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Seizures at the emergency department in Thailand and risk factors for recurrent seizures

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Abstract

Background: Seizure is a common neurological presenting symptom at the emergency department (ED). Recurrent seizure may result in an overcrowded ED and affect morbidity. Factors associated with recurrent seizure in Thailand or other developing countries are limited. *Methods:* Clinical features of adult patients who presented with seizure at the ED, Ramathibodi Hospital, Mahidol University, Thailand were retrospectively reviewed. Factors associated with recurrent seizure were identified by multivariate logistic regression analysis. *Results:* During the study period, there were 65,586 patients who visited the ED. Of those, there were 156 seizure patients who were identified for analysis. The mean (S.D.) age of all patients was 47.44 (19.80) and males accounted for 41.67%. There were 40 patients who had recurrent seizures (25.64%). There were 10 significant factors associated with recurrent seizure at the ED. Of those, seven factors had a positive association with recurrent seizure; the top three factors were seizure attacks >4 times prior to ED visit, age >70 years and cerebral infarction, while the other three factors were negatively associated (history of antiepileptic drugs, brain surgery and alcohol consumption).
Conclusions: Recurrent seizure at the ED may be related to seizure history prior to the ED visit, age, cause of seizure, and co-morbid conditions.

INTRODUCTION

Seizures are one of the common neurological conditions at the emergency department (ED). The prevalence rates for all seizures, first-time seizures, and status epilepticus were 1.2%, 0.3%, and 6.0% in the Western countries.[1-4] Causes and precipitating factors may be different among countries. The American study showed that alcohol was the common cause of seizure at the ED, while poor antiepileptic drug compliance was the common cause in a report from Thailand.[4,5]

Recurrent seizures at the ED may occur while the patients are visiting the ED and causing ED overcrowding.[2] The ED visit time for those with recurrent seizure may be as high as 16 hours for cause identification and treatment.[2] Recurrent seizure at the ED was reported to be 18.6% and up to 23.5% if focal brain lesion was present.[1] A report from France found that alcoholism, plasma glucose, and Glasgow Coma Scale were associated with recurrent seizure at the ED.[6] This study aimed to evaluate the seizure characteristics and risk factors for recurrent seizure at the ED in Thailand. There were limited reports on these issues for Asian population in medical literatures.

METHODS

This study retrospectively reviewed all patients presenting with seizure at the ED, Ramathibodi Hospital, Mahidol University, Thailand. Ramathibodi Hospital is a major University hospital in Bangkok. The study period was between January 1st, 2010 and December 31st, 2010.

Patients with an age over 15 years and diagnosed as seizure, epilepsy, status epilepticus by the ICD-10 code were enrolled. Patients who had missing data, not presenting with seizure at the ED, or lacking a final diagnosis that was not a seizure such as pseudoseizure, or syncope were excluded.

Prevalence of seizures, characteristics of seizures, laboratory investigations, treatment, and incidence of recurrent seizures were recorded. The

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incidence of recurrent seizures was calculated by cumulative incidence and incidence density. The cumulative incidence was calculated by numbers of recurrent seizure patients divided by the total number of the study population. The person-time calculated by sum of length of observation time at the ED of each patient. The incidence density calculated by numbers of recurrent seizure patients divided by person-times of observation of all patients at the ED. Factors associated with recurrent seizures were identified by multivariate logistic regression analysis. All data analyses were performed with STATA software (College station, Texas, USA).

RESULTS

During the study period, there were 65,586 patients who visited the ED. Of those, 279 patients presented with seizures and were aged over 15 years. Ninety four patients were excluded because final diagnosis was not seizure, and 29 patients were excluded due to missing medical records. In total, there were 156 patients for the analyses.

The mean (S.D.) age of all patients was 47.4 (19.8) years and males accounted for 41.7% (Table 1). Generalized tonic clonic seizure was the most common seizure type (85.3%) and the first-time seizure was found in 51 patients (32.7%). Laboratory work ups were performed in 147 patients (94.2%). Epilepsy was the most common cause of seizure (46.8%), while 8 patients (5.1%) did not have definite causes of seizure. Intravenous antiepileptic drugs were the most common treatment in 65 patients (41.7%).

There were 40 patients who had recurrent seizures during the ED visit. The cumulative incidence rate (95% confidence interval) was 25.64% (18.32-34.92). The person-times of observation of 156 patients were 323.05 person-hours. The incidence density of recurrent seizure (95% confidence interval) was 12.38 per 100 person-hours (8.85-16.86). The mean (S.D.) time for recurrent seizures was 8.07 (12.79) hours after the ED visit.

There were 10 significant factors associated with recurrent seizures at the ED (Table 3). Of those, seven factors had a positive association with recurrent seizure; the top three positive factors were seizure attacks >4 times prior to ED visit, age >70 years and cerebral infarction, while the other three factors were negatively associated (history of antiepileptic drugs, brain surgery and alcohol consumption).

