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A comparative study to assess traumatic head injury patient with full outline of unresponsiveness score scale and glasgow coma scale in neurosurgical intensive care unit

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Abstract---Context: FOUR Score is a more operational tool for critically ill patients who are intubated cause requiring no verbal items. Aim: We aimed to A Comparative Study To Assess Traumatic Head Injury Patient With Full Outline Of Unresponsiveness Score Scale And Glasgow Coma Scale In Neurosurgical Intensive Care Unit At K.H. Karad. setting and design: The study was conducted among 55 patients who were admitted in neurosurgical intensive care unit Krishna hospital karad. A convenient sampling technique was used for selecting the sample. The qualitative research design was used. Analysis: statistical analysis was performed using instat software. Result: Assessed GCS and FOUR score on admission, 1st hour, 6th hour and 24th hour all time patient found in semiconscious state except in FOUR score at 24 th hour patient found conscious state. Conclusion: FOUR Sore was very useful than GCS, as the FOUR Score contain additional part of brain stem reflexes for pupil's examination and respiration that will useful to assessment of consciousness in intubated patient.

Keywords---consciousness, FOUR score, GCS score, traumatic head injury, neurosurgical intensive care unit.

Introduction

Consciousness is a state of general awareness of oneself and the environment and includes the ability to orient towards new stimuli.[1] Altered level of consciousness (LOC) is an acute medical problem frequently encountered both in casualty, acute care units and intensive care units. It is defined as every change from inhibit self-awareness.[2] Coma is a state of deep sleep, in which the patient is unaware of self or the environment for prolonged time period, cannot be awakened, fails to respond to external stimuli as pain, light or sound and sensation.[2] The Glasgow Coma Scale (GCS) originally designed for patients with traumatic brain injury (TBI) by Teasdale and Bryan since 1974 and had become widely accepted scoring system for altered LOC patients in the ICUs.[2] The full outline of unresponsiveness (FOUR) score was introduced by Wijdicks and colleagues in neurological patients with traumatic and nontraumatic disorders of the central nervous system and miscellaneous acute neurological conditions. This scale is supposed to take into account various levels of brain stem damage, and should thus allow for more precise clinical prognosis concerning patient outcome. In the present study, we aimed at a correlation of both scales GCS and FOUR score in the assessment of newly admitted neurosurgical ICU patients with severely impaired consciousness due to traumatic brain injury.[3] Clinicians' management decisions about acute traumatic brain injury (TBI) patients are guided by assessments of the person's current state and may also be influenced by their perceptions of its relation to the patient's likely outcome.

The Glasgow Coma Scale (GCS) is the most widely used tool for assessing and communicating about a patient's responsiveness. All the three components are eye, motor, and verbal responses relate to outcome, as does the derived summation into the GCS score, albeit with some loss of information about patient was intubated condition. Moreover, the GCS is combined with other features, such as pupil response, age, and injury characteristics, in numerous multi-variety prognostic models for predicting functional outcome and mortality. The difficulty in assigning a verbal response in an intubated patient and the separation of assessment of brain stem features, such as pupil response, in multi-variety modeling stimulated specialists in neurological intensive care to propose an alternative approach.[4] FOUR Score is a more operational tool for critically ill patients who are intubated cause requiring no verbal items.[5]

Need for study

FOUR score had higher accuracy prediction of in-hospital outcomes and the prognostic power than GCS in the first three assessment days. Therefore, this study's results would be supported by other studies that recruited a larger number of patients with different acuity levels within more hospitals.[2] Need of the full outline of unresponsiveness (FOUR) score the full outline of unresponsiveness score consists of four components: motor response, eye response, brain stem reflexes, and respiration. In each component the minimal score is zero, while the maximal score to reach is four. Thus, the total score ranges from 0 as the deep in come whereas 16 as the best reaction of conscious. By suggestive naming the authors of the paper on the FOUR score aimed for the morability of the new score.[3]

Problem statement

“A Comparative Study To Assess Traumatic Head Injury Patient With Full Outline Of Unresponsiveness Score Scale And Glasgow Coma Scale In Neurosurgical Intensive Care Unit At K.H. Karad.”

