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Clinical Effectiveness, Cognitive Effects, and Caregiver Attitudes Toward Modified Electroconvulsive Therapy: A Prospective Observational Study

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Abstract

Introduction

Electroconvulsive therapy (ECT) is effective across several severe psychiatric disorders, yet families who consent to it often fear it. We examined caregiver attitudes toward modified ECT and the early clinical and cognitive outcomes of treatment in an Indian tertiary care setting.

Methods

In this prospective observational study, consecutive inpatients prescribed modified bitemporal ECT and their primary caregivers were enrolled between April 2020 and December 2021. Caregivers completed the 22-item Modified ECT Attitudes Questionnaire (EAQ; range 0-44) at baseline. Patients were rated on the Clinical Global Impression-Severity (CGI-S), the Mini-Mental State Examination (MMSE), and diagnosis-specific scales before the first session and after 5-7 sessions.

Results

Of the 60 dyads enrolled, 58 completed follow-up (mean patient age 42.8 ± 8.8 years; 60.3% male). Treatment-resistant depression and treatment-resistant schizophrenia were the most common indications (29.3% each). After a mean of 5.7 sessions, CGI-S fell from 5.4 ± 1.0 to 3.5 ± 0.9 ($p < 0.001$; $dz = 1.69$). Hamilton Depression Rating Scale scores fell by 49.0% (n = 27), Bush-Francis Catatonia Rating Scale scores by 61.3% (n = 6), Young Mania Rating Scale scores by 30.0% (n = 8), and Positive and Negative Syndrome Scale scores by 37.1% (n = 21) (all $p < 0.01$). Overall, 23 patients (39.7%) met response criteria. Mean MMSE did not change in the full sample (23.9 to 23.5; $p = 0.19$), but fell by 1.0 point in patients without catatonic features ($p < 0.001$). Memory complaints were the most frequent predominant adverse effect (24.1%). The mean caregiver EAQ score was 22.9 ± 6.9, near the scale midpoint, and half of caregivers named films or television as their main source of information about ECT. Attitude scores did not differ by information source, caregiver sex, caregiver education, or previous ECT exposure.

Conclusions

Modified ECT was associated with rapid early symptomatic improvement and a small short-term decline in MMSE scores, although the MMSE may underestimate memory effects and, without a control group, these changes cannot be attributed solely to ECT. Caregiver attitudes were ambivalent, and half of caregivers relied on films or television for information, which argues for structured, clinician-led education during the consent process.

Categories: Neurology, Psychiatry
Keywords: caregiver attitudes, cognitive side effects, ect attitudes questionnaire, electroconvulsive therapy, india, mini-mental state examination, stigma, treatment-resistant depression, treatment-resistant schizophrenia

Introduction

Electroconvulsive therapy (ECT) remains an indispensable intervention in psychiatric practice, demonstrating superior efficacy over pharmacotherapy in treatment-resistant depression [1] and serving an established role in refractory mania, catatonia, acute suicidality, and treatment-resistant schizophrenia [2-6]. In India, the Mental Healthcare Act (2017) mandates that ECT be administered exclusively in modified form under general anesthesia and muscle relaxation [7]. Despite modern anesthetic safety protocols, negative perceptions of ECT persist widely among patients and families.

In the Indian clinical context, family members play a central role in treatment decision-making and, when a patient lacks capacity, may give consent as a nominated representative under the Mental Healthcare Act (2017) [7]. Surveys indicate that relatives often possess limited formal knowledge regarding ECT and harbor

substantial fears regarding cerebral damage, severe pain, and permanent memory loss [8,9]. Indian films have repeatedly portrayed ECT as punitive or frightening, which may shape public sentiment and caregiver hesitation [10].

Cognitive side effects, particularly memory impairment following bilateral placement, represent the primary clinical concern raised during consent discussions [11-13]. To facilitate informed decision-making, clinicians must provide families with balanced, context-specific data detailing both expected early symptomatic gains and typical short-term cognitive changes. This prospective study had three aims: to assess caregiver attitudes toward modified ECT, to determine whether these attitudes varied by caregivers' main source of information, and to measure changes in clinical severity and cognition after 5-7 ECT sessions across the major diagnostic indications.

Materials And Methods

Study design and setting

This prospective observational study was conducted in the inpatient psychiatry department of NRI Medical College and General Hospital, a tertiary care teaching facility in Guntur, Andhra Pradesh, India, from April 2020 through December 2021. Treatment decisions, including the indication, schedule, and continuation of ECT, were determined independently by treating consultant psychiatrists according to standard clinical protocols. The study protocol was approved by the Institutional Ethics Committee (Protocol No. IEC NRIMC 189). Written informed consent for research participation was obtained from all patients or their legally authorized representatives, and from all participating caregivers, prior to enrollment.

