Prevalence of Post-Stroke Seizures in Srinagarind Hospital

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Objective: *Post-stroke seizures in Thailand have not been studied. Thus, the authors' main objective was to assess the prevalence of post-stroke seizures and the secondary objective was to determine the factors associated with post-stroke seizures and mortality after stroke.*

Material and Method: *This was a retrospective, descriptive study. The population included stroke patients admitted to Srinagarind Hospital between 2000 and 2004. The patients were 15 years of age and older. The authors reviewed medical records, mailed out a questionnaire, and conducted telephone interviews.*

Results: *The present study included 372 patients with stroke; of whom 15.6% had the seizures after the stroke. The length of follow-up was at least 5 years. Generalized tonic-clonic seizures were the most common type of post-stroke seizures. The time from the onset of stroke to the seizures was mostly (60.3%) less than 2 weeks (i.e., early post-stroke seizures). The associated factors of post-stroke seizures were non-dyslipidemia ($p = 0.0007$), intracerebral hemorrhage ($p = 0.015$), and lesions at cortical area ($p = 0.05$). The overall mortality rate at the time of the present study was 39.5%, 7.5% at 30 days and 22.8% at 1 year.*

Conclusion: *The prevalence of post-stroke seizures was higher than in previous studies but the associated factors of post-stroke seizures were similar.*

Keywords: *Post-stroke seizures, Stroke, Prevalence*

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More than 50% of the epilepsy in the elderly results from stroke. Based on the stroke registry about 5 to 20% of all stroke patients will have subsequent seizures[1]. In the Oxfordshire Community Stroke Project, the cumulative actuarial risk of having a seizure after ischemic stroke was 4.2% (95% CI, 2.2-6.2) at 1 year and 9.7% at 5 years (95% CI, 3.7-15.7)[2].

Post-stroke seizures are classified as early and late onset seizure, according to their timing after stroke. An arbitrary cut-off point of two weeks after the presentation of stroke has been recognized as the way to distinguish between early and late post-stroke seizures[1,2].

In previous studies[2], the risk factors for post-stroke seizures were the stroke subtype, stroke location, and stroke severity. There was a clear impact of post-stroke seizures on early mortality and long-term functional outcome[3].

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The main objective of the present study was to learn the prevalence of post-stroke seizures in the authors' tertiary care hospital and secondarily to clarify the associated factors of post-stroke seizures and the mortality after stroke.

Material and Method

This was a retrospective, descriptive study. The target population included those 15 years of age and over, admitted to Srinagarind Hospital between 2000 and 2004, and diagnosed with stroke. Stroke was defined according to the WHO[4].

Included were patients with: cerebral thrombosis, cerebral embolism, intracerebral hemorrhage from hypertensive hemorrhage, cerebral aneurysm, and arteriovenous malformation (AVM). All patients must have had a CT brain.

Excluded were patients with traumatic intracerebral hemorrhage, subarachnoid hemorrhage, cerebral venous thrombosis, and any for whom the seizures could be explained by another cause.

The sample size was calculated from the estimating a population proportion when sampling is

from a finite population[5]. The target population was chosen by simple random sampling of 650 patients. The out- and in-patient medical records were reviewed and questionnaires mailed out to patients who were lost to follow-up, or irregularly followed-up.

The medical records included baseline characteristics, type and subtype of stroke, CT brain finding, seizure occurrence, recurrent stroke, and mortality at 30 days and 1 year.

The mailed out questionnaire was a nervous health survey used to screen patients who had seizures. The sensitivity and specificity was 79.3% and 92.9%, respectively[6]. The positive and negative predictive values were 18.3% and 99.6%, respectively. A telephone interview was used for patients who did/could not answer the questions.

Descriptive statistics were used and the Chi-square to test the relationship between variables.

The present study was approved by the Ethics Committee of Khon Kaen University.

Results

Data from the Medical Record Service of Srinagarind Hospital revealed that 1,413 stroke patients were admitted between 2000 and 2004, from which the target population of 650 patients was randomly sampled. Of the 650 patients, 494 had complete medical records, but 85 did not fulfill the inclusion criteria and 37 were in the exclusion criteria. The remaining sample size was 372 patients.

Of the 372 patients included in the present study, 218 were male and 154 female. The mean age was 58.9 years, range of 16 to 91 years. Most patients ranged between 61 and 75 years of age. Hypertension was the most common underlying disease (58.3%), followed by diabetes mellitus and heart diseases (36.1 and 35.1 percent, respectively), as shown in Table 1.