Objectives of the study

- To assess traumatic head injury patient by using FOUR score and GCS score in patient admitted in neurosurgical intensive care unit in Krishna hospital Karad.
- To assess validity by comparing the FOUR Score and GCS in patient with traumatic head injury admitted in neurosurgical intensive care unit in Krishna hospital Karad.
- To evaluate correlation between FOUR Score and GCS in patient with traumatic head injury admitted in neurosurgical intensive care unit in Krishna hospital Karad.

Subjects and Methods

In this study Qualitative research design was used for analysing the Comparative Study To Assess Traumatic Head Injury Patient With Full Outline Of Unresponsiveness Score Scale And Glasgow Coma Scale In Neurosurgical Intensive Care Unit. In this study convenience sampling technique used for data collection. Sample size was 55 patients admitted in neurosurgical intensive care unit in Krishna Hospital and Medical Research Centre, Karad included in this study. Patients who are admitted within 24 hours of injury with any radiological documented traumatic brain injury are included in study. Patients with non-traumatic injuries they are exclude from study. Those who are not willing to participate in study. Those who are not undergone radiological documented head injury patient.

Standard tools were used

Tool consist of two sections A and B.

- Demographic variables.
- GCS score scale and FOUR score scale to assess traumatic head injury patients.

This was done by the same person to reduce observer variation and standard scheme of testing was followed. This was done on admission, at 1 hour, 6 hour and 24 hr. after admission. (and on daily basis).

Statistical analysis

All data were computed, and the answer were coded in Microsoft Excel spread sheet. The data were analysed by using inferential and descriptive statistics in Microsoft Excel. Statistical analysis was performed by using Instat software.

Results

Section A: Frequency and Percentage distribution of demographic variables of patients admitted in Krishna Hospital Karad.



Fig 1. Column diagram representing distribution of traumatic head injury patients according to age. Among 55 patients, in that 81-100 age group there was only 1 patient (i.e.1.81%) whereas in 21-40 age group, there were 26 patients (i.e.47.27%)

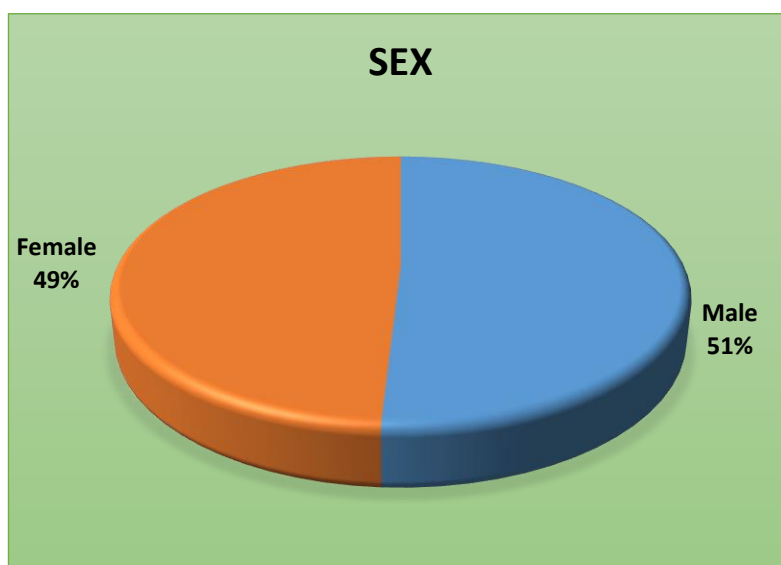


Fig 2. Pie diagram representing distribution of traumatic head injury patients according to sex. Among 55 patients, 28(50.90%) were male whereas 27(49.09%) were female

