

# Recognizing Changes in Cognition in Sub Types of Acute Confusional State

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## ABSTRACT

**Background:** Delirium or acute confusional state is an acute neuropsychiatric syndrome, with varied cognitive dysfunctions. However, no comprehensive studies about this common condition have been carried out in India.

**Objectives:** To assess cognitive dysfunctions in hypoactive and hyperactive delirium.

**Materials and Methods:** Forty cases of delirium including hypoactive and hyperactive delirium and 40 other patients (neuropsychiatric patients) were studied as controls. Cognitive status estimation test, mini mental state examination and memorial delirium assessment scale were administered to each patient. All assessments were carried out three times in 24 hour

cycle of day and night. The data was analysed using two sample independent t-test.

**Results:** The mean age (standard deviation) of study and control group was 27.85 (13.73) and 33.10 (11.26) years respectively. 70% patients had hyperactive delirium while 30% were having hypoactive delirium. Hypoactive delirium had more cognitive impairment compared to hyperactive delirium ( $p=0.001$ ). The difference between highest and lowest score of MMSE in both types of delirium (day to night) was found to be statically significant ( $p=0.001$ ).

**Conclusion:** The fluctuation in intensity of cognitive symptoms varies from day to night in both types of delirium, but more in hypoactive delirium and wider fluctuation in cognitive dysfunctions was noted in delirium cases with psychosis.

**Keywords:** Psychosis, MMSE, Neuropsychiatric syndrome

## INTRODUCTION

Delirium is a widely prevalent acute neuropsychiatric syndrome brought about by potentially reversible direct or indirect cerebral insult [1]. Currently delirium is conceptualized both as a disease and a syndrome [1]. Disturbance of consciousness and attention are identified as core symptoms of delirium. The associated symptoms consist of mixture of various cognitive dysfunctions, thought and language disturbances, psychopathological, perceptual and affective symptoms [1]. As far as cognitive symptoms are concerned, disturbance of attention and comprehension are considered as central to delirium [2]. Impaired concentration, vigilance, orientation, memory, visual retention and recognition are the other cognitive symptoms that are affected in delirium [2]. The pathophysiology of delirium is poorly understood. Multiple aetiologies for delirium may funnel into final common neural pathway. Electrolyte imbalance, impaired liver function test, alcohol withdrawal and anticholinergic drugs are well known risk factors for delirium [3]. The psychopathological symptoms in delirium occur in the form of delusions, perceptual disturbances and affective symptoms [3]. 10-15% of patients in hospital are estimated to suffer from delirium. Further 46% of terminally ill patients and 37% of postoperative patients are known to suffer from delirium [1]. The incidence of delirium varies with hospital setting, age, disease, and psychosocial variables [1]. Delirium can be differentiated from dementia as dementia has a gradual onset, progressive in nature and persists for more than one month. Dementia occurs in clear consciousness with no fluctuations in cognitive functions and it is not associated with decreased alertness [3]. Depression can share common characteristics with hypoactive delirium like slow speech, withdrawn behaviour, apathetic mood, and poor results on cognitive testing. However it can be differentiated from delirium as there is no clouding of consciousness and variability of cognitive functions [3].

**Broadly two types of delirium have been identified:** Hyperactive delirium and hypoactive delirium [1]. Delirium can affect treatment-related decisions and result in delayed recognition and management. Further it can lead to significant increased risk of self-injurious behaviour, decreased self-care, non-compliance to

medication and medical complications like aspiration pneumonia [4].

Large number of studies have been conducted on delirium in western countries [2,4-9]. However no comprehensive study about this common condition has been carried out in India. The few published studies are sporadic and generally focused on specific areas like hepatic encephalopathy, uraemic encephalopathy and old age [10]. In view of the above, a comprehensive study to investigate cognitive dysfunctions in hypoactive and hyperactive delirium was carried out.

## MATERIALS AND METHODS

The study was conducted at Shri Maharaja Hari Singh Hospital of Government Medical College Srinagar (Kashmir), India. Forty DSM-IV TR (Diagnostic and Statistical Manual of Mental Disorders IV edition, text revision) [11] identified cases of delirium drawn from various departments of the hospital formed the study group and equal number of patients without delirium (neuropsychiatric patients) formed the control.

### Inclusion criteria

1. Patients 18 years and above.
2. Consent to participate in the study.
3. Permission by the primary medical caregiver.

### Exclusion criteria

1. Patient incapacitated to participate in the study due to poor medical status.
2. Grossly disturbed and uncooperative patients.

Detailed mental status evaluation was carried out to establish the diagnosis of the delirium. Patients characterised by restlessness, hypervigilance, rapid speech, irritability and combativeness were diagnosed as hyperactive delirium. Whereas patients characterised by psychomotor retardation and apathy were diagnosed as hypoactive delirium [1].

