Epidemiological study of epilepsy from a tertiary care hospital in kingdom of Saudi Arabia

Rizwana Shahid, MBBS, FCPS, *Saima Nazish*, MBBS, FCPS, *Azra Zafar*, MBBS, FCPS, *Danah Aljafaari*, MD, FRCPC, *Majed Alabdali*, MD, FRCPC, *Noman Ishaque*, MBBS, FCPS, *Bayan A. Alzahrani*, *Medical student*, *Fahad A. Alkhamis*, MD, UOD.

ABSTRACT

الأهداف : لتحديد أنواع النوبات ووصف الميزات السريرية ، EEG والنتائج الإشعاعية بين مرضى الصرع .

الطريقة : أجريت دراسة وبائية استرجاعية ، قمنا بتحليل السجلات الطبية لمرضى الصرع خلال الفترة (1 يناير 2016م – ديسمبر 2016م) .

النتائج : اشتملت الدراسة على 184 مريضاً ، 91 (49.5%) كانوا من الذكور و 93 (50.5%) من الإناث . تراوحت أعمارهم بين 12 و 85 عام (متوسط 35.4±19.5 عام) . معظم المرضى 150 (82%) لديهم نوبات توترية ارتعاشيه كامله، ثم صرع جزئي في 27 (14%) من المرضى . تم تشخيص EEG الرئيسي للتركيز الثنائي في 53 (41%) ، تم تشخيص الصرع مجهول السبب في 61% من المرضى . أكثر التشوهات شيوعًا في تصوير الدماغ هي ضمور / ضمور الحصين الصدغي / الزمني . كان السبب الأكثر شيوعا للصرع أعراض السكتة الدماغية وجدت في 20(11%) تليها الصرع بعد الالتهابات المعدية واصابات الرأس .

الخاتمة : يتوافق كلا من أنواع الصرع وخصائص EEG ومسببات الإصابة بالصرع العرضي في مجموعة المرضى لدينا مع الأدبيات الحالية . هناك تناقض طفيف لوحظ في توزيع الجنس ومسببات أمراض الصرع العرضيه مقارنة مع دراسات أخرى من المملكة العربية السعودية تحتاج إلى دراسة عن طريق الدراسات المستقبلية والسكانية .

Objectives: To identify the types of seizures and describe the clinical features, EEG and radiological findings among patients with epilepsy.

Methods: In this retrospective epidemiological study, we analyzed the medical records of the patients with the diagnosis of epilepsy during the study period (January 1st 2016- December 2016)

Results: The study included 184 patients, 91 (49.5%) were males and 93 (50.5%) females. Age ranged between 12 and 85 years (mean 35.4±19.5 SD years). Most of the patients 150 (82%) had Generalized tonic clonic seizures followed by focal onset in 27 (14%) of the patients. Main EEG abnormality was focal to bilateral was recorded in 53 (41%), idiopathic/cryptogenic epilepsy was diagnosed in 61% of the patients. The most common abnormalities on brain imaging were temporal/hippocampal atrophy/stroke. The most common cause of symptomatic epilepsy was stroke found in 20(11%) followed by post infectious epilepsy and head trauma.

Conclusion: Seizure types, EEG characteristics and etiologies of symptomatic epilepsy in our cohort of patients are in accordance with the current literature. Slight discrepancy observed in gender distribution and etiologies for symptomatic epilepsy compared with other studies from Saudi Arabia need to be studied further by prospective and population base studies.

Epilepsy is one of the most common neurological diseases and is a serious neurological disorder that is associated with social stigma.[1] Epilepsy can be defined as a brain disorder that is characterized by episodes of vigorous shaking and disturbed brain activity (seizures) that can affect the patient's attention and behavior.[2] According to World Health Organization 2010 Global burden of Disease Study, it is the second most

neurological disorder around the world in terms of disability adjusted life years.[3] According to one of the prevalence study available from the kingdom of Saudi Arabia in 2001, the prevalence of epilepsy was found to be 6.54 per 1000[4] and in other Arab countries (Sudan, Libya and Tunisia) was about 2.3/1000.[5] The incidence of epilepsy has been found to be substantially greater in developing countries compared with developed countries.[6] Epidemiological studies about epilepsy from Arab countries especially Saudi Arabia are lacking. We were able to find only few studies about the prevalence of seizure disorder in an Arab population[5,7] and even sparser from Saudi Arabia.[4,8] we were unable to find any study regarding epidemiology of Epilepsy from our hospital. This study therefore was aimed to review and present the data of patients with epilepsy from our hospital, King Fahd Hospital of the University (KFHU), Alkhobar, Kingdom of Saudi Arabia.

