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Prevalence of Mortality and Morbidity in Ischemic versus Hemorrhagic Strokes using mSOAR Score

Dr. Rida Younis[1], Dr. Bashir A. Soomro[2], Dr. Hudaibiya Ayub[3], Dr. Maha Ali[4], Dr. Hira Fatima[5], Dr. Filza Qureshi[6]

[1]Neurology Resident, Dr. Ziauddin University Hospital Karachi Pakistan.
Email ID: Younisrida786@gmail.com
[2]Consultant Neurologist, Dr. Ziauddin University Hospital Karachi Pakistan.
Email ID: basoomro@gmail.com
[3]Neurology Resident, Dr. Ziauddin University Hospital Karachi Pakistan.
Email ID: ght2haty@gmail.com
[4]Neurology Resident, Dr. Ziauddin University Hospital Karachi Pakistan.
Email ID: mahaa16493@gmail.com
[5]Neurology Resident, Dr. Ziauddin University Hospital Karachi Pakistan.
Email ID: Hirazaidi1994@gmail.com
[6]Neurology Resident, Dr. Ziauddin University Hospital Karachi Pakistan.
Email ID: FilzahQ@gmail.com

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ABSTRACT

Background: Stroke is the second most common cause of mortality worldwide and it pose a significant threat to the population of low- and middle-income countries, including Pakistan. This study aims at determining the prevalence of Mortality and Morbidity in Ischemic versus Hemorrhagic Strokes using mSOAR Score presenting to a tertiary care hospital, Karachi Pakistan.

Methods: This comparative observational study was conducted from 20 March 2024 to 20 September 2024. After taking ethical approval from clinical research committee (CRC) and the ethical review committee (ERC) Ziauddin University Hospital Karachi (REF# 8470224RYNEU) The patients of either gender aged 18years and above presenting with stroke visiting the "Department of Neurology" Ziauddin hospital North Nazimabad were recruited by using non-probability consecutive sampling. An informed consent was taken from patients prior to data collection. The calculated "sample size" was found to be 248(124 in each group) by using Lin naing calculator. The data was collected by using a questionnaire. All the patients who are presented with stroke symptoms in emergency department had neuro-imaging either CT scan or MRI brain and this would be basic protocol of stroke patients. The findings of CT scan and MRI brain assessed stroke type (hemorrhagic or ischemic), size and site of stroke. Regarding clinical scores, mSOAR score was calculated. It is composed of the designated scores for each of the following 5 domains: stroke subtype, OCSP project classifications, age, mRS and NIHSS. The score of mSOAR is calculated by combining the score of the 5 domains. The "researcher" followed the patient during hospital stays and after discharge. The mortality and morbidity (mSOAR ≥4) of the patients were noted during hospital stay as well as after discharge. The patients were contacted by the researcher through telephonic contact from their index stroke from discharge till 3 months follow up to label mortality and morbidity (mSOAR ≥4). The data was analyzed by using SPSS version 22. The "Quantitative variables" age, GCS were presented in "mean" and "standard deviation. Percentages and frequencies were calculated for qualitative variables like gender, type of stroke, mortality and morbidity. The data was non parametric therefore Mann Whitney U test was used to find statistically significant difference between groups. $p \leq 0.05$ was taken as significant.

Result: The mean age of study subjects were 62.04±12.84. Group A (ischemic) has higher scores across all components of the GCS compared to Group B (hemorrhagic), suggesting better levels of consciousness in the ischemic group. Group A, more patients had lower mSOAR scores (≤4) (70 vs. 54) and (110 vs. 7), suggesting a potentially better prognosis during their hospital stay and three month follow up respectively. In Group B more patients had higher mSOAR scores (≥4) (95 vs. 29) at hospital stay and (70 vs. 26) at three months follow up; Hence group A showed better prognosis. There was statistically

a significant difference between groups at hospital stay and three months follow up(p=0.00 each). For mortality among Group A (Ischemic) 7 out of 124 patients (5.6%) died, in Group B (Hemorrhagic) 28 out of 124 patients (22.6%) died and overall mortality (combined groups) was found to be 35 out of 248 patients (14.1%). Regarding hospital stay morbidity, 75 out of 124 patients (60.5%) in Group A (ischemic) experienced morbidity whereas in Group B (Hemorrhagic) 112 out of 124 patients (90.3%) had morbidity during hospitalization. 17 out of 124 patients (13.7%) in Group A (Ischemic) experienced morbidity at the 3-month follow-up, 38 out of 124 patients (30.6%) in Group B (Hemorrhagic) experienced morbidity at the 3-month follow-up.