Cognitive status estimation test (CSET), MMSE, (Mini-mental status examination) and Memorial Delirium Assessment Scale (MDAS) were administered to each patient [12,13]. These tests were self-

administered by consultant psychiatrist. All assessment were carried out three times in 24 hour cycle of day and night. This was done primarily to ascertain the fluctuation in the intensity of symptoms. Highest and lowest scores were recorded for purpose of statistical analyses.

**Memorial Delirium Assessment Scale (MDAS):** It is a ten item, four point clinician rated scale designed to quantify the severity of delirium in medically ill patients. Items included in MDAS reflect diagnostic criteria in the DSM IV TR (Diagnostic and Statistical Manual of Mental Disorders IV TR edition). The score ranges from 0-30 and a score of 13 and above indicates presence of delirium [12].

**Mini Mental State Examination (MMSE):** It is a brief 30-point questionnaire test that is used to estimate the severity of cognitive impairment and to follow the course of cognitive changes in an individual over time, thus making it an effective way to document an individual's response to treatment. The highest and lowest score of MMSE in both types of delirium (day to night) was recorded [13].

**Cognitive Status Estimation Test (CSET):** This is a specially designed test prepared exclusively for the study, keeping the nature of the client, who may be illiterate and rural or literate and urban, into consideration. Most items are taken out of standardized test. Some items are modified for sake of brevity. Mean in respect of each item, category and total score of patient were obtained and compared with score of the control.

## STATISTICAL ANALYSES

The data was analysed using paired t-test, two sample independent t-test and the mean difference between the two groups was considered to be statistically significant at  $p \leq 0.05$ . Demographic quantitative characteristics were presented as mean, standard deviation (SD) and qualitative characteristics as percentage.

## RESULTS

The Mean age (SD) of study group was 27.85 years (13.73). Whereas the mean age (SD) of control was 33.10 years (11.26). Out of 40 controls, 31 were psychiatric patients. The mean total cognitive score (measured by CSET) of the study was 24.8 which is much less than that of control group (62.3). The difference was found to be statistically significant ( $p=0.001$ ) [Table/Fig-1]. Patients suffering from schizophrenia constitute 25% of the control group. In the study group, drug dependence cases (67.5%) formed the majority [Table/Fig-2].

The mean MDAS score was 22.13 and 23 in hyper and hypoactive delirium respectively [Table/Fig-3]. Out of 40 cases, 28 (70%) were found to be hyperactive delirium, while 12 (30%) were having hypoactive type delirium. The fluctuation in intensity of cognitive symptoms was more in hypoactive delirium [Table/Fig-4]. Delirium cases with psychosis had significant cognitive impairment in comparison with delirium cases without psychosis [Table/Fig-4]. The difference between highest and lowest score of MMSE in both types of delirium (day to night) was found to be statically significant [Table/Fig-5].

## DISCUSSION

Delirium falls in the noman's land between psychiatry and other fields of medicine and surgery. Psychiatric investigators particularly in India have not generated interest in this disorder with any degree of seriousness. This is indeed unfortunate as the condition is widely

Age	Mean	S.D.	Sd
Study (N=40)	27.85	13.73	t statistics = 1.68 with df = 78 p=0.217
Control (N=40)	33.10	11.26	
Total cognitive score			
Study group	24.8	6.42	t statistics = 30.99 with d f=78, p=0.001
Control group	62.30	4.42	

**[Table/Fig-1]:** Mean and Standard deviation (SD) and Total cognitive score

prevalent in hospital settings [2-4,14] because of its core features. It impairs help seeking and communication, resulting in misdiagnosis and delayed intervention with implications for increased mortality and morbidity [3,4,14,15]. Distress to self, caregivers and risk of self injurious behaviour are the other clinical issues which are also of utmost importance. The controls group had a higher age (mean age 32). Overall both the study and control groups were young adults. Most of the previous studies [2,3,15] focused on the elderly. The mean age of the study group was 27 years. Cutting et al., however noted that average age of delirium patient was 57.4 years [2]. The study was done on young adults, compared to other studies which focused on elderly patients [2]. The author is of the view that this

S. No.	Diagnosis	Control N (%)	Study group N (%)
1	Drug and alcohol dependence	8 (20%)	27 (67.5%)
2	Schizophrenia	10 (25%)	3 (7.5%)
3	Psychosis NOS	2 (5%)	0
4	Mood disorder	10 (25%)	0
5	Neurosis	1 (2.5%)	0
6	Trauma	7 (17.5%)	8 (20%)
7	Diabetes mellitus	4 (10%)	4 (10%)
8	Infections	2 (5%)	1 (2.5%)
9	Tumors	1 (2.5%)	1 (2.5%)
10	Degenerative disorders	0	0
11	Post-operative	0	3 (7.5%)
12	Seizures	0	2 (5%)
13	Miscellaneous	0	15(37.5%)

