

Original Article:**Aetiology and factors affecting outcome in patients admitted to medical intensive care unit with delirium in a tertiary care teaching hospital****B. Shivanandh,¹ T.P. Sudhakar,² Alladi Mohan,³ P. Lokeshwar Reddy,² D. Aruna²***Department of¹Psychiatry, ³Medicine, Sri Venkateswara Institute of Medical Sciences, Tirupati and Department of²Psychiatry, Regional Psychiatry Hospital, Sri Venkateswara Medical College, Tirupati*

ABSTRACT

Background: Delirium, a common manifestation in critically ill patients is a strong predictor of prolonged intensive care unit (ICU) stay, higher morbidity and mortality.

Methods: One hundred patients admitted to medical ICU (MICU) at our tertiary care teaching hospital with delirium were evaluated using confusion assessment method. Their Simplified Acute Physiology score II (SAPS II) at presentation, socio-demographic details, risk factors for development of delirium were recorded; aetiology and factors affecting outcome were identified.

Results: Their mean age was 48.1 ± 16.6 years; there were 63 males. Most of them (87%) belonged to lower socioeconomic status. Infections (65%) followed by intentional poisonings (19%), metabolic causes (10%) and substance abuse (6%) were the important aetiological causes. Hyperactive delirium (48%) was the most common, followed by mixed (27%) and hypoactive delirium (25%). Univariate analysis showed that non-survivors had a significantly higher SAPS II ($p < 0.001$) and a higher burden of chronic kidney disease ($p < 0.001$) compared to survivors.

Conclusion: Knowledge of the factors influencing delirium will increase our ability for early detection and prevention of delirium.

Key words: *Delirium, Medical intensive care unit, SAPS II score, Critical care*

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INTRODUCTION

Critical care clinicians have historically been accustomed to pulmonary, cardiac, and renal dysfunction as a source of morbidity and mortality in critical care patients but have underestimated the impact of brain dysfunction.¹ Delirium, a common manifestation of acute brain dysfunction in critically ill patients is associated with poor short-term outcomes and may result in adverse sequelae years after intensive care unit (ICU) discharge in form of early onset cognitive decline.^{2,3} Delirium remains unrecognized and misdiagnosed because of its short onset,

fluctuating course and manifestations similar to those of depression and dementia.⁴

Delirium was defined as per Diagnostic and Statistical Manual of Mental Disorders-IV Text Revision (DSM-IV TR) as foremost disturbance of consciousness, attention, cognition and perception.⁵ It is one of the most common cause for psychiatric referrals due to behavioural disturbances, which range from unco-operativeness to treatment to physical violence towards staff, resulting in difficult scenario to treat. Above said hyperactive delirium which immediately gets attention of staff contrasts with hypoactive delirium due to

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its non-demanding nature resulting in inattention from staff, which is more dangerous.

Studies⁶⁻⁹ from the west suggest that prevalence of delirium in patients admitted to ICU ranges from 20%-83% depending upon the severity of physical illness and the age of the patient. Prevalence of delirium in ICU patients has been reported to be 64% in a study from India.¹⁰ Many health care providers do not understand the progression of delirium and do not recognize the outcomes of its complications. Delirium is often incorrectly thought to be transient and of little consequence. After adjusting for numerous co-variants, delirium is a strong, independent predictor of prolonged length of stay, reintubation, higher mortality¹¹⁻¹³ and cost of care.^{6,14-17}

Current approaches to delirium focus primarily on the precipitating factors and do not address the predisposing factors. Knowing risk factors for delirium would enable clinicians to avoid or detect delirium soon after onset and provide symptomatic relief, thus decreasing complications and even death.^{10,18-20}

MATERIAL AND METHODS

The present prospective study was carried out during the period August 2010 - February 2011 in medical intensive care unit (MICU) of Sri Venkateswara Institute of Medical Sciences (SVIMS), Tirupati, which is a tertiary care referral centre and teaching hospital in south India, catering to the population of the Rayalaseema area comprising Chittoor, YSR Kadapa, Kurnool, and Ananthapur districts and the neighbouring PS Nellore district of Andhra Pradesh state. This study was approved by the Institutional Ethics Committee. All the patients were recruited after obtaining written informed consent from the next responsible attendant of the patient. All patients with delirium were managed by the treating physicians as was mandated by their clinical condition.

