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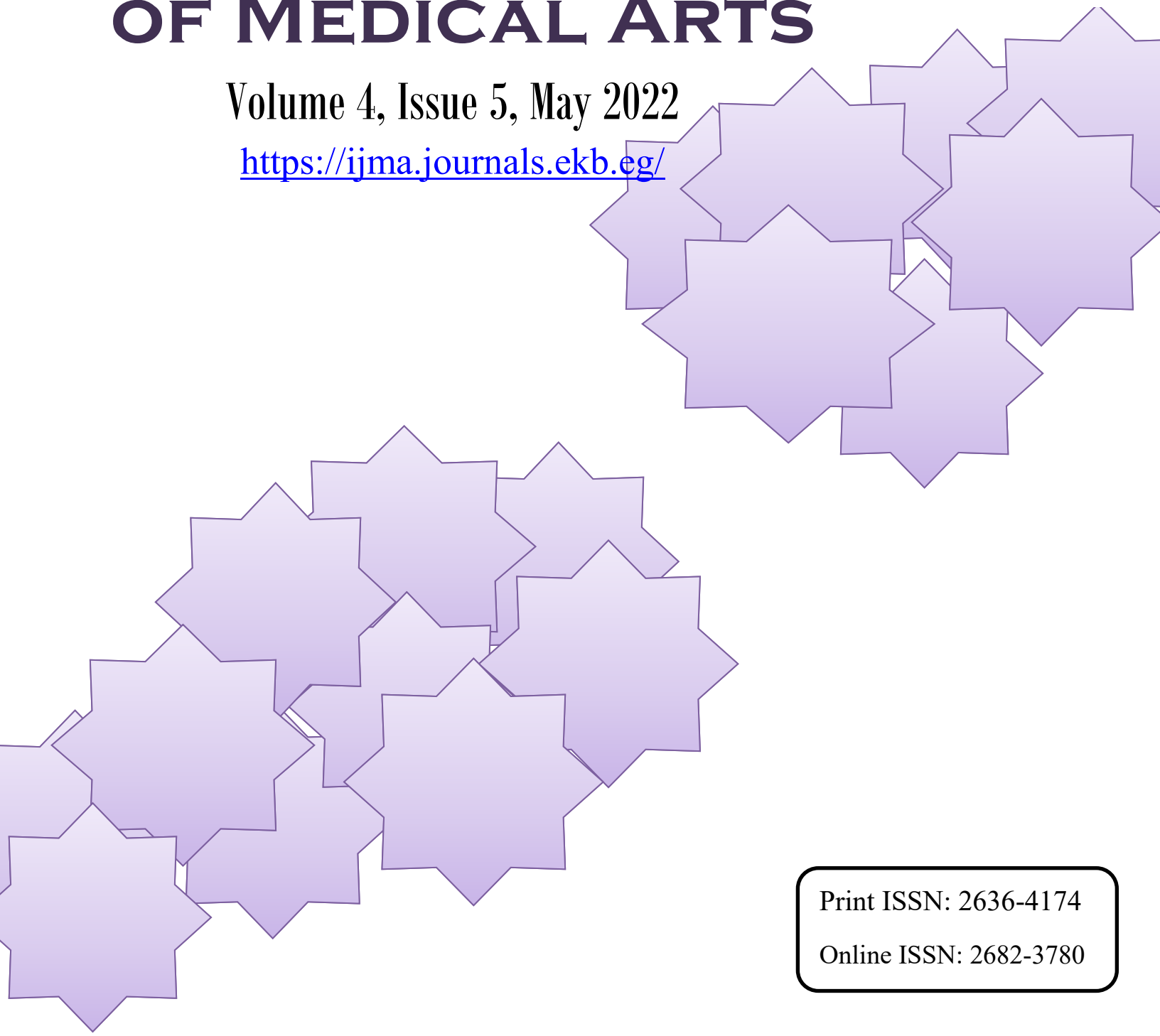

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Original Article

Prediction of Status Epilepticus Outcome in a Sample of Egyptian Patients Using Status Epilepticus Severity Score [STESS]

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ABSTRACT

Background: The Status Epilepticus Severity Score [STESS] has become frequently utilized in recent years to predict the prognosis of SE patients [status epilepticus].

