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ORIGINAL ARTICLE

Greek stroke score, Siriraj score and Allen score in clinical diagnosis of intracerebral hemorrhage and infarct: validation and comparison study

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1 | INTRODUCTION

Stroke is the second leading cause of death world wide and a major cause of disability in the elderly.

Optimal patient management largely depends on whether stroke is hemorrhagic or ischemic.

CT scan is not available everywhere hence the study was carried out for the options.

This study aims at differentiating ischaemic and haemorrhagic strokes at bedside by using clinical scoring systems and comparing with CT scan findings .

2 | MATERIALS AND METHODS

This is a prospective study involving 100 inpatients who were admitted with acute stroke.

INCLUSION CRITERIA

1. Stroke as defined by the WHO.(1)
2. Patient presenting within 48 hours of onset of illness & age above 20.

EXCLUSION CRITERIA

1. Patient with history of head injury / brain tumour/ space occupying lesions.
2. Patient with subarachnoid hemorrhage.

The following CT scan criteria taken for diagnosis of stroke-

Cerebral infarction – area of decreased attenuation / no change in attenuation within the cerebral substance.

Supplementary information The online version of this article (https://doi.org/10.15520/ijmhs.v10i07.3020) contains supplementary material, which is available to authorized users.

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TABLE 1:

Variable	Clinical Features	Score
Apoplectic Onset ● a.Loss of consciousness	One or none of these	0
b.Headache within 2 hour	Two or more	+21.9
c.Vomiting		
d.Neck stiffness		
Level of consciousness (24 hr after admission)	Alert	0
	Drowsy	+7.3
	Unconscious	+14.6
Plantar responses	Both flexor/single extensor	0
	Both extensor	+7.1
Diastolic blood pressure (24 after admission,in mm of Hg)		+ (BP x 0.17)
Atheroma markers (Angina, claudication, DM)	None	0
	One or more present	-3.7
History of hypertension	Not present	0
	Present	-4.1
Previous event Transient ischemic event	None	0
	Any no. of previous event	-6.7
Heart disease	None	0
	Aortic or mitral murmur	-4.3
	Cardiac failure	-4.3
	H/O Cardiomyopathy	-4.3
	Atrial fibrillation	-4.3
	Cardiomegaly	-4.3
	MI within 6 months	-4.3
Constant		-12.6

Cerebral hemorrhage – areas of increased attenuation within the cerebral substance .

krishna CD et al., (above 60years). (3)

ALLEN STROKE SCORE

< 4 = Infarction 4-24=Equivocal

> 24=Hemorrhage

SIRIRAJ STROKE SCORE

- < -1 = Ischemic
- +1 to -1= Equivocal
- >+1 = Hemorrhage

GREEK STROKE SCORE

Number of points = 6*(neurological deterioration within 3hrs from admission)+4*(vomiting)

+4*(WBC > 12,000) + 3* (decreased LOC)

< 4 = Ischemic 4 to 10 = Equivocal

> 10 = Hemorrhage

3 RESULTS

- The present study was carried out with an objective to assess the validity and reliability of SSS, ASS, GSS to differentiate ischemic from hemorrhagic stroke in comparison with CT scan.
- In our study 70 were males and 30 females with M:F 2.3:1 was in accordance to study done by Mumtaz A M,et al in pakistan.(2)
- Maximum number of stroke cases were above 55 was in accordance to study done by krishna CD et al., (above 60years). (3)

4 | CONCLUSION

1.The maximum incidence of stroke was between 55 to 64 years of age, with M:F 2.3:1.

TABLE 2:

Parameters		Score
Level of consciousness		
	Alert	0
	Drowsy, Stupor	2.5
	Coma	5
Headache within 2 hrs of onset of event		
	No	0
	Yes	2
Vomiting		
	No	0
	Yes	2
Atheroma markers		
DM	None	0
Angina	One or more	-3
Ischemic heart disease		
Intermittent claudication		
Diastolicblood pressure		Value X 0.1
Constant		-12

TABLE 3: validation of stroke score

Score		CT Outcome			
		Hemorrha		Infarct(80)	
			%		%
Allen	infarct(<4)	4	20%	58	73%
	Equivocal(-1 to +1)	2	10%	18	23%
	Hemorrhage(>+1)	14	70%	4	5%
Siriraj	infarct(<4)	2	10%	64	80%
	Equivocal(-1 to +1)	0	0%	10	13%
	Hemorrhage(>+1)	18	90%	6	8%
Greek	infarct(<4)	2	10%	68	85%
	Equivocal(-1 to +1)	10	50%	10	13%
	Hemorrhage(>+1)	8	40%	2	3%