All the patients who were admitted to the MICU with Glasgow coma scale (GCS)²¹ score more than or equal to 11 are screened for symptoms of delirium by using confusion assessment method^{6,22} (CAM) and screen positive patients were followed till the outcome.

Every day a psychiatrist made rounds in the MICU between 6 pm and 8 pm and assessed patients for emergence of delirium. Socio-demographic factors, risk factor checklist prepared after taking into account the predisposing, precipitating and environmental factors,¹⁸ aetiological cause, co-morbid chronic conditions, were recorded. Polypharmacy was defined as use of four or more regular medications. While assessing environmental factors, we checked with the informants regarding watch reading ability in all patients. For those who cannot read the watch we asked to point where were the short arm and long arm of the clock, so as to know the visibility of clock. No patient failed to read out the numbers.

The diagnosis of delirium was based on the information provided by the patient, caregivers, treating physician and nurses. Discharge, death were considered as outcome variables. Subtyping of delirium was done on the basis of Richmond Agitation and Sedation Scale (RASS) scores.²³ A score of +1 to +4 during most of the period while in delirium was considered as hyperactive delirium. Patients who frequently exhibited agitation and restlessness, attempted to remove catheters or tubes, tried to get up from the bed, required physical restraint, tried to hit or did hit the persons around, who had hallucinations and/or delusions were categorized as having hyperactive delirium. A score of 0 to "4 during most of the period while in delirium was taken as an indicator of hypoactive delirium. Patients who were mostly calm and quite, appeared lethargic, hardly moved spontaneously and exhibited flat affect or apathy were categorized as having hypoactive delirium. Patients who

exhibited features of both types while in delirium were considered as having “mixed” type of delirium. Simplified Acute Physiology II score²⁴ (SAPS II score) which measures the severity of disease in ICUs and gives an integer point score between 0 and 163, was recorded in all patients who were screen positive for delirium at the initial time.

Statistical analysis

Descriptive analysis of the salient factors resulting in delirium were described in terms of mean, standard deviation and range for continuous variables. Categorical variables were described as percentages. Student’s t-test and Chi-square test were used to compare continuous variables respectively. Data were analyzed using SPSS16 statistical software.

RESULTS

We prospectively studied 100 patients admitted to the MICU. Their demographic characteristics are shown in Table 1. Eighty seven patients were below poverty line. Comparison of SAPS II score in patients with and without various

disease conditions is shown in Table 2. Mean SAPS II was significantly higher in patients with chronic systemic diseases. Patients who had history of substance abuse and in particular alcohol dependency suffered withdrawal delirium. Poly pharmacy along with chronic systemic diseases had significantly higher SAPS II score (Table 2).

The precipitating events for delirium are shown in Figure 1. Infective causes like cerebral malaria and complicated leptospirosis, meningitis, encephalitis, lower respiratory tract infections were commonly associated with occurrence of delirium. Intentional intake of organophosphorous compounds and paraphenylene diamine resorcinol containing hair dye in adolescents and adults due to impulsive suicidal ideation, snake bite in the rest of the group made poisoning the second most common cause for delirium (Figure 1).

