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Original Research Article

To evaluate the Sensitivity and Specificity of the individual clinical signs and their combinations used in the diagnosis of Acute Cerebrovascular Stroke.

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Abstract:

Background & Method: The aim of the study is to evaluate the Sensitivity and Specificity of the individual clinical signs and their combinations used in the diagnosis of Acute Cerebrovascular Stroke. The controls included the relatives of the patients those who gave verbal consent to be included in the study, before including them as control, a brief history / workup was done to exclude any illness.

Result: Arm Weakness to the above parallel combination increases the sensitivity to 98.56% while specificity remains 100%. Further addition of clinical signs increases the sensitivity very minimally.

Conclusion: We also tried to calculate the sensitivity and specificity of combination of clinical signs. Parallel Combinations of the clinical signs is much more useful and efficient method than the series combination. When a parallel combination of 2 clinical signs viz. Facial Asymmetry and Hand Grip weakness is used to diagnose the Acute Stroke, then the combination has a sensitivity of 92.64% and specificity of 100%.

Keywords: Sensitivity, Specificity, clinical & ACS.

Study Designed: Observational Study.

1. Introduction

An ischemic stroke occurs when an artery supplying the brain with blood becomes blocked, suddenly decreasing or stopping blood flow and ultimately causing a brain infarction. This type of stroke accounts for approximately 80 percent of all strokes. Blood clots are the most common cause of artery blockage and brain infarction[1]. The process of clotting is necessary and beneficial throughout the body because it stops bleeding and allows repair of damaged areas of arteries or veins. However, when blood clots develop in the wrong place within an artery they can cause devastating injury by interfering with the normal flow of blood. Problems with clotting become more frequent as people age[2].

Blood clots can cause ischemia and infarction in two ways. A clot that forms in a part of the body other than the brain can travel through blood vessels and become wedged in a brain artery. This free-roaming clot is called an embolus and often forms in the heart. A stroke caused by an

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embolus is called an Embolic stroke[3]. The second kind of ischemic stroke, called a Thrombotic stroke, is caused by thrombosis, the formation of a blood clot in one of the cerebral arteries that stays attached to the artery wall until it grows large enough to block blood flow[4].
Ischemic strokes can also be caused by stenosis, or a narrowing of the artery due to the buildup of plaque (a mixture of fatty substances, including cholesterol and other lipids) and blood clots along the artery wall. Stenosis can occur in large arteries and small arteries and is therefore called large vessel disease or small vessel disease, respectively[5]. When a stroke occurs due to small vessel disease, a very small infarction results, sometimes called a Lacunar infarction, from the French word "lacune" meaning "gap" or "cavity."

2. Material & Method

This study was carried out in the Department of Medicine from Jan 2022 to Dec 2022 at Birsa Munda Government Medical College, Shahdol, total 100 subjects were included. Out of them, 50 subjects were those who fulfilled the inclusion criteria of the study and they were the patients with a possible diagnosis of Acute Cerebrovascular Stroke.
Another set of 50 healthy subjects were included as Control. The controls included the relatives of the patients those who gave verbal consent to be included in the study, before including them as control, a brief history / workup was done to exclude any illness.
Before being allowed to examine by the Raters, each patient was assessed for the Screening Criteria to rule out Stroke Mimics like Post-ictal state in Seizure disorders, Hypoglycemia, Trauma, Chronic illness superimposed by acute stressful conditions like infection.

INCLUSION CRITERIA

1. Patient who came within 24 hours of onset of symptoms.
2. Patient who had signs and symptoms pertaining to Stroke i.e. “Abrupt onset of neurological deficit that is attributable to a focal vascular cause”.

EXCLUSION CRITERIA

1. Patients with known Multi-system diseases or multi-organ failure where the symptomatology of stroke is confounded.
2. Patients with known severe / multiple metabolic abnormalities.
3. Patients with h/o head injury.

3. Results

TABLE 1: Age Distribution

Age	Cases	Controls	Total
45-55 years	18	12	30
55-65 years	16	24	40
> 65 years	16	14	30

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TABLE 2: DISTRIBUTION OF ACUTE STROKE CASES

	Infarction	Haemorrhage	Total
Conscious	22	3	25
Unconscious	12	13	25
Total	34	16	50

TABLE 3: OVERALL ANALYSIS

TOTAL SCORE	SENSITIVITY	SPECIFICITY	POSITIVE PREDICTIVE VALUE	NEGATIVE PREDICTIVE VALUE
=10	**-**	**100%**	**-**	**50%**
>9	**-**	**100%**	**-**	**50%**
>8	**4%**	**100%**	**100%**	**51%**
>7	**22%**	**100%**	**100%**	**56.1%**
>6	**38%**	**100%**	**100%**	**61.72%**
>5	**44%**	**100%**	**100%**	**64.1%**
>4	**68%**	**100%**	**100%**	**75.75%**
>3	**78%**	**100%**	**100%**	**81.96%**

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>2	**92%**	**100%**	**100%**	**92.59%**
>1	**100%**	**76%**	**80.64%**	**100%**

TABLE 4: SENSITIVITY AND SPECIFICITY OF CLINICAL SIGNS

S.NO	CLINICAL SIGN	SENSITIVITY	SPECIFICITY
1.	**BABINSKI SIGN**	**80%**	**76%**
2.	**FACIAL ASYMMETRY**	**54%**	**100%**
3.	**HAND GRIP WEAKNESS**	**84%**	**100%**
4.	**ARM WEAKNESS**	**82%**	**100%**
5.	**WRIST EXTENSOR WEAKNESS**	**84%**	**100%**
6.	**VISUAL SYMPTOMS**	**08%**	**100%**
7.	**SLURRING OF SPEECH**	**76%**	**100%**

4. Discussion

We can also conclude that incidence of unconsciousness was higher in cases with imaging findings of haemorrhage (52%) as compared to cases who had infarction in their imaging (12%).

The frequency of patients with impaired level of consciousness was significantly higher in the hemorrhage group as compared to the infarction group (59.3 % vs 3.8 %, $p < 0.001$). Unilateral weakness or sensory loss was observed more frequently in patients with infarction compared to hemorrhage (69.8 % vs 11.9 %, $p < 0.001$)[6].

Shows the sensitivity, specificity, positive predictive value and negative predictive value of different cut-off scores in total 100 subjects (50 cases + 50 healthy controls). From this table, it can be concluded that best results are obtained when the cut-off score is > 2. As the cut-off score is increased to > 3, sensitivity and negative predictive value decreases, which further decrease when the cut-off score is increased to > 4. Further increase in the cut-off score leads to a drastic decrease in the sensitivity and the negative predictive value. If the cut-off score is kept as > 1, the

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scale has maximum sensitivity and negative predictive value (100%), but at the cost of poor specificity (76%) and poor positive predictive value (80.64%)[7].
One reason for these observations may be that the maximum score for unconscious acute stroke cases is 4 and maximum number of true positives is 11 when a cut-off score of > 2 is used. But when the cut-off score in case of unconscious cases is increased to 4, there is a sudden decrease in the number of true positives with corresponding increase in the number of false negatives[8]. Another reason may be that the sample size is too small to comment on these aspects of the scale. And further studies may be required with a larger sample size to validate the hypothesis.

5. Conclusion

We also tried to calculate the sensitivity and specificity of combination of clinical signs. Parallel Combinations of the clinical signs is much more useful and efficient method than the series combination. When a parallel combination of 2 clinical signs viz. Facial Asymmetry and Hand Grip weakness is used to diagnose the Acute Stroke, then the combination has a sensitivity of 92.64% and specificity of 100%.

6. References

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