

Effect of Seasonal Variation in the Occurrence of Delirium in Patients Admitted to Intensive Care Units of a Tertiary Care Centre in North India

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Abstract: ***Introduction:** Delirium is a quite common entity in critically ill patients and known to have several predisposing and precipitating factors. Clinically we have seen a strong relationship between delirium occurrence and season. The observation that the general morbidity of the patients varies according to seasonal factors may suggest the possible existence of seasonal differences regarding delirium. **Aims and objectives:** The aim of current study was to determine the effect of seasonal variation in occurrence of delirium in patients admitted to intensive care units of tertiary care centre. **Material and methods:** We conducted a prospective study of patients admitted to intensive care units of tertiary care centre in north India, between July 2021 and June 2022. Patients were screened using RASS (Richmond Agitation Sedation Scale) and DOSS (delirium observation screening scale). Confusion Assessment Method Intensive Care Unit (CAM - ICU) was used to assess delirium. The incidence of delirium and LOS were summarised by season and statistically analysed. **Result:** Total 720 patients admitted to intensive care units, 158 (21.94%) had delirium, 64 of whom in females (40.5%) and 94 in males (59.5%). Incidence of delirium was more in winter (57%) than in summer (43%). **Conclusion:** The study indicates higher rates of occurrence of delirium in the winter than in the summer months. The role of possible underlying favouring or triggering factors deserves further research.*

Keywords: Delirium, Seasonal variation, Intensive care unit, critically ill, tertiary care centre

1. Introduction

Delirium can be defined as an acute brain dysfunction characterised by transient and fluctuating changes in the state of consciousness, accompanied by cognitive impairment, which frequently affects patients admitted to intensive care units (ICU). [1] It occurs in a short period (hours or days), is generally reversible and can be a direct consequence of a medical condition, intoxication or withdrawal syndrome caused by the use of drugs, even in therapeutic concentration, exposure to toxins or a combination of these factors. [2] Environmental factors can also trigger it, such as stress induced by ignorance of the environment, alarm noise, constant changes in professionals who provide assistance and care or procedures poorly explained to patients. **Error! Bookmark not defined.**

The prevalence of delirium in critically ill patients varies between studies and can affect approximately 80.0% of patients admitted to the Intensive Care Unit using mechanical ventilation. However, only 32.0% to 66.0% of patients are correctly diagnosed and treated. [3] Delirium remains considerably underdiagnosed despite its high prevalence in the intensive care unit (ICU). There are reports of ICU prevalence ranging from 28.0% to 73.0%. This variation can be attributed to the heterogeneity of the population assessed (for example, disease severity, patients on mechanical ventilation or not, elderly) as well as the definition of delirium and the instrument chosen for its detection. [4]

Recently, it has been shown that even among healthy subjects, cognitive function, especially attention and executive processes, may peak in late summer and early fall and decline in late winter and early spring, with a more dysfunctional pattern during winter. [5] [6] Furthermore, alteration in cognition was robustly associated with seasonal changes. [7] Two previous studies showed a seasonal effect on delirium incidence, with a higher incidence in autumn - winter compared to summer months. [8] However, these findings are limited to general medical patients, and the seasonal effect on delirium remains poorly understood in critically ill surgical patients.

Seasonal occurrence of cardiovascular, cerebrovascular, or infectious events and seasonal rhythms in the psychological state has been previously reported. [9] [10] The possible underlying mechanism of this seasonal influence may be related to changes in a light - darkness cycle or lower vitamin D levels in winter. Previous research also showed seasonal variation in the hospitalisation rate of patients with chronic conditions, namely longer LOS during winter months. [11] However, the influence of seasonal changes on LOS in surgical intensive care patients is unclear. So, we aimed to study the effect of seasonal variation in the occurrence of delirium in patients admitted to intensive care units of a tertiary care centre in north India.

2. Material and Methods

This prospective study was performed in the Department of Psychiatry, Career Institute of Medical Sciences & Hospital,

Lucknow, UP, on patients admitted to intensive care units of the tertiary care centre in north India between July 2021 and June 2022 for a duration of 1 year on 720 adult delirium patients who confirmed consent and fit to the inclusion criteria were recruited for this study.

Inclusion exclusion criteria

Inclusion criteria

- Aged between 18 and 85 years
- Both genders
- Who has passed through the intensive care unit
- Whose attendants were willing to give informed consent.

Exclusion criteria

- Age less than 18 years
- Non - ICU patients
- Not willing to participate in the study
- Having a pre - existing psychiatric illness

Procedure methodology

Patients were screened using RASS (Richmond Agitation Sedation Scale) and DOSS (delirium observation screening scale). Confusion Assessment Method Intensive Care Unit (CAM - ICU) was used to assess delirium. The incidence of delirium and LOS were summarised by season and statistically analysed.