Participants and sample selection

Consecutive inpatients prescribed modified ECT were enrolled along with their primary family caregiver involved in the treatment consent process. Sixty patient-caregiver dyads were initially enrolled. Two patients were lost to follow-up before the post-ECT assessment and were excluded from the analysis. The final analytic cohort comprised 58 patients and 58 caregivers.

Sample size

All consecutive eligible patients prescribed ECT between April 2020 and December 2021 were enrolled. As enrollment was based on a fixed study period, sample size adequacy was assessed retrospectively using the formula for paired comparisons: $n = (Z_{1-\alpha/2} + Z_{1-\beta})^2 / dz^2$ [14]. Assuming a two-sided significance level of 0.05, 80% power, and a moderate standardized effect size (dz = 0.5), the estimated minimum sample size was 32 patients using the normal approximation, or approximately 34 using the exact paired t-test calculation. The final sample of 58 patients exceeded this requirement for the overall paired analysis. However, the smaller diagnostic subgroups were not individually powered, and their estimates should be interpreted with caution.

Diagnostic definitions and eligibility

Patients were evaluated and diagnosed by a consultant psychiatrist according to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) criteria [15]. Treatment-resistant depression (TRD) was defined as the failure to achieve clinical remission following at least two adequate antidepressant trials (sufficient dose for ⩾6 weeks) during the current episode. Treatment-resistant schizophrenia (TRS) was defined as the failure of at least two adequate antipsychotic trials of sufficient dose and duration; a failed clozapine trial was not required for inclusion. Catatonic features were identified as the presence of two or more of the 14 screening items of the Bush-Francis Catatonia Rating Scale (BFCRS), and catatonia was diagnosed according to DSM-5 criteria. Each patient was assigned to a single group according to their primary DSM-5 diagnosis and main indication for ECT. Patients with depression were therefore grouped by their main indication: treatment resistance (treatment-resistant depression), acute suicidality (major depressive disorder (MDD) with suicidal ideation), or MDD with comorbid anxiety disorders, including obsessive-compulsive disorder (OCD). Patients in the other depressive groups could also report suicidal thoughts, but these were not the primary indication for ECT.

Eligible patients were adults aged 18-60 years. Patients were excluded if they presented with comorbid neurological illness, primary dementia, substance dependence, or high anesthetic risk.

ECT procedure and assessments

Modified ECT was administered thrice weekly using a brief-pulse, constant-current device (RMS PC Ecton, Recorders & Medicare Systems, Chandigarh, India) with standard bitemporal electrode placement. Stimulus dose was determined by empirical dose titration at the first session. Brief-pulse stimuli were delivered at a frequency of 70 Hz with a pulse width of 1 ms, and the charge delivered at each session was calculated as described by Andrade [16] and documented in the clinical ECT records. Subsequent treatments were given at 1.5 times the seizure threshold. General anesthesia was induced with intravenous propofol (1-1.5 mg/kg), followed by succinylcholine for muscle relaxation. Concurrent psychotropic medications were maintained at

stable doses throughout the ECT course, and benzodiazepines were withheld for 12 to 24 hours before each session. Seizure adequacy was monitored clinically with EEG during each session; for analysis, motor seizure duration was timed visually at each session and averaged across sessions for each patient. At follow-up, the single predominant adverse effect, if any, was recorded for each patient.

Clinical assessments were conducted at baseline (prior to the first session) and at follow-up (12 to 16 days after treatment initiation, corresponding to 5-7 completed sessions); the same clinician rated each patient at both time points. In patients presenting with catatonic features, baseline ratings (including the MMSE) were obtained following initial lorazepam administration, once partial motor and verbal cooperation permitted bedside testing, before benzodiazepines were withheld prior to the first ECT session. All patients were assessed using the Clinical Global Impression-Severity (CGI-S) scale [17,18] and the Mini-Mental State Examination (MMSE) [19]. An unauthorized translation of the MMSE was used by the study team without permission; however, this use has now been settled with PAR. The MMSE and MMSE-2 are copyrighted instruments and may not be used or reproduced in whole or in part, in any form or language, or by any means without written permission from PAR (www.parinc.com). Diagnostic cohorts were assessed using specific validated instruments: the 17-item Hamilton Depression Rating Scale (HAM-D) for major depressive episodes [20], the Young Mania Rating Scale (YMRS) for bipolar mania [21], the Modified Scale for Suicidal Ideation (MSSI) for suicidal ideation [22], the Positive and Negative Syndrome Scale (PANSS; contact information and permission to use: Mapi Research Trust, Lyon, France, https://eprovide.mapi-trust.org) for schizophrenia spectrum disorders [23], and the Bush-Francis Catatonia Rating Scale (BFCRS) for catatonia [24]. Clinician-rated scales were completed in English following interviews conducted in the participant's preferred language.