DISCUSSION

The prevalence of seizure at the ED was 0.23% which was considerably lower from reports from the US (1.2%)[4] but similar to the previous report from the Northeast, Thailand (0.3%).[5] The most common cause of seizures at the ED in Thailand

Table 1: Clinical features of 156 patients who presented with seizures at the emergency department

Features	Values N = 156
Mean age (S.D.), years	47.4 (19.8)
Male gender, n(%)	65 (41.7)
Type of seizure, n (%)	
Generalized tonic clonic	133 (85.3)
Focal seizure	23 (14.7)
First-time seizure, n (%)	51 (32.7)
History of brain surgery, n (%)	46 (29.5)
History of cancer, n (%)	38 (24.4)
History of stroke, n (%)	37 (23.7)
History of alcohol consumption, n (%)	22 (14.1)
History of anticoagulant use, n (%)	12 (7.7)
Epilepsy with poor antiepileptic drug compliance, n (%)	44 (32.8)
Laboratory investigation, n (%)	147 (94.2)
Computed tomography of brain with contrast injection, n (%)	64 (41.0)
Computed tomography of brain without contrast injection, n (%)	21 (13.5)
Magnetic resonance imaging, n (%)	21 (13.5)
Lumbar puncture, n (%)	14 (9.1)
Electroencephalography, n (%)	14 (9.1)

Table 2: Causes and treatments of 156 patients presented with seizure at the emergency department

Factors	Values N = 156
Causes	
Epilepsy	73 (46.8)
Brain tumor	21 (13.5)
Cerebral infarction	18 (11.5)
Alcohol withdrawal	14 (8.9)
Intracerebral hemorrhage	11 (7.1)
Metabolic derangement	8 (5.1)
CNS infection	3 (1.9)
Unknown	8 (5.1)
Treatment	
Intravenous antiepileptic drugs	65 (41.7)
Oral antiepileptic drugs	35 (22.4)
No antiepileptic drugs	51 (32.7)

Note. Data represented as numbers (percentage).

is epilepsy (46.8%) which was different from previous reports from the Western world (Table 2). These findings may indicate that epilepsy control is still a public health problem in developing countries such as Thailand or other Asian countries.

The incidence rate of recurrent seizure was somewhat higher than a previous report in children (25.64% vs 20%)[7] and a report from France (25.64% vs 18.6%).[1] The report also indicated that the numbers of seizure attacks prior to the ED visit was significantly associated with recurrent seizure within 24 hours in children.[7] This study also had similar findings in the adults. The risk of recurrent seizure may be as high as 8.15 times if the patients had seizure attacks more than 4 times prior to the hospital ED visit (Table 3).The average recurrent seizure interval time in this study was 8 hours. This information indicated that patients with a seizure attack may require to be hospitalized for at least 21(Mean+1SD) hours before discharge from the hospital.[1]

Other clinical features that were considered a high risk for recurrent seizures included older

Table 3: Significant factors associated with recurrent seizures at the emergency department.

Factors	Adjusted odds ratio	95% confidence interval
Seizure attacks > 4 times prior to ED visit	8.15	1.61-25.73
Age > 70 years	6.66	2.65-14.76
Cerebral infarction	5.58	1.10-17.63
Diastolic blood pressure > 100 mmHg	5.57	1.44-15.54
History of anticoagulant use	5.11	1.91-11.74
Pulse rate > 100/min	2.39	1.04-5.02
First-time seizure	2.32	1.05-4.79
History of brain surgery	0.36	0.17-0.73
History of antiepileptic drugs	0.31	0.16-0.64
History of alcohol consumption	0.16	0.02-0.61

ED: emergency department.

age of more than 70 years, high diastolic blood pressure more than 100 mmHg, tachycardia of more than 100 beats/min, first-time seizure, history of anticoagulant use and cerebral infarction. The three factors that indicated a low risk for recurrent seizures by multivariate logistic regression were history of epileptic drugs, alcohol use and brain surgery. In other words, persons with epilepsy who have antiepileptic drug treatment, alcohol use, or those who had previous brain surgery are less likely to have recurrent seizures. Note that persons with epilepsy who also took an anticoagulant may have had a higher chance for recurrent seizures; probably from secondary intracranial bleeding.

Factors associated for recurrent seizure during ED visit in this study were different from the study from France.[6] In the present study, more factors were put in the multivariate analysis. As a result, more factors were associated with recurrent seizure at the ED such as age, diastolic blood pressure, or pulse rate (Table 3). Different study population (Thai vs French) may be another explanation of different predictors; French patients may receive better health care and have higher education level.

Even though the study population in this study was small, significant factors were elucidated with statistical analyses. The results of this study, however, may not be universal particularly for the Western countries due to different study populations. It may apply for other developing countries though.

In conclusion, recurrent seizure at the ED may be related to seizure history prior to the ED visit, age, cause of seizure, and co-morbid conditions.

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