

Efficacy of Electroconvulsive Therapy in Various Psychiatric Disorders: A Hospital Based Longitudinal Follow-up Study

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ABSTRACT

Introduction: Electroconvulsive Therapy (ECT) is one of the neurobiological therapies available for the treatment of various psychiatric disorders especially those resistant to pharmacotherapy or, where a rapid response is needed.

Aim: To study the response of patients with different psychiatric disorders to ECT and study the relationship between seizure duration and response.

Materials and Methods: It was a longitudinal study where a total of 40 patients were studied. Patients aged ≥ 12 years, who were resistant to pharmacotherapy or, having conditions where rapid response was warranted like suicidality or catatonia were included in our study as cases. A written informed consent was taken from all patients or their caretakers wherever necessary. Scales for assessment of various disorders were applied before

and after treatment.

Results: Majority of the patients 37.5% were in the age-group of 38-47 years followed by 22.5% in 28-37 years. Only 5% of patients were aged >60 years. Males were slightly higher in number as compared to females (21:19). Affective disorders formed the major group of the patients (75%) followed by schizophrenia (10%), obsessive compulsive disorder (10%) and mental retardation (5%). Overall, 75% of patients showed $>50\%$ response to ECT with maximum response seen in affective disorders. No significant relation was seen between seizure duration and response to ECT.

Conclusion: ECT is very effective for treating various psychiatric disorders especially affective disorders. ECT is life saving in conditions like catatonia and suicidality.

Keywords: Affective disorders, Montgomery asberg depression rating scale, Response, Suicidality, Yale-brown obsessive compulsive scale

INTRODUCTION

Electroconvulsive therapy is one of the brain stimulation therapies where we use electric current to induce neurobiological and biochemical changes in the brain [1]. The current induces widespread electrical discharges (seizure) in the brain which is responsible for the therapeutic effect of ECT as well as some of its side-effects [2]. About 13.4 to 14.3% patients in India receive ECT, which is far more than in developed countries [3]. ECT is the most effective and rapid treatment available for patients with resistant depression, bipolar disorder and acute psychosis. For patients who suffer from intractable catatonia and neuroleptic malignant syndrome, ECT can be life saving [4].

Since the exact mechanisms underlying ECT remain unknown, the postulated hypothesis relates to its role in alteration of various neurotransmitters and peptides in the brain. ECT works by producing generalised seizure, thereby modulating the various monoamines in the brain circuitry which also result in various side effects of the procedure [5]. Despite being so effective in treating various psychiatric disorders, the use of ECT remains restricted to few conditions due to lack of knowledge and negative attitude towards the procedure even among medical professionals [6]. There are very less studies showing the effectiveness of ECT in patients having mental retardation although some studies have shown it to be effective in severe or refractory psychotic symptoms in such patients [7]. Administering ECT early, in the course of illness leads to quick recovery as compared to pharmacotherapy. It also improves the quality of life and activities of daily living [8]. We therefore, studied the effectiveness of ECT in various psychiatric disorders.

MATERIALS AND METHODS

The study was carried out at a tertiary care hospital in Kashmir which caters to the psychiatric needs of whole of Jammu and Kashmir

state including Ladakh. The study was carried over a period of one year from July 2016 to June 2017. It was a longitudinal study where patients receiving ECT were enrolled. A total of 40 patients were included in present study. Patients' ≥ 12 years of age who were resistant to pharmacotherapy or who had life-threatening conditions like catatonia, refusal to feed or suicidality were included in present study. Only those patients who gave consent for the procedure were included. In patients aged less than 18 years, consent was taken from the caregivers who in most cases were parents of the patient. Patients having contraindications to general anaesthesia or having history of recent intracranial haemorrhage, cardiac arrhythmias, myocardial infarction or pheochromocytoma were excluded from present study. Patients with features of raised intracranial tension were also excluded.

General information including age, sex, residence, occupation, socioeconomic status was recorded. The variables analysed in the study included sociodemographic information, clinical profile (diagnosis, previous psychiatric hospitalisations, family history of mental disorders, presence of clinical comorbidities), and ECT data, i.e., number of sessions, complications during and immediately after the procedure (within 72 hours), late complications (more than 72 hours after the procedure) and treatment response.

Sample size was calculated using parametric statistics to calculate the Chi-square value which has been applied in the data collected. Since our study was a longitudinal follow-up study, we could not get more than the collected number of cases.

ECT Parameters

ECT was administered by a junior resident in psychiatry under the supervision of senior resident and a consultant. The procedure was carried out under general anaesthesia given by an anaesthetist. Propofol or thiopentone was used as an inducing agent and

succinylcholine as muscle relaxant. An indigenously manufactured brief-pulse, constant energy machine (Medicaid Systems, Chandigarh, India) was used where duration of current, frequency and pulse width was adjusted as per the dose needed to induce an effective seizure. Motor seizure was monitored by the cuff method. Motor seizure lasting more than 15 seconds was taken as adequate seizure.

Scales Used

Montgomery Asberg Depression Rating Scale (MADRS): It is a 10 item scale with each item having a maximum score of 6, thus total score of the scale is 60. It helps to measure the severity of depression [9].

Yale-Brown Obsessive Compulsive Scale (YBOCS): It is a 10 item balanced scale designed to rate both the severity and type of symptoms in patients with Obsessive Compulsive Disorder (OCD) [10].

Young's Mania Rating Scale (YMRS): It is an 11 item scale used to assess disease severity in patients with mania [11].

Bush Francis Catatonia Rating Scale (BFCRS): It is a 23 item scale used to assess the severity of catatonia [12].

Becks Suicide Intent Scale (BSIS): It includes 20 items to assess the severity of suicidal attempt. It also gives us the risk of repeated attempts by the severity level [13].

