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Assessing the immediate outcomes and etiology of comatose adult subjects

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Abstract--Introduction: Adult subjects who are a comatose present challenge to the treating healthcare professionals in Indian subjects. Prompt and proper handling of these subjects is vital to attain favorable outcomes. Attaining the diagnosis based on the etiology is vital to handle these subjects properly. Aims: The present study was conducted to assess the immediate outcomes and etiology of comatose adult subjects in Indian settings. Methods: The present prospective and observational clinical study included 150 adult comatose subjects admitted for etiologies other than non-traumatic cases and GCS of less than/equal to 10 in the Indian healthcare center. After inclusion, detailed history, investigation, and examinations were done for all the subjects. Immediate outcomes and etiologies were assessed for all the subjects. Results: 2.66% (n=4) subjects were comatose from malignancy, in 5.33% (n=8) subjects snake bite, in 14% (n=21) subjects infection, in 28.66% (n=43) subjects metabolic cause, and in 49.33% (n=74) subjects was stroke. In malignancy cases, 1.49% (n=1) subject died, whereas, 3.61% (n=3) subjects survived, in snake bite 5.97% (n=4) subjects died and 4.81% (n=4) subjects survived, in

infection, 7.46% (n=5) subjects died and 19.27% (n=16) subjects survived, in metabolic cause, 13.43% (n=9) subjects died and 40.96% (n=34) subjects survived, and in stroke as etiology, 71.64% (n=48) subjects died and 31.32% (n=26) subjects survived. Based on GCS scores, 30% (n=45) subjects had GCS score of 3-6 where 56.71% (n=38) subjects died and 8.43% (n=7) subjects survived, whereas, there were 70% (n=105) subjects with GCS score of 7-10 where 43.28% (n=29) subjects died and 91.56% (n=76) subjects survived.

Keywords---Adult comatose patients, coma etiology, GCS (Glasgow Coma Scale), NTC (Non-Traumatic Coma)

Introduction

Assessing and managing comatose subjects in Indian health care settings is challenging to the treating personnel. High mortality rates of nearly 25% to 48% are seen in subjects reporting to the emergency units of various institutions with coma/ unconsciousness disorders of non-traumatic origins. For prediction of outcomes in the comatose subjects, assessment of clinical presentations and etiology are vital in comatose adults of non-traumatic etiology.¹

Previous literature data use the cut-off value of less than/equal to 10 for non-traumatic coma subjects. Coma in adult subjects can be seen associated with acute encephalitic syndromes, with prominent focal signs (stroke) and meningitis syndromes, or without focal neurological signs (metabolic and toxic encephalopathies).²

The most common causes of sudden coma include basilar artery occlusion, epilepsy, cardiac arrest, cerebral hemorrhage, and/or drug ingestion. Coma can also be seen in adult subjects sub-acutely owing to infarction or brain edema. It can also be encountered in some adults secondary to neurological illness or secondary to some pre-existing underlying diseases.³

Glasgow Coma Scale (GCS) also acts as the best indicators to predict the mortality rates in subjects with coma cases of non-traumatic etiology. Better clinical and survival outcomes are seen with the metabolic causes of coma in the adult subjects. Vital factors in assessing and predicting the clinical outcomes of the coma subjects include pre-existing comorbidities, etiology, onset, and GCS scores.⁴ The present study was conducted to assess the immediate outcomes and etiology of comatose adult subjects in Indian settings.

Method

The present study prospective, observational, clinical study was conducted to assess the immediate outcomes and etiology of comatose adult subjects in Indian settings. The study was conducted Department of Emergency Medicine, ACSR Government Medical College, Nellore, Andhra Pradesh. The study population was comprised of adult comatose subjects reported to the emergency department of the Institute. After explaining the detailed study design, informed consent was taken from all the study subjects.

The study included a total of 150 adult subjects from both genders. The inclusion criteria for the study were subjects who were comatose with GCS ≤ 10 , aged more than 20 years, and subjects whose attendants were willing to give consent. The exclusion criteria were subjects with underlying neurologic diseases having a frequent incidence of consciousness loss and whose attendants were not willing to give informed consent. The study was aimed at assessing the immediate outcomes and etiology in adult comatose subjects in 4 weeks of admission.

After the final inclusion of the study subjects, detailed history was recorded for all the subjects followed by clinical examination and laboratory examination. The laboratory parameters assessed were EEG, CT scan chest/abdomen, MRI brain, chest X-ray PA view, CT scan brain, ECG, serum osmolality, urine ketone bodies, CSF analysis, coagulation profile, ANA profile, blood ammonia, HIV screening, hepatitis B, C, A, E, arterial blood gas analysis, liver function test, creatinine, urea, complete hemogram, serum potassium, serum sodium, and/or capillary blood glucose depending on the accuracy of the parameter. All the subjects were followed for 4 weeks since the study started.