Objective: The study's purpose was to find determinants of SE severity and short-term outcomes in SE patients admitted to the hospitals of Al-Azhar University.

Patients and Methods: At the hospitals of Al-Azhar University in Cairo, Egypt, A prospective observational study of 43 consecutive SE patients admitted and treated over six months was done. Demographics and clinical data from established SE patients were gathered, and their association to SE duration and short-term outcomes was examined.

Results: The STESS findings demonstrated a statistically significant connection between the failure to respond to therapy after one hour [P-value = 0.0001]. There was a tendency [P-value = 0.7508] toward greater fatality, the necessity for coma induction [P-value = 0.1799], and a bad outcome [P-value = 0.0636], with a higher STESS score. A STESS score of < 3 has NPV of 96.67 % for fatality, 76.67 % for the necessity for coma induction, and 53.85 % for bad outcomes.

Conclusion: The outcome of status epilepticus can be consistently predicted using STESS. Additional research on STESS-based treatment techniques could aid in the development of more effective SE treatment regimens.

Keywords: Status epilepticus; STESS; Outcome predictor; NPV; Negative predictive value.

INTRODUCTION

Status epilepticus [SE] is a potentially fatal neurological disorder that necessitates a clear diagnosis and appropriate therapy to minimize the high rates of morbidity and fatality, which vary depending on the etiology [1]. SE occurs when there is an imbalance between seizure starting and terminating systems, according to a recent paper from the International League Against Epilepsy [ILAE] [2].

Predicting outcomes following SE is still a challenging process, with various overlapping determinants, such as demographic, clinical, and management variables [3].

Death risk in SE patients is determined by many clinical prediction rules [4, 5]. A Status Epilepticus Severity Score [STESS] is, however, the most extensively utilized. STESS evaluates four clinical variables: history of epilepsy, seizure type, age, and consciousness level [1]. Furthermore, STESS is effective in predicting death in patients with SE all over the world [6, 7].

THE AIM OF THE STUDY

To find predictors of the Status Epilepticus severity and the short-term outcome of SE patients admitted to Al-Azhar University Hospitals.

PATIENTS AND METHODS

Between June 2021 and December 2021, an observational prospective study was done. Patients were recruited from the emergency, neurocritical, or various medical intensive care units [ICUs] at the hospitals of Al-Azhar University [Al-Hussein & Sayed Galal], Cairo, Egypt.

Ethical consideration: The Research Ethics Committee gave their approval to the project at the Neurology Department, Faculty of Medicine, Al-Azhar University. Before being included in the trial, patients or their families were asked to sign a written informed permission form if the patient's degree of awareness was disturbed.

Inclusion criteria: From the most recent ILAE [International League Against Epilepsy] study on the diagnosis and categorization of SE [2], All patients with SE, whether CSE [convulsive status epilepticus] or NCSE [non-convulsive status epilepticus], were included in this study.

Criteria for exclusion

1. Those who were given hypnotic drugs before being evaluated by the research group because it may obstruct the evaluation of mental state [No. = 2].

2. Anyone whose discharge result was unknown at the time of discharge [discharged against the advice of doctors [No. = 1] or permission was revoked [No. = 1]].

STESS Description: STESS is a basic score that may be used at the bedside [range: 0-6] [1,8-10], is composed of four parts; Consciousness Level [Alert or somnolent or confused [0], and Stuporous or comatose [1]], Type of SE [Simple partial, complex partial, myoclonic, absence [0], Generalized convulsive [1], Non-convulsive SE in coma [2]], Age in years [< 65 [0], ≥ 65 [2]], and Past history of seizures [Yes [0], No [1]].