Ischemic stroke had discovered about 271 of 372 patients (72.8%), while 98 patients (26.3%) had hemorrhagic stroke. In the ischemic group, 194 patients (71.6%) had cerebral thrombosis and 70 (25.8%) had cerebral embolism. In the hemorrhagic stroke group, 50 (51.0%) had hypertensive intracerebral hemorrhage (ICH) and 25 (25.5%) had a stroke of unknown origin. Infarcts were located in multiple sites, 82 in 271 patients (30.3%), 74 in the cortical area (27.3%), 12.2% in the cerebellum, and 11.1% in the subcortical area. The hemorrhagic sites were in the cortical area 33 in 98 patients (33.7%), 26.5% in the subcortical area, and 22.5% in the cerebellum (Table 2).

Seizures occurred in 58 (15.6%) of the 372 patients with stroke. In the present study of post-stroke seizures in 58 patients, generalized tonic-clonic seizures were the most common type (39.7%), followed by simple partial seizures and status epilepticus were 10.4% each. The classification of post-stroke seizures indicated that early post-stroke seizure occurred in 35 (60.3%) of 58 patients, and late post-stroke seizures in 17 (29.3%) of 58 patients.

In the group of early post-stroke seizure in 35 patients, 22 patients (62.9%) developed a seizure within the first 24 hours and 18 patients had a seizure at stroke onset (51.4%). Twenty-seven of the 58 patients in the seizures group developed recurrent seizures, 16 in 27 were early post-stroke and 9 in 27 late post-stroke seizures. Two patients had seizures of unknown origin.

Patients with hemorrhagic stroke was a significantly associated factor of seizure ($p = 0.015$). Other factors, viz., stroke subtype, age, sex, DM, HT,

Table 1. Baseline characteristic of stroke patients

Feature	Number (n = 372)
Age, year	
Mean (SD)	58.9 (15.3)
Sex, No. (%)	
Male	218 (58.6)
Female	154 (41.4)
Underlying diseases	
Hypertension	176 (58.3)
DM	109 (36.1)
Dyslipidemia	54 (17.9)
Heart diseases	106 (35.1)
Malignancy	18 (5.9)
Other	78 (25.9)

Table 2. CT brain findings of 372 stroke patients

CT brain location	Stroke subtype	
	Ischemic (%)	Hemorrhagic (%)
Cortical area	74 (27.3)	33 (33.7)
Subcortical area	30 (11.1)	26 (26.5)
Cerebellum	33 (12.2)	22 (22.5)
Brain stem	5 (1.8)	6 (6.1)
Multiple site	82 (30.3)	6 (6.1)
No data	18 (6.6)	5 (5.1)

* 29 patients had normal CT-scan brain

heart diseases and malignancy were not significantly associated factors of seizure. Surprisingly, patients without dyslipidemia was a significantly associated risk factor of seizures (p = 0.0007) (Table 3). The authors found no statistically significant relationship (p = 0.1) between ICH and dyslipidemia.

In the present study, the recurrence of strokes was 16.4%, mostly once within 5 years. The length of time between the first and recurrent stroke averaged 2.07 years (± 2.27). In the present study, the overall mortality rate at the time of the present study was 39.5%, and 7.5% at 30 days and 22.8% at 1 year and post-stroke seizure was significantly associated with mortality.

Discussion

The results of the present study indicate that 15.6% of patients with stroke experienced seizures compared to the Seizures After Stroke Study (SASS)[3] in 2000, which found an 8.9% prevalence of post-stroke seizures. The reason for the difference with the present study is the exclusion criteria. The SASS excluded brainstem stroke, cerebellar stroke, AVM, and inflammatory vascular disease. Previous studies of post-stroke seizure had a prevalence range between 0.4 and 43%, depending on the population size and methodology[7].

The occurrence of early post-stroke seizures was similar to the studies by Bladin et al[3] and Kilpatrick et al[8]. The types of seizures in the present study were different from other studies; such as those done by Giroud et al[9], Bladin et al[1], Lamy et al[10] and Kilpatrick et al[8]. The cause for the differences may be that the present study was a retrospective study with incomplete medical records.

Table 3. Associated factors of post-stroke seizure

Feature	Seizure (n)	Non-seizure (n)	p-value
Age, mean	55.13	57.9	0.83
Sex, male	34	87	0.89
Underlying diseases			
Hypertension	23	72	0.21
D M	15	47	0.37
Dyslipidemia	2	31	0.0007
Heart disease	22	47	0.43
Malignancy	2	8	0.42
Stroke type			
Ischemia	36	114	0.015
Hemorrhage	22	31	
Stroke subtype			
Cerebral thrombosis	20	79	0.055
Cerebral embolism	15	31	
Other ischemic stroke	1	3	
Hypertensive ICH	9	16	
Ruptured AVM	1	4	
Ruptured aneurysm	3	1	
Other hemorrhagic stroke	3	6	
Unknown ICH	6	4	
Stroke location			
Normal CT brain	2	11	
Cortical area	26	33	
Subcortical area	8	26	0.05
Cerebellum	6	28	
Brain stem	1	5	
Multiple sites	13	35	
Mortality			
Alive	27	104	<0.001
Dead	31	42	

* 2 patients had no data

So et al[7] found that patients with early post-ischemic seizures were nearly eight times more likely to develop late post-ischemic seizures, and approximately sixteen times more likely to develop epilepsy than patients without early seizures. Moreover, Bladin et al found that late post-stroke seizures were an independent risk for post-ischemic stroke epilepsy[1]. Thus, the data indicate that early post-stroke seizures are clearly associated with epilepsy.

