Assessment of utility of Siriraj Stroke Score (SSS) in stroke patients of Pt. BD Sharma PGIMS hospital, Rohtak, India

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Abstrak

India mempunyai populasi rural yang mayoritas miskin, di mana pemeriksaan CT-scan otak yang paling sering dianjurkan pada pasien stroke tidak selalu tersedia, sehingga para dokter India dalam membangun diagnosis seringkali harus mengandalkan hasil evaluasi gejala klinik yang dapat dilakukan dengan menggunakan SSS (Siriraj Stroke Score). ***Obyektif penelitian:*** *untuk menilai kegunaan SSS pada pasien stroke.* ***Metodologi:*** *sejumlah 60 pasien stroke dievaluasi menggunakan SSS dan perkiraan diagnosis dibuat dan kemudian dibandingkan dengan diagnosis pasti hasil pemeriksaan CT-scan otak.* ***Penemuan utama:*** *dengan menggunakan SSS, diagnosis perkiraan ialah: infark otak (SSS < - 1) pada 32 subyek, perdarahan otak (SSS > + 1) pada 24 subyek, sedangkan 4 subyek tak dapat ditentukan diagnosisnya (SSS di antara –1 dan +1). Limapuluh subyek dengan diagnosis perkiraan dipasangkan dengan hasil diagnosis pasti menggunakan CT-scan. Hasilnya menunjukkan bahwa SSS mempunyai sensitifitas 93,7%, spesifisitas 76,6%, nilai prediksi positif 81,2%, nilai prediksi negatif 92% dengan akurasi keseluruhan sebesar 93,7% untuk diagnosis infark otak. Untuk pasien dengan perdarahan otak, sensitifitas 83,3%, spesifisitas 92,5%, nilai prediksi positif 86,8%, nilai prediksi negatif 92,5% dengan akurasi keseluruhan 83,3%.* ***Kesimpulan utama:*** *bagi para dokter di daerah rural, SSS tampaknya cukup berguna dalam penatalaksanaan stroke, terutama bila pemeriksaan radiologi yang lebih canggih untuk penetapan diagnosis tidak tersedia oleh karena harga tak terjangkau atau apabila transportasi ke tempat pemeriksaan CT-scan terdekat berisiko tinggi bagi pasien.* ***(Med J Indones 2001; 10: 164-8)***

Abstract

India has predominantly poor rural population where brain CT scan, most often advised investigation in patients of stroke, may not always be available, hence Indian physician in such setting base his diagnosis on bed side sign evaluation for which Siriraj Stroke Score (SSS) could be helpful. ***Objective of study:*** *to assess the utility of SSS in patients of stroke.* ***Methodology:*** *sixty subjects of stroke were evaluated on SSS and 'probable' diagnosis so made was compared with CT scan's (brain) 'certain' diagnosis.* ***Main findings:*** *by using SSS, the probable bedside diagnosis was cerebral infarct (score < -1) in 32 subjects and cerebral haemorrhage (score > +1) in 24 subjects while 4 subjects had indeterminant score (-1 to +1). Fifty subjects had their probable diagnosis matched with brain CT scan certain diagnosis. The above findings showed that SSS had 93.7% sensitivity, 76.6% specificity, 81.2% positive predictive value, 92% negative predictive value with an overall accuracy as 93.7% for diagnosis of cerebral infarction. For patients of cerebral haemorrhage the sensitivity was 83.3%, specificity was 92.5%, positive predictive value was 86.9%, negative predicitive values was 92.5% with overall accuracy as 83.3%.* ***Principal conclusion:*** *physicians in the rural settings may find SSS to be quite useful in the management of stroke especially where more sophisticated radiological investigations may not be available for confirmation of diagnosis due to high cost or attended due to transportation risk.* ***(Med J Indones 2001; 10: 164-8)***

Keywords: stroke, cerebrovascular accident, infarction, haemorrhage

WHO has defined stroke as "rapidly developing clinical signs of focal or global disturbance of cerebral function, lasting for more than twenty four hours or leading to death, with no apparent cause other than vascular origin."[1] The disturbance of cerebral function due to vascular cause could be caused by three morphological abnormalities i.e. (a) stenosis (b) occlusion or (c) rupture of arteries.[1] The net neurological defect depends upon the extent of site of the area involved along with underlying cause. Cerebral infarction accounts for approximately 80% of the stroke as opposed to 9-15% due to intracerebral bleed.[2]

The bedside clinical diagnosis of the pathology of stroke (haemorrhage and infarction) is difficult to make by clinical features alone due to unreliability of these symptoms. Still various authors have suggested bedside scoring system for easy but correct evaluation.

