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A Cross Sectional Study On Risk Factors, Etiology, Clinical Characteristics, Comorbidities, And Referral Pattern Of Patients Suffering From Delirium At A Tertiary Care Hospital In Kanchipuram District

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I. INTRODUCTION

The word ‘delirium’ comes from the Latin word delirare, meaning ‘to go out of the furrow’, or to be insane [1]. Delirium is a severe neuropsychiatric illness that causes sudden attention and cognition deficits. Patients' arousal ranges from near-coma to hypervigilance and acute agitation. Psychosis symptoms including delusions, hallucinations, and mood swings can be disturbing. The presence and severity of delirium vary. Delirium causes patient and carer distress [2].Many words have been used to characterise delirium, including ‘acute confusional state’, ‘acute brain syndrome’, ‘acute cerebral insufficiency’, and ‘toxic–metabolic encephalopathy’, but ‘delirium’ should remain the standard [3]. The term "delirium" now refers to a temporary, reversible, acute, fluctuating medical condition. Clinical experience and new research reveal that delirium can have persistent or permanent consequences. Delirium can start a chain of events that lead to functional deterioration, loss of freedom, institutionalisation, and mortality in the elderly. An estimated 14–56% of elderly hospitalised patients have delirium. Delirium problems affect 20% of the 12.5 million US seniors hospitalised each year [4-6].Delirium can be caused by acute sickness, drug withdrawal, trauma, or surgery. Mostly outside the brain, delirium with primary neurological causes like stroke is recognised. Most delirium bouts last a few days, but 20% can continue weeks or months [7-9]. Subsyndromal delirium refers to people who exhibit certain delirium symptoms but not all [10,11].Delirium typically starts a chain of events that lead to functional deterioration, independence loss, morbidity, and death. Delirium increases hospital and post-hospital costs in the elderly due to institutionalisation, frequent medical follow-up, rehabilitation, and home health care. Delirium is commonly iatrogenic and can be used to assess hospital care quality due to its tight relationship to care [12].Delirium is often multifactorial. A vulnerable person often triggers it. Understanding predisposing variables helps identify high-risk individuals and avoid delirium. Since triggering factor causes delirium, correct identification and targeted action lead to full recovery. Unlike predisposing factors, precipitating factors for delirium can be changed. Delirious patients exhibit lethargy, somnolence, restlessness, agitation, and hyperactivity. Psychomotor activity classifies delirium as hypoactive, hyperactive, or mixed. Hypoactive delirium is less recognised and has a worse prognosis.Hypoactive delirium may be misdiagnosed due to its low activity [13]. This study will investigate delirium patients' risk factors, aetiology, clinical features, co-morbidities, and referral patterns.

II. METHODS

This cross-sectional study spanned 18 months, from November 2019 to July 2021, within the inpatient wards and intensive care units of Karpaga Vinayaga Institute of Medical Sciences and Research Centre, focusing on patients diagnosed with delirium. The study population comprised individuals meeting ICD-10 criteria for delirium, aged 18 years and older, whose caregivers consented to participation. Purposive sampling was employed to select participants based on specific criteria, ensuring a representative sample. In-depth data collection was facilitated through a semi-structured proforma, designed to capture essential information including socio-demographic details, referral patterns, potential risk factors, etiology of delirium, and concurrent comorbidities. Key assessment tools utilized included the Confusion Assessment Method-Intensive Care Unit (CAM-ICU), Delirium Rating Scale-Revised (DRS-R 98), and Amended Delirium Motor Symptom Scale, enabling comprehensive evaluation of delirium presentation and severity. Ethical considerations were paramount throughout the study, with written informed consent obtained from patients and

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caregivers prior to data collection. Care was taken to ensure that study participation did not interfere with the ongoing treatment or care of the patients.