Caregiver attitudes were assessed at baseline, before the ECT consent discussion, using the Modified ECT Attitudes Questionnaire (EAQ) [25], a 22-item participant-rated scale assessing thoughts, emotions (fear and shame), and hypothetical behaviors relating to ECT. Each statement is answered with agree, neither agree nor disagree, or disagree. Responses are scored 0 (negative), 1 (neutral), or 2 (positive), with negatively phrased items reverse-coded, giving a total of 0-44 in which higher scores indicate more favorable attitudes. In its validation sample of 196 members of the Irish public, the EAQ showed good internal consistency (Cronbach's $\alpha = 0.873$) [25]. The EAQ was chosen because it is, to our knowledge, the only systematically validated ECT attitude scale; it retains 14 items from an earlier Indian questionnaire and adds items addressing emotions, beliefs about adverse effects, and involuntary treatment [25]. For participants who did not understand English, both the MMSE and the EAQ were administered in Telugu by bilingual clinicians, with items translated orally at the time of administration. Because these oral translations were not standardized or validated, item wording may have varied between administrations. The EAQ was used with the permission of its developers. The total EAQ score was used in the present analysis. Caregivers also identified their primary source of information regarding ECT.

Statistical analysis

Data are presented as mean ± SD or n (%). Pre-post changes were compared using two-tailed paired t-tests, with Cohen's d, and 95% confidence intervals reported as measures of effect size [26]. Clinical response was defined as a ⩾50% reduction on the diagnosis-specific scale (HAM-D for depressive episodes, YMRS for mania, BFCRS for primary catatonia, and PANSS for schizophrenia spectrum disorders, after subtracting the PANSS minimum score of 30). Caregiver EAQ scores were compared across information sources and education levels using one-way ANOVA, and by caregiver sex and previous ECT exposure using independent-samples t-tests. Internal consistency was assessed using Cronbach's α. All analyses included the 58 patients with complete follow-up data, and $p < 0.05$ was considered significant. Analyses were performed using IBM SPSS Statistics for Windows, Version 25.0 (Released 2017; IBM Corp., Armonk, NY, USA). The study is reported in accordance with the STROBE guidelines for observational studies [27].

Results

Participant characteristics

Fifty-eight patient-caregiver dyads were analyzed. Patients had a mean age of 42.8 ± 8.8 years, and 35 (60.3%) were men. Mood disorders and catatonia made up 37 cases (63.8%), and schizophrenia spectrum disorders 21 (36.2%). Treatment-resistant depression and treatment-resistant schizophrenia were equally common, at 17 patients each (29.3%). Eighteen of 55 patients with available data (32.7%) had received ECT before. Patients received a mean of 5.7 ± 0.6 sessions before follow-up at 13.6 ± 1.3 days, and mean motor seizure duration was 31.9 ± 10.2 seconds (Table *1*).

Characteristic	n (%) or mean ± SD
Patients	
Age, years	42.8 ± 8.8
Male sex	35 (60.3)
Previous ECT (n = 55)	18 (32.7)
Diagnosis and indication for ECT	
Depressive disorders	27 (46.6)
Treatment-resistant depression	17 (29.3)
MDD with suicidal ideation	6 (10.3)
MDD with comorbid anxiety disorders (including OCD)	4 (6.9)
Bipolar I disorder, current episode manic	8 (13.8)
Catatonia	2 (3.4)
Schizophrenia spectrum disorders	21 (36.2)
Treatment-resistant schizophrenia	17 (29.3)
Schizophrenia with catatonia	2 (3.4)
Schizophrenia with aggression	2 (3.4)
Treatment	
Sessions to follow-up	5.7 ± 0.6 (range 5-7)
Follow-up, days	13.6 ± 1.3 (range 12-16)
Motor seizure duration, seconds (per-patient mean across sessions)	31.9 ± 10.2 (range 15-50)
Caregivers	
Male sex	32 (55.2)
Education: primary/secondary/graduate/postgraduate	12 (20.7)/20 (34.5)/23 (39.7)/3 (5.2)
Main source of information: films/TV/doctor/friends	29 (50.0)/20 (34.5)/9 (15.5)

TABLE 1: Characteristics of patients, caregivers, and treatment (N = 58)

OCD: obsessive-compulsive disorder, MDD: major depressive disorder.