As per the subtyping based on RASS, the most common subtype of delirium seen in the study group was that of hyperactive (48%) followed by mixed (27%) and hypoactive types (25%)

Table 1: Demographic characteristics

Variable	Observations
Age (years)*	48.1±16.6 (range 13-85)
Gender (No.)	
Male	63
Female	37
Educational status (No.)	
Uneducated	45
Primary education	28
Secondary education and above	27
Marital status (No.)	
Unmarried	9
Married	77
Widowed	14
Living arrangement (No.)	
Alone	4
With family	96
Occupation (No.)	
Unskilled	39
Skilled	27
Self employed	11
House-wife	12
Others	11

* data are presented as mean ± standard deviation

Table 2: Comparison of SAPS II score in patients with various disease conditions admitted to MICU (n=100)

Disease condition	SAPS II score*	p-value
CNS disorders		0.016
Present (n = 24)	31.5±10.7	
Absent (n = 76)	25.5±10.3	
Psychiatric disorders		0.394
Present (n = 13)	29.3 ± 9.6	
Absent (n = 87)	26.6 ±10.8	
Substance abuse		0.957
Present (n = 57)	27.0±10.8	
Absent (n = 43)	26.9±10.6	
Sensory impairment		0.001
Present (n = 21)	33.5 ±9.1	
Absent (n = 79)	25.2 ±10.4	
History of previous surgery		0.315
Present (n = 11)	30.0 ± 9.4	
Absent (n = 89)	26.6±10.7	
Chronic kidney disease		<0.001
Present (n = 6)	44.5±11.4	
Absent (n = 94)	25.8± 9.6	
Chronic pulmonary disease		0.02
Present (n = 12)	33.6± 8.8	
Absent (n = 88)	26.1±10.6	
Chronic liver disease		0.419
Present (n = 2)	33.0±15.6	
Absent (n = 98)	26.8±10.6	
Chronic cardiac disease		0.006
Present (n = 32)	31.2±12.1	
Absent (n = 68)	25.0±9.3	
Cancer		0.385
Present (n = 4)	31.5±8.7	
Absent (n = 96)	26.8±10.7	
Endocrine disorders		0.003
Present (n = 25)	32.4±8.5	
Absent (n = 75)	25.2±10.7	
Polypharmacy		<0.001
Present (n = 25)	33.3±9.3	
Absent (n = 75)	24.8±10.2	

* data are presented as mean ± standard deviation

SAPS II = Simple Acute Physiology Score; MICU = medical intensive care unit; CNS = central nervous system

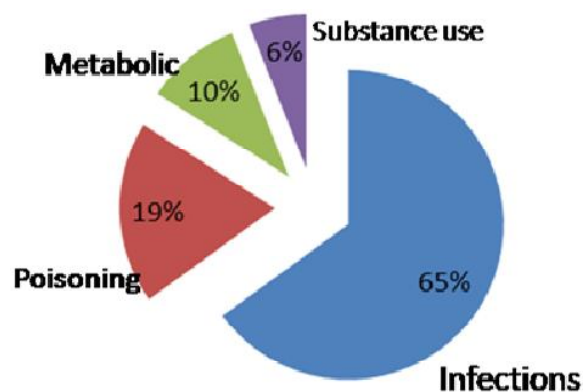


Figure 1: Precipitating events

(Table 2). Eighty one patients were delirious at the time of admission into MICU; 15% of patients who became delirious within 3 days of admission had history of alcohol dependence and other substance abuse. Comparison of various parameters between survivors and non-survivors with delirium is shown in Table 3. Univariate analysis showed that non-survivors had a significantly higher mean SAPS II score ($p < 0.001$) and more frequently had CKD ($p < 0.001$).

DISCUSSION

Males formed the majority of study group, which was similar to observations in another study¹⁸ where male gender was found to be a risk factor to develop delirium. Our study population was much younger (mean age 48.1 years) when compared to western studies^{5,21} where subjects were more than 65 years. These differences in the age possibly reflect the kind of patients admitted to the MICU in developed and developing countries. Whereas infectious diseases are leading causes in developing countries, malignancies and terminal illnesses are leading cause in developed countries.^{1,18,25,26} The status of living alone, which is more common in western societies¹⁸ was not found

to be a risk factor in our study as majority of study population had families living with them (Table 1).

