Srithanya Screening Test for Epilepsy: A Short Version

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ABSTRACT

Objective: To develop a short version of the Srithanya screening tests for epilepsy.
Methods: A prospective study was carried out from September to December 2011. The 10 item- version of the Srithanya screening test was applied to 206 subjects. Item reduction by 7 statistical methods were used. Optimal cut off point by receiving operating characteristic curve (ROC) was calculated to compare areas under curve (AUC) of short form and other versions.
Results: There were 55 epileptic patients and 151 control cases who completed the questionnaire. The short version of 5 items (1, 2, 6, 8 and 10) were selected with these methods and experts' opinions. There were 1) loss of consciousness, during attack, 2) can't remember an event, 3) tongue bite, 4) confused after the attack and 5) told by other person about having epilepsy. The internal consistency was highly acceptable. The optimal cut off-score at 2 had sensitivity and specificity at 92.7 and 90.7% respectively.
Conclusion: The short version of the Srithanya screening test for epilepsy consisted of 5 items could detect people with both types of generalized seizure and complex partial seizure in a hospital setting,

Keywords: Epilepsy, screening

INTRODUCTION

Epilepsy is the most common disease of neurological disorders reported from the primary care setting of all WHO regions.[1] In 2010, data showed that only 50% of people with epilepsy living in low middle income countries accessed to treatment which varied from urban to rural areas of each country.[2] The proportion of people with active epilepsy who did not receive an appropriated treatment was defined as epilepsy treatment gap.[3] A treatment gap program has been initiated by WHO since 2005[4] and it needs information especially data from epidemiological study.

Only few epidemiological studies of epilepsy in Thailand have been done locally or hospital based.[5,6] The national survey by the Department of Mental Health was done in 1999.[7] A 26 -item questionnaire was used for screening and proposed a lifetime prevalence of epilepsy at 0.7%.[7] Screening questionnaires in community surveys were usually less than 10 items.[8-11] There has been no short validated-questionnaire available in Thailand to screen epilepsy in the community. Though the Srithanya screening test for epilepsy was published in 1994,[12] this questionnaire has been used only in psychiatric hospitals. This study aimed to reduce the items from this questionnaire in order to use in the community survey.

MATERIALS AND METHODS

The prospective study was carried out from July to December 2011 and approved by the ethical committee of Srithanya and Suanprung hospitals. Epileptic cases were known cases of epilepsy who attended the neurologic outpatient departments of Srithanya Hospital and Suanprung Hospital. Control cases were Srithanya hospital staff and other cases who attended at the neurologic clinic of Srithanya hospital. They were invited to complete the questionnaire by nursing staff. Clinical data such as age and diagnosis were collected. The instrument used was the Srithanya screening test for epilepsy which consisted of 10 items with a score of 1 for 'yes' on each of the 10 items. (Appendix) The sample size was estimated using a 95% CI of sensitivity at 90%±8%[12] for epileptic cases (n= 55 cases) and a 95% CI of specificity at 97%±3% for controls (n = 125 cases).

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TABLE 1. Demographic data of epileptic cases.

Diagnosis	Male	Female	Mean age (SD)	Age range	Total
G402 (complex partial seizure)	13	10	43.6 (17.7)	17-75	23
G403 (generalized seizure)	13	12	48.5 (15.9)	21-83	25
G40X (other seizure)	4	3	34.4 (16.5)	21-53	7
	30	25	44.7 (16.7)	17-83	55

To reduce the number of items, 7 statistical methods were applied.[13] 1) Cronbach's alpha if an item was deleted for internal consistency study. 2) Coefficient of variation (CV), items with CV ≥ 15% was deleted. 3) The co-efficient of correlation between each item and total items was calculated. High correlation was defined as rho >0.75. 4) Binary logistic regression by Wald's method selected significant items for the regression model.[14] 5&6) Items of sensitivity ≥80% or specificity ≥90% were selected. 7) Scoring by 5 experienced neurologists working more than 15 years by using 1-5 rating scale (5=most important, 1= least important) with a modified Delphi technique (2 rounds of scoring) for the final total score. Any item with a total score less than 18/25 was deleted. An item with ≥5 methods was selected for the short form and items with 4 methods were selected by experts' opinions.

Optimal cut off point by receiving operating characteristic curve (ROC) was calculated to compare the area under the curve (AUC) of the short form, experts' opinions and all 10 items.

RESULTS

There were 221 copies of the questionnaire returned, of these 206 (93.3%) were completed satisfactorily to analyze. The mean age was 42.7±14.6 years and 78 were male and 128 female.

The known cases of epilepsy were 55 cases of age between 17-83 years. The mean age was 44.7±16.7 years. More than half were diagnosed as generalized seizure (GTCS) according to the ICD-10 classification (Table 1).