Of the 58 caregivers, 32 (55.2%) were men. Half (29, 50.0%) named films or television as their main source of information about ECT, while 20 (34.5%) had learned about it from a doctor and 9 (15.5%) from friends.

Clinical outcomes

Every diagnosis-specific scale improved between baseline and follow-up, and all of these changes were statistically significant (Table *2*). Among the 27 patients with a depressive episode, HAM-D scores fell from 26.6 ± 5.9 to 13.6 ± 6.8, a mean reduction of 13.0 points (95% CI 10.6 to 15.5; $p < 0.001$; dz = 2.08). The largest proportional gain was in catatonic features, where BFCRS scores fell by 61.3%. Manic and psychotic symptoms improved more slowly over the same interval, with YMRS scores falling by 30.0% and PANSS scores by 37.1% after adjustment for the scale minimum. Reductions were similar across depressive subgroups: 51.9% in treatment-resistant depression (n = 17), 47.3% in MDD with suicidal ideation (n = 6), and 39.2% in MDD with comorbid anxiety disorders (n = 4). In the six patients with suicidal ideation, MSSI scores fell more modestly, from 22.0 ± 3.6 to 18.0 ± 3.6 (18.2%; $p < 0.001$).

Measure (subgroup)	n	Baseline	Follow-up	Mean change (95% CI)	t	p	dz	% reduction
HAM-D (all depressive episodes)	27	26.6 ± 5.9	13.6 ± 6.8	13.0 (10.6-15.5)	10.82	<0.001	2.08	49.0
MSSI (MDD with suicidal ideation)	6	22.0 ± 3.6	18.0 ± 3.6	4.0 (2.9-5.1)	8.94	<0.001	3.65	18.2
YMRS (mania)	8	38.4 ± 6.9	26.9 ± 6.3	11.5 (5.6-17.4)	4.63	0.002	1.64	30.0
BFCRS (catatonic features)	6	13.3 ± 3.0	5.2 ± 2.8	8.2 (5.1-11.2)	6.83	0.001	2.79	61.3
PANSS (schizophrenia)	21	78.0 ± 19.1	60.2 ± 18.2	17.8 (13.0-22.6)	7.73	<0.001	1.69	37.1*
MMSE (all)	58	23.9 ± 2.1	23.5 ± 1.7	0.4 (-0.2 to 1.0)	1.31	0.19	0.17	1.7
CGI-S (all)	58	5.4 ± 1.0	3.5 ± 0.9	1.9 (1.6-2.2)	12.90	<0.001	1.69	34.6

TABLE 2: Pre- and post-ECT scores on clinical and cognitive measures (after 5-7 sessions)

Values are presented as mean ± SD. Mean change = baseline minus follow-up. *After subtracting the PANSS minimum of 30. The HAM-D row includes all patients with a depressive episode (treatment-resistant depression, n = 17; MDD with suicidal ideation, n = 6; MDD with comorbid anxiety disorders, n = 4). The BFCRS row includes two patients with primary catatonia, two with schizophrenia with catatonia, and one each with mania and treatment-resistant schizophrenia who had catatonic features.

ECT: electroconvulsive therapy, HAM-D: Hamilton Depression Rating Scale, MSSI: Modified Scale for Suicidal Ideation, MDD: major depressive disorder, YMRS: Young Mania Rating Scale, BFCRS: Bush-Francis Catatonia Rating Scale, PANSS: Positive and Negative Syndrome Scale, MMSE: Mini-Mental State Examination, CGI-S: Clinical Global Impression-Severity.

Global severity tells the same story across diagnoses. Mean CGI-S fell by 1.9 points, 53 patients (91.4%) improved by at least one point, and none worsened. At follow-up, 28 patients (48.3%) were rated mildly ill or better (CGI-S ⩽ 3), compared with none at baseline. Overall, 23 patients (39.7%) met the response criterion of a ⩾50% reduction on their diagnosis-specific scale. Response was most frequent in primary catatonia (2/2) and depressive disorders (15/27, 55.6%), and less frequent in schizophrenia spectrum disorders (5/21, 23.8%) and mania (1/8, 12.5%).