The collected data were subjected to the statistical evaluation using SPSS software version 21 (Chicago, IL, USA) and one-way ANOVA and t-test for results formulation. The data were expressed in percentage and number, and mean and standard deviation. The level of significance was kept at $p < 0.05$.

Results

The present study prospective, observational, clinical study was conducted to assess the immediate outcomes and etiology of comatose adult subjects in Indian settings. The study included a total of 150 adult subjects from both genders within the age range of 21-88 years. Based on age range, it was seen that majority of the study subjects were in the age range of 51-60 years with 22% ($n=23$) subjects, where 25.37% ($n=17$) subjects died and 19.27% ($n=16$) subjects survived followed by 14.66% ($n=22$) subjects from 61-70 years, 16% ($n=24$) subjects from 41-50 years, 14.66% ($n=22$) subjects from 71-80 years, 14% ($n=21$) from 31-40 years, 13.33% ($n=20$) from 21-30 years, and 2% ($n=3$) subjects from 81-88 years age group. In subjects who died maximum subjects were from 61-70 years with 26.86% ($n=18$) subjects followed by 25.37% ($n=17$) from 51-60 years, 16.41% ($n=11$) from 71-80 years, 11.94% ($n=8$) from 41-50 years, 8.95% ($n=6$) subjects from 31-40 years, 7.46% ($n=5$) from 21-30 years, and 2.98% ($n=2$) subjects from 81-88 years ago. The majority of recovered subjects were within the age range of 41-50 and 51-60 years with 19.27% ($n=16$) subjects followed by age of 21-30- and 31-40-years age groups with 18.07% ($n=15$) subjects each (Table 1).

On assessing the etiology, it was seen that 2.66% ($n=4$) subjects had coma from malignancy, in 5.33% ($n=8$) subjects snake bite, in 14% ($n=21$) subjects infection, in 28.66% ($n=43$) subjects metabolic cause, and in 49.33% ($n=74$) subjects was stroke. In malignancy cases, 1.49% ($n=1$) subject died, whereas, 3.61% ($n=3$) subjects survived, in snake bite 5.97% ($n=4$) subjects died and 4.81% ($n=4$) subjects survived, in infection, 7.46% ($n=5$) subjects died and 19.27% ($n=16$) subjects survived, in metabolic cause, 13.43% ($n=9$) subjects died and 40.96% ($n=34$) subjects survived, and in stroke as etiology, 71.64% ($n=48$) subjects died

and 31.32% (n=26) subjects survived. Based on GCS scores, 30% (n=45) subjects had GCS score of 3-6 where 56.71% (n=38) subjects died and 8.43% (n=7) subjects survived, whereas, there were 70% (n=105) subjects with GCS score of 7-10 where 43.28% (n=29) subjects died and 91.56% (n=76) subjects survived (Table 2).

Based on the death reported in the study subjects based on etiology and comorbidities, it was seen that among 1 subject with malignancy the comorbidity was associated. In 5.97% (n=4) subjects having snake bite etiology, 2.08% (n=1) subject had comorbidity, whereas, 15.78% (n=3) subjects were without comorbidity. In infection subjects, 6.25% (n=3) subjects had comorbidity. In 13.43% (n=9) subjects with metabolic etiology, all subjects had associated comorbidity. In 71.64% (n=48) subjects with stroke as etiology, 70.83% (n=34) subjects had associated comorbidities, whereas, in 73.68% (n=14) subjects had no associated comorbidity as shown in Table 3.

Discussion

The present study prospective, observational, clinical study was conducted to assess the immediate outcomes and etiology of comatose adult subjects in Indian settings. The study included a total of 150 adult subjects from both genders within the age range of 21-88 years. Based on age range, it was seen that majority of the study subjects were in the age range of 51-60 years with 22% (n=23) subjects, where 25.37% (n=17) subjects died and 19.27% (n=16) subjects survived followed by 14.66% (n=22) subjects from 61-70 years, 16% (n=24) subjects from 41-50 years, 14.66% (n=22) subjects from 71-80 years, 14% (n=21) from 31-40 years, 13.33% (n=20) from 21-30 years, and 2% (n=3) subjects from 81-88 years age group. In subjects who died maximum subjects were from 61-70 years with 26.86% (n=18) subjects followed by 25.37% (n=17) from 51-60 years, 16.41% (n=11) from 71-80 years, 11.94% (n=8) from 41-50 years, 8.95% (n=6) subjects from 31-40 years, 7.46% (n=5) from 21-30 years, and 2.98% (n=2) subjects from 81-88 years of age. The majority of recovered subjects were within the age range of 41-50 and 51-60 years with 19.27% (n=16) subjects followed by age of 21-30- and 31-40-years age groups with 18.07% (n=15) subjects each. These findings were comparable to the studies of Magwood GS et al⁵ in 2019 and Joseph SA et al⁶ in 2018 where authors reported comparable death and survival rate in similar age groups as in the present study.