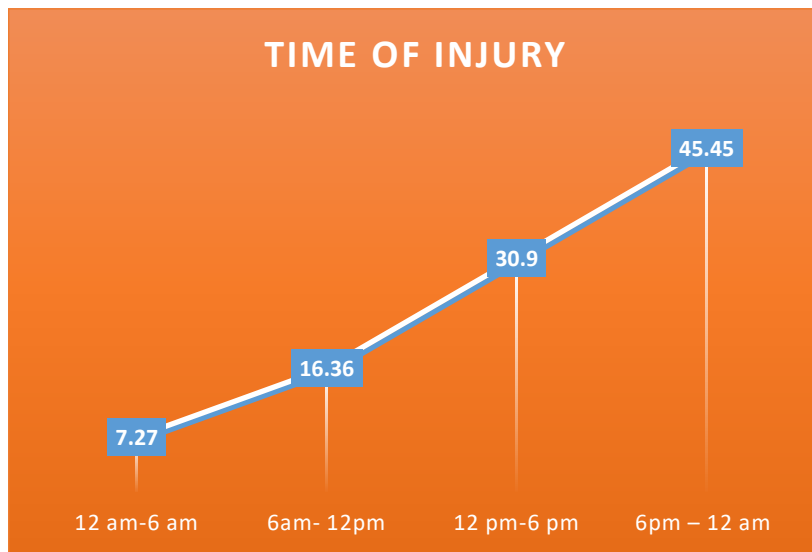


Fig 3. A Line diagram representing distribution of traumatic head injury patients according to time of injury. Among 55 patients, 12 am-6am, injuries were 4 (7.27%) and 6pm-12am injuries were 25 (45.45%)



Fig 4. Column diagram representing distribution of traumatic head injury patients according to event of injury . Among 55 patients, road traffic accidents were 35 (63.63 %) and violence place or assault injury were 6 (10.90%)

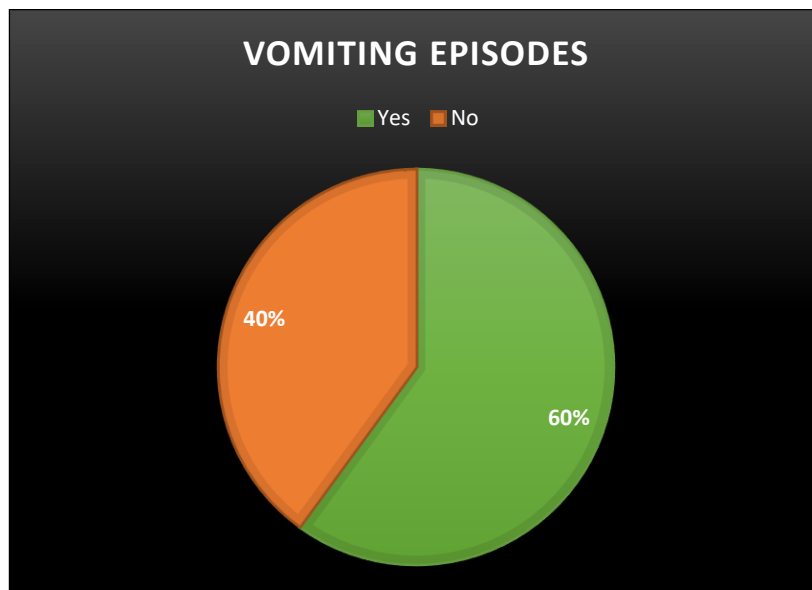


Fig 5. Pie diagram representing distribution of traumatic head injury patients according to vomiting episode happens within 6 hours. Among 55 patients, vomiting happens were 33 (60 %) and vomiting not happens were 22 (40 %)