Cognitive and adverse effects

Mean MMSE scores were stable in the sample as a whole, falling from 23.9 ± 2.1 to 23.5 ± 1.7 ($p = 0.19$). This average, however, concealed two opposite movements. The six patients with catatonic features, whose baseline testing was conducted after an initial lorazepam response but remained limited by their motor and verbal state, gained a mean of 4.7 points (20.0 to 24.7). In the remaining 52 patients, MMSE fell by a mean of 1.0 point, from 24.3 ± 1.6 to 23.3 ± 1.5 ($p < 0.001$; $dz = 0.65$). Eight patients (13.8%) lost three or more points. Among these 52 patients, a significant decline was observed in the mood disorder group (n = 34; 24.3 ± 1.6 to 23.0 ± 1.5; $p < 0.001$), whereas the change in the psychosis group was not statistically significant (n = 18; 24.3 ± 1.7 to 23.9 ± 1.4; $p = 0.26$); the smaller psychosis subgroup had limited power to detect a decline of similar size.

Forty-six patients (79.3%) reported an adverse effect. Subjective memory loss was the most frequent predominant complaint (14, 24.1%), followed by myalgia (11, 19.0%), post-ECT confusion (11, 19.0%), headache (7, 12.1%), and fever (3, 5.2%). No serious adverse events were recorded.

Caregiver attitudes

The mean caregiver EAQ score was 22.9 ± 6.9 (95% CI 21.1 to 24.7; range 7-37), close to the scale midpoint of 22. Internal consistency was good (Cronbach's $\alpha = 0.82$).

Attitudes did not differ by where caregivers had learned about ECT. Mean scores were 22.7 ± 7.2 among those informed by films or television, 23.6 ± 5.5 among those informed by a doctor, and 21.9 ± 9.0 among those informed by friends ($F(2, 55) = 0.23$; $p = 0.80$), although the friends group was small (n = 9) and this comparison had limited power. Male and female caregivers scored similarly (23.4 ± 6.5 vs 22.2 ± 7.4; $p = 0.52$), as did caregivers of patients with and without previous ECT (n = 55; 21.6 ± 6.9 vs 23.6 ± 7.0; $p = 0.33$). Scores also did not differ by caregiver education ($F(3, 54) = 1.45$; $p = 0.24$).

Discussion

This prospective study examined early clinical and cognitive outcomes of modified ECT in 58 patients, together with the attitudes of the caregivers involved in their treatment decisions. Symptoms improved substantially across all major indications within five to six sessions, with only a small early decline in MMSE scores, whereas caregivers held ambivalent attitudes toward the treatment, and half had relied on films or

television for their information about it.

Clinical improvement was evident early in the course of treatment. Depressive symptoms fell by nearly half within two weeks, and more than half of patients with depressive episodes had already responded, consistent with the efficacy reported in meta-analytic data [1] and the rapid response described in larger prospective cohorts [28]. The 61% reduction in catatonic symptoms is consistent with the well-established responsiveness of catatonia to ECT [2,4]. In the six patients with suicidal ideation, MSSI scores fell more modestly (18%) than HAM-D scores, although the effect was consistent across all six. This may indicate that suicidal ideation lags behind mood in the earliest sessions, as larger studies over complete courses have shown substantial relief of suicidal intent [5]. Alternatively, the MSSI may capture more enduring cognitive aspects of suicidality, such as hopelessness and the wish to die, which change more slowly than overall depressive severity; with only six patients, these explanations cannot be distinguished. Manic and psychotic symptoms improved more slowly. Only one in eight patients with mania and one in five with schizophrenia had responded at follow-up, although effect sizes were large in both groups. Response in these conditions usually builds over a full course of treatment [3,6], so our two-week window may capture the early part of a longer trajectory rather than its end point. Given the small size of several diagnostic subgroups, these differences in response between diagnoses are descriptive and do not permit conclusions about the relative efficacy of ECT across disorders.

Cognitive outcomes varied across subgroups. Overall, mean MMSE was unchanged, but this reflected two opposite trends. The six patients with catatonic features gained a mean of 4.7 points, most likely because they became better able to engage with testing rather than because of a true cognitive benefit. In the remaining 52 patients, MMSE fell by a mean of one point; this decline reached statistical significance only in the mood disorder group, although the smaller psychosis subgroup had limited power to detect a change of similar size. Only one in seven patients lost three or more points. The reason for this apparent difference between diagnostic groups is unclear; it may reflect differences in concurrent medication or baseline clinical characteristics, but it could also be a chance finding given the size of the subgroups. The MMSE is a brief screening instrument that is relatively insensitive to the anterograde and retrograde memory effects of bitemporal ECT, so the small mean decline, and the absence of significant change in some subgroups, should not be taken to indicate minimal cognitive impact. Meta-analytic evidence suggests that cognitive effects of ECT are greatest in the first days after treatment and largely resolve within weeks [12], but our follow-up did not extend beyond the treatment course. Subjective memory loss was the most frequently reported adverse effect, affecting one in four patients, and families should be counselled that memory complaints are common during treatment.