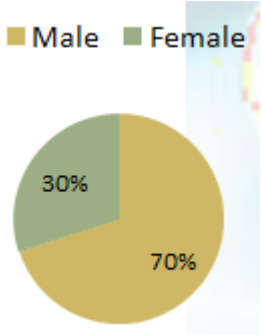

FIGURE 1: SEX Distribution

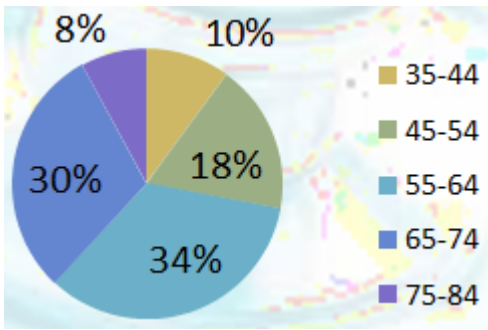

FIGURE 2: AGE DISTRIBUTION

TABLE 4: Impact patients

		CT SCAN				Sensitivity	Specificity	PPV
c		Infarct (80)		Hemorrha				
			%		%			
All	Infarct	58	70 %	4	10%	72.5%	80%	93.5 4%
	No Infarct	22	30 %	16	90%			
Sir	Infarct	64	80 %	2	10%	80%	90%	96.9 %%
	No Infarct	16	20 %	18	90%			
Gr	Infarct	68	80 %	2	10%	85%	90%	97.1 %%
	No Infarct	12	20 %	18	90%			

TABLE 5: Validation of stroke score in hemorrhagic Patients

		CT Scan				Sensiti ity	Specifi ity	PPV
		Hemorrha (20)		Infarct(80)				
			%		%			
Alle	Hemorrhage	14	70%	4	5%	70%	95%	77.7
	No Hemorrhage	6	30%	76	95%			%
Sirir aj	Hemorrhage	18	90%	6	7.5%	90%	92.5%	75%
	No Hemorrhage	2	10%	74	92.5%			
Gre ek	Hemorrhage	8	40%	2	2.5%	40%	97.5%	80%
	No Hemorrhage	12	60%	78	97.5%			

2. The sensitivity of infarction was more in Greek score (85%) compared to siriraj score (80%) and Allen score (73%),whereas the sensitivity for haemorrhagic stroke was more in Siriraj (90%) compared to Allen (70%) and Greek (40).

3. When clinician wishes to start antithrombotic treatment while waiting for CT scan results , they can relay on Siriraj stroke score as the sensitivity to detect hemorrhage is highest 90%. Hence it can be used as simple screening method.

4. History and clinical signs cannot accurately distinguish hemorrhage from ischemic stroke because of an unacceptable proportion of equivocal cases. Hence CT scan of head remains as gold standard diagnostic tool.

5 | REFERENCES

1. The global burden of cerebrovascular Disease by Thomas Truelsen , Stephen Begg, Colin Mathers.

C Scores		Siriraj						Kappa	p-value
		Infarct		Equivocal		Hemorrhage			
		N	%	N	%	N	%		
Allen	Infarct	35	76.1 %	28	77.8 %	1	5.5 %	0.612	\<0.001
	Equivocal	11	23.9 %	8	22.2 %	1	5.5 %		
	Hemorrhage	0	0 %	0	0 %	16	89.0 %		

FIGURE 4:

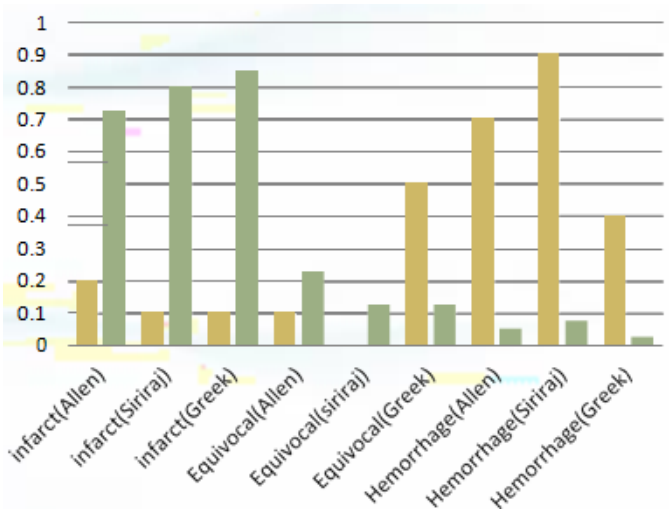

FIGURE 3: OBSERVATIONS OF STROKES SCORES

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Scores		Sir4iraj						Kappa	p-value
		Infarct		Equivocal		Hemorrhage			
		N	%	N	%	N	%		
Greek	Infarct	33	71.7%	29	80.5%	4	8.69%	0.365	<0.001
	Equivocal	13	28.3%	7	19.5%	8	39.13%		
	Hemorrhage	0	0%	0	0%	6	52.17%		

FIGURE 5:

Scores		Greek						Kappa	p-value
		Infarct		Equivocal		Hemorrhage			
		N	%	N	%	N	%		
Allen	Infarct	48	72.7%	16	57.2%	0	0.0%	0.487	<0.001
	Equivocal	13	19.7%	6	21.4%	1	16.7%		
	Hemorrhage	5	7.6%	6	21.4%	5	83.3%		

FIGURE 6: