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ORIGINAL RESEARCH

A Study to Find Out the Accuracy of Siriraj Stroke Score (SSS) System in Classifying Clinical Type of Stroke and Correlation of Siriraj Score Diagnosis with CT scan

[1]Anjum Joban, [2]Sohail Badi

[1]Consultant Physician, Mission Trust Hospital, Kim, Surat, Gujarat, India
[2]Consultant Spine Surgeon, Saurashtra Spine and Pain Hospital, Rajkot, Gujarat, India

Correspondence:
Anjum Joban
Consultant Physician, Mission Trust Hospital, Kim, Surat, Gujarat, India
Email: dranjumjoban@gmail.com

ABSTRACT

Introduction: Stroke is associated with up to 5.54 million deaths every year, two thirds of which occur in resource poor countries. Non-contrast computed tomography (CT) scan is the gold standard for distinguishing stroke sub-types. It is cheaper than Magnetic Resonance Imaging (MRI) but is still expensive and inaccessible for most resource poor settings. To overcome these difficulties and to enhance clinical bedside diagnosis, clinical stroke scores have been developed. Hence, the present study was undertaken to assess accuracy of Siriraj score system in classifying clinical type of stroke and correlation of Siriraj score diagnosis with CT scan.

Materials and Methods: The present cross-sectional study comprised of 100 patients admitted in the Department of Medicine cases of acute strokes and were studied in accordance with SSS and sensitivity and specificity of SSS for infarction and haemorrhage was tested against the computerised brain scanning (CT) as a gold standard. Siriraj Stroke Scoring was applied. For statistical analysis of the study, X^2withk<0.5 and a P value<0.01 was considered as significant value.

Results: In our study we found that out of 100 patients around 70% patientshad SSS<1 stating infarct, 5% patients had SSS -1 - +1 stating uncertain and in 25% patient significant rise of SSS>1 denoting haemorrhage. Out of 100 cases we found that SSS was 89% efficientin figuring out haemorrhagic stroke and 96% in case of Ischemic stroke. As chi-square value was <0.5and*p*-value was <0.01, our study revealed significant efficiency of SSS in classifying stroke type in patients which is88%in case of haemorrhagic and 95%incaseofischemic.

Conclusion: This study showed that SSS is fairlyreliable in differentiating acute ischemic strokefrom acute haemorrhagic stroke, but efforts shouldbe made by the government and other agencies to make neuro imaging available and affordable in resource poor settings, as critical decisions cannot be made in acute stroke without imaging. Neuro imaging remains the gold standard in diagnosing stroke types.

Keywords: Haemorrhagic stroke; Ischemic stroke; Siriraj stroke score (SSS) system.

INTRODUCTION

Stroke is associated with up to 5.54 million deaths every year, two thirds of which occur in resource poor countries (RPC).[1] It has two main subtypes, ischemic and haemorrhagic.For optimal management, a distinction must be made between the subtypes since the therapy is

different. Ischemic stroke warrants institution of thrombolytic and/or antiplatelet therapy while in haemorrhagic stroke, haemostatic therapy may be given.[2] Ideally, either thrombolytic or haemostatic therapy should be given soon after the onset of stroke in order to improve outcome.

Non-contrast computed tomography (CT) scan is the gold standard for distinguishing stroke sub-types. It is cheaper than Magnetic Resonance Imaging (MRI) but is still expensive and inaccessible for most resource poor settings. To overcome these difficulties and to enhance clinical bedside diagnosis, clinical stroke scores have been developed. The most commonly used ones include the Guy's hospital score (GHSS),the Besson score,the Greek stroke score and the Siriraj stroke score (SSS).[3] In developing these scores, clinical variables that could potentially distinguish ischemia from haemorrhage in patients with acute stroke were used.

While these scores are not more accurate than neuro-imaging, they are simple, cheap and practical. However, their true accuracy and value in the diagnosis of stroke in resource poor settings remains unknown. Hence, the present study was undertaken to assess accuracy of Siriraj score system in classifying clinical type of stroke and correlation of Siriraj score diagnosis with CT scan.

MATERIALS AND METHODS

The present cross-sectional study comprised of 100 patients admitted in the Department of Medicine at C.U. SHAH Medical College and admitted and diagnosed as stroke cases. The study was initiated after obtaining ethical approval from the institutional ethical committee. The participants were selected by convenient sampling after receiving informed and written consent from them. Inclusion criteria comprised in-patients presenting with following signs:

- Unilateral or bilateral motor impairment (including dyscoordination)
- Unilateral or bilateral sensory impairment
- Aphasis/dysphasis (non-fluent speech)
- Hemianopia (half-sided impairment of visual fields)
- Perception deficit of acute onset
- Ataxia of acute onset
- Dysarthria (slurred speech)

and those patients in whom CT Scan brain was done as well as those patients/Relatives who gave consent to participate in the study. Exclusion criteria comprised of patient presenting causes of stroke other than cerebrovascular stroke, patient presenting with repeated/recurrent stroke and patient/relative unwilling to participate in the study. Investigation carried were CT scan of Brain.One hundred (100) consecutive cases of acute strokes were studied in accordance with SSS and sensitivity and specificity of SSS for infarction and haemorrhage was tested against the computerised brain scanning (CT) as a gold standard. Siriraj Stroke Scoring was applied.For statistical analysis of the study, X^2withk<0.5 and a *p*-value<0.01 was considered as significant value.

RESULTS

It was found that out of 100 patients around 70% patients had SSS<1 stating infarct, 5%patients had SSS -1to+1 stating uncertain and in 25%patient significant rise of SSS>1 denoting haemorrhage (table 1).

It was found that out of 100cases we found that SSS was 89% efficient in figuring out haemorrhagic stroke and 96% in case of Ischemic stroke (table 2).

In our study the relevant factors include the various variables for calculation of SSS in a manner as stated in the table 3.

As per our study stating in the above table the value of X^2 revealed a significant range of k<0.5 and a P value<0.01 showing good efficiency of SSS in classifying stroke type in

patients which is 88% in case of haemorrhagic and 95% in case of ischemic (table 4).

Table 1: Siriraj stroke scoring in patients

Siriraj Stroke Score	Siriraj Stroke Score Cases
< -1	70
-1 to +1	5
> +1	25
TOTAL	100

Table 2: Comparing result of siriraj stroke scoring with CT brain

Siriraj stroke score	CT brain		Total P value 0.0001
	Haemorrhagic stroke	Ischemic stroke	
Haemorrhagic stroke	23	4	27
Ischemic stroke	3	70	73
Total	26	74	100

Table 3: Patients characteristics and included variables

	Haemorrhagic n (%)		Infarct n (%)		Total n (%)	
Gender						
Male	14	53.85	50	67.57	64	64
Female	12	46.15	24	32.43	36	36
Level of consciousness						
Alert	4	15.38	69	93.24	73	73
Semiconscious	14	53.85	3	4.05	17	17
Comatose	8	30.77	2	2.70	10	10
Vomiting						
Yes	22	84.62	5	6.76	27	27
No	4	15.38	69	93.24	73	73
Headache at onset						
Yes	26	100.00	74	100.00	100	100
No	0	0.00	0	0.00	0	0
Atheroma Markers						
Yes	17	65.38	64	86.49	81	81
No	9	34.62	10	13.51	19	19

Table 4: SSS classification into stroke types in patients with CT confirmed diagnosis of stroke:

SSS Diagnosis	CT Haemorrhage	CT Ischemia	Total	X2	P Value	Se %	Sp%	PPA %
SSS Haemorrhage	23	4	27	26.2	<0.01	(23/26) 88	(70/73) 96	(23/27) 85
SSS Ischemia	3	70	73			(70/74) 95	(23/27) 85	(70/73) 96
Total	26	74	100					

Se:Sensitivity; Sp:Specificity; PPA: Positive predictive accuracy

DISCUSSION

In our study Siriraj Stroke Score was more specific for identification of ischemic stroke with higher specificity and positive predictive value. Sensitivity was more for haemorrhagic stroke with higher negative predictive value as compared to ischemic stroke. Studies conducted to

validate the Siriraj Stroke Score had variable results. A Meta-analysis of different studies shows sensitivity for ischemic stroke ranged from 30% to 85% while specificity ranged from 36%
to97%.[4]KolapoKetal[5]inastudyfound71%sensitivityand63%specificityforischemicstroke,where as positive predictive value was 91% for ischemic stroke in their study. Specificityis bit high in our study as compared to this study, but sensitivity and positive predictive value arec omparable. Another study conducted by Sherin A et al[6] showed 78% sensitivity,90% specificity and positive predictive value of 94.73%. This is whatwe noted in our study also. Siriraj Stroke Score is not accurate enough to diagnose and start the treatment of ischemic stroke.

Sensitivity and specificity of Siriraj Stroke Score for haemorrhagic stroke is also different in different studies. In another study,[7] it was concluded that sensitivity and specificity of Siriraj Stroke Score is 68% and 64% respectively for intra cerebral hemorrhage. These Findings are comparable with our results. These findings suggest that it is difficult to rule out haemorrhagic stroke confidently to give thrombolytic therapy or to start anti platelet therapy on the basis of Siriraj Stroke Score. Another study showed sensitivity of 84% and specificity of 89%.[5]Ourresults are matching with these findings. Study conducted by Islam SS etal[8] also showed very high sensitivity and specificity for hemorrhagic stroke; 90%and 92%respectively. A study conducted at Ayub Medical College showed sensitivity of only 52% for intra cerebral hemorrhage.[9] Another study showed sensitivity of 68% and specificity of94%.[6]

Some studies done on validation of SSS proposed that stroke score may be used to distinguish ischemic from haemorrhagic stroke at places where neuro imaging is not available.[4,10] However, other studies recommend though stroke scores may be helpful in differentiating acute ischemic stroke from acute haemorrhagic stroke, but critical decisions for initiation of therapy cannot be made without neuro imaging.[11-13]

CONCLUSION

This study showed that SSS is fairly reliable in differentiating acute ischemic stroke from acute haemorrhagic stroke, but efforts should be made by the government and other agencies to make neuro imaging available and affordable in resource poor settings, as critical decisions cannot be made in acute stroke without imaging. Neuro imaging remains the gold standard in diagnosing stroke types.

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