Due to constituency of young population in study group, prevalence of chronic diseases and their impact are found to be non significant in relation to outcome of delirium. But presence of chronic disease and increased age (>55 years) has significant impact on SAPS II score which is a marker of morbidity.¹⁸ In subjects who had history of substance abuse especially alcohol abuse, withdrawal delirium developed within 3 days after getting admitted to ICU due to forced abstinence.^{19,21} Our observations were similar (Table 2). Infectious diseases were found to be the leading cause of delirium

Table 3: Univariate analysis: comparison between survivors and non-survivors

Variable	Alive (n=89)	Dead (n=11)	p-value
Age*	47.7 ± 17	51.2 ± 12.8	0.517
Gender			0.96
Male	56	7	
Female	33	4	
SAPS II score at admission*	25.7 ± 9.8	37.3 ± 11.6	<0.001
Precipitating event			0.045
Infective causes	56	9	
Metabolic causes	9	1	
Illicit drug use	19	0	
Poisoning	5	1	
Disease condition			
CNS disorders	21	3	0.963
Psychiatric disorders	11	2	0.633
Substance abuse	52	5	0.412
Sensory impairment	19	2	0.808
CKD	2	4	<0.001
COPD	12	0	0.194
Chronic liver disorders	1	1	0.75
Chronic cardiac disorders	27	5	0.311
Cancer	4	0	0.473
Endocrine disorders	20	5	0.97
Poly pharmacy	11	2	0.633
Type of delirium			0.195
Hyperactive	40	8	
Hypoactive	23	2	
Mixed	26	1	

* data are presented as mean ± standard deviation

CNS= central nervous system; CKD= chronic kidney disease; COPD= chronic obstructive pulmonary disease
SAPS II= Simplified Acute Physiology II score

followed by poisonings, metabolic and illicit drug use. These observations are in line with reports from other Indian studies.^{11,27} Majority of study population falls under the first two groups and most of them are delirious by the time they reached emergency room (Figure 1). This is because majority of them reached hospital after the florid symptoms of delirium appeared due to poor awareness regarding health, acute poisonings with organophosphorous compounds and prescription tablet overdosing, and referrals were made from outside hospitals once the case had worsened. ICU patients are under continuous illumination which could badly affect their sleep

ICU patients are under continuous illumination which could badly affect their sleep wake cycle and predispose many ill patients to delirium. Recovering from delirium was delayed in cases which had no visible clock. Sensory impairment like poor vision and hearing difficulties had shown impact over duration of stay in ICU due to difficulty in getting cues from environment. Our observations suggest that delirium is associated with longer duration of ICU stay and higher ICU mortality. Physicians usually have poor knowledge about delirium, and this is often missed or expected to occur in seriously ill patients; hence, it is not given as much importance as other organ dysfunctions.²⁸

Hyperactive and mixed type of delirium constituted 75% of cases. Most common type of delirium which caught immediate attention of medical staff was delirium tremors followed by hyperactive delirium due to atropinization. These patients posed difficulty to MICU staff because of their hyperactive and aggressive behaviour. Many of these patients were physically restrained to deliver medications and to avoid physical injuries. Hyperactive delirium is the most common type of delirium. This is contrary to the observations from India^{10,11} which report hypoactive delirium as most

common type of delirium followed by mixed and hyperactive delirium. These variations could be because of differences in type of MICU set ups and nature of study population.

Patients who died had a higher mean SAPS II score and a higher burden of CKD. Computing SAPS-II scoring in the MICU at admission may considerably help in alerting MICU staff regarding emergence of symptoms of delirium.

The study has many limitations like a small sample size, non-homogeneous population, assessment in a single MICU, non elimination of seasonal variations and lack of special window sealed rooms. The study has also not assessed potential risk factors which can predispose non delirious patients to delirium. Factors like number of medications used and effect of various medications in ICU patients like doses of steroids and sedatives were not evaluated to understand dose-causality/risk relationship. Future studies which could address above shortcomings will enhance our knowledge on delirium.

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