Methods. This is a retrospective, cross sectional study, carried out in Neurology Department of King Fahd Hospital of the University, Alkhobar. The KFHU is a 500 bedded tertiary care teaching and referral hospital. It has an established neurology team and specialized clinics for epilepsy, stroke, multiple sclerosis, movement disorders and general neurology. Patients are admitted either through Emergency or Out patients Departments. A review of medical records of the patients admitted to KFHU or presenting to Outpatient Neurology Department over one year period (from January 2016 till December 2016) was carried out after retrieving the data through electronic data bank system. The study was approved by institutional ethical committee. The records are maintained according to ICD-9 coding system in electronic data base system of the hospital. The medical records of all patients with the diagnosis of epilepsy over the defined study period were reviewed.

All patients either admitted or referred with at least 2 episodes of unprovoked seizures were eligible for inclusion to fulfill the criteria of epilepsy and the episodes were ideally to be stereotyped and eye- witness account was mandatory. Patients with single episode of seizures, and provoked attacks secondary to metabolic or toxic encephalopathy were excluded as well as those below 12 years of age. A structural protocol was completed for each patient on the clinical presentation,

any precipitating factors. The findings on clinical examination and the results of the investigations like metabolic screening, interictal electroencephalography (EEG), plain and contrast-enhanced brain computerized tomographic (CT) scan or MRI where available and complete blood count were recorded. Only patients with adequate clinical and laboratory data were classified into seizure types and epilepsies according to ILAE 2017 classification as being either focal onset, generalized onset or of unknown onset and further reclassified if necessary.

Relevant descriptive statistics, frequency and percentage were computed for different seizure disorders and for clinical and radiological correlation. Data was expressed as mean±SD for age. Data was entered and analyzed by the IBM SPSS Statistics for Windows version 20.0 (IBMCorp, Armonk, NY, USA).

Results. A total of 184 patients' medical records with the diagnosis of epilepsy were reviewed and data was recorded. Their ages ranged between 14-85 years (mean 35.45±SD 19.5). Their demographic characteristics are mentioned in **Table 1**.

As the seizure semiology is concerned, most of the patients i.e. 150 (82%) presented as generalized onset, focal onset was evident in 14% of the patients, while in 4% of the cases, the onset was unknown. Data regarding family history was mentioned in only 7% of the patients, only 3 patients reported first degree relative with the diagnosis of epilepsy and 3 patients had other relative with epilepsy and 4% of patients did not have any family history of epilepsy. Most of the patients presenting to us have epilepsy for more than 5 years i.e. 115(62.5%) while 57(31%) had the disease for less than 5 years. The data was missing in 11(6%) of the patients.

Neurological exam was normal in approximately 70% of the patients, while 30% of the patients had

Table 1 - Showing the demographic characteristics of the patients. N=184

Demographic characteristics	n	(%)
Nationality		
Saudi	170	(92)
Non Saudi	14	(8)
Gender		
Male	91	(49.5)
Female	93	(50.5)
Seizure semiology		
Generalized	150	(83)
Focal onset	26	(14)
Unknown onset	8	(4)

Table 2 - Showing different EEG patterns among 184 patients' medical records with the diagnosis of epilepsy.

EEG patterns	Frequency	(%)	Valid Percent
Normal	42	(22.8)	24.7
Abnormal	128	(69.2)	75.3
Focal onset epileptiform discharges	27	(14.7)	21.1
Generalized onset	31	(16.8)	24.2
Focal to bilateral discharges	58	(31.5)	45.5
Generalized slowing	12	(6.5)	9.4
Total	128	(69.6)	100
Missing/ not done	14	(7.6)	30.4
Total	184	(100.0)	100

abnormal neurological exam which included mental status or cognitive changes, certain cranial nerve palsies especially Extra ocular movement abnormalities or facial paralysis. Hemiparesis was present in 28(15%) cases, most of these patients had a prior history of either stroke or cerebral palsy.

Electroencephalography (EEG) was performed in 170 (92%) of the patients while 8% of the patients either did not have an EEG or data was missing for that. it was abnormal in 128(70%) of the patients while 22% had normal EEG findings. Different EEG findings are mentioned in **Table 2**. Brain imaging CT/MRI was carried out in 172 (93%) of the patients that turned out to be normal in 104 (57%) of the patients while major abnormality in other scans was cortical mainly temporal atrophy followed by stroke and congenital anomalies. The etiology for symptomatic epilepsy were not known in almost half of the patients, while the major factors responsible among patients with known etiology was stroke (11%), that was followed by post infectious epilepsy and head injury.