There were 151 cases in the control group. The average age was 42.7±14.6 years. Most were female (103 cases). The clinical diagnoses of 47 subjects were hypertension, diabetes, dyslipidemia, dizziness, renal disease and Parkinson's disease at 25, 6, 5, 5, 3 and 3 cases respectively.

Item numbers 1, 9 and 2 were 3 in order were the most frequently positive answers respectively and item numbers 3 and 4 in order were the least frequently positive answers respectively. The process of item selection has been shown in Table 2. Item numbers 2 and 8 were selected with ≥5 methods, item numbers 1, 6 and 10 were selected by 4 methods and experts' opinions.

ROC, sensitivity, specificity, Cronbach's alpha, Pearson's correlation of the short form, expert opinion selection items and all items were compared. The short form had AUC at 0.94 and optimal cut off point at 2 score. The sensitivity and specificity were 92.7 and 90.7% respectively. (Table 3 and Fig 1)

At score 2, the short form detected G402 and G40X equally (21/23 cases), and all 7 cases respectively. (Table 4) It classified cases correctly at 91.7% (controls 144/151, cases 45/55).

TABLE 2. Process of item selection.

Item	α	%CV	Rho	LR	Expert	Result	Test	Case	Control	Sens	Spec	No. of methods keep
1	0.85[1]	24	0.83[1]	1	1	+	80	47	33	85.4[1]	78.1	4
						-	126	8	118	72.8,93.1	70.5,84.3	
2	0.84[1]	20	0.76[1]	1	1	+	56	45	11	81.8[1]	92.7[1]	6
						-	150	10	140	68.6,90.5	87.0,96.1	
3	0.87	6[1]	0.35	1		+	12	10	2	18.2	98.7[1]	3
						-	194	45	149	9.5,31.4	94.8,99.8	
4	0.86	6[1]	0.40			+	14	9	5	16.4	96.7[1]	2
						-	192	46	146	8.2, 29.3	92.0,98.8	
5	0.86	8[1]	0.45		1	+	18	12	6	21.8	96.0[1]	3
						-	188	43	145	12.2,35.4	91.2,98.4	
6	0.86	8[1]	0.48	1	1	+	19	13	6	23.6	96.2[1]	4
						-	187	42	145	13.7,37.3	91.2,98.4	
7	0.84[1]	15	0.67			+	37	27	10	49.1	93.4[1]	2
						-	169	28	141	35.5,62.8	87.8,96.6	
8	0.84[1]	18	0.75[1]	1	1	+	48	40	8	72.2	94.1[1]	5
						-	158	15	143	58.1,83.1	88.7,97.1	
9	0.86	20	0.65			+	57	30	27	54.5	82.1	1
						-	149	25	124	40.7,67.8	74.9,87.7	
10	0.84[1]	18	0.73	1	1	+	48	42	6	76.4	96.0[1]	
						-	158	13	145	62.7,86.3	91.2,98.4	4
	[1]0.88			*								

1 = selected item, ∝ = Cronbach's alpha, *p<.00, CV = coefficient of variation, LR = logistic regression, + = test positive, - = test negative, sens = sensitivity, spec = specificity
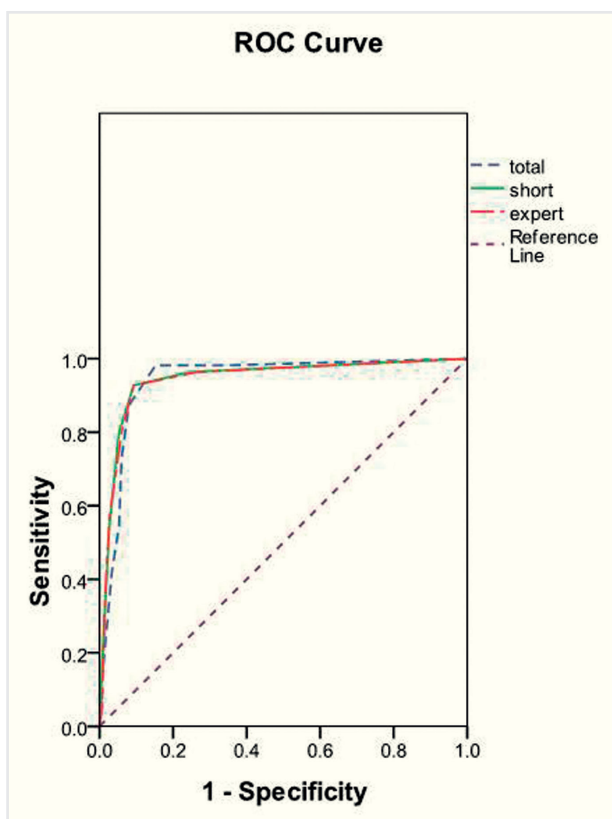
Fig 1. ROC

TABLE 4. Cut off score and diagnosis classified by each form questionnaire.