Data analysis involved rigorous statistical methods using SPSS Version 25, encompassing descriptive statistics such as mean, median, standard deviation, frequency, and percentages. Inferential tests such as Student's t-test, Chi-Square test, and Spearman correlation test were applied to derive meaningful insights from the collected data. By investigating the prevalence, characteristics, and underlying factors associated with delirium among hospitalized patients, this study aimed to contribute to a deeper understanding of this complex condition, ultimately informing clinical practices and interventions aimed at improving patient care and outcomes. The findings have the potential to guide healthcare strategies, enhance delirium management protocols, and highlight areas for further research and intervention development.

III. RESULTS:

VARIABLES	VALUES	DESCRIPTIVE
AGE (IN YEARS)		
MEAN	52.87	
MEDIAN	50	
SD	13.73	
MIN-MAX	28-80	
RANGE	52	
AGE GROUP	**FREQUENCY**	**PERCENTAGE**
21-40	14	20
41-60	37	52
61-80	19	27
GENDER		
FEMALE	14	20
MALE	56	80
MARITAL STATUS		
SINGLE	5	7.1
MARRIED	61	87.1
WIDOW	4	5.7
EDUCATION		
NOT EDUCATED	13	18.6
PRIMARY	23	32.9
UPTO 12^{TH}	25	35.7
GRADUATE	3	4.3
OCCUPATION		
NOT EMPLOYED	8	11.4
HOMEMAKER	13	18.6
LABORER	3	4.3
FARMER	12	17.1
SKILLED WORKER	23	32.9
BUSINESS	11	15.7
RELIGION		
CHRISTIAN	2	2.9
HINDU	65	92.9
MUSLIM	3	4.3
CLINICAL HISTORY		
MEDICAL COMORBIDITIES	37	52.9
SURGICAL COMORBODITIES	7	10
PSYCHOLOGICAL	31	44.3

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COMORBIDITIES		
CAUSE OF DELIRIUM-IDENTIFIED	42	60
REFERAL DEPARTMENT		
DIRECT	26	37
MEDICINE DEPT	40	57
SURGERY DEPT	4	6
CAM ICU FEATURE		
ALTERATION/FLUCTUATION IN MENTAL STATUS	70	100
INATTENTION	68	97.1
ALTERED LEVEL OF CONSCIOUSNESS	70	100
DISORGANISED THINKING	70	100
TYPE OF DELIRIUM		
HYPERACTIVE	48	68.6
HYPOACTIVE	15	21.4
MIXED	7	10

The study provides a comprehensive overview of demographic, clinical, and behavioral characteristics among participants. The average age of participants is 52.87 years, with a median age of 50 years and a standard deviation of 13.73 years. Age ranges from 28 to 80 years, with a range of 52 years. The age group distribution shows that a majority of participants (52%) fall within the 41-60 age range, followed by 27% in the 61-80 age range and 20% in the 21-40 age range.

Regarding gender, the study comprises predominantly male participants (80%) compared to females (20%). In terms of marital status, the majority of participants are married (87.1%), with smaller proportions being single (7.1%) or widowed (5.7%).

Education levels vary among participants, with a notable percentage having education up to the 12th grade (35.7%), followed by primary education (32.9%) and being not educated (18.6%). In terms of occupation, a significant portion of participants are skilled workers (32.9%) and homemakers (18.6%), while other occupations such as business (15.7%), farmer (17.1%), and not employed (11.4%) are also represented.

Religiously, the majority of participants identify as Hindu (92.9%), followed by Muslim (4.3%) and Christian (2.9%). The clinical history reveals a substantial prevalence of medical comorbidities (52.9%) and psychological comorbidities (44.3%) among the participants.

Regarding the referral department, most participants were referred from the medicine department (57%), followed by direct referrals (37%) and a smaller proportion from the surgery department (6%).

The study also identifies common features and types of delirium among participants, with a high prevalence of alteration/fluctuation in mental status (100%), altered level of consciousness (100%), and disorganized thinking (100%). Hyperactive delirium is the most prevalent type (68.6%), followed by hypoactive (21.4%) and mixed (10%).