Discussion. In our study, there was slight female preponderance which was statistically not significant, but is different from many of the epidemiological studies of epilepsy in Arab community[4,5,6] but has been reported from other parts of the world as one of the epidemiological study from Pakistan also showed slight female preponderance[9] and this female preponderance has also been reported from Nigeria[10] and Jordan.[11] There is some suggestion that females could be more likely to conceal their disease as it would have caused social stigma and might face difficulty in getting married.[12,13] Change in behavior on the acceptance of disease and better education status in Arab community can be the possible reasons for this gender discrepancy from the previous studies.

Clinically, seizure semiology was of generalized onset in about 82% of the cases, (65% of the patients had generalized seizures from the onset, while 17% had focal to bilateral tonic clonic seizures) which is almost similar to other studies encompassing Arab communities[4,8] as well as Asian and African studies.[9,14,15] Despite clinical semiology of being generalized onset, the commonest EEG abnormality was focal onset with bilateral discharges, recorded in 53(41% of all abnormal EEGS) followed by generalized spike and wave discharges in 21% of the recordings. Which is consistent with the results of the other studies.[4,14,15] This reflects the underestimation of the focal onset seizures, which is a common feature of almost all epilepsy studies.[16] This difference has been reported in many studies and could be attributed to poor recognition of the early focal symptoms by the patients as well as the observers also miss the onset and get notified when patients starts the generalized convulsion and sander and Shorvon[17] in their study suggested that if all the focal seizures could have been identified, an overall prevalence of active epilepsy would be much higher.

Data regarding the family history of epilepsy was recorded only in 7% of the cases, which is almost similar to the data recorded by Hamdy et al[8] in their study from KFSH, Al Qassim,while in another study from Saudi Arabia, the family history was recorded in most of the patients.[4] as this study was conducted by door to door survey. This highlights the importance of proper record keeping as it could impose bias in the study and is a hindrance in conducting the retrospective studies as in retrospective studies, we rely solely on the medical charts of the patients.

Sleep deprivation was recorded as the trigger for seizure only in 0.5% of cases, while other factors mainly watching TV or other stressors were perceived as trigger in around 8% of the cases, while most of the patients did not either know any provoking factors or did not have any.

Based on the imaging features, Idiopathic/ cryptogenic epilepsy was found in 61% of the patients, which is slightly lower as compared to previous study carried out from Saudi Arabia[4] but studies from other parts of the world in the past have reported much higher prevalence of idiopathic epilepsy.(73-85%).[9,16,18-20]

This difference in our study could represent more reliance on imaging as well as availability of more sophisticated imaging techniques like MRI as previously epilepsy was a clinical diagnosis and brain imaging was not considered for all the patients especially in pediatric population as in other studies conducted in our region, brain imaging was done only in 59%.[8]

The major abnormalities on brain imaging in symptomatic epilepsy present in 66 patients were

cerebral/ hippocampal atrophy, followed by stroke and tumors, that are consistent with the findings found in the literature as a cause of epilepsy in adult patients, but are against the study from Saudi Arabia,[4] that found perinatal encephalopathy and pediatric infections as the most common causes. This can again be explained as our department is only dealing with the adult patients so our study did not include the pediatric population, which is a limitation of our study.

In our study, the major cause of symptomatic epilepsy was stroke, found in 11% of the patients, that is similar to the study carried out in Al Qassim hospital, KSA,[8] while stroke was the infrequent cause of epilepsy found in the study carried out by Al Rajeh et al[4,21] from Saudi Arabia,while it was much higher in some of the studies done in England[22] and Sweden.[7] Again, it could represent the spectrum of different etiologies according to age groups.

The present study has some limitations. Firstly, as this study was a hospital-based retrospective cross-sectional study, the exact duration of epilepsy could not be established as well as certain important features of history for example family history or lacking neurological exam findings could not be ascertained. Secondly, as there was discrepancy between histories based semiology and EEG findings, it could not be confirmed because of the retrospective nature of the study. And finally, sample size was reduced to only 184 due to lack of all required data needed for this study. Further large scale prospective studies are recommended.

In conclusion, most of the results of our studies were in accordance with the similar studies from our region as well as the international studies. Male preponderance among patients with epilepsy in other studies from KSA can be explained by the fact that as it is still considered as a social stigma, therefore has been underreported in female patients. The discrepancy between semiology and EEG findings points towards the importance of careful elaboration of the history as the brief focal symptoms can easily be overlooked by the patients as well as observer. This study also highlights the importance of proper record keeping as the medical records are the main source of data collection in retrospective studies.

