



Epilepsy and driving: Local experience from Saudi Arabia

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ABSTRACT

Introduction: The issue of epilepsy and driving has legal, social, and psychological implications. Many countries in the world restrict driving to people prone to epilepsy. There is no data from Saudi Arabia regarding the prevalence of driving among patients with epilepsy and their driving practices. In addition, to the best of our knowledge, there are no local laws or guidelines concerning driving for patients with epilepsy in Saudi Arabia. This study aimed to determine the prevalence of driving among male patients with epilepsy at King Abdulaziz Medical City in Jeddah, Saudi Arabia and determine the barriers and difficulties that they are suffering from especially when it comes to driving.

Methods: This is a cross-sectional study that was conducted between July 2017 and June 2018 at King Abdulaziz Medical City in Jeddah, Saudi Arabia. The inclusion criteria of this study were male patients with epilepsy 18 years of age or above. The exclusion criteria were female patients at any age (since they were not allowed to drive at the time of the study) and male patients less than 18 years of age. This study utilized a self-made self-administered 25-item questionnaire.

Results: A total of 182 surveys were distributed, and 164 individuals completed the survey (90.1% response rate). Most of the participants have a driving license (95.7%) and drive a car (98.8%). Almost all participants (99.4%) mentioned that nobody asked them whether they have epilepsy or not when issuing a driver's license. In addition, 94.5% were never told not to drive after the diagnosis of epilepsy. Regarding restrictions to driving, 98.7% reported that they drive at all times without any restrictions, and 92.7% reported that they drive both inside and outside the city.

Conclusion: This study showed that the number of male patients with epilepsy driving cars was extremely high, accounting for almost all the patients in this study, with most of them doing several wrong practices during driving. Other major issues include the lack of specific laws regulating driving for patients with epilepsy and no counseling from physicians about driving after the diagnosis of epilepsy. We recommend developing the Saudi driving regulations for patients with epilepsy, and this study is considered an urgent call for action for the formation of a local driving regulations taskforce. Health education about the risk of driving should be disseminated, especially for patients with uncontrolled epilepsy.

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1. Introduction

Driving is the passport to adulthood, providing independence, transportation, employment, and social opportunities [1]. It is a complex cognitive motor task, which is considered a privilege, not a right. It requires attention, coordination, judgment, and skilled movements [2]. Some medical conditions, including epilepsy, have been recognized as posing risks of motor vehicle accidents because of impairment of consciousness, loss of body control during driving, and side effects of antiseizure medications [3]. Around one-third of patients with epilepsy continue

to experience seizures and are with inadequately controlled epilepsy despite optimal medical treatment [4]. Around 30% of patients with uncontrolled seizures continue to drive in the United States despite legal restriction [5].

The issue of epilepsy and driving has legal, social, and psychological implications [6]. Many countries in the world restrict driving to people prone to epilepsy. Several laws and regulations exist globally to restrict patients with epilepsy from obtaining or keeping a driving license mainly to limit the risk that they might pose to themselves and others [7]. Research has repeatedly shown an increased rate of road traffic accidents in drivers with epilepsy, and the death rate due to driving for older drivers is 2–3 times that for middle-aged drivers on a per-mile-driven basis [8]. The fatalities associated with epilepsy and driving represent around 4.2% of all medically related accidents [9].

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Motor vehicle accidents are reported to account for a large proportion of the mortality in Saudi Arabia. This is much more common than in most other countries and is linked to unsafe driving practices [10]. There is no data from Saudi Arabia regarding the prevalence of driving among patients with epilepsy and their driving practices. In addition, to the best of our knowledge, there are no local laws or guidelines concerning driving for patients with epilepsy in Saudi Arabia [11]. This study aimed to determine the prevalence of driving among male patients with epilepsy at King Abdulaziz Medical City in Jeddah, Saudi Arabia and determine the barriers and difficulties that they are suffering from especially when it comes to driving.

2. Methods

This is a cross-sectional study that was conducted between July 2017 and June 2018 at King Abdulaziz Medical City in Jeddah, Saudi Arabia. The medical city is one of the largest hospitals in the western region of Saudi Arabia, and it receives cases from all social and economic classes including non-Saudis; thus, the demographics of the hospital clinic population compare with the general population of Saudi Arabia. The stratified random sampling technique (probability sampling technique) was utilized in the selection of respondents. The inclusion criteria of this study were male patients with epilepsy 18 years of age or above. The exclusion criteria were female patients at any age (since they were not allowed to drive at the time of the study) and male patients less than 18 years of age.