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Guy's Hospital score based on eight variables but requiring cumbersome calculations showed that 89% of cerebral infarction and 55% of cerebral haemorrhage could be correctly diagnosed at bed side.[3] von Arbin's study showed 69% correct bed side diagnosis.[4] Similarly, Siriraj Stroke Score (SSS) was postulated to distinguish supratentorial intracerebral haemorrhage from infarction at Bangkok using thirteen clinical variables and simple calculations showed sensitivity of 89.3% for cerebral haemorrhage and 93.2% for bedside diagnosis of cerebral infarct.[5]

Radiological investigations have been quite useful in establishing the cause of stroke i.e. occlusion or haemorrhage. Head CT scan allows the accurate diagnosis between the above two main groups but may miss small lesions especially of posterior fossa or if attempted early (less than 12 hours) of stroke.[6]

But majority of patients of stroke especially in developing countries continued to be managed by physicians who do not have an easy access to these radiological facilities. Hence clinical diagnosis in most circumstances is only more or less "probably correct". This study is therefore to look for utility of Sisiraj Stroke Score (SSS) as a clinical bed side method for assessing the "most probable" etiological diagnosis by information available at patients bedside which could be quite helpful in developing countries like ours.

METHODS

Sixty consecutive patients of stroke (as per WHO criteria[5]) admitted in medical wards of Pt. B.D. Sharma PGIMS, Rohtak were included in the present study. However, those with evidence of severe hepatic, renal or pulmonary diseases were excluded from the study. Patients' history of both past and present illness were taken in detail along with complete clinical examination (including fundus). Based on the above clinical profile, Siriraj Stroke Score (Table 1) was applied for making a clinical diagnosis of type of stroke.

Brain CT scan (within forty eight hours of admission but not less than twelve hours of episode) of all patients included in the study was than done. Radiological diagnosis obtained on CT scan of every patient included in the study was compared to clinical diagnosis made by SSS.

Table 1. Siriraj stroke score

SSS = 2.5 (consciousness) + 2 (vomiting) + 2 (headache) + 0.1 (diastolic blood pressure) - 3 (atheroma) – 12.

Where,

		Point
(a) Consciousness:	alert →	0
	drowsy & stupor →	1
	semi-coma and coma →	2
(b) Vomiting/headache: within 2 hours	No →	0
	Yes →	1
(c) Atheroma/diabetic history, angina, peripheral claudication	None →	0
	One or more →	1

If SSS is	
> 1	diagnosis of cerebral haemorrhage
< -1	diagnosis of cerebral infarction
-1 to 1	uncertain diagnosis

All the data collected were then analysed by standard error method and 'Z' test.

RESULTS

The present study was undertaken in the medical wards of Pt. B.D. Sharma PGIMS, Rohtak which included sixty subjects of stroke.

Demographic data

The mean age of the patients in the present study was 58.05 ± 14.8 years with youngest being 20 years of age and oldest being 82 years of age.

The male: female ratio was 3 : 1 (Table 2).

Tabel 2. Showing age/sex distribution

Age (in years)	Male	Female	Total
< 40	3	2	5
41-60	15	3	18
61-80	25	8	33
80 and above	2	2	4
	45	15	

Risk and symptoms profile

Table 3 shows the risk factor profile seen in the present study.

Hypertension were seen in 23 patients, 6 patients had evidence of previous stroke, two patients had evidence of mitral valve rheumatic heart disease, three each had evidence of ischaemic heart disease and diabetes. None had evidence of intermittent peripheral claudication.

Table 3. Showing risk factor profile

Risk factor	Patients	
	Number	Percentage
Hypertension	23	36.7
Previous stroke		
CVA	4	6.6
TIA	2	3.3
Rheumatic heart disease	2	3.3
Atheroma marker		
(a) Peripheral claudication	None	0
(b) IHD	3	5
(c) DM	3	5

Clinical profile

Table 4 shows clinical profile used for SSS scoring.

Table 4. Showing clinical parameters

Clinical parameter	Patients	
	Number	Percentage
1. Level of consciousness		
Consciousness	31	51.7
Stuporous	9	15
Coma/Semicoma	20	33.3
2. Symptoms of		
Headache	15	25
& Vomiting	12	20
Both	9	15
Seizure	3	5
3. Blood pressure reading		
SBP (> 140 mm of Hg)	39	65
DBP (> 100 mm of Hg)	36	60
Both elevated	23	38.3

Siriraj Stroke Score

Table 5 shows SSS aplication in the present study.

The average SSS of all patients was found to be +0.26 $\pm$ 0.48. As per SSS, 32 patients had a score of less than one i.e. cerebral infarct whereas 24 patients had a score of more than one i.e. cerebral haemorrhage while 4 patients had an indeterminate score. The average score of those having cerebral infarct as per SSS was -2.08 $\pm$ 0.24 while those diagnosed as cerebral haemorrhage was +3.77 $\pm$ 0.47.

CT Scan results

Thirty seven patients (61.67%) were found to have intracerebral infarction and 23 patients (38.33%) were found to have intracerebral bleed after CT scan (Table V).