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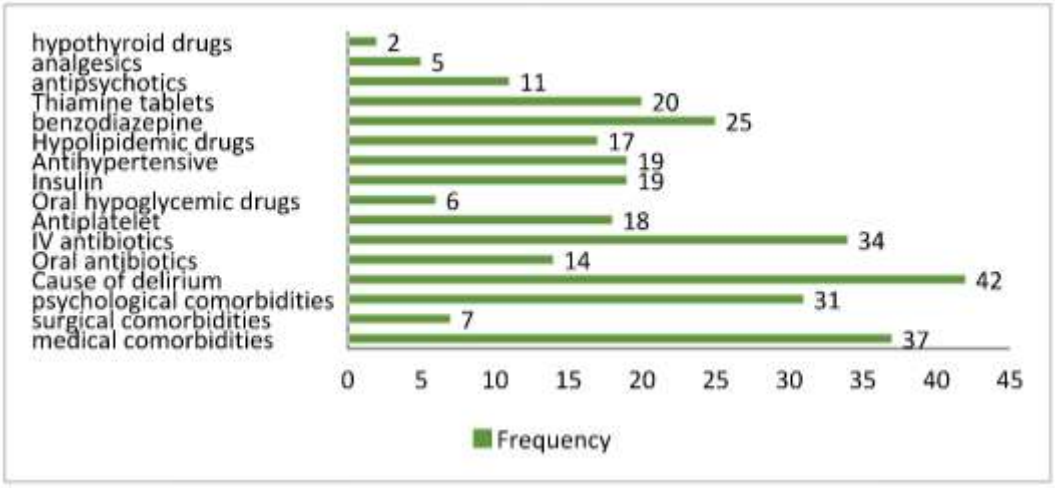

Figure : 1 Distribution of clinical Details

Table 15 and 16

Table 2.

Variables	**DRS SEVERITY SCORE**						
Age	**Mean**	**N**	**Std. Deviation**	**Minimum**	**Maximum**	**Range**	
<40 Years	29.93	14	3.912	22	35	13	
>40 Years	29.2	56	4.253	15	37	22	
Total	29.34	70	4.17	15	37	22	

ANOVA Table

			Sum of Squares	Df	Mean Square	F	Sig.
TOTALSCORE * Age	**Between Groups**	**(Combined)**	6.004	1	6.004	0.342	0.56
	Within Groups		1193.768	68	17.555		
	Total		1199.771	69			

Sex	**Mean**	**N**	**Std. Deviation**	**Minimum**	**Maximum**	**Range**
Female	27.64	14	3.028	22	32	10
Male	29.77	56	4.327	15	37	22
Total	29.34	70	4.17	15	37	22

ANOVA Table

			Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
TOTALSCORE * sex	**Between Groups**	**(Combined)**	50.575	1	50.575	2.993	0.09
	Within Groups		1149.2	68	16.9		
	Total		1199.77	69			

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1. **Age group:** Among the three age groups of 21–40-year, 41-60 year and 61-80 years, the mean DRS severity scores were 24.14(sd-3.86), 23.7(sd-3.92) and 23.79(sd- 4.53) respectively. There was no significant difference between the groups in the severity scores (p=0.94). In this study DRS severity score between age group of <40 and > 40 were compared. There was no difference between two age groups (p=0.561). Details provided in table 15
2. **Gender difference**: In this study the mean DRS severity score between genders shows little higher in males (29.77) than females (27.64) however the difference was not statistically significant (p=0.088). Details provided in table 2.

TABLE 3.

