

An Experience of Modified Electroconvulsive Therapy at a Tertiary Care Hospital in Puducherry, India: A Retrospective Study

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ABSTRACT

Introduction: Electroconvulsive Therapy (ECT) originated as a form of biological/neuro modulatory treatment for psychiatric disorders. In recent decades, its use is declining despite evidence-based international guidelines, but on the contrary, there has been an increase in research on ECT.

Aim: To explore the sociodemographic profile, clinical profile, ECT parameters, side-effects and outcomes of modified ECT among patients who received ECT over the past six years (2019-2025).

Materials and Methods: This retrospective study was conducted in Department of Psychiatry, Aarupadai Veedu Medical College and Hospital (AVMCH), Vinayaka Mission's Research Foundation (VMRF-DU), Puducherry, India in March 2025 to September 2025. The medical records were obtained for 71 patients who received ECT in the last six years (May 1st, 2019-May 31st, 2025). The data were collected using a semi-structured proforma for sociodemographic details, clinical

profile, ECT parameters and the clinical response. The data was entered in MS Excel 365 and statistical analysis was done using mean and standard deviation for continuous variables, percentage and frequency for categorical variables.

Results: A total of 64 records were included out of 71. The most common ICD 10 diagnosis of subjects who received ECT was bipolar affective disorder- 21 (32.8%), followed by Schizophrenia- 19 (29.6%). The most common indication for ECT, irrespective of diagnosis was irritability/aggression/violence- 19 (29.7%). The clinical response of the subjects who received ECT were improved in 43 (67.2%), partially improved in 15 (23.4%) and not improved in 6 (9.4%).

Conclusion: In the present study, no major life-threatening complications was found with minimal and manageable side-effects following modified ECT. ECT was indicated predominantly for mood disorders followed by psychotic disorders, especially, for those patients with irritability/aggression.

Keywords: Adverse effects, Neurostimulation, Safety, Treatment outcome

INTRODUCTION

Even before the advent of antipsychotics, Electroconvulsive Therapy (ECT) originated as a form of biological/neuromodulatory treatment for psychiatric disorders. It was Ugo Cerletti and Lucio Bini who devised a method of using electric current to induce seizures, replacing the earlier use of Metrazol by Meduna [1]. Recommendations for ECT vary worldwide. Initially, it was primarily used for the treatment of schizophrenia but with time, experience with the procedure, and the advent of pharmacological agents, indications for ECT changed [1]. In Europe, the primary indication for ECT shifted towards mood disorders, while in Asia, schizophrenia remained the main indication [2].

In recent decades, its use is declining despite evidence-based international guidelines but, on the contrary, there has been an increase in research on ECT [3]. Though many patients would benefit from ECT, in practice, only a small proportion receive it. The reasons could be due to stigma, need for anaesthesia, cognitive side-effects, legislation, lack of training in postgraduates and cost. ECT is one of the most legislated treatments in medicine. Rajkumar MG et al., reported that implementation of Mental Health Care Act, 2017 will significantly affect the use of ECT in India [4].

The ECT training is essential for all postgraduates of Psychiatry. It is important to share the experience with ECT from all parts of this nation which will help in formulation of future treatment guidelines for psychiatric disorders and for comparison with newer neuro-modulatory treatments. Most of the studies in literature [1,2,5-11] focus mainly on the sociodemographic and clinical profile of patients receiving ECT but this study attempts to include many parameters (sociodemographic profile, clinical profile, ECT parameters and response). Hence, this study is undertaken as a step to re-emphasise

the usage of ECT in psychiatric practice so that the role of ECT does not diminish in modern psychiatric practice or get underestimated with the newer neuromodulatory treatment modalities.

To explore the sociodemographic and clinical parameters of modified ECT among patients who received ECT in the past six years at a tertiary care centre in Puducherry.

MATERIALS AND METHODS

It was a retrospective study conducted in the Department of Psychiatry, AVMCH, Puducherry, India from March 2025 to September 2025. After receiving approval from the Institutional Research Committee (IRC) and Institutional Ethical Committee (IHECNo: AV/IHEC/May 2025/05), patient records were obtained from the Medical Records Department (MRD) and the Hospital Information Management System (HIMS), using the Unique Health Identification (UHID) numbers obtained from the ECT register maintained by the Department of Psychiatry. Obtaining patient consent was waived by IEC as per request as it involved only patient records. However, anonymity and confidentiality were maintained throughout the study.

