of AEDs (SD)	2.0 (0.9)	1.6 (0.7)	2.2 (1.0)	<0.001
Compliant with medication (%)	181 (95.3)	66 (97.1)	115 (94.3)	0.384