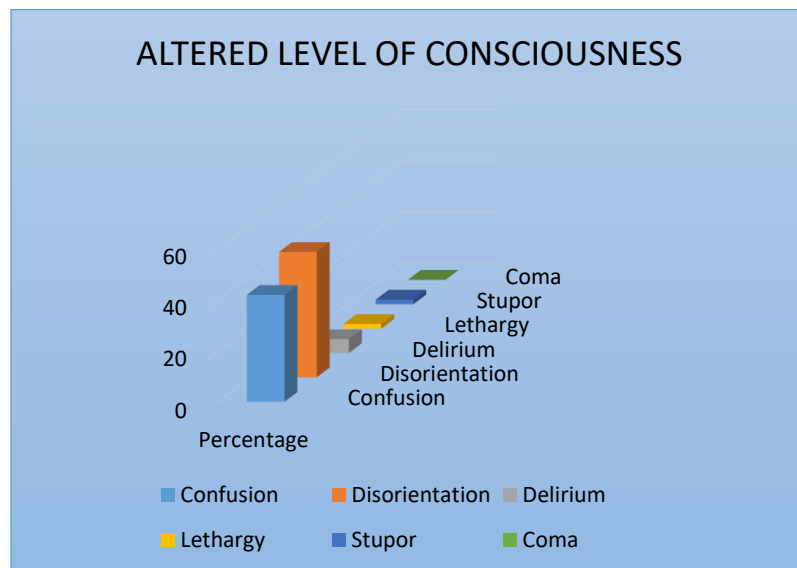


Fig 6. Column diagram representing distribution of traumatic head injury patients according to level of consciousness. Among 55 patients, disorientation were 27 (49.09 %) and no patient found in deep coma

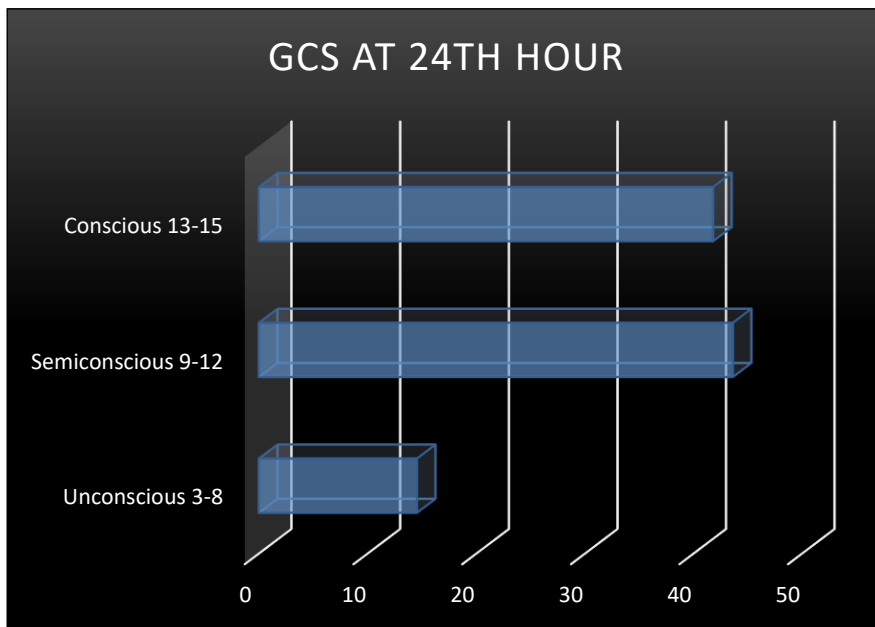


Fig 7. Bar diagram representing distribution of traumatic head injury patients according to score of consciousness at 24th hours. Among 55 patients, between unconscious were 8 (14.54%), semiconscious were 24 (43.63%) and conscious were 23 (41.81%)

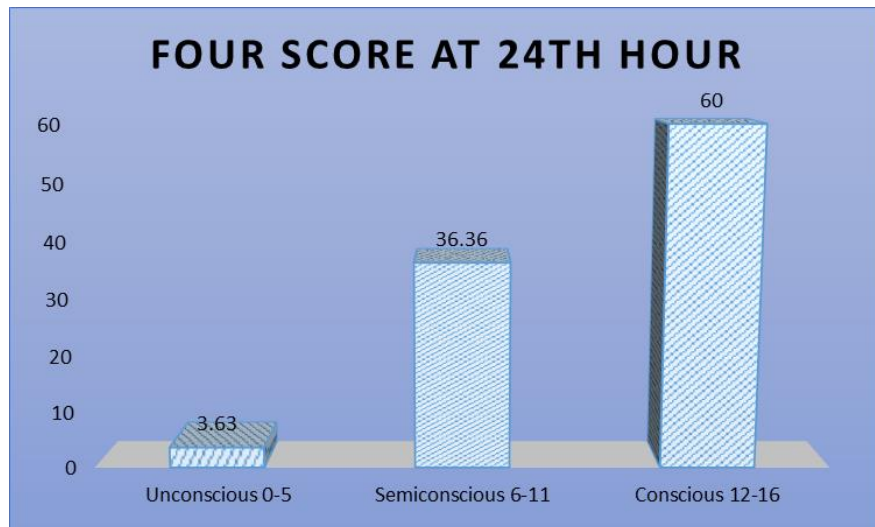


Fig 8. Column diagram representing distribution of traumatic head injury patients according to score of consciousness at 24th hour. Among 55 patients, between unconscious were 2 (3.6%), semiconscious were 20 (36.36) and conscious were 33 (60 %)

Section B: Findings related to the validity by comparing the GCS and FOUR Score scale patients admitted in Krishna Hospital Karad.