Conclusion: This study concluded that the prevalence of mortality and morbidity was more among group B (Hemorrhagic) as compared to group A(Ischemic). Hence group A had better prognosis.

Keywords: *Prevalence, Mortality, Morbidity, Ischemic stroke, Hemorrhagic Stroke.*

1. INTRODUCTION

Stroke is the second leading cause of death globally[1] and long-term disability as about 50% of stroke patients will experience chronic disability[2]. For stroke victims and their families, the psychological, social, and physical disabilities are upsetting. As a result, trustworthy recovery prediction tools will help healthcare professionals meet patient and family expectations[3]. Stroke, pose a significant threat to the population of low- and middle-income countries, including Pakistan[4]. When compared to other regions, South Asia stands out as a major contributor to the global stroke burden, with varying prevalence rates among different countries[3]. Stroke in South Asia exhibits distinct characteristics, including a higher prevalence rate, occurrence at a younger age, elevated mortality rates, increased burden of modifiable risk factors, and some lesser-explored non-conventional risk factors[5]. Hemorrhagic and ischemic strokes differ in terms of clinical presentation, outcome, and associated risk factors. Common risk factors that contribute to variations in manifestation and outcome of stroke types include atherosclerosis[6], atrial fibrillation[7], hyperlipidemia[8], hypertension[9], and diabetes[10]. These risk factors are more prevalent in ischemic strokes compared to hemorrhagic strokes[11].

Presently, treatment choices are restricted, and even if patients survive the “acute phase” and are discharged from intensive care, they frequently encounter persistent paralysis and cognitive impairment, requiring prolonged rehabilitation[12]. As a result, the identification of “risk factors” for adverse “outcomes” in “critically ill stroke patients” becomes essential for enhancing patient care and facilitating more precise prognosis estimation[13].

Numerous prognostic tools have been developed to forecast early mortality and disability following a stroke; however, some of these are complex and time-consuming[14].

The modified SOAR (mSOAR) score is simple and easily calculated prognostic tool[15]. It has been determined and proven to be a valid predictor of length of stay and mortality[3]. Previously, it was known as SOAR score and was used to predict mortality. The SOAR is an 8-point scale (0–7), which includes Stroke subtype (ischemic/hemorrhagic), Oxford Community Stroke Project classification, Age, and pre stroke modified Rankin score.[14,16,17]

The modified SOAR (mSOAR) score is simple and easily calculated prognostic tool that includes, National Institutes of Health Stroke Scale (NIHSS), age, pre-stroke modified Rankin score (mRS), stroke subtype, and Oxfordshire Community Stroke Project (OCSP) classification[15]. The OCSP predicts the site and size of cerebral infarction shown on CT with reasonable accuracy and the NIHSS scale was effective and reliable, especially in anterior acute strokes, but also emphasized the necessity of using the GCS assessment together with NIHSS in the first 24 h to show clinical disability and mortality, especially in PCI. This will be important in outcome analysis if the OCSP is used to stratify patients in clinical trials [18, 19]

Previous prognostic scoring systems for predicting post stroke prognosis were complex, required multiple measures that varied with time and failed to produce a simple scoring system that can be used in routine clinical practice. A simple 8-point clinical score is highly predictive of acute stroke mortality and length of hospital stay. It could be used as prognostic tool in service planning and to risk-stratify patients to use these outcomes as markers of stroke care quality across institutions[20,21]

In a recent study done by Hend Abdelghany, the research findings led to the conclusion that mSOAR serves as an outstanding and precise tool for forecasting disability severity at the time of hospital discharge and one month after experiencing a stroke[15]. This study also confirmed that mSOAR score is an excellent and accurate tool for predicting discharge disability requiring additional support and mortality. It is useful for admission prognosis discussions with patients and their relatives. Furthermore, it can aid the multidisciplinary team in decision making for early supported discharge or to alternative appropriate destinations[15].