This study utilized a 25-item self-made self-administered questionnaire. This questionnaire was developed in three phases including a preparatory phase, a pilot study phase, and a final revision phase. In the initial preparatory phase, a thorough literature review was conducted, and published studies concerning epilepsy and driving were reviewed. A questionnaire was then designed in a simple and clear Arabic language to determine the prevalence and other aspects related to driving for patients with epilepsy. The questionnaire was revised internally for a validity check, and a pilot study was conducted on 15 persons for a reliability check. Any issues identified in any question were modified, and the final modified version was validated and then used in this study.

All numerical values and demographic data obtained from the questionnaire were calculated and presented as frequency and percentage. Descriptive statistics were used including means, median, and standard deviation. All collected data were entered and analyzed through the IBM Statistical Package for the Social Sciences (SPSS) version 23.

All questionnaires were anonymous with no identifiers used. Confidentiality of information from the participants was ensured. A cover page was included to explain confidentiality issues to the participants and provide instructions to complete the questionnaire. This study was approved by the Institutional Review Board (IRB) of King Abdullah International Medical Research Center (KAIMRC).

3. Results

A total of 182 surveys were distributed, and 164 individuals completed the survey (90.1% response rate). The mean age of the population was 33.75 ± 11.256 . All the participants were males (100%). The majority were Saudi nationals (93.3%). Around 18% of the participants were students; 16.5% were retired, and 11% were military officers. Ninety-eight participants (59.8%) were single while 39% were married.

The majority of the participants (89.6%) know what epilepsy is, and 76.8% know the specific type of epilepsy that they have. The mean period of having epilepsy was 10.45 ± 8.130 years. The majority of the patients (82.3%) had their epilepsy controlled on either one or two medications, and 81.1% were compliant to treatment.

Most of the participants have a driving license (95.7%) and drive a car (98.8%). Around 60% do not fasten the seat belt while driving. More than 100 participants (65.2%) reported that they sometimes cross the red traffic light, and 67% reported that they park the car in

places where parking is prohibited. Approximately 70% of the participants exceed the speed limit while driving. Fifty participants (30.4%) smoke during driving, and 78.1% use their mobile phones while driving. More than 25% of the participants reported that they do not place their children in the designated place during driving.

Almost all participants (99.4%) mentioned that nobody asked them whether they have epilepsy or not when issuing a driver's license. In addition, 94.5% were never told not to drive after the diagnosis of epilepsy. One hundred sixty-two participants (98.8%) reported that they have never been arrested by the traffic police because of epilepsy. Several reasons to continue driving were identified by the participants including lack of proper means of transportation (82.9%), lack of assistance from the family (71.3%), lack of support from the community (68.3%), and lack of adequate health education (65.9%). Regarding restrictions to driving, 98.7% reported that they drive at all times without any restrictions, and 92.7% reported that they drive both inside and outside the city. More than 90% of the participants reported that they had not driven the car outside of the Kingdom of Saudi Arabia.

Sixty-five (39.6%) participants have been involved in a traffic accident because of a variety of reasons, but only 3 (1.8%) had a car accident due to epilepsy. One hundred thirty-five (82.3%) participants reported that their jobs do not depend on driving. Almost all participants do not carry a card or any written logo declaring that they have epilepsy, and 64.6% reported that if they were given a card stating that they have epilepsy, they would carry it.

4. Discussion

Over the past two decades, the laws have become stricter, resulting in various restrictions imposed in sufferers of epilepsy in different countries. These include withholding driving license for various periods until the attacks are controlled and the patient with epilepsy is considered to be at less risk of accidents [12]. In some European countries, a single tonic-clonic seizure in adulthood prohibits holding a license for the rest of the person's life [13]. Ideally, legislation should balance the risk of driving against the psychological and social disadvantages when driving is prohibited. However, achieving this balance is difficult, and that is why the regulations vary so widely between countries [14].

The Kingdom of Saudi Arabia has enjoyed economic prosperity in the last four decades with changing lifestyles, increased family fortunes, and purchase of automobiles to facilitate transportation and business activities. In Saudi Arabia, there are no formal restrictions from driving for patients with epilepsy as far as the authors are aware. This study was carried out to document the driving practices of Saudi male patients with epilepsy and the reasons behind driving despite an increased risk of accidents and/or mortality and to initiate the establishment of policies and guidelines in driving for patients with epilepsy.

The male patients with epilepsy who participated in this study appeared to have knowledge about epilepsy and its types. They have been with epilepsy for a mean period of 10 years. The majority of patients have their seizures controlled on antiseizure medication with good compliance with treatment. In spite of this good perception, the number of epileptic drivers was extremely high, and almost all the male patients with epilepsy in this study were driving cars. This number appeared higher than reported from other countries [15]. The majority of patients studied were in the economically active stage of life, with 39% being married. They need independence to move around in pursuit of their studies and businesses and to take care of their family issues, especially if they have children.

The reason behind excluding females in this study is that they were not allowed to drive at the time of the study. In September 2017, the king of Saudi Arabia (King Salman) issued a royal decree that allows women to drive, and it was implemented by June 2018 [16]. The results of this study are also important since females have recently become allowed to drive in Saudi Arabia, which will increase the number of patients with epilepsy driving in streets and highways.

An important finding in this study is the identification of the several wrong practices of the participants during driving. These include not fastening the seat belt while driving, crossing the red traffic light, and parking the car in places where parking is prohibited. Other wrong practices include exceeding the speed limit, smoking during driving, and using mobile phones on the road. Around one-fourth of the participants do not place their children in the designated place during driving. There are no statistics to compare with from Saudi Arabia. We do not understand the reasons behind these violations, and we cannot conclude whether this is a general practice by the Saudi population or it is related to behavioral and psychological changes that accompany epilepsy. DeNicola et al. [10] discussed in their study several potential reasons behind wrong practices leading to motor vehicle accidents in the Saudi population. These included male gender and young age (more likely to engage in risky driving behaviors), immigration, lenient traffic law enforcement, and insufficient driver education. Further studies are required to clarify these issues.

In this study, almost all participants were not asked by license-issuing authorities whether they have epilepsy or not when they issued their driving license. This is similar to some countries such as Argentina, Pakistan, and Ecuador where no specific laws regulate driving for patients with epilepsy [17]. It is left to the discretion of the treating neurologist to advise the patient as to whether he/she should drive or not. In Saudi Arabia, the general medical certificate needed to obtain a driver's license does not include a history of epilepsy. In addition, neurologists cannot report patients with epilepsy to the authorities, and there is no mechanism for such an endeavor.

Physicians should discuss the driving issues in patients with epilepsy. This process can be challenging, considering the consequences. Physicians should ensure privacy and confidentiality and allocate enough time to break the news and give time for the patient to ask questions [18]. Unfortunately, the vast majority of the participants in this study were never told not to drive after the diagnosis of epilepsy. This could be explained by our busy neurology clinic, which has many patients with different neurological diseases and little time to spend with each patient, which allows physicians to only discuss the most necessary issues such as diagnosis and treatment. Lack of specialized epilepsy unit and epilepsy health educators is another reason. Key recommendations concerning driving restriction for patients with epilepsy have been established by several organizations and societies including the American Epilepsy Society, American Academy of Neurology, and Epilepsy Foundation of America [19]. In Saudi Arabia, there are no local guidelines for assessing the fitness of patients with epilepsy for driving. Most of the neurologists follow the American guidelines and recommendations for patients with epilepsy. The Saudi Neurology Society should prepare for the establishment of such legal standards by creating and operating its own guidelines. They should adopt liberal driving regulations with favorable safety records. Lifetime bans should not be recommended given the mounting recognition of the socioeconomic necessity of driving. In the United Kingdom, for example, the lifetime ban was introduced in the 1920s but more recently was reduced to six months in the case of unprovoked first seizure [20].

Several reasons behind continuing driving in male patients with epilepsy were identified in this study. These include lack of proper means of transportation, lack of assistance from the family and the community, and lack of adequate health education. In Saudi Arabia, these obstacles have been tackled by the government with the institution of huge networks of airports and train stations, utilization of global ride-hailing firms, financial support, and modern transit bus networks. These transportation methods are subject to more and more development, especially in the era of vision 2030. In addition, Saudi Arabia has an advanced healthcare system, which is provided for free to all Saudi citizens. According to the World Health Organization, the Saudi healthcare system is ranked 26th among 190 of the world health systems [21]. It comes before many other international healthcare systems such as

Canada, Finland, and the United States of America. Collaboration between different ministries is all that is needed.

Patients with epilepsy consider it important to drive despite having a potentially dangerous condition since the restriction interferes with their ability to work and has a negative influence on their quality of life. Previously published studies showed that even individuals with poorly controlled seizures continue to drive, and patients tend to under-report their seizure frequency because of the fear of driving restriction [4]. In Saudi Arabia, continuing driving is important, especially for men since the culture of the kingdom is that men are obligated to provide such important task for their family, and women were not allowed to drive. With the recent permission for women to drive, this cultural and social pressure of continuing driving for men is expected to decrease.