Inclusion criteria: Subjects who received modified ECT in the last six years (May 1st, 2019-May 31st, 2025) were included.

Exclusion criteria: Medical records with more than 75% of information not documented and ECT cycles that were stopped abruptly due to technical issues were excluded.

Study Procedure

Nivique ECT machine- Model SA/VR was the model used for ECT procedure. All patients received only modified ECT (ECT under Short General anaesthesia). The motor seizures were monitored

using the cuff method. Administration of ECT was done biweekly or thrice weekly as a routine practice. All Patient records from May 1st, 2019 to May 31st, 2025 which was 71 in total, were collected by consecutive sampling and based on the inclusion and exclusion criteria recruited into the study. Though the retrospective study period taken was 6yrs, it includes the Coronavirus Disease 2019 (COVID-19) pandemic during which the hospital psychiatry in-patient services and ECT services were non functioning for one year.

The data was collected using a semi-structured proforma which contained:

- Sociodemographic details:** UHID number, age, gender, education, marital status, occupation, residence;
- Clinical profile: International Classification of Diseases, 10th Revision (ICD 10)** diagnosis, indication, history of ECT, time taken to administer ECT following admission, co-morbid medical illnesses and psychiatric illness;
- ECT parameters:** Anaesthetic agent used, electrode placement, number of ECT cycles, number of cycles with adequate seizure duration, complications during ECT, post ECT side-effects, medications for side-effects, acceptance of ECT;
- Clinical response:** Clinical improvement following ECT was categorised as improved, partially improved and not improved based on clinical notes in the records.

STATISTICAL ANALYSIS

The data was entered in MS Excel 365 and statistical analysis was done using mean and standard deviation for continuous variables, percentage and frequency for categorical variables.

RESULTS

Out of the total 71 case records, seven case records were excluded as ECT was stopped abruptly due to technical issues resulting in a total of 64 case records. Among the 64, 39 (60.9%) were males and 25 (39.1%) were females. The mean age of subjects was 36.9±11.6yrs. 41 (64.1%) were married, 22 (34.4%) were unmarried and 1 (1.5%) was a widower. A 22 (34.4%) completed high school, 10 (15.6%) completed primary school, and only 6 (9.3%) were illiterates. About 30 (46.9%) were from urban background and 34 (53.1%) were from rural background. A total of 14 (21.9%) subjects were unemployed, 16 (25%) were housewife, 13 (20.3%) were doing skilled works, 8 (12.5%) were doing semi-skilled works and 6 (9.4%) were students [Table/Fig-1].

S. No.	Sociodemographic details	n (%)
1.	Total number of subjects	64 (100)
2.	Gender	
	Males	39 (60.9)
	Females	25 (39.1)
3.	Marital status	
	Married	41 (64.1)
	Unmarried	22 (34.4)
	Widower	1 (1.6)
4.	Education	
	Illiterate	6 (9.3)
	Primary school	10 (15.6)
	Middle school	9 (14.1)
	High school	22 (34.4)
	Diploma	4 (6.3)
	Graduate	8 (12.5)
	Professional degree	5 (7.8)

5.	Occupation	
	Unemployed	14 (21.9)
	Unskilled works	3 (4.7)
	Semi-skilled works	8 (12.5)
	Skilled works	13 (20.3)
	Clerical/shop/farm	2 (3.1)
	Semi profession	1 (1.6)
	Professional	1 (1.6)
	Housewife	16 (25)
Student	6 (9.4)	
6.	Residence	
	Rural	34 (53.1)
	Urban	30 (46.9)
7.	Age (in years) (Mean±SD)	36.9±11.6 yrs

[Table/Fig-1]: Sociodemographic details of study subjects receiving ECT.

The ICD 10 diagnosis of subjects who underwent ECT were Schizophrenia- 19 (29.6%), schizoaffective disorder- 1 (1.6%), depressive episode- 15 (23.4%) recurrent depressive disorder- 2 (3.1%), bipolar affective disorder- 21 (32.8%), acute and transient psychotic disorder- 4 (6.3%), others- 2 (3.1%) [Table/Fig-2].