The present study supported many studies in that intracerebral hemorrhage and a cortical area of stroke was associated with post-stroke seizures. The SASS[1] reported a two-fold increase in the risk of seizures in patients with hemorrhagic stroke (HR, 1.85) as well as a two-fold increase in risk if it was in the cortical area. Labovitz et al[11] found that intracerebral hemorrhage had a 2.4-fold greater risk than ischemic stroke.

In 2000, the prevalence of stroke among those 20 years of age and over was 690 per 100,000. A comparison of stroke prevalence with other countries in Asia indicated that stroke prevalence in Thailand was greater than in India but less than in Taiwan[12,13]. The present study revealed that the respective recurrent stroke rate at 1 and 6 months was 1.34 and 5.1%. Lovett et al reported that the respective recurrent stroke rate at 30 days and 3 months was 4.2 and 6.6%[14]. In Australia, Hardie et al found that the cumulative risk of first recurrent stroke in 10 years was 43%, with the greatest risk in the first 6 months after the first stroke[15].

The mortality rate at 30 days and 1 year was 7.5 and 22.8%, which is less than the study by Hardie et al, 22.3 and 36%, respectively[16]. In the study of East and Southeast Asians, Burke and Venketasubramanian found that the mortality rate at 28 days was 17.3%[13].

Conclusion

The prevalence of post-stroke seizures was higher than in previous studies but the associated factors of post-stroke seizures were similar.

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ความชุกของการชักหลังโรคหลอดเลือดสมองในโรงพยาบาลศรีนครินทร์

อนุพล พาณิชย์โชติ, สมศักดิ์ เทียมเก่า

วัตถุประสงค์*: การชักหลังโรคหลอดเลือดสมองในประเทศไทยยังไม่มีการศึกษา ดังนั้น วัตถุประสงค์หลักของผู้นิพนธ์คือการประเมินความชุกของการชักหลังโรคหลอดเลือดสมอง วัตถุประสงค์รองคือค้นหาปัจจัยที่สัมพันธ์กับการชักหลังโรคหลอดเลือดสมอง และอัตราตายหลังเกิดโรคหลอดเลือดสมอง*

วัสดุและวิธีการ*: การศึกษานี้เป็นการศึกษาวิจัยย้อนหลังเชิงพรรณนา ประชากรเป้าหมายคือผู้ป่วยโรคหลอดเลือดสมองที่เข้ารักษาในโรงพยาบาลศรีนครินทร์ ระหว่างปี พ.ศ. 2543 ถึง พ.ศ. 2547 ผู้ป่วยที่เข้ามาในการศึกษาต้องมีอายุตั้งแต่ 15 ปี ขึ้นไป ผู้นิพนธ์ทบทวนเวชระเบียน แบบสอบถามทางไปรษณีย์ และการสัมภาษณ์ทางโทรศัพท์*

ผลการศึกษา*: ประกอบด้วยผู้ป่วยโรคหลอดเลือดสมอง 372 คน ในจำนวนนี้ร้อยละ 15.6 มีภาวะชักหลังโรคหลอดเลือดสมอง ระยะเวลาติดตามการรักษาอย่างน้อย 5 ปี โดย generalized tonic-clonic seizures เป็นชนิดของการชักที่พบมากที่สุด ช่วงเวลาหลังจากเกิดโรคหลอดเลือดสมองจนถึงการชักส่วนใหญ่ ร้อยละ 60.3 เกิดภายใน 2 สัปดาห์ (การชักระยะแรกหลังเกิดโรคหลอดเลือดสมอง) ปัจจัยที่สัมพันธ์กับการชักหลังโรคหลอดเลือดสมอง ได้แก่ การไม่พบภาวะไขมันในเลือดผิดปกติ ($p = 0.0007$) โรคหลอดเลือดสมองแตก ($p = 0.015$) และตำแหน่งพยาธิสภาพ ที่อยู่บริเวณ cortex ($p = 0.05$) อัตราการตายในช่วงที่ทำการศึกษาพบร้อยละ 39.5 โดยอัตราการตายที่ 30 วัน ร้อยละ 7.5 และ ที่ 1 ปี ร้อยละ 22.8*

สรุป*: ความชุกของการชักหลังโรคหลอดเลือดสมอง สูงกว่าการศึกษาในอดีตส่วนปัจจัยที่สัมพันธ์กับการชักหลังโรคหลอดเลือดสมอง คล้ายคลึงกับการศึกษาที่ผ่านมา*