Calculation of STESS: At the moment of admission to the ER, a neurologist who's not engaged in choosing a therapy calculated STESS in all of the patients. The STESS result was kept secret from the treating team to minimize bias.

Therapeutic protocol for SE: The therapy was carried out by stated guidelines [9,11,12].

Data collection and outcome measurements: All of the patients had a thorough medical history as well as a thorough physical, systemic, and neurological assessment. The following outcomes were studied: [a] fatality, [b] coma induction, [c] SE control within 1 hour of the starting treatment, and [d] outcome at discharge. The functional independence measure [FIM] [13] defines the outcome at discharge [A good result is an FIM score of 5-7; a bad result is an FIM score of 1-4].

Data analysis: Descriptive statistics were used to examine the frequency, average, standard deviation, range, and study parameters percentage. Parametric and nonparametric tests, such as unpaired, Chi-Square, and Fisher's exact test, were used to make conclusions. The data were analyzed using Excel 2019 and SPSS Version 22 software.

RESULTS

Patient demographics, clinical characteristics, and laboratory findings [as shown in Table 1]: At presentation time, 39 [90.7%] of generalized convulsive status epilepticus [GCSE] were seen in 43 patients, and NCSE was seen in 4 [9.3%]. The

average age of the patients was 34.78 19.51 years [range: 3-67 years]. The average duration of hospital stay was 13.86 ± 5.83 days [range: 5-24 days]. There were 24 [55.81%] men and 19 [44.19%] women in the study group.

STESS score: Each patient's STESS score was determined. It was one in 15 [34.88%], two in 15 [34.88%], three in ten [23.26%], four in one [2.33%], and five in two [4.65%] patients [as shown in Figure 1].

Outcome measures at discharge: During their hospitalization, two patients [4.65%] died as a result of their sickness. 11 patients [25.58%] had bad outcomes, based on a 1-4 FIM score, and 13 [30.23%] required coma induction to control SE. SE could not be managed in 24 [55.81%] of the patients within 1 hour of starting therapy. The factors that contributed to a bad outcome included a longer SE duration [p = 0.0002]. This variable had a strong relationship with SE control within 1 hour of starting therapy. Notably, neither age nor the aetiology of SE [symptomatic vs. idiopathic] had any bearing on any of the prognostic variables [as shown in Table 2].

Outcome measures and STESS: The STESS findings demonstrated a statistically significant connection between the failure to respond to therapy after one hour [P-value = 0.0001]. There was a tendency [P-value = 0.7508] toward greater fatality, the necessity for coma induction [P-value = 0.1799], and a bad outcome [P-value = 0.0636], with a higher STESS score [as shown in Table 3].

STESS has a predictive value in predicting SE prognosis: A STESS score of < 3 has NPV of 96.67 % for fatality, 76.67 % for the need for coma induction, and 53.85 % for bad outcome at discharge [as shown in Table 4].

Table [1]: Patient's demographic characteristics

Characteristics			Patients [No. = 43]
Age, years	Average ± SD		34.78 ± 19.51
Duration of hospital stay, Day	Average ± SD Range		13.86 ± 5.83 5 - 24
Status epilepticus duration, minutes	Average ± SD Range		127.23 ± 133.36 5 - 456
Type of status epilepticus	Convulsive Non-Convulsive		39 [90.70 %] 4 [9.30 %]
Epilepsy's past history			24 [55.81 %]
SE's Aetiology	**Idiopathic**		12 [27.91 %]
	Symptomatic		31 [72.09 %]
	Vascular [Stroke]		10 [23.26 %]
	Tumour / Trauma		5 [11.63 %]
	Febrile Convulsion		3 [6.98 %]
	CNS Infection		8 [18.60 %]
	Metabolic and Electrolyte Disturbance		5 [11.63 %]
Neuroimaging	**Normal**		22 [51.16 %]
	Abnormal		21 [48.84 %]
	Calcified Granuloma		1 [2.33 %]
	Viral Encephalitis		2 [4.65 %]
	Neuronal Migration Disorders		2 [4.65 %]
	Gliotic Scar		5 [11.62 %]
	Chronic Infarct		3 [6.98 %]
	Tuberculomas		1 [2.33 %]
	Focal Cortical Dysplasia		3 [6.98 %]
	Cerebral Venous Sinus Thrombosis		2 [4.65 %]
	Hypoparathyroidism		2 [4.65 %]