S. No.	ICD 10 diagnosis	n (%)
1.	Schizophrenia	19 (29.6)
2.	Schizoaffective disorder	1 (1.6)
3.	Mood disorders	38 (59.4)
	• Severe depressive episode without psychosis	10 (15.6)
	• Severe depressive episode with psychosis	5 (7.8)
	• Recurrent depressive disorder	2 (3.1)
	• Bipolar affective disorder- mania without psychotic symptoms	14 (21.9)
	• Bipolar affective disorder- mania with psychotic symptoms	4 (6.2)
	• Bipolar affective disorder- severe depressive episode without psychotic symptoms	1 (1.6)
	• Bipolar affective disorder- mixed episode	2 (3.1)
4.	Acute and transient psychotic disorder	4 (6.3)
5.	Others (OCD with co-morbid severe depressive episode, mental retardation with behavioural disturbances)	2 (3.1)

[Table/Fig-2]: ICD 10 diagnosis of study subjects receiving ECT.

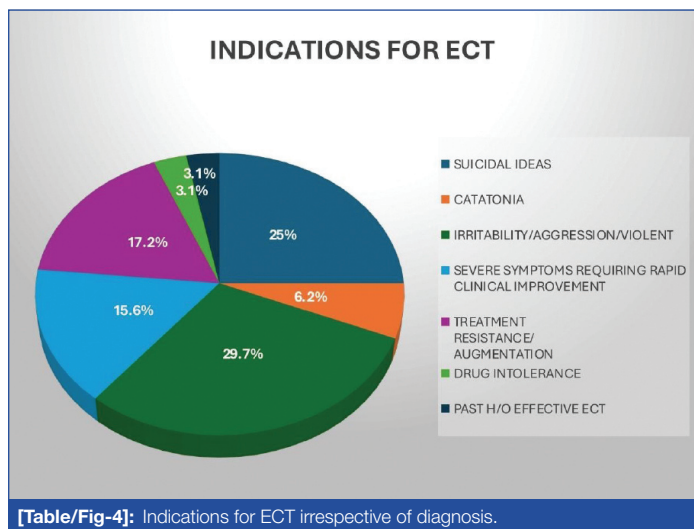
The co-morbid medical illness in subjects who underwent ECT were systemic hypertension/ Diabetes mellitus/ both- 8 (12.5%), old cerebrovascular accidents- 2 (3.1%), hypothyroidism- 3 (4.6%), others- 3 (4.6%). The co-morbid psychiatric illness was substance dependence (alcohol/nicotine/cannabis)- 12 (18.7%) and others- 2 (3.1%) [Table/Fig-3].

S. No.	Co-morbid Illness	n (%)
1.	Medical illness	
	Systemic hypertension/Diabetes mellitus/both	8 (12.5)
	Old cerebrovascular accident	2 (3.1)
	Hypothyroidism	3 (4.7)
	Others (Macular degeneration, psoriasis, bronchial asthma)	3 (4.7)
2.	Psychiatric illness	
	Substance dependence (Alcohol/ nicotine/ cannabis)	12 (18.7)
	Obsessive compulsive disorder	1 (1.6)
	Borderline personality disorder	1 (1.6)

[Table/Fig-3]: Co-morbid medical and psychiatric illness and history of ECT among subjects receiving ECT.

The indications for ECT irrespective of diagnosis were irritability/ aggression/violence- 19 (29.7%), suicidal ideas- 16 (25%), treatment resistance/ augmentation- 11 (17.2%), severe symptoms requiring

rapid clinical improvement- 10 (15.6%), catatonia- 4 (6.2%), drug intolerance- 2 (3.1%), history of effective ECT in the past- 2 (3.1%) [Table/Fig-4]. However, when individual diagnosis is considered, among schizophrenia, treatment resistance/ augmentation was the most common indication- 9 (14.1%), next being suicidal ideas and irritability/aggression/violence- 3(4.7%), respectively. Irritability/aggression/violence and severe symptoms were the most common indication among acute and transient psychotic disorder subjects- 2 (3.1%). Presence of suicidal ideas was the most common indication 11 (17.2%) among depressive disorder subjects. Among bipolar affective disorder, irritability/ aggression/violence was the most common indication in patients having a diagnosis of mania with psychotic symptoms- 3 (4.7%), and those diagnosed as mania without psychotic symptoms -8 (12.5%) [Table/Fig-5].



[Table/Fig-4]: Indications for ECT irrespective of diagnosis.