Medical Co-Morbidity	**Hyperactive**	**Hypoactive**	**Mixed**	**Total**	**p-value**
No	**24**	**6**	**3**	**33**	
	72.7	**18.2**	**9.1**		**0.773**
Yes	**24**	**9**	**4**	**37**	
	64.9	**24.3**	**10.8**		
Surgical Co-Morbidities	**Hyperactive**	**Hypoactive**	**Mixed**	**Total**	**p-value**
No	**42**	**14**	**7**	**63**	
	66.7	**22.2**	**11.1**		**0.523**
Yes	**6**	**1**	**0**	**7**	
	85.7	**14.3**	**0**		
Psychological Co-morbidities	**Hyperactive**	**Hypoactive**	**Mixed**	**Total**	**p-value**
No	**24**	**13**	**2**	**39**	
	61.5	**33.3**	**5.1**		**0.14**
Yes	**24**	**2**	**5**	**31**	
	77.4	**6.5**	**16.1**		
Delirium Identified	**Hyperactive**	**Hypoactive**	**Mixed**	**Total**	**p-value**
	32	**5**	**5**	**42**	
No	**76.2**	**11.9**	**11.9**		
					0.057
Yes	**16**	**10**	**2**	**28**	
	57.1	**35.7**	**7.1**		
Referral to Psychiatry	**Hyperactive**	**Hypoactive**	**Mixed**	**Total**	**p-value**
No	**15**	**0**	**3**	**18**	
	83.3	**0**	**16.7**		**0.03***
Yes	**33**	**15**	**4**	**52**	

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	63.5	**28.8**	**7.7**		

1. **Medical comorbidities and delirium type:** Among 37 patients with medical comorbidities 64.9% had hyperactive and 24.3% were observed with hypo active and 9.1% of them observed with mixed delirium
2. **Surgical comorbidity and delirium type:** Among patient with surgical comorbidity (7), among 85.7% were observed with hyperactive and 14.3% had hypoactive delirium.
3. **Psychological comorbidity and delirium:** Among patient with psychological comorbidity 77.4% were observed with hyperactive delirium and 6.5% patient had hypoactive delirium and 16.1% had mixed delirium.
4. **Etiology identified and delirium type:** Among 42 participants in which the cause of delirium was identified 32 (45.7%) were observed with hyperactive, 5 (7.1%) hypoactive and 5 (7.1%) with mixed delirium features. Among the others whose etiology not identified 22.9%, 14.3% and 2.9% had hyperactive, hypoactive and mixed delirium features respectively.
5. **Referral pattern and type of delirium:** Among referral, those visiting psychiatry department directly (n=18), 83.3% and 16.7% participants had hyperactive and mixed delirium features. Those referred from other departments to psychiatry (n=52), 63.5%, 28.8% and 7.7% had hyperactive, hypoactive and mixed delirium features respectively

IV. DISCUSION

The majority of study participants aged 41-60. The average age of our delirium patients was 52.87. Farshid Rahimi-Bashar et al. evaluated delirium risk and incidence in 400 consecutive ICU patients in a prospective cohort study. The study group had an average age of 39.87±13.37 years, contradicting our observation [164].Using risk markers, Justus Marquetand et al. compared younger and older delirium patients. Patients' average age was 59, SD 15.2. Our study averaged age. Delirium is more common in older people, studies show. Age promotes ICU delirium. Univariate analysis showed over-65s have more delirium. Damage to cells and molecules accelerates ageing. Illness increases with chronic mental and physical decline [165].

Delirium can affect elderly and seriously ill medico-surgical patients. Deepthi Kukreja et al. found that over half of Indian seniors had chronic conditions and 5% were immobile [166]. Older people become mad. delirium is rare in seniors (1-2%) but common in 85+ (14%). 10-30% of older patients had ED delirium, indicating illness. We found multimorbidity and age independently predicted delirium. These findings confirm previous study (Fong, 2009; Ahmed, 2014; Guenther, 2016). Age, depression, multimorbidity, and executive function may predict long-term delirium [167-169].