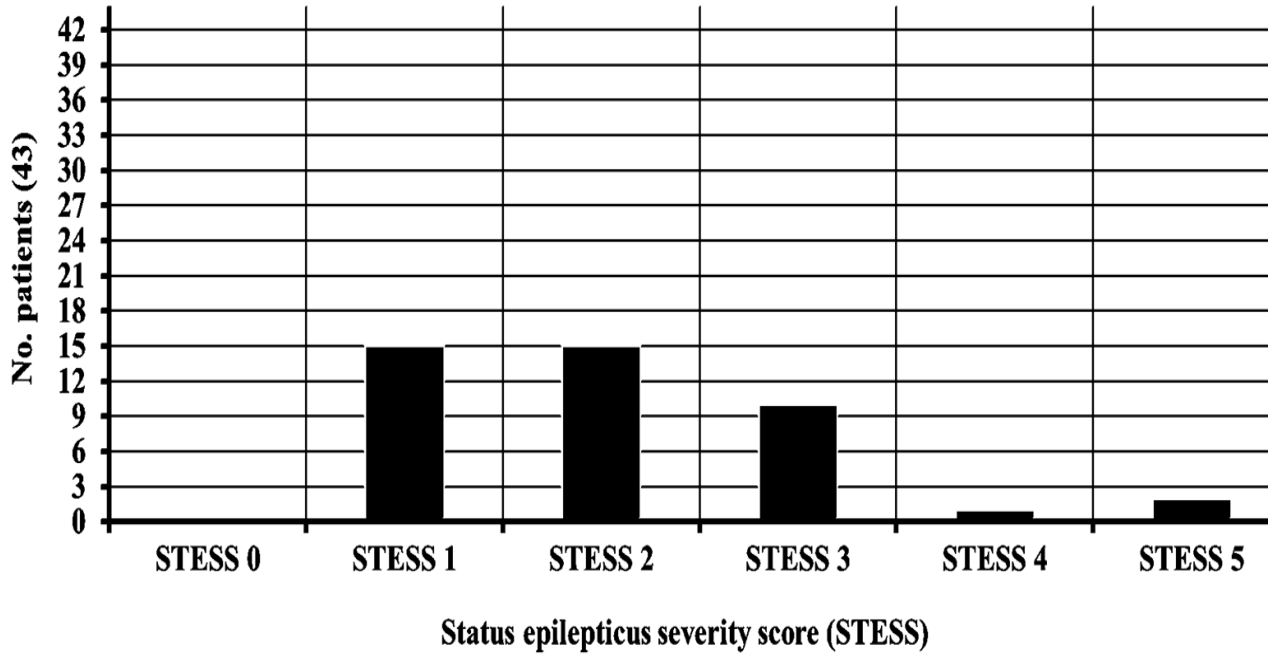

Figure [1]: Status epilepticus severity score [STESS]

Table [2]: Outcome at the discharge of Status epilepticus

Parameter		SE duration		Past history of seizures		Consciousness level	
		< 60	≥ 60	no	yes	Comatose / Stuporous	alert / somnolence
Outcome at discharge	Bad	0	13	8	5	7	6
	Good	20	10	11	9	10	20
	p-value	0.0002		0.9911		0.3098	

Table [3]: Variables outcome measures and STESS

Variables		STESS score					P-Value
		1	2	3	4	5	
Fatality	No	15	14	9	1	2	0.7508
	Yes	0	1	1	0	0	
SE control within 1 hr of starting therapy	No	3	9	10	0	2	**0.0001**
	Yes	12	6	0	1	0	
Outcome at discharge	Bad	1	6	5	0	1	0.0636
	Good	14	9	5	1	1	
Need for coma induction	No	14	9	5	1	1	0.1799
	Yes	2	5	5	0	1	