S. No.	Indications for ECT	Frequency (%)
1.	Schizophrenia	
	• Treatment resistance/augmentation	9 (14.1)
	• Suicidal ideas	3 (4.7)
	• Irritability/aggression/violence	3 (4.7)
	• Severe symptoms requiring rapid clinical improvement	2 (3.1)
	• Catatonia	2 (3.1)
2.	Schizoaffective disorder	
	• Augmentation	1 (1.6)
3.	Acute and transient psychotic disorder	
	• Irritability/aggression/violence	2 (3.1)
	• Severe symptoms requiring rapid clinical improvement	2 (3.1)
4.	Depressive episode	
	• Suicidal ideas	11 (17.2)
	• Catatonia	2 (3.1)
	• Severe symptoms requiring rapid clinical improvement	2 (3.1)
5.	Recurrent depressive disorder	
	• Severe symptoms requiring rapid clinical improvement	1 (1.6)
	• Suicidal ideas	1 (1.6)
6.	Bipolar affective disorder	
	Mania with psychotic symptoms	
	• Irritability/aggression/violence	3 (4.7)
	• Past H/O effective ECT	1 (1.6)
	Mania without psychotic symptoms	
	• Irritability/aggression/violence	8 (12.5)
• Severe symptoms requiring rapid clinical improvement	3 (4.7)	

7.	• Drug intolerance	2 (3.1)
	• Past H/O effective ECT	1 (1.6)
	Severe depressive episode without psychotic symptoms	
	• Treatment resistance	1 (1.6)
	Mixed episode	
	• Irritability/aggression/violence	2 (3.1)
	Others	
7.	• Suicidal ideas	1 (1.6)
	• Irritability/aggression/violence	1 (1.6)

[Table/Fig-5]: Indications for ECT among various psychiatric disorders.

Number of subjects who had received ECT in the past was 8 (12.5%). The mean number of days after which ECT was given in the admitted patients was 5.4±3.5 days. In almost all subjects, anaesthetic agent used was thiopentone- 61 (95.3%) and 3 (4.7%) received propofol. The electrode placement in all 64 subjects was bitemporal (100%). All subjects received either biweekly or thrice weekly ECT administration. The mean number of sessions for the subjects, irrespective of diagnosis was 3.8±1.7. The mean number of ECT sessions with adequate seizures was 3.4±1.3. Complications during ECT administration were observed in 4 subjects (6.3%). These included tongue bite in 2 subjects (3.1%), teeth injury in 1 subject (1.6%), and respiratory distress in 1 subject (1.6%). The post ECT side-effects were seen in 10 (15.6%) subjects- memory disturbances 6 (9.3%), headache 3 (4.7%), vomiting 1 (1.6%). Medications used for post ECT side-effects were Analgesics (paracetamol) for 3 (4.7%) and antiemetic (Ondansetron) for 1 (1.6%). Memory disturbances were managed expectantly without pharmacological treatment. Number of subjects who withdrew from consenting for ECT was- 4 (6.2%). For one subject reason was not mentioned, one subject was discharged against medical advice, and the other two subjects withdrew consent for their cognitive side-effect [Table/Fig-6].

S. No.	ECT parameters	n (%)
1.	Past H/O ECT	
	Yes	8 (12.5)
	No	56 (87.5)
2.	No. of post admission days following which ECT was given	5.4±3.5
3.	Anaesthetic agent used for ECT	
	Thiopentone sodium	61 (95.3)
	Propofol	3 (4.7)
4.	Position of electrodes	
	Bitemporal	64 (100)
5.	Mean no. of ECT sessions	3.8±1.7
6.	Mean no. of ECT sessions with adequate seizure	3.4±1.3
7.	Complications during ECT	4 (6.3)
	Teeth injury	1 (1.6)
	Tongue bite	2 (3.1)
	Respiratory distress	1 (1.6)
8.	Post ECT side-effects	10 (15.6)
	Memory disturbances	6 (9.3)
	Headache	3 (4.7)
	Vomiting	1 (1.6)
9.	Medications for side-effects	
	NSAIDs	3 (4.7)
	Ondansetron	1 (1.6)
10.	Withdrawal of consent for ECT	4 (6.2)

[Table/Fig-6]: ECT parameters among subjects receiving ECT.

The clinical response of the subjects who received ECT were improved in 43 (67.2%), partially improved in 15 (23.4%) and not improved in 6 (9.4%) [Table/Fig-7].