Table 1
On admission

Title	GCS Score	FOUR Score
Mean	8.7	8.8
Standard deviation	2.3	2.6
Medium	9.0	9.0

Mean of GCS Score on admission is 8.7 and FOUR Score is 8.8.

The mean difference is 0.1. Does the mean of differences between GCS and FOUR Score on admission differ significantly from zero. Difference in standard deviation is 0.3 and medium of GCS and FOUR Score is same so no difference.

Table 2
At 1st hour

Title	GCS Score	FOUR Score
Mean	9.2	9.8
Standard deviation	2.1	2.3
Medium	9.0	10.0

Mean of GCS Score at 1st hour is 9.2 and FOUR Score is 9.8.

The mean difference is 0.6. Does the mean of differences between GCS and FOUR Score at 1st hour differ significantly from zero. Difference in standard deviation is 0.2 and medium of GCS and FOUR Score difference is 1.0.

Table 3
At 6th hour

Title	GCS Score	FOUR Score
Mean	10.25	10.52
Standard deviation	2.0	2.6
Medium	10.0	11.0

Mean of GCS Score at 6th hour is 10.25 and FOUR Score is 10.52.

The mean difference is 0.27. Does the mean of differences between GCS and FOUR Score at 6th hour differ significantly from zero. Difference in standard deviation is 0.6 and medium of GCS and FOUR Score difference is 1.0.

Table 4
At 24th hour

Title	GCS Score	FOUR Score
Mean	11.32	11.89
Standard deviation	2.5	2.8
Medium	12.0	13.0

Mean of GCS Score at 24th hour is 11.32 and FOUR Score is 11.89.

The mean difference is 0.56. Does the mean of differences between GCS and FOUR Score at 24th hour differ significantly from zero. Difference in standard deviation is 0.3 and medium of GCS and FOUR Score difference is 1.0

Section C: To evaluate correlation between FOUR Score and GCS in patient with traumatic head injury admitted in Krishna hospital karad.

Correlation of GCS score and FOUR score by using Paired t test.

Table 1
Correlation between GCS score and FOUR score on admission

GCS Score and FOUR score	P value	r value
On admission	<0.0001	0.7799

P value is <0.0001, considered extremely significant.

Table 2
Correlation between GCS score and FOUR score at 1st hour

GCS Score and FOUR score	P value	r value
1 st hour	<0.0001	0.7460

P value is <0.0001, considered extremely significant.

Table 3
Correlation between GCS score and FOUR score at 6th hour

GCS Score and FOUR score	P value	r value
6 th hour	<0.0001	0.7777

P value is <0.0001, considered extremely significant.

Table 4
Correlation between GCS score and FOUR score at 24th hour

GCS Score and FOUR score	P value	r value
24 th hour	<0.0001	0.8691

P value is <0.0001, considered extremely significant.

Discussion

Major findings related to demographic variables:

- Majority of subjects 26 (47.27%) who participated in the study were between the age group of 21-40 years.
- The most traumatic brain injury 25 (45.45%) happens in 6pm-12am.

- There were more event 35(63.63%) were the road traffic accidents.
- Most participants have 33(60%) vomiting episodes were happened.
- Maximum number of participants 27(49.09%) were disoriented level of consciousness.
- 24th hour maximum number of patients 24 (43.63%) were semiconscious.
- 24th hour maximum number of patients 33 (60%) were conscious.

Major findings related to validity of GCS and FOUR Score:

- On admission Mean Difference between GCS and FOUR Score is 0.1 and it differ significantly from zero.
- 1st hour Mean Difference between GCS and FOUR Score is 0.6 and it differ significantly from zero.
- 6th hour Mean Difference between GCS and FOUR Score is 0.27 and it differ significantly from zero.
- 24th hour Mean Difference between GCS and FOUR Score is 0.56 and it differ significantly from zero.