Studies done on Chinese population; this study confirmed its efficacy in predicting mortality. The mSOAR score has a good ability for predicting the discharge mortality and 3-month mortality in Chinese patients with acute stroke. The mSOAR score

is a reliable and easy to use clinical instrument to predict mortality in acute stroke patients [22,23,24].

The rationale for comparing ischemic and hemorrhagic stroke mortality and morbidity with mSOAR scores lies in the need to understand and differentiate the outcomes of these two major types of strokes. Ischemic and hemorrhagic strokes have distinct underlying mechanisms and treatment strategies, leading to potentially different prognosis and functional outcomes for patients. The findings from this research can aid in tailoring personalized care plans for patients with ischemic and hemorrhagic strokes, leading to better overall stroke care and patient quality of life. This study aimed at determining the prevalence of mortality and morbidity by using mSOAR as prognostic tool among ischemic and hemorrhagic stroke patients.

2. METHODS

After taking ethical approval from clinical research committee (CRC) and the ethical review committee (ERC) Ziauddin University Hospital Karachi (REF# 8470224RYNEU) this comparative observational study was conducted from March 2024 to August 2024. The patients of either gender aged 18years and above presenting with stroke visiting the "Department of Neurology" Ziauddin hospital North Nazimabad were recruited by using non-probability consecutive sampling. Patients presenting with TIA, SAH, SDH, Epidural hemorrhages, history of acute trauma and patients who received tPa were excluded. An informed consent was taken from patients prior to data collection. The sample size was calculated by using Lin naing calculator. The prevalence of morbidity 57%[3] was used and the margin of error was taken as 8% and "confidence level" as 95%. The calculated "sample size" was found to be 248(124 in each group). The data was collected by using a questionnaire. The questionnaire constitutes demographic variables age, gender, type of stroke, any co-morbidity and GCS. All the patients who are presented with stroke symptoms in emergency department had neuro-imaging either CT scan or MRI brain and this would be basic protocol of stroke patients. The findings of CT scan and MRI brain assessed stroke type (hemorrhagic or ischemic), size and site of stroke. Regarding clinical scores, mSOAR score was calculated. It is a simple score that uses clinical and imaging data in the initial assessment of the patient. It is composed of the designated scores for each of the following 5 domains: stroke subtype (score 0 for ischemic infarction and 1 for hemorrhagic stroke) OCSP project classifications (score 0 for lacunar and partial anterior circulation, score 1 for posterior circulation, and score of 2 for total anterior circulation strokes), age (patients with age 65 years or less were given score 0, score 1 for age range from 66 to 85 years, and score 2 for patients aged more than 85years), mRS (mRS from 0 to 2 had score 0, mRS 3–4 had score1,and mRS 5 had score 2) and NIHSS (NIHSS 0–4 had score 0, NIHSS 5–10 had score 1, and NIHSS 11 or more had score 2). The score of mSOAR is calculated by combining the score of the 5 domains. The "researcher" followed the patient during hospital stays and after discharge. The mortality and morbidity (mSOAR ≥4) of the patients were noted during hospital stay as well as after discharge. The patients were contacted by the researcher through telephonic contact from their index stroke from discharge till 3 months follow up to label mortality and morbidity (mSOAR ≥4). The data was analyzed by using SPSS version 22. The "Quantitative variables" age and GCS were presented in "mean" and "standard deviation. Percentages and frequencies were calculated for qualitative variables like gender, type of stroke, mSOAR score, mortality and morbidity. Shapiro wilk test was applied to check for the normality of data. The data was non parametric therefore Mann Whitney U test was used to find statistically significant difference between groups. $p \leq 0.05$ was taken as significant.

3. RESULTS

Table 1 shows the mean age of study subjects were 62.04±12.84. The frequency distribution involving certain parameters showed out of total 248 study subjects Males were 172 (69.4%) and Females were 76 (30.6%). For **Co-morbidity** Diabetes Mellitus was found among 11 (4.4%), Hypertension 119 (48.0%), Hypertension and Diabetes was observed in 108 (43.5%) and other co-morbidities were reported among 10 (4.0%). **For type of Stroke** Right MCA Infarct was found in 43 (17.3%) followed by Right BG Bleed 31 (12.5%), Left MCA Infarct: 24 (9.7%), Left BG Bleed: 19 (7.7%), Left PCA Infarct: 16 (6.5%) and Left Thalamic Bleed: 13 (5.2%)