Item selection	Cut-off score	G402 (n=23)	G403 (n=25)	G40X (n=7)	N
Total	2	22	25	7	54
(10 items)	3	18	24	7	49
Short form	2	21	23	7	51
(1,2,6,8,10)	3	17	20	7	44
Expert	2	21	23	7	51
(1,2,5,6,8,10)	3	17	20	7	44

Item reduction can be done by different statistic methods.[13] Discriminate analysis and factor analysis were not appropriate to this study because of unequal dispersion matrices and one main symptom respectively. Cronbach's alpha coefficient was used to select items which had higher consistency. The short form had highly acceptable internal consistency which can be calculated the total score. Correlation, coefficient of variation and regression were based on statistically significant results which did not rely on knowledge theory whereas experts' opinions were based on clinical experience. Clinical experience was considered important for items which tended to meet statistical criteria such as items 1, 6 and 10.

At any cut off score, the short form had lower sensitivity than that of the full version, but the reverse for the specificity. However, the AUC of these 2 versions were equal which implied the same accuracy. For the community survey, user needed to be aware that there is a trade-off between sensitivity and specificity.

The short form consisted of 5 items i.e., item numbers 1, 2, 6, 8 and 10 which could identify epilepsy in a hospital setting. The validity and reliability were highly acceptable.

DISCUSSION

The Srithanya screening test for epilepsy was obtained from Placencia et al and Hoefnagels et al.[8,15] The current study showed different results of sensitivity and specificity from the previous published articles. These could explained by differences of control group who might experience syncope, dizziness from their illness i.e., hypertension, diabetes, Parkinson's disease. This questionnaire aimed to detect both complex partial seizure and generalized seizure. Comparing items with the 6 item questionnaire developed by Anand et al,[16] 3 items had close meaning to those of Srithanya's questionnaire, that is, item numbers 1,4 and 5 while other items were aimed to confirm symptoms of epilepsy. However, only item number 1 was retained by 4 methods. Lifestyle and culture might have an effect on the response from Thai people especially on item number 4 (loss of bowel or bladder control).

CONCLUSION

The short version of the Srithanya screening test for epilepsy consisted of 5 items, i.e., 1) loss of consciousness, during attack, 2) cannot remember an event, 3) tongue bite, 4) confused after the attack and 5) told by other person of having epilepsy which had high internal consistency. At the cut off score 2, it had sensitivity and specificity at 92.7% and 90.7% respectively. This questionnaire could detect people with either type of GTCS, complex partial seizure in a hospital setting.

TABLE 3. Correlation (r), Cronbach's alpha, AUC and sensitivity and specificity of each form.

Item	r,α	Cut-off Score	AUC (95%CI)	Case (N=55)	Control (N=151)	Sensitivity (95%CI)	Specificity (95%CI)
Total	1	1	0.94	54	99	98.2(89.0,99.9)	65.6(57.3,73.0)
(10 items)	0.87	2	(0.91,0.98)	54	128	98.2(89.0,99.9)	84.8(77.8,89.9)
		3		48	139	87.4(74.9,94.3)	92.1(86.2,95.6)
Short form	0.96,	1	0.94	53	114	96.4(86.4,99.4)	75.5(67.7,82.0)
(1,2,6,8,10)	0.85	2	(0.91,0.98)	51	137	92.7(81.6,97.6)	90.7(84.6,94.6)
		3		44	143	80.0(66.6,89.1)	94.7(89.5,97.5)
Expert	0.97	1	0.94	53	111	96.4(86.4,99.4)	73.5(65.6,80.2)
(1,2,5,6,8,10)	0.84	2	(0.90,0.98)	51	137	92.7(81.6,97.6)	90.7(84.6,94.6)
		3		42	142	76.4(62.7,86.3)	94.0(88.6,97.1)

r=Pearson's correlation, ∝ = Cronbach's alpha

Appendix

Questionnaire
You had ever lost of consciousness.
During loss of consciousness, you could not remember the event.
Before loss of consciousness, you had ever smelled peculiar odor.
During loss of consciousness, you had ever lost bladder or bowel control.
During loss of consciousness, you had ever gotten body injury.
During loss of consciousness, you had ever tongued bitten.
You fell down during loss of consciousness.
You had ever confused suddenly when you gained consciousness.
You had ever been told/ or felt limbs, face or body shaking which out of control.
You had ever been told of having epilepsy or convulsion.

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