Table [4]: STESS Predictive value ≥ 3

Variables		STESS ≥ 3	STESS < 3	95% CI of NPV [1]	95% CI of PPV [2]	P-Value
Fatality	Yes No	1 12	1 29	96.67 % [82.79 - 99.92%]	7.69 % [0.19 - 36.03%]	**0.518**
SE control within 1 hr of starting therapy	Yes No	1 12	18 12	40 % [22.66 - 59.40%]	7.69 % [0.19 – 36.03%]	**0.002**
Outcome at discharge	Good Bad	7 6	23 7	53.85 % [25.13 – 80.78%]	23.33 % [9.93 – 42.28%]	**0.163**
Need for coma induction	Yes No	6 7	7 23	76.67 % [57.72 – 90.07 %]	46.15 % [19.22 – 74.87 %]	**0.163**

1 NPV = Negative predictive value = Specificity; 2 PPV = Positive predictive value = Sensitivity

DISCUSSION

The scope of SE treatment approaches differs significantly. Although a more intensive therapy regimen may improve SE management, Therapy-related adverse effects can increase in proportion to the severity of the treatment. With the use of some factors that can predict the result of SE from its commencement, the treatment procedure could be improved [8, 9].

Many factors have been linked to a bad SE result, including being over 60 years old [14], longer SE duration [15-17], SE type [8,9], lack of previous seizures history [18], a low score of Glasgow coma scale at the time of admission [14,18], acute symptomatic SE [19], and EEG changes in the form of PLED [periodic lateralized epileptiform discharges] [14].

A bedside score should be dependable, accessible and rapidly quantifiable, and repeatable to be effective as an outcome predictor. STESS's four variables are all simply and immediately measured, as well as repeatable. Other parameters, such as the etiology of SE, could be added to the score to improve its predictive value even more. However, because precise etiology may only be determined after extensive examinations, its use in the early stages is limited. Before administering intravenous benzodiazepines, the level of sensorium should be measured.

In this trial, a STESS score of less than 3 had a strong NPV for fatality, need for coma induction, and bad neurological outcomes. As a result, STESS appears to be a reliable predictor of a good outcome. For Patients with a poor STESS and a high risk of general anesthesia problems, coma induction for SE management might be avoided.

Unlike prior reports of acute symptomatic SE being linked to bad outcomes, this study found no such link [14]. The etiology of SE and the outcome were not linked in this study. This might be owing to a lower number of patients in this group having etiologies linked to poor outcomes such as cerebral anoxia or infarctions. The precise etiology of SE, rather than the generic phrase 'acute symptomatic', is likely a better predictor of prognosis. Patients with a history of seizures may have a good outcome since acute symptomatic etiologies are less likely.

Among the STESS characteristics, the patient's age did not affect the SE result. It agrees with a recent review [14], which is a remarkable etiology than age as a factor of SE outcome. In the aged, SE's bad prognosis is connected to more sinister causes such as infracts, cerebral anoxia, and malignancies.

The study's sample size is small, which is a drawback. The fatality analysis was difficult as there were only 2 patients who died in our study. Epidemiology-based Mortality score in SE-EMSE is even better than STESS at predicting SE result, which is another score [20]. If this score can be duplicated in future research, It has the potential to be utilized in conjunction with STESS to predict a good SE outcome.

Conclusion: A STESS is easy to compute at the bedside and based on clinical variables. A low STESS score [< 3] has a high NPV for a bad outcome. With a low STESS in SE, coma induction can be avoided, at least in the early stages. Future well-designed studies using a STESS-guided treatment approach may aid in standardizing SE therapy. Other characteristics such as the length of SE before therapy, might be added to STESS to assist increase its predictive values and provide an evidence-based strategy for SE therapy.

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