Table 1: Mean ± Std. Dev and frequency distribution of parameters

Parameters(n=248)		**N**	**%**
Gender	Male	172	69.4
	Female	76	30.6
Age	Mean±S.D	62.04 ± 12.84	
Co-morbidity	Diabetes Mellitus	11	4.4
	Hypertension	119	48.0

	Diabetes and Hypertension	108	43.5
	Others	10	4.0
Type of Stroke	Bilateral middle cerebral artery infarct	10	4.0
	Bilateral posterior cerebral artery and middle cerebral artery patchy infarct	2	.8
	Bilateral posterior cerebral artery infarct	5	2.0
	Left anterior cerebral artery Infarct	1	.4
	Left middle cerebral artery Infarct	24	9.7
	Left middle cerebral artery Larger infarct	4	1.6
	Left posterior cerebral artery Infarct	16	6.5
	Right middle cerebral artery large Infarct	2	.8
	Right anterior cerebral artery infarct	1	.4
	Right anterior cerebral artery and middle cerebral artery patchy infarct	2	.8
	Right anterior cerebral artery infarct	1	.4
	Right bg infarct	1	.4
	Right middle cerebral artery infarct	43	17.3
	Right posterior cerebral artery infarct	13	5.2
	Bilateral intra cerebral bleed	8	3.2
	Left Atypical intra cerebral bleed	1	.4
	Left basal Ganglion bleed	19	7.7
	Left cerebellar bleed	3	1.2
	left large intra cerebral bleed	9	3.6
	Left pontine bleed	10	4.0
	Left thalamic bleed	13	5.2
	Right atypical intra cerebral	3	1.2

	bleed		
	Right basal Ganglion bleed	31	12.5
	Right cerebellar bleed	4	1.6
	Right large intra cerebral bleed	5	2.0
	Right pontine bleed	7	2.8
	Right thalamic bleed	10	4.0
	Total	248	100.0

Table 2 shows the mean and standard deviation (ST.D) values for the Glasgow Coma Scale (GCS) across different components (Eye, Verbal, and Motor responses) in two study groups: ischemic and hemorrhagic, as well as the combined total group and it was found that among Group A (Ischemic, n=124) Eye Response, verbal response and motor response Mean ± SD was 3.524± 0.61, 4.209± 0.838 and 12.99± 2.36 respectively. Among Group B (Hemorrhagic, n=124) the Eye Response Mean ± SD was 2.927± 0.9551, Verbal Response Mean ± SD was 3.403± 1.24 and Motor Response Mean ± SD was10.483± 3.76. Total (n=248) Eye Response Mean ± SD was 3.226± 0.85, Verbal Response Mean ± SD was 3.806±1.13 and Motor Response Mean ± SD was11.737 ± 3.38. Overall, Group A (ischemic) has higher scores across all components of the GCS compared to Group B (hemorrhagic), suggesting better levels of consciousness in the ischemic group.

Table 2: Mean ± ST.D of GCS among study groups

Study Groups		**GCS Eye**	**GCS Verbal**	**GCS Motor**
Group A Ischemic(n=124)	Mean± Std. Deviation	3.524±0.61	4.209±0.838	12.99±2.36
Group B Hemorrhagic(n=124)	Mean±Std. Deviation	2.927±0.9551	3.403±1.24	10.483±3.76
Total(n=248)	Mean±Std. Deviation	3.226±0.85	3.806±1.13	11.737±3.38

Table 3 shows at hospital stay in group A 70 had mSOAR score ≤4 and 54 had mSOAR score ≥4 whereas in group B 29 had mSOAR score ≤4 and 95 had mSOAR score ≥4. Hence in Group A, more patients had lower mSOAR scores (≤4) (70 vs. 54), suggesting a potentially better prognosis during their hospital stay. In Group B more patients had higher mSOAR scores (≥4) (95 vs. 29), indicating a higher risk or more severe outcomes. At three months follow up in group A 110 had mSOAR score ≤4 and 7 had mSOAR score ≥4 whereas in group B 7 had mSOAR score ≤4 and 26 had mSOAR score ≥4. Hence group A showed better prognosis. There was statistically a significant difference between groups at hospital stay and three months follow up(p=0.00 each).