Our sample was 80% male, 20% female. The 8-year observational study by Christian Mychajliw et al. evaluated delirium risk variables. His survey had 53.4% women [170]. In India, Sandeep Grover et al. observed 62.4% male motor subtypes and delirium symptoms using DRS-R 98 and MDAS ratings [171]. Farshid Rahimi-Bashar et al. discovered 77.8% male ICU delirium risk factors [164]. Education increases delirium risk, although late-life cognitive lifestyle and dementia delirium severity are unknown. Mental reserve may make men more brain dysfunction-resistant than women. Men with dementia lost more brain metabolism than expected despite improved PET data.The poll revealed 18.6% ignorant and 4.3% graduated. Xing et al. found 28.3% of delirium patients attended senior high. Kolanowski et al. reported 8.5% female and 49% male education in 148 delirium cases [172,173]. Delirium was higher in the uneducated. Higher education may affect men's intelligence. Schools and other mentally difficult activities can enhance reserve by improving synaptic connections and density and teaching brain illness avoidance.

In our occupational study, skilled professionals (32.9%) experienced the highest delirium, followed by homemakers (18.6%). C. Helmer listed 376 housewives and inactive (10.2%), 561 farmers (15.3%), and 315 domestic service workers (8.6%) as main occupations [174]. Farmers suffered more from this disease. The study indicated skilled workers had more delirium. Though weak, role does not affect delirium risk.Alcohol dependence was 40% in our study. Farshid Rahimi-Bashar et al. showed smoking and alcohol to be the main delirium risk factors [164]. We know smoking and drinking cause delirium. Study links artificial respiration and head injuries to delirium. One head injury patient in our study developed delirium weeks after hospitalisation. Brain injury causes delirium.

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In our study, abnormal liver function tests (37.1%) indicate alcohol dependence, followed by infection (31.1%) and electrolyte imbalance (30%). Infections cause delirium. Electrolyte delirium from hyponatasia. Only 20% of patients showed abnormal renal function tests, likely due to chronic kidney disease. Northern Indian delirium patients exhibited higher rates of metabolic condition (70), infections (45), organ failure (25), drug withdrawal (22), seizure-related (16), cerebrovascular accidents (6), and traumatic brain injury (5), according to Mattoo et al Results fit us better. Since these produce most delirium in our practice. Treating delirium requires identifying its causes. We found 42 of 70 delirium causes. For several reasons, the remaining subjects' delirium causes are unknown. These patients may have avoided delirium tests due to cost.Hypertension followed diabetes as the most prevalent comorbidity. Brenda T Pun et al. discovered congestive heart failure (6.7%), COPD (11.5%), diabetes 483 (23.1%), liver disease 48 (2.3%), and renal disease 134 (6.4%). Smoking and alcohol risk factors for diabetes, liver, renal, and pulmonary illnesses were common in delirium patients. Diabetes and hypertension are closely connected in our study. Meagher et al.'s investigation of neuropsychiatric and cognitive characteristics in delirium, dementia, and co-morbidity found the most incidence of delirium and dementia. OPD delirium symptoms were identical in our vascular dementia patient [176].In our study, patients received oral, IV, antiplatelet, oral hypoglycemic, insulin, hypolipidemic, benzodiazepine, Thiamine tablets, antipsychotics, analgesics, and hypothyroid Per Pasian et al., 2019,, anticholinergics increase delirium. IV and oral antibiotics may have caused infection in our study [177]. K Alagiakrishnan et al. found that high doses of anticholinergics, benzodiazepines, and opioids can cause delirium in elderly persons. Using antipsychotics. Its few side effects make haloperidol beneficial for short-term delirium. Most delirium patients take haloperidol briefly due to its moderate anticholinergic effect. Second, ageing and comorbidities boost medicine prescriptions. Only enrollment drug counts were examined [179].

Clinicians often overlook delirium. Delirium is untreated 1/3–2/3. Delirium is underdiagnosed because to its various symptoms, overlap with dementia, lack of cognitive assessment, and difficulties determining probability. Misdiagnosis can result from insufficient premorbid cognitive and function evidence and ageist views of older individuals with "expectation" of disorientation.Wong et al. extensively tested bedside devices for adult delirium diagnosis [180]. Best bedside delirium numbers were from CAM. We detected delirium using CAM-ICU. The majority of our research participants demonstrated acute mental state change, including course shift, inattention, disorganised thinking, and awareness.