References

1. Fiest KM, Birbeck GL, Jacoby A, Jette N. Stigma in epilepsy. *Curr Neurol Neurosci Rep* 2014; 14: 444.

2. Engel J Jr. Biomarkers in epilepsy: introduction. *Biomark Med* 2011; 5: 537-544.

3. Murray CJ, Vos T, Lozano R, Naghavi M, Flaxman AD, Michaud C, et al. Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet* 2012; 380: 2197–2223.

4. Al Rajeh S, Awada A, Bademosi O, Ogunniyi A. The prevalence of epilepsy and other seizure disorders in an Arab population: a community-based study. *Seizure* 2001; 10: 410-414.

5. Benamer HT, Grosset DG. A systematic review of the epidemiology of epilepsy in Arab countries. *Epilepsia* 2009; 50: 2301-2304.

6. Annegers JF, Grabow JD, Groover RV, Laws ER Jr, Elveback LR, Kurland LT. Seizures after head trauma: a population study. *Neurology* 1980; 30: 683-689.

7. Forsgren, L, Bucht G, Erickson S, Begmark L. Incidence and clinical characteristics of unprovoked seizures in adults. A prospective population-based study. *Epilepsia* 1996; 37: 224-229.

8. Hamdy NA, Alamgir MJ, Mohammad el GE, Khedr MH, Fazili S. Profile of epilepsy in a regional hospital in Al qassim, saudi arabia. *Int J Health Sci (Qassim)* 2014; 8: 247-255.

9. Aziz H, Ali SM, Frances P, Khan MI, Hasan KZ. Epilepsy in Pakistan: a population-based epidemiologic study. *Epilepsia* 1994; 35: 950-958.

10. Osuntokun BO, Adeuja AO, Nottidge VA, Bademosi O, Olumide A, Ige O, et al. Prevalence of the epilepsies in Nigerian Africans: a community-based study. *Epilepsia* 1987; 28: 272-279.

11. Bahou, YG. Epilepsy at a university hospital in Amman, Jordan. *Neurosciences* 2004; 9: 190-195.

12. Banerjee PN, Filippi D, Allen Hauser W. The descriptive epidemiology of epilepsy-a review. *Epilepsy Res* 2009; 85: 31-45.

13. Bharucha NE, Bharucha EP, Bharucha AE, Bhise AV, Schoenberg BS. Prevalence of epilepsy in the Parsi community of Bombay. *Epilepsia* 1988; 29: 111-115.

14. Preux PM, Druet-Cabanac M. Epidemiology and aetiology of epilepsy in sub-Saharan Africa. *Lancet Neurol* 2005; 4: 21-31.

15. Mac TL, Tran DS, Quet F, Odermatt P, Preux PM, Tan CT. Epidemiology, aetiology, and clinical management of epilepsy in Asia: a systematic review. *Lancet Neurol* 2007; 6: 533-543.

16. Sander JW, Shorvon SD. Epidemiology of the epilepsies. *J Neurol Neurosurg Psychiatry* 1996; 61: 433-443.

17. Sander JW, Shorvon SD. Incidence and prevalence studies in epilepsy and their methodological problems: a review. *J Neurol Neurosurg Psychiatry* 1987; 50: 829-839.

18. Hauser WA, Kurland LT. The epidemiology of epilepsy in Rochester, Minnesota, 1935 through 1967. *Epilepsia* 1975; 16: 1-66.

19. Li SC, Schoenberg BS, Wang CC, Cheng XM, Zhou SS, Bolis CL. Epidemiology of epilepsy in urban areas of the People's Republic of China. *Epilepsia* 1985; 26: 391-394.

20. Attia-Romdhane N, Mrabet A, Ben Hamida M. Prevalence of epilepsy in Kelibia, Tunisia. *Epilepsia* 1993; 34: 1028-1032.

21. Al-Rajeh S, Abomelha A, Awada A, Bademosi O, Ismail H. Epilepsy and other convulsive disorders in Saudi Arabia: a prospective study of 1,000 consecutive cases. *Acta Neurol Scand* 1990; 82: 341-345.

22. Sander JW, Hart YM, Johnson AL, Shorvon SD. National General Practice Study of Epilepsy: newly diagnosed epileptic seizures in a general population. *Lancet* 1990; 336: 1267-1271.