Table 3: mSOAR score at Hospital stay and three months follow up

Parameters		**Group**		**Total**	**p-value**
		Group A Ischemic	**Group B Hemorrhagic**		
Total mSOAR score at hospital Stay	≤4	70	29	99	**0.00***
	≥4	54	95	149	
	Total	124	124	248	

Total mSOAR score at three months followup	≤4	110	70	180	**0.00***
	≥4	7	26	33	
	Total	117	96	213	

***Statistically significant**

Mann Whitney U test applied

Table 4 shows the frequency distribution of mortality and morbidity among two groups (Group A: Ischemic and Group B: Hemorrhagic) for three different parameters: Mortality, Morbidity during Hospital Stay, and Morbidity at Three Months Follow-Up. For mortality among Group A (Ischemic) 7 out of 124 patients (5.6%) died, in Group B (Hemorrhagic) 28 out of 124 patients (22.6%) died and overall mortality (combined groups) was found to be 35 out of 248 patients (14.1%).

For morbidity during hospital stay among Group A (Ischemic) 75 out of 124 patients (60.5%) experienced morbidity during their hospital stay, In Group B (Hemorrhagic) 112 out of 124 patients (90.3%) experienced morbidity during their hospital stay and overall morbidity during hospital stay was 187 out of 248 patients (75.4%). For morbidity at three months follow-up among Group A (Ischemic) 17 out of 124 patients (13.7%) had morbidity at the 3-month follow-up, in Group B (Hemorrhagic): 38 out of 124 patients (30.6%) had morbidity at the 3-month follow-up and overall morbidity at 3 months follow-up was reported as 55 out of 248 patients (22.2%).

Table 4: Frequency distribution of Mortality and Morbidity among groups

Parameters		**Study Groups**		**Total**
		Ischemic stroke Group A (n=124)	**Hemorrhagic stroke Group B (n=124)**	
Mortality	Yes	7(5.6%)	28(22.6%)	35(14.1%)
	No	117(94.4%)	96(78.4%)	213(85.9%)
Morbidity at Hospital Stay	Yes	75(60.5%)	112(90.3%)	187(75.4%)
	No	49(39.5%)	12(9.7%)	61(24.6%)
Morbidity at three months follow up	Yes	17(13.7%)	38(30.6%)	55(22.2%)
	No	100(80.6%)	58(46.7%)	158(63.7%)
	Mortality	7(5.6%)	28(22.5%)	35(14.1%)
Total		124(100%)	124(100%)	248(100%)

4. DISCUSSION

Prognostic models and scales that forecast mortality or other outcomes following an acute stroke are becoming more and more prevalent. Few of the scales have been integrated into standard clinical practice, despite the fact that many have been reported to have positive qualities. [15]

In current study the mean age of study subjects were 62.04±12.84. Out of total 248 study subjects 172 (69.4%) were males and 76 (30.6%) females. Among Group A (Ischemic, n=124) eye response, verbal response and motor response Mean ± SD was 3.524± 0.61, 4.209± 0.838 and 12.99± 2.36 respectively. Among Group B (Hemorrhagic, n=124) the eye response Mean ± SD was 2.927± 0.9551, verbal response Mean ± SD was 3.403± 1.24 and motor response Mean ± SD was10.483± 3.76. Total (n=248) eye response Mean ± SD was 3.226± 0.85, verbal response Mean ± SD was 3.806±1.13 and motor response Mean ± SD was11.737 ± 3.38. Overall, Group A (ischemic) has higher scores across all components of the GCS compared to Group B (hemorrhagic), suggesting better levels of consciousness in the ischemic group. In concordance to current study

a previous study by Ojaghihaghighi S found lower GCS score, seizure, and eye gaze impairment had significantly higher prevalence in hemorrhagic stroke then ischemic stroke.[25] another similar study by Besson G et al also showed lower GCS in hemorrhagic stroke.[26]

In present study at hospital stay in Group A, more patients had lower mSOAR scores (≤4) (70 vs. 54), suggesting a potentially better prognosis during their hospital stay. In Group B more patients had higher mSOAR scores (≥4) (95 vs. 29), indicating a higher risk or more severe outcomes. At three months follow up in group A 110 had mSOAR score ≤4 and 7 had mSOAR score ≥4 whereas in group B 7 had mSOAR score ≤4 and 26 had mSOAR score ≥4. Hence group A showed better prognosis. There was statistically a significant difference in mSOAR score between groups at hospital stay and three months follow up(p=0.00 each).