Major findings related to correlation of GCS and FOUR Score:

- Using paired t test
- Correlation of GCS and FOUR Score on admission, 1st hour, 6th hour, 24th hour all had p values are <0.0001 and considered extremely significant.

Discussion

Hosseini SH, Ayyasi M done this study in 2017 Comparison of Glasgow coma scale and Full outline of unresponsiveness in predicting mortality in trauma patients. The study showed that, From a total of 80 patients with TBI, 16 (20%) were females and 64 (80%) males.⁶ In this study shows that the total 55 patients with TBI, 28 (51%) were males and 27 (49%) were females means approximately both genders have same percentage. Hosseini SH, Ayyasi M done this study in 2017 Comparison of Glasgow coma scale and Full outline of unresponsiveness in predicting mortality in trauma patients. The study showed that, GCS and FOUR score have the same value in predicting the mortality of trauma patients in first 24 hours.⁶

In this study also the FOUR Score have the prognostic power of 24th hour and after 24th hour than GCS as the result shows that patient were GCS Assessment at 24th hour maximum number 24(43.63%) were semiconscious and FOUR score on 24th hour maximum number 33(60%) were conscious. Zeiler FA, Lo BWY done the study on 2017 This was a descriptive study, conducted on 69 patients admitted to the general surgical and neuro-surgical wards of Government Medical College, Trivandrum, India with traumatic head injury. Result shows that a statistically significant correlation was found between FOUR Score and GCS Score.⁷ In this study the also correlation between GCS Score and FOUR Score in neurosurgical ICU done in Krishna hospital karad with traumatic head injury patient. Statistical result shows that extremely significant correlation found in

GCS and FOUR Score so FOUR score can be apply in traumatic head injury patient.

Conclusion

The FOUR score results was excellent among medical intensivists. In contrast to the GCS, all components of the FOUR score can be rated even when patients have undergone intubation. The FOUR score is a good predictor of the prognosis of critically ill patients and has important advantages over the GCS in the ICU setting.⁸ FOUR Sore was very useful than GCS, as the FOUR Score contain additional part of brain stem reflexes for pupils examination and respiration that will useful to assessment of consciousness in intubated patient. FOUR score had high accuracy than GCS score after 24 hours. Both tools had high predictive power in predicting the outcome of the patient.⁶ In traumatic head injury patient focused early assessment of pupils were most important to know the intracranial pressure, in assessment of pupils know that patients intracranial pressure was increased then immediately the treatment for patient given and beneficial for patient life.

Zeiler FA, Lo BW, Akoth E author concluded in his study FOUR score can be applied as an ideal tool to evaluate consciousness levels and patients' status in patients with traumatic head injury. It can be used as the ideal replacement for Glasgow Coma Scale.⁷ This study also concludes that FOUR score was more helpful for save life of patient because the immediate treatment is provided. So that both tools can be apply for assessing traumatic head injury patient, but little more additional benefits were noted in the FOUR score.

Nursing Implication

The findings of this study have implication for Nursing services, Nursing education, Nursing administration and Nursing research.

- **NURSING SERVICE:**

FOUR score can be apply in every critical patient and every traumatic brain injury patient as the GCS had some limitation about respiration in intubated patient and it not included the brain stem reflexes.

- **NURSING EDUCATION:**

In the nursing teaching syllabus FOUR score can include to know the nursing undergraduate student and important of the FOUR score and assessment. That help for early treatment and good outcome of patient.

- **NURSING ADMINISTRATION:**

Administrator can be impose the use of FOUR score. While give responsibility of each ICU supervisor to observe the staff assessment and collect information through them.

- **NURSING RESEARCH:**

Nursing research can be carried out in large group of participants.

Research help to know the newer things and how to improve the outcome of the patient and early treatment provided to patient that help to save the life of patient.

Recommendation

- A large scale study need to be carried out to generalized the findings.
- The FOUR Score can be done in regularly basis in traumatic head injury intubated patients along with GCS.
- Aware staff and teach staff about FOUR score assessment.

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