Combining sedation and delirium monitoring was necessary to diagnose delirium using the two - step method for assessing consciousness. The first step refers to the assessment of sedation and agitation, quantified by the Richmond Scale of Agitation—RASS Sedation, which has already been implemented in the service. The rating scale ranges from +4 to -5. The attribution of scores to the patient by the RASS scale was done as follows:

Score zero refers to the alert patient without apparent agitation or sedation. Levels below zero mean some degree of sedation, and levels above zero indicate that the patient has some degree of agitation.

After the patient assessment, according to the RASS definition, all patients whose classification was greater than -4 and less than +4 proceeded to the second step. Those classified as RASS -4 and -5 were excluded from intense sedation, and those classified as RASS +4 due to severe agitation. After determining the RASS, the second step was continued: the assessment using the Confusional Assessment Method in the Intensive Care Unit (CAM - ICU) scale, which allowed for identifying delirium episodes in critically ill patients.

Ethical clearance

The research procedure was followed per the approved ethical standards of the Department of Psychiatry, Career Institute of Medical Sciences & Hospital, Lucknow, UP, India Ethics Committee (Human).

Statistical Analysis

Microsoft Excel was used in creating the database and producing graphs, while the data were analysed using the Statistical Package for the Social Sciences (SPSS) version

23 for Windows. Mean and standard deviation (\pm SD) were used to describe quantitative data meeting normal distribution. Parametric independent Student's t - test compared two continuous independent groups. Discrete (categorical) groups were compared by the chi - square (χ^2) test. p values less than 0.05 ($p < 0.05$) were considered statistically significant.

3. Observation

Out of 720 patients admitted in intensive care units, 158 (21.94%) had delirium (Figure 1), 64 of whom were females (40.5%) and 94 were males (59.5%). The delirium incidence was higher in winter (57%) than in summer (43%).

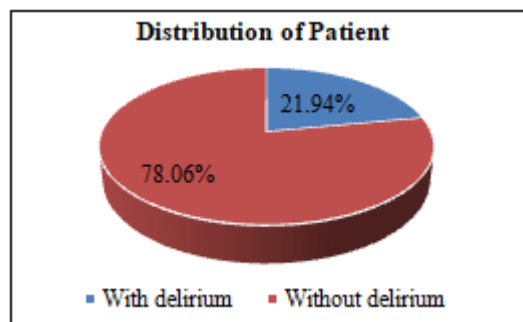


Figure 1: Distribution of patients evaluated by CAM - ICU in the ICU.

Table 1: Length of hospital stay in patients with and without delirium

Hospital Stay (days)	No. of patients (n=720)	Mean \pm SD	P value
With delirium	158 (21.94)	23.25 \pm 10.5	<0.001
Without delirium	562 (78.06)	4.5 \pm 3.5	

Table 2: Outcome of patients with and without delirium in the ICU

Outcome	with delirium (n=158)	without delirium (n=562)	P value
Death	61 (38.6%)	105 (18.7%)	>0.05
Discharged	97 (61.4%)	457 (81.3%)	

Table 3: Outcome of patients with delirium based on season

Season	with delirium (n=61)	without delirium (n=105)	P value
Summer (n=90)	37 (41.1%)	59 (56.2%)	0.575
Winter (n=68)	24 (35.3%)	46 (43.8%)	

Table 4: Length of hospital stay in patients with delirium based on season

Season	delirium (n=158)	p - value
Summer (n=90)	27.1 \pm 11.7	<0.05
Winter (n=68)	19.3 \pm 9.5	

4. Discussion

Delirium is the most common form of acute brain dysfunction in ICU and affects up to 80.0% of patients. However, it is often undervalued and not recognized similarly to other organ dysfunction. **Error! Bookmark not defined.** There are reports of ICU prevalence ranging from 28.0% to 73.0%. This variation can be attributed to the heterogeneity of the population assessed (for example, disease severity, patients on mechanical ventilation or not,

elderly), the definition of delirium, and the instrument chosen for its detection. [4]

The CAM - ICU scale, unprecedented in use in this ICU, proved to be simple, fast and easy to apply the scale. It only required quick training, which allowed its proper use. The analyses show a 21.94% prevalence of delirium in the studied population. This result is compatible with the study performed by **da Silva Machado et al. [12]**, who reported the prevalence of delirium as 30.1%. **Qui Y et al. [13]** found that the incidence of delirium in SICU was over 50.0%, consistent with previous studies [14], which may be even more significant in those under invasive mechanical ventilation.

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