S. No.	Diagnosis	Total no. of subjects n (%)	Clinical response		
			Improved n (%)	Partially improved n (%)	No improvement n (%)
1.	Schizophrenia	19	6	10	3
2.	Schizoaffective disorder	1	-	1	-
3.	BPAD- Mania with psychotic symptoms	4	4	-	-
4.	BPAD- Mania without psychotic symptoms	14	12	2	-
5.	BPAD- Mixed	2	2	-	-
6.	BPAD- Depressive episode	1	1	-	-
7.	Severe depressive episode without psychotic symptoms	10	8	-	2
8.	Severe depressive episode with psychotic symptoms	5	3	2	-
9.	Recurrent depressive disorder	2	2	-	-
10.	Acute and transient psychotic disorder	4	4	-	-
11.	Others:				
	a. OCD with co-morbid severe depressive episode	1	-	-	1
	b. Mental retardation with behavioural disturbances	1	1	-	-
	Total	64 (100%)	43 (67.2)	15 (23.4)	6 (9.4)

[Table/Fig-7]: Clinical response among subjects with different diagnosis.

OCD: Obsessive compulsive disorder; BPAD: Bipolar affective disorder

DISCUSSION

The present study had predominant male subjects (60.9%). In previous studies, there is a gender variability among subjects who underwent ECT with some studies showing male predominance [1,6,9] some with female predominance [2,5,10,11] and variable gender predominance over a period of years [7]. The mean age of subjects was 36.9±11.6 years, which is comparable with the similar study done by Kota VS et al., (25-45 years) [1] and Martin E et al., (35-45 years) [12]. It is also close to the majority age group 20-39 years according to Ismail H and Subedi S et al., [5,10]. This also reflects the age of onset of major psychiatric illnesses like schizophrenia, bipolar disorders and depressive disorders.

More than half of the subjects were married (64.1%) and the same is reflected in the study done by Kota VS et al., (68%) [1]. About 53.1% of subjects belonged to rural background. This reflects the type of patient in flow in a hospital, based on its set-up and type of organisation- Government or private. Many studies did not indicate about the educational status of the subjects but in this study, higher

frequency of subjects had completed at least high school (34.4%). But despite the educational level, nearly 21.9% were unemployed. This may reflect the impairment caused by psychiatric illness in chronic patients. Most common co-morbid medical disorder in the present study was systemic hypertension/diabetes mellitus/ both which was around 12.5%. The next common medical comorbidity was hypothyroidism 4.6%. In a study done by Manuel CM et al., on medical co-morbidity among inpatients with psychiatric disorders, the most common medical co-morbidity found were diabetes mellitus, hypothyroidism and systemic hypertension which is replicated in this study [13]. Substance dependence was the most common psychiatric comorbid disorder in this study (18.7%), which is similar to the study done by Kota VS et al., where it was about 11% [1]. The substances most frequently used among patients with severe mental disorders were alcohol, cannabis, sedatives and stimulants [14]. The most common substances used by subjects in the present study too were alcohol, nicotine and cannabis.

The general anaesthetic agent used in most subjects was thiopentone sodium (95.3%). The other anaesthetic agent used was propofol (4.7%). This is consistent with similar studies conducted by Aruna G and Yadiyal MB [7] and Pitidhamabhorn U et al., [2] and at par with the clinical practice guidelines for ECT [15]. All subjects (100%) underwent bitemporal electrode placement for ECT. Bitemporal ECT being the classical method was the routine for all patients requiring ECT in the hospital. It was also preferred because the evidence for effectiveness of unilateral ECT being available only for depression [15]. The mean number of days post admission following which ECT was administered was 5.4±3.5 days. The decision to administer ECT was done ranged from 0 to 14 days of admission in this study to address their symptoms faster and to reduce the days of admission. The mean ECT sessions in this study subjects was 3.8±1.7. The mean number of ECT sessions with adequate seizures was 3.4±1.3. According to the clinical practice guidelines, good quality seizure should be given more importance than any specific duration [15]. However, for research purpose the study considered adequate seizures as motor seizure activity of ≥15 seconds [16]. The number of sessions was less compared to most studies but falls within the range of sessions 2 to 12 as quoted in most studies [1,2,5-11,17]. The reason for fewer number of sessions may be justified by the fact that the most common indication for ECT in the present study being irritability/ aggression/violent, the ECT sessions were stopped once the aggression came down i.e., once the response to indication is achieved. In the present study, the improvement rate among patients with schizophrenia was relatively lower (6/19, 31.6%) compared with the overall response rate (67.2%) and mood disorders. This may reflect the higher proportion of treatment-resistant schizophrenia cases receiving ECT.