Current findings revealed that for mortality among Group A (Ischemic) 7 out of 124 patients (5.6%) died, in Group B (Hemorrhagic) 28 out of 124 patients (22.6%) died and overall mortality (combined groups) was found to be 35 out of 248 patients (14.1%). Therefore more patients died in group B. For morbidity among Group A (Ischemic) 75 out of 124 patients (60.5%) experienced morbidity during their hospital stay, In Group B (Hemorrhagic) 112 out of 124 patients (90.3%) experienced morbidity during their hospital stay and overall morbidity during hospital stay was 187 out of 248 patients (75.4%). At three months follow-up among Group A (Ischemic) 17 out of 124 patients (13.7%) had morbidity, in Group B (Hemorrhagic): 38 out of 124 patients (30.6%) had morbidity and overall morbidity at 3 months follow-up was reported as 55 out of 248 patients (22.2%). Therefore both at hospital stay and three months follow up group B showed increased morbidity. We found that at hospital stay and three month follow up mSOAR score is reliable tool in assessing mortality and morbidity among groups. This is in line with Thaller and Mitchell's findings, which showed that an increase in mSOAR score was linked to a significantly worsening of discharge disability; as a result, it is a very good indicator of discharge disability. Thaller et al., found at discharge, 57% had a slight disability or less (mRS≤2), and the mortality rate was 13%. Significantly worse discharge disability was linked to each increase in mSOAR score ($p<0.05$).[3] Alike our findings Andersen KK found Patients with Hemorrhagic Stroke typically experience more severe strokes. Particularly linked to the hemorrhagic nature of the lesion, Hemorrhagic Stroke is linked to a significant increase in mortality during the first three months following stroke.[27,28,29] In concordance with our findings another study reported Although the relationship was not statistically significant, higher mSOAR scores were associated with mortality within 30 days following the onset of a stroke. According to Wang et al., the mSOAR score predicts both discharge and 90-day mortality, and as mSOAR scores rise, so does the risk of death. [22] Another study showed similar findings as increase in the mSOAR score was also found to significantly raise the risk of a poor prognosis at discharge.[23] The length of hospital stay is significantly correlated with the mSOAR score. Additionally, Kwok et al. in 2015 demonstrated that a significantly higher mean and median for hospital length of stay were associated with an increasing SOAR score (the older version of mSOAR).[30] Similarly Abdul-Rahim et al. also showed supporting findings as mSOAR score is an excellent predictor for 90-day mortality.[31] Contradictory findings were observed in a previous study by Abdelghany,H as they did not reveal a statistical significance for the mSOAR score in predicting the 30-day mortality rate.[15] This could be because this study had a small sample size, few deaths, and a brief follow-up period (30 days versus 90 days in our research). Combining the various components of the mSOAR score (such as information on the type, location, severity, and disability of the initial stroke) made it simple to incorporate into clinical practice and helpful for discussing the patient's admission prognosis. The mSOAR score is a great tool for predicting discharge disability and mortality following cerebrovascular stroke. [15]

5. CONCLUSION

This study concluded that the prevalence of mortality and morbidity was more among group B (Hemorrhagic) as compared to group A (Ischemic). Hence group A had better prognosis. We found that at hospital stay and three month follow up mSOAR score is reliable tool in assessing mortality and morbidity among groups

LIMITATIONS:

Single Centre Study

ETHICAL APPROVAL:

Ethical approval was obtained before study initiation by the institutional review board of Ziauddin University Karachi. All procedures performed in studies involving human participants were in accordance with the ethical standards of the Helsinki declaration.

CONSENT FOR PUBLICATION:

Prior to data collection, verbal informed consent was taken from each participant of the study.

AVAILABILITY OF DATA:

Data cannot be shared publicly because it is intellectual property of Ziauddin University. Data are available from the Ziauddin

University Karachi.

CONFLICT OF INTERESTS:

All authors do not have any conflict of interest.

FUNDING STATEMENT:

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DISCLAIMER:

This article is extracted from one of the principle author's thesis.