Tabel 5. Showing SSS and CT scan results

Score	Patients	
	Number	Percentage
1. Siriraj Stroke Score		
Score		
< -1	32	53.33
> +1	24	40.00
-1 to +1	4	6.67
2. CT scan		
Infarct	37	61.67
Haemorrhage	23	38.33

Comparison of SSS vs CT scan

Of the 60 patients, 50 patients (83.3%) had matched diagnostic finding of SSS and CT scan brain. Of these 50 patients, 30 (50%) had evidence of cerebral infarct and 20 (33.3%) had evidence of cerebral haemorrhage (table 6).

Table 6. Showing comparative results of SSS and CT scan

SSS & CT Scan	Infarct	I/C Bleed	Total
Matched	30	20	50
Unmatched	7	3	10

Only in 10 patients (16.6%) the bed side 'probable' diagnoses with SSS did not match radiological 'certain' diagnosis of CT scan. Of these, 4 patients

were in indeterminate range, 2 patients of probable cerebral infarct and 4 patients of cerebral haemorrhage on SSS were otherwise proved by CT scan.

Based on the above finding, for cerebral infarct, the sensitivity was 93.75%, specificity 76.66%, overall accuracy was 93.7%, positive predictive value 81.2% and negative predictive value 92%, by using SSS. For patients of cerebral haemorrhage, the sensitivity was 83.3%, specificity was 92.5%, overall accuracy was 83.3%, positive predictive value as 86.9% and negative predictive value as 92.5%.

Mortality data

A total of 16 patients (16.6%) expired during hospitalisation. Of these, 7 were with cerebral infarct and 9 were with evidence of cerebral haemorrhage. Amongst them, 10 patients expired due to raised intracranial tension and its effect while the remaining 6 had developed aspiration pneumonia and its complication as cause of death.

DISCUSSION

Stroke ranks foremost among the disorders of CNS and it is the third main cause of death after IHD and cancer in the present time.[1] In order to reduce mortality in stroke, prompt and correct diagnosis of pathological type and early institution of therapy thereupon helps. Brain CT scan (a non-invasive method) is quite helpful in differentiating intra-cerebral bleed from infarction. This facility is still not always available countrywide in India specially in rural settings. So the dealing physicians is generally dependent upon a reliable history and bedside clinical examination for making a 'probable' diagnosis. In this regard, based on clinical presentation SSS may be a good bedside tool to differentiate cerebral haemorrhage from infarct.[1,5]

The present study has shown sensitivity of SSS for cerebral haemorrhage to be 83.3%. This has been reported to be varying from 39 to 92% by various authors and 69 to 92% in various Indian studies (Table 7).[4,7-13] The specificity of SSS for cerebral haemorrhage was 92.5% which has been reported by various authors as 61 to 94% and by Indian studies as 73 to 82%.[4,7-18] Based on these values various authors have shown positive predictive value of SSS for cerebral haemorrhage varying from 32 to 65%.[4,7-18] In the present study it was found to be 86.9% for cerebral haemorrhage.

Table 7. Showing comparison of results based on SSS in stroke

Name of study and year	Intracerebral bleed (%)			Cerebral infarction (%)		
	Sensitivity	Specificity	PPV	Sensitivity	Specificity	PPV
von Arbin (1981)[4]	39	92	32	83	67	88
Hawking (1994)[7]	48	85	59	61	74	84
Weir (1994)[9]	68	64	84	-	-	-
Butterworth (1994)[10]	54	61	64	-	-	-
Cellani (1994)[8]	61	94	71	69	81	93
Kochar (1999)[2]	85	73	71	73	85	71
Ghosh (2000)[11]	69	82	76	74.4	74	80
Dhar (2001)[13]	92	-	-	87	-	80
Present study	83.3	92.5	86.9	93.75	76.6	81.2

For the cerebral infarction group, the sensitivity was 93.7% using SSS. Various authors have found sensitivity of SSS of cerebral infarction to vary from 61 to 87% whereas Indian studies in particular have shown it to vary from 73 to 87%.[4,7-18] The specificity for cerebral infarction was found to 76.6% by using SSS. Specificity of SSS for cerebral infarction has been shown to be 67 to 85% by various authors and 74 to 85% by Indian studies (in particular).[4,7-16] The positive predictive value varies from 71 to 93% in these studies which was 81.2% in the present study (table 7).[4,7-18]

Thus to summarise this study has shown that Siriraj Stroke Score is an important bed side tool in the hands of physicians which help in differentiating cerebral haemorrhage and cerebral infarct without adding any extra cost to the patients. As the overall accuracy of SSS in the present study was 83.3% for cerebral haemorrhage and 93.7% for cerebral infarction, so it may be concluded that physicians in the periphery rural settings may find SSS to be quite useful in the management of patients of stroke especially where more sophisticated radiological investigations for confirmation of stroke diagnosis may not be avaiable due to high cost or attended, due to transportation risks. The present study reaffirms the high accuracy of diagnosis made by using SSS for differentiation of two pathological type at bed side in patients of stroke.

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