The most common ICD 10 diagnosis among subjects receiving ECT was mood disorders (59.4%), particularly, bipolar affective disorders (32.8%). Among bipolar disorders, mania without psychotic disorder was the most common diagnosis (21.9%). The next common diagnosis was schizophrenia (29.6%). This finding is contrary to most studies in India where schizophrenia is the most common diagnosis [1,2,5,7,9,10]. Leiknes KA et al., studied the contemporary use and practice of ECT worldwide in 2012 from studies published from the year 1990 and the most common diagnosis of subjects who underwent ECT in Europe, Australia, New Zealand, USA, South America, Africa was depressive disorders, whereas in Asia it was schizophrenia [18]. A 2022 survey of practice on ECT across nations was also in concordance with this diagnosis [19]. More recent international studies also gives similar reports [12,17,20-23]. The most common indication for ECT irrespective of diagnosis was irritability/aggression/ violence (29.7%). When individual diagnosis was considered, among schizophrenia, treatment resistance/ augmentation is the most common indication (14.1%). When depressive disorders are considered, suicidal ideas was the most

common indication (17.2%). Among bipolar disorders, irritability/aggression/violence was the most common indication. In this study, 6.2% of subjects underwent ECT for catatonia, which is comparable with similar study done by Chakravorty S et al., where catatonia was the diagnosis among 7.2% of subjects receiving ECT [11]. The indication for ECT is varied (Augmentation, non-response to drugs, treatment resistance) among different studies [1,2,8,17], which could be due to usage of different practice guidelines and based on most common diagnosis.

The complications during ECT were about 6.3%. Less severe complications were present like teeth injury and tongue bite in three subjects which was managed symptomatically with NSAIDs. One subject had respiratory distress while coming out of anaesthesia but improved with oxygen support for about two hours. This is in accordance with similar study done by Sherchan S and Joshi D [6] (complications in 3 patients) and Subedi S et al., [10] (complications in 7.4%). Post-ECT side-effects in this study was around 15.6%, most common was memory disturbances 9.3% and headache in 4.7%. Studies [2,19] show cognitive impairment in more than three-fourth of the patients and headache in more than half of the patients who underwent ECT which is in contrast to this study. The reason may be due to non usage of any standard scales to measure cognitive impairment and relying on the clinical notes from the medical records. Also, Argyelan M et al., states there is a great variability in the occurrence and severity of ECT-induced cognitive side-effects [24]. Majority of patients suffer no to minimal impairment, but few patients may display marked impairments following a course of treatment.

The ECT acceptability in this study was 93.8%. Only four subjects (6.2%) withdrew from consenting to ECT midway of a course. The reasons mentioned in the clinical records were concern about cognitive impairment in two subjects and discharge against medical advice in one subject, no reason was mentioned for one subject. This high acceptability of ECT is comparable to the studies done by Kota VS et al., and Khan S et al., [1,9]. The present study also included clinical response of subjects following ECT and study utilised the clinical notes in the records and did not take into consideration the standard scales for clinical response as they were not uniform in all subjects of individual diagnosis. Based on the clinical symptom response to the specific indication for ECT, subjects were categorised as showing complete, partial and no improvement. In this study, 67.2% showed complete improvement, 23.4% showed partial improvement and 9.4% did not improve with ECT. Similar studies done by Kota VS et al., [1] Pitidhammabhorn U et al., [2] Chung KF [25] and Khan S et al., [9] showed response to ECT as 85%, 79.3%, 95% and 100%, respectively and either used clinical response for assessment or has not mentioned about the method of assessment. The response rate in the present study is slightly less compared to these studies which could be due to inclusion of many treatment resistant schizophrenia cases and variations in the usage of tools to consider response in these studies.

Limitation(s)

It's a hospital-based study with less sample size and hence limits the generalisability of the findings. It is based on clinical notes and documentation and hence the chance of information and ascertainment bias are more likely. No standard scales were used to measure clinical response and memory impairment.

CONCLUSION(S)

In the present study, no major life-threatening complications were found with minimal and manageable side-effects following modified ECT. ECT was indicated predominantly for mood disorders followed by psychotic disorders, especially, for those patients with irritability/aggression. Although stigma for psychiatry disorders prevail in

the community, acceptance of ECT remains high among patients and attenders. Cognitive impairment following ECT requires serial monitoring and adequate rehabilitative measures should be planned in severe cases if persisting. However, a multicentric study in future will give broader perspective and also formulation of treatment guidelines for various disorders including ECT as a treatment option.

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