Based on the etiology of coma in adult subjects, it was seen that 2.66% (n=4) subjects were comatose from malignancy, in 5.33% (n=8) subjects snake bite, in 14% (n=21) subjects infection, in 28.66% (n=43) subjects metabolic cause, and in 49.33% (n=74) subjects was stroke. In malignancy cases, 1.49% (n=1) subject died, whereas, 3.61% (n=3) subjects survived, in snake bite 5.97% (n=4) subjects died and 4.81% (n=4) subjects survived, in infection, 7.46% (n=5) subjects died and 19.27% (n=16) subjects survived, in metabolic cause, 13.43% (n=9) subjects died and 40.96% (n=34) subjects survived, and in stroke as etiology, 71.64% (n=48) subjects died and 31.32% (n=26) subjects survived. Based on GCS scores, 30% (n=45) subjects had GCS score of 3-6 where 56.71% (n=38) subjects died and 8.43% (n=7) subjects survived, whereas, there were 70% (n=105) subjects with GCS score of 7-10 where 43.28% (n=29) subjects died and 91.56% (n=76)

subjects survived. These results were consistent with the results of Owolabi LF et al⁷ in 2013 and Posner JB et al⁸ in 2019 where authors reported similar etiology in adult subjects who were comatose.

Depending on the death reported in the study subjects based on etiology and comorbidities, it was seen that among 1 subject with malignancy the comorbidity was associated. In 5.97% (n=4) subjects having snake bite etiology, 2.08% (n=1) subject had comorbidity, whereas, 15.78% (n=3) subjects were without comorbidity. In infection subjects, 6.25% (n=3) subjects had comorbidity. In 13.43% (n=9) subjects with metabolic etiology, all subjects had associated comorbidity. In 71.64% (n=48) subjects with stroke as etiology, 70.83% (n=34) subjects had associated comorbidities, whereas, in 73.68% (n=14) subjects had no associated comorbidity. These results were in agreement with the studies of Mwanja K et al⁹ in 2016 and Greer DM et al¹⁰ in 2012 where comparable death rates were shown by the authors associated with etiology and comorbidities.

Conclusion

Within its limitations, the present study concludes that the most common cause of non-traumatic coma is stroke. However, infective and metabolic causes were also found to be equally important causes. Prompt and early identification of etiology can help in achieving better clinical outcomes. Poor GCS scores are associated with poor clinical outcomes in adult comatose subjects. However, the present study had a few limitations including a small sample size, shorter monitoring period, and geographical area biases. Hence, more longitudinal studies with larger sample size and longer monitoring period will help reach a definitive conclusion.

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Tables

Parameters	Total subjects n=150 (%)	Deaths n=67 (%)	Recovered n=83 (%)
Age Range(years)			
21-30	20 (13.33)	5 (7.46)	15 (18.07)
31-40	21 (14)	6 (8.95)	15 (18.07)
41-50	24 (16)	8 (11.94)	16 (19.27)
51-60	33 (22)	17 (25.37)	16 (19.27)
61-70	27 (18)	18 (26.86)	9 (10.84)
71-80	22 (14.66)	11 (16.41)	11 (16.41)
81-88	3 (2)	2 (2.98)	1 (1.20)

Table 1. Clinical outcomes based on age range in the study subjects

Etiology	Total subjects n=150 (%)	Deaths n=67 (%)	Recovered n=83 (%)
Malignancy	4 (2.66)	1 (1.49)	3 (3.61)
Snakebite	8 (5.33)	4 (5.97)	4 (4.81)
Infection	21 (14)	5 (7.46)	16 (19.27)
Metabolic	43 (28.66)	9 (13.43)	34 (40.96)
Stroke	74 (49.33)	48 (71.64)	26 (31.32)
GCS			
3-6	45 (30)	38 (56.71)	7 (8.43)
7-10	105 (70)	29 (43.28)	76 (91.56)

Table 2. Clinical outcomes based on etiology and GCS in the study subjects

Etiology	Total deaths n=67 (%)	With comorbidities n=48 (%)	Without comorbidities n=19 (%)
Malignancy	1 (1.49)	1 (2.08)	
Snakebite	4 (5.97)	1 (2.08)	3 (15.78)
Infection	5 (7.46)	3 (6.25)	2 (10.52)
Metabolic	9 (13.43)	9 (18.75)	
Stroke	48 (71.64)	34 (70.83)	14 (73.68)

Table 3. Clinical outcomes based on etiology and comorbidities in the study subjects