Caregivers in this study appeared to have little access to such balanced information. The mean EAQ score sat almost exactly at the scale midpoint, indicating neither clear acceptance nor clear rejection of the treatment. Half of the caregivers had formed their impression of ECT from films or television, echoing earlier Indian surveys in which relatives held limited knowledge and substantial fears about the treatment [8,9] and the persistent influence of its portrayal in Indian films [10]. Contrary to expectations, caregivers who had learned about ECT from a doctor did not hold more favorable attitudes than those informed by media. In an earlier Indian study, relatives informed by doctors had better knowledge of ECT [8], suggesting that medical contact may improve factual knowledge without necessarily changing attitudes. Previous ECT exposure did not improve attitudes either, consistent with the same study [8]. These null findings should, however, be interpreted cautiously: the information-source categories were broad, the friends group was small, and the content and depth of information previously provided by doctors were not recorded. With these caveats, the findings raise the possibility that neither routine clinical contact nor prior experience is sufficient to change how families feel about the treatment. Information may need to be delivered in a structured way, with outcome and side-effect data presented explicitly, rather than left to the consent conversation alone; structured education modules have been shown to improve caregivers' knowledge of and attitudes toward ECT [29], and current Indian Psychiatric Society guidelines treat informed consent as a core component of ECT practice [30].

Limitations

The sample was drawn from a single center and several diagnostic subgroups were small, so subgroup estimates are imprecise, and several outcomes were tested without correction for multiple comparisons, although most effects were large and highly significant. There was no control group, and improvement over two weeks may partly reflect concurrent medication, although doses were held stable, and inpatient care, so the observed changes cannot be attributed solely to ECT. Ratings were not blinded, and the same treating clinician conducted both the baseline and post-ECT assessments, which may introduce observer bias. Because outcomes were captured at an early midpoint of treatment (after 5-7 sessions), the improvements recorded represent early response trajectories rather than final remission, particularly for the depressed cohorts, and cognitive recovery after the course could not be assessed. The MMSE is a coarse measure of the memory domains most affected by ECT and likely underestimates cognitive effects compared with more sensitive memory tests, and only the single predominant adverse effect was recorded for each patient. Stimulus charge was documented clinically at each session, but these records were not available for analysis, so charge values could not be reported. Caregiver attitudes were measured once, at baseline, so we could not test whether they shifted as caregivers watched patients improve. For participants who did not understand

English, MMSE and EAQ items were translated orally into Telugu at the time of administration; because these translations were not standardized or validated, measurement consistency may have been affected, and scores may not be fully comparable between participants assessed in English and in Telugu; the EAQ was validated in an Irish general-population sample, although internal consistency in our sample was good. Finally, the comparisons of caregiver attitudes were underpowered to detect small differences.

Conclusions

Modified ECT was associated with rapid improvement across depression, catatonia, mania, and treatment-resistant schizophrenia within five to six sessions, although the small diagnostic subgroups do not allow comparisons of response between disorders. Mean MMSE scores did not change significantly overall and fell by about one point in patients without catatonic features, but the MMSE is insensitive to ECT-related memory effects, and subjective memory complaints were common. Caregivers, who are closely involved in treatment decisions and may consent on the patient's behalf when capacity is lacking, held ambivalent attitudes, and half had learned about ECT mainly from films or television. Their attitudes did not differ between those informed by doctors and those informed by films or television, nor did they differ with previous ECT exposure. Structured, evidence-based counseling that sets out the expected early benefits and the typical short-term cognitive changes should become a routine part of the consent process.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Gautami Nagabhirava, Janhavi Pande, Anusha Siripurapu

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Critical review of the manuscript for important intellectual content: Gautami Nagabhirava, Janhavi Pande, Anusha Siripurapu

Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. Institutional Ethics Committee, NRI Medical College and General Hospital, Guntur, Andhra Pradesh, India issued approval IEC NRIMC 189. **Animal subjects:** All authors have confirmed that this study did not involve animal subjects or tissue. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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