ANNEXURE A: PROFORMA

COMPARISONOFTHEFREQUENCYOFMORTALITYANDMORBIDITYIN ISCHEMIC VERSUS HEMORRHAGIC STROKES USING MSOAR SCORE

Name: _____

Age: _____Year

Gender: Male/Female

Type of stroke: Ischemic/Hemorrhagic

Co-morbid: ____

GCS: _____

Outcome Variables:

Mortality: Yes/No

mSOAR Score during Hospital stay: _____

Morbidity during Hospital stay: Yes/No

mSOAR Score at 3 months follow up: _____

Morbidity at 3 months follow up: Yes/No

ANNEXURE B: GLASSGOW COMA SCALE

Glasgow Coma Scale (GCS)

Response	Criterion	Score
Eye-opening response (E)	Eye-opening spontaneously	4 points
	Eye-opening to sound	3 points
	Eye-opening to pain	2 points
	No response	1 point
Verbal response (V)	Orientated	5 points
	Confused	4 points
	Inappropriate words	3 points
	Incomprehensible sounds	2 points
	No response	1 point
Motor response (M)	Obeys command	6 points
	Localises to pain	5 points
	Withdraws to pain	4 points
	Abnormal flexion to pain (decorticate)	3 points
	Abnormal extension to pain (decerebrate)	2 points
	No response	1 point

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ANNEXURE C: mSOAR SCALE

Categories	Criteria	Description	Score	Patient's score
Stroke type	Infarct		0	
	Haemorrhage		1	
Oxford Community Stroke Project Stroke classification	Lacunar	Motor or sensory deficit only	0	
	Partial anterior circulation	Two of:	0	
		motor or sensory		
		higher cortical dysfunction		
		hemianopia		
	Posterior circulation	Any of:	1	
		brainstem signs		
		cerebellar signs		
		isolated hemianopia		
	Total anterior circulation	Three of:	2	
		motor or sensory		
		higher cortical dysfunction		
		hemianopia		
Age	≤65		0	
	66–85		1	
	≥86		2	
Modified Rankin scale (Pre-stroke)	0	No symptoms	0	
	1	No significant disability. Able to carry out all usual activities, despite some symptoms.	0	
	2	Slight disability. Able to look after own affairs without assistance, but unable to carry out all previous activities.	0	
	3	Moderate disability. Requires some help, but able to walk unassisted.	1	
	4	Moderately severe disability. Unable to attend to own bodily needs without assistance, and/or unable to walk unassisted.	1	
	5	Severe disability. Requires constant nursing care and attention, bedridden, incontinent.	2	
Admission National Institutes of Health Stroke Scale score	0–4		0	
	5–10		1	
	≥11		2	
		TOTAL SCORE		

ANNEXURE- A

GLASSGOW COMA SCALE (GCS) SCORE

Glasgow Coma Scale		
Response	Scale	Score
Eye Opening Response	Eyes open spontaneously	4 Points
	Eyes open to verbal command, speech, or shout	3 Points
	Eyes open to pain (not applied to face)	2 Points
	No eye opening	1 Point
Verbal Response	Oriented	5 Points
	Confused conversation, but able to answer questions	4 Points
	Inappropriate responses, words discernible	3 Points
	Incomprehensible sounds or speech	2 Points
	No verbal response	1 Point
Motor Response	Obeys commands for movement	6 Points
	Purposeful movement to painful stimulus	5 Points
	Withdraws from pain	4 Points
	Abnormal (spastic) flexion, decorticate posture	3 Points
	Extensor (rigid) response, decerebrate posture	2 Points
	No motor response	1 Point
Minor Brain Injury = 13-15 points; **Moderate Brain Injury** = 9-12 points; **Severe Brain Injury** = 3-8 points		

ANNEXURE- B

MODIFIED RANKIN SCALE (mRS)

MODIFIED RANKING SCORE

SCORE	DESCRIPTION
0	No symptoms at all
1	No significant disability despite symptoms; able to carry out all usual duties and activities
2	Slight disability; unable to carry out all previous activities, but able to look after own affairs without assistance
3	Moderate disability; requiring some help, but able to walk without assistance
4	Moderately severe disability; unable to walk without assistance and unable to attend to own bodily needs without assistance
5	Severe disability; bedridden, incontinent and requiring constant nursing care and attention
6	Dead

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