ICU delirium severity experiment. Delirium severity tests and therapies are cumbersome and ineffective. Studies use the reliable DRS-R-98 delirium severity scale. It is psychometrically sound and covers all delirium symptoms, although ICU application is limited. DRS-R-98 assessments are hampered by administration duration, training, and ICU-specific factors like disease severity and mechanical breathing. Age affects DRS-R-98 severity, not group ($p = 0.561$). Trzepacz et al. found no age effect on R-98 delirium severity. Study severity is gender-neutral [181]. Research backs it up.The Amended DMSS classifies delirium as hyperactive, hypoactive, or mixed. Multiple hypoactive-hyperactive criteria are 3. The ingredients indicate 24-hour motor activity. A redesigned delirium motor symptom scale was used to detect clinical characteristics. Hyperactive (68.6%), hypoactive (21.4%), and mixed (10%) delirium occurred. Grover et al. discovered more hypoactive (47%), mixed (29%), and hyperactive (24.5%) delirium in ICUs. It contradicts our study [171]. The most common clinical delirium is hyperactive (64.2%), followed by mixed (28.2%) and hypoactive (6.9%), according to Kim et al. Hypoactive delirium may go unnoticed. This doesn't bother ward nurses or patients. Aggression, psychomotor activity, roaming, and noncooperation characterise hyperactive delirium. Thus, most hypoactive delirium patients in our study may have that reason.We compared Amended DMSS score report to age, gender, occupation, and marriage. Hyperactivity was higher in men (75%), than women (42.9%). Hypoactive women (53.3%) outnumbered men (12.5%) ($p=0.001$). Hyperactive-hypoactive was higher (81.8%) by profession and 12.9% in ADMSS. 24.3 and 73.9% of skilled workers were hyperactive. High hyper and hypo activity morbidity compared to other professions. Hyper (58%) and hypo (17%) were slightly greater in nuclear houses. Our study found 64.9% of medical comorbid patients hyperactive, 24.3% hypoactive, 9.1% mixed active, and 6 surgical patients hyperactive and 1 hypoactive without

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statistical significance. Mentally comorbid patients were 31 hyperactive and 1 hypoactive without statistical significance.

Our study found that ICU medicine referred 57% of delirium patients, direct psychiatry 37%, and surgery 6%. Mattoo et al. reported 51% medical and 49% surgical delirium referrals. A medical ward had more participants than our study [175]. Medical conditions like infection cause most delirium. Medical ward referrals are high.This study may not reflect hospital delirium. We found worse alcohol withdrawal psychosis and liver impairment. The author claims this inquiry occurred during COVID 19 lockdowns, relaxations, and alcohol outlet openings. Lockdown withdrawal delirium, rebound drinking, and liver damage may have increased after curfew relaxations.

This study fills a gap in Indian delirium research by investigating referral patterns and including patients from inpatient wards and intensive care units, unlike earlier studies. The COVID-19 pandemic made it one of the only studies that estimate delirium prevalence under constraints. The study's hospital-based methodology may bias the sample towards more severe delirium, overlooking milder cases. Lack of investigator blindness to patient diagnoses increases observer bias. The study's reduced sample size due to pandemic limits raises issues about generalizability and statistical power compared to larger research. Despite these obstacles, the research sheds light on hospital delirium during a unique and difficult period, suggesting topics for further research and potential delirium detection and management improvements.

V. CONCLUSION

Delirium is widespread in clinical practice. Delirium kind determines its symptoms. Men and older people are more prone to delirium. Alcohol dependence syndrome increases delirium risk. Drug therapy can cause delirium in long-stay patients. Stopping reversible causes, reorienting, and mobilising hospitalised patients are nonpharmacological methods. Reduce physical and chemical constraint. Daily management of high-risk patients should include delirium prevention.