In this study, almost all male patients drive at all times with no restrictions, and they drive both inside and outside the city. Almost all participants have not driven cars outside the Kingdom of Saudi Arabia. Restrictions and rules regarding driving for patients with epilepsy vary widely among countries [22]. These are usually based upon expert opinion rather than strong scientific evidence. In Saudi Arabia, such regulations should be established as soon as possible, given the prosperity and great development of this wealthy nation.

Many studies have shown that epilepsy poses lower driving risk as compared with other conditions such as alcohol and drug abuse and some mental illnesses [23]. Around 40% of the participants in this study have been involved in car accidents because of a variety of reasons, but only 1.8% had a car accident due to epilepsy. This is much less than that reported in the literature (11%) and could be because of the good epilepsy management and control of the study population or because of the patients unwillingness to disclose this information because of the fear for having medication dosage increased or having to add more medications. Another possibility is that there is some dishonesty due to fear of being held 100% accountable for the accident and due to fear about job loss. In a study done by Sheth et al. [24], it was estimated that the proportion of fatal driver's crashes caused by an epileptic seizure was only 0.2% as compared with 30% caused by alcohol. Several other studies have also shown that car accidents involving people with epilepsy are caused by driving errors rather than a seizure [25].

Several factors impact driving safety, including vehicle-related, environment, and human factors. The human factors are considered the most important and the target for traffic accident management. Epilepsy was considered as a major human factor limiting the ability to drive due to the potential sudden occurrence of seizures during driving. Studies documented that accidents involving drivers who had seizures usually result in material damage and rarely personal injuries or death [26]. Good compliance with medications and seizure control significantly enhances the driving safety of patients with epilepsy. Previous studies suggest that well-controlled epilepsy does not pose an extraordinary risk to traffic safety in comparison to other risk factors such as age or medical conditions besides epilepsy. This led to more liberalization of driving restrictions in some countries. Primarily, the safety of driving in epilepsy depends on the judgment of patients with epilepsy and their compliance with the medical advice and driving regulations in their countries [27].

In an attempt to know the current system in our city or the country in general, we tried to ask the patients who had accidents due to seizures and also some random traffic police officers if there are any penalties or potential problems should a person with epilepsy cause a crash. We were told that if the person declares that it was a seizure that caused the accident, the traffic police would hold the driving license and request a medical report to decide accordingly. If the person hides the information about the seizure or about having epilepsy, the accident will be treated in an ordinary way and settled as if it was because of any other causes.

Almost all participants in this study do not carry a card, a logo, or a bracelet indicating that they have epilepsy. However, around two-thirds of the participants said that they would carry such items if offered

to them. Currently, medical identification bracelets that alert paramedics and physicians to the patient's condition are available. These bracelets inform the medical staff that the patient has epilepsy, and urgent treatment is required. Although such bracelets might not be preferred by some patients because of stigma, new high technology bracelets might save thousands of life annually [28].

Despite some limitations in the present study, we believe that our results help advance the understanding of the current driving status of male patients with epilepsy in Saudi Arabia. The limitations of this study include surveying patients from one hospital only in Jeddah city, which may not be representative of other surrounding areas in the western region of Saudi Arabia and the entire country in general. There is a possibility that driving patterns vary in other urban/suburban/rural locales. In addition, there is an absence of identification of professional drivers, including non-citizen drivers. This study was a patient survey with results such as percent crashing due to seizures not corroborated by public safety data or patients' medical records. We utilized a self-report questionnaire, which is subject to recall bias.

5. Conclusion

This study showed that the frequency of male patients with epilepsy driving cars was extremely high, accounting for almost all the patients in this study, with most of them doing several wrong practices during driving. Other major issues include lack of specific laws regulating driving for patients with epilepsy and no counseling from physicians about driving after the diagnosis of epilepsy. We recommend developing the Saudi driving regulations for patients with epilepsy, and this study is considered an urgent call for action for the formation of a local driving regulations taskforce. Health education about the risk of driving should be disseminated, especially for patients with uncontrolled epilepsy. The Saudi Neurology Society should prepare for the establishment of legal standards and counseling recommendations by creating and operating its own guidelines.

Declaration of Competing Interest

The authors declare that they have no conflicts of interest.

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