**[Table/Fig-2]:** Diagnoses of study and control Group

MDAS	Mean	S.D.			
Hyperactive	22.13	2.61	t statistics = 0.88 with df=38 p=0.05		
Hypoactive	23	1.59			
Total Cognitive status	Night		Day		
	Mean	S.D.	Mean	S.D.	
Hyperactive, N=28	19.64	3.74	25.8	5.11	t statistics =17.4, p=0.001*
Hypoactive, N=12	16.17	4.06	20.17	7.56	t statistics =2.94, p=0.01*
	t statistics =11.56 with df = 38 p=0.001*		t statistics = 7.71 with df = 38 p=0.001*		

**[Table/Fig-3]:** MDAS (Memorial Delirium Assessment Scale) scores in types of delirium. \*Significant at 5% level of significance

Cognitive score with psychosis	Mean	S.D.	Sd	Sd	Sd
Study N=34	Day		Night		t paired =4.71, p=0.001*
	24.68	6.28	18.97	4.09	
Control N=21	64.3	4.1	64.19	3.83	t paired = 0.63, p=0.225*
	t statistics=25.23 with df=53, p=0.001*		t statistics =40.01 with df=53 p=0.001*		
Cognitive score without psychosis					
Study N=6	21.3	7.03	16.5	3.94	t (paired) =1.46, p=0.191*
Control N=19	67.84	2.43	67.26	2.38	t (paired) =0.47, p=0.303*
	Independent t-test =23.6 with df=23, p=0.001*		Independent t-test =36 with df=23, p=0.001*		

**[Table/Fig-4]:** Total Cognitive score in delirium with and without psychosis. \*Significant at 5% level of significance

	Mean	S.D.	Mean	S.D.	
Study N=40	Day		Night		t (paired)=11.93 p=0.001*
	7.8	3.3	2.55	1.8	
Control N=40	27.7	1.9	27.35	1.69	t (paired)=1.25 p=0.211*
	Independent t-test = 7.32 df=78 withp, p=0.001*		Independent t-test = 14.01 with df=78, p=0.001*		

**[Table/Fig-5]:** Table Showing Mini - mental status examination (MMSE Scores). \*Significant at 5% level of significance

study is first of its kind, which focused on cognitive dysfunctions in young adults diagnosed with delirium. None of the studies appeared to have delirium as its primary area of investigation in young adults.

Seventy percent of the cases in our study group had hyperactive delirium. There was no mixed type. Fann et al., reported 86% of hypoactive delirium [4]. Liptzin et al., reported 15% hyperactive and 52% mixed type [16]. The results are in contrast to Peterson et al., who found only 4 cases of hyperactive delirium among 398 delirious patients [17]. Predominantly mixed type was also reported by others [3,15]. However all these studies were related to old and debilitated patients. Moreover the study had large number of alcohol dependence cases (67%) which is known to be hyperactive delirium [3,18].

Cognitive symptoms that occur in delirium are disturbed attention, impaired concentration, disturbance in orientation, impaired memory, and impaired recognition [19]. All listed cognitive functions were severely affected in the present study. This is in contrast to Meagher et al., who reported differential impairment of cognitive functions. They found disorientation was the least frequent symptom [14]. In the study, patient suffering from hypoactive delirium had significantly higher cognitive impairment. The fluctuation in intensity of cognitive symptoms varies from day to night in both types of delirium, but more in hypoactive delirium. There was also fluctuation in cognitive symptoms while comparing hypoactive and hyperactive delirium in day as well as night. To the best of author's knowledge, this aspect has not been studied previously [2,4-9].

In the study patients with hypoactive delirium had higher cognitive disturbances. This is in accordance with previous studies, where cognitive disturbances were reported to be high in hypoactive delirium [20]. In the present study, wider fluctuation in cognitive dysfunctions was noted in delirium cases with psychosis to a significant level whereas no significant fluctuations were noted in patients of delirium without psychosis. Also the difference between highest and lowest score of MMSE in both types of delirium was significant in study group, strongly indicating fluctuating intensity. This aspect was not studied by previous researchers [2,4-9].

Delirium continues to be understudied, under recognised, under diagnosed and misdiagnosed as depression by non-psychiatrists [21]. Misdiagnosis is more when delirium is hypoactive and when patients are referred from intensive care settings [22]. This study however appears to have sensitized some of the non psychiatric medical staff to the importance of understanding delirium.

## CONCLUSION

The present study showed that various cognitive dysfunctions are associated with delirium. The fluctuation in intensity of cognitive symptoms was more in hypoactive delirium and wider fluctuation in cognitive dysfunctions was noted in delirium cases with psychosis. A comprehensive study with a much larger sample is needed to gain more insights into the much neglected but ubiquitous clinical psychiatric syndrome.

## LIMITATIONS

**There were few limitations in the study:**

1. The study was conducted at only one center and sample size was small, our study was thus cross sectional in nature

therefore, the generalisation of results may be questioned.

2. Another limitation included the possibility of selection bias as the sample was drawn from one hospital only.
3. Control was obtained from neuropsychiatric patients. For comparison with case group, the control should be homogenous. Our control group was heterogeneous consisting of different types of psychiatric patients.

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