Clinical Global Impressions Scale (Severity index) CGI-S: It measures illness severity and is one among the three domains of CGI scale which includes CGI Improvement Index (CGII) and Efficacy Index (EI). CGIS helps us to measure the response at various intervals by comparing the scores [14]. The improvement was graded as more than 50% or less than 50% as assessed by various scales.

STATISTICAL ANALYSIS

Data were filled into Microsoft Excel. Continuous variables were analysed in the form of mean and standard deviation. Categorical variables were summed up as frequency and percentages. Chi-square test was applied to analyse the relationship between categorical variables. Fisher's-exact test was used wherever chi-square test did not meet Cochran criteria. Difference between two means were analysed using unpaired t-test.

RESULTS

Majority of the patients 15 (37.5%) were in the age-group of 38-47 years followed by 9 (22.5%) in 28-37 years. Only 2 (5%) of patients were aged >60 years. Males were slightly higher in number as compared to females (21:19). Majority of our patients 25 (62.5%) were married, which could be due to the fact that affective disorders, forming the major lot of our patients receiving ECT, have a relatively late age of onset. With regards to the dwelling, the patients were from rural background mostly which is a reflection of the fact that majority of our population hails from a rural background. About 75% of the patients were having affective disorders with the rest having OCD (10%), schizophrenia (10%) and mental retardation in 5%. About 36 (90%) of our patients received a mean of 8 ECT sessions while only 4 (10%) received more than 9 sessions of ECT [Table/Fig-1].

Among patients presenting with unipolar depression, about 69% showed $\geq 50\%$ improvement after ECT as assessed by MADRS with the remaining showing $\leq 50\%$ response. It could be because majority of patients with unipolar depression were having resistant depression where the response rates are a bit lower as compared to bipolar depression or other forms of depression. In patients of mania, 90% showed $\geq 50\%$ improvement in symptoms as assessed by YMRS. Among patients of mania, we had a pregnant female not responding to mood stabilizers who was given ECT in her second

Age (years)	Number of patients	Percentage
18-27	8	20
28-37	9	22.5
38-47	15	37.5
48-57	6	15
58-67	2	5
Sex		
Male	21	52.5
Female	19	47.5
Marital status		
Married	25	62.5
Unmarried	15	37.5
Occupation		
Unemployed	22	55
Employed	18	45
Residence		
Rural	22	55
Urban	18	45
Clinical Diagnosis		
Unipolar depression	16	40
BPAD-I	10	25
BPAD-II	4	10
OCD	4	10
MR	2	5
Schizophrenia	4	10
Number of ECTs received		
6-9 sessions	36	90
10-14 sessions	4	10

[Table/Fig-1]: Sociodemographic and baseline characteristics of cases. BPAD= Bipolar affective disorder; OCD=Obsessive compulsive disorder; MR=Mental retardation; ECT=Electroconvulsive therapy. Applying chi-square test, p-value was calculated to be >0.05 and was not statistically significant.

trimester and showed good response. In patients suffering from schizophrenia, ECT was administered for catatonia (2 patients), affective symptoms (1 patient) and agitation (1 patient). ECT has been regarded as the treatment of choice for catatonia. There was more than 50% improvement in all patients of schizophrenia who received ECT. In patients suffering from OCD, ECT was administered for severe depression seen in 3 patients and suicidality in 1 patient. We had two patients of mental retardation; one had affective symptoms (mania) and the other agitation. Both the patients did not respond to pharmacotherapy, but their response to ECT was very good ($\geq 50\%$ improvement on CGI-I) [Table/Fig-2,3].

Regarding the relation of seizure duration and the response to ECT shown by patients, no significant association was found. While analysing the cumulative seizure duration in various cases, it was found that about 21 patients had cumulative seizure duration < 200 seconds and 19 patients had >200 seconds. The two groups did not differ significantly in the remission rates. It may be due to the varied clinical conditions for which ECT was given and also, due to the heterogeneity of medications our patients were taking [Table/Fig-4].

In present study, the side-effects noted immediately after the procedure were confusion seen in 20 (50%) patients. It was self-limiting and resolved after 10-15 minutes. Delirium after the procedure was present in two patients only and both patients were taking lithium. Low doses of midazolam were used to manage delirium. Late complications after ECT included body aches reported by 10 (25%) patients, headache by 8 (20%) and forgetfulness by 16 (40%) patients. In patients complaining of body aches and headache, paracetamol was given which relieved the symptoms. Most of the patients had retrograde amnesia which improved within a few

Patients with unipolar depression (n=16)				
	Number of patients	Pre-ECT score	Post-ECT score	p-value
Indication for ECT				
Suicidality	5	Mean BSIS=84.5	Mean BSIS=40	<0.05
Resistant depression	11	Mean MADRS=45.14	Mean MADRS=20	<0.05
Patients with BPAD-I				
Mania(resistant)	10	Mean YMRS=31.37	Mean YMRS=10.87	<0.05
Patients with BPAD-II				
Depression(resistant)	4	Mean MADRS=46	Mean MADRS=19	<0.05
Patients with schizophrenia				
Catatonia	2	Mean BFCRS=22	Mean BFCRS=7	<0.05
Affective symptoms	1	YMRS=22	YMRS=11	<0.05
Agitation	1	CGI (S)=6	CGI (S)=4	<0.05
Patients with OCD				
Suicidality	1	YBOCS=24 BSIS=21	YBOCS=16 BSIS=13	<0.05
MDE	3	Mean YBOCS=23 Mean MADRS=24.3	Mean YBOCS=14 Mean MADRS=14.3	<0.05
Patients with mental retardation				
BPAD (mania)	1	YMRS=38	YMRS=16	<0.05
Agitation	1	CGI (S)=6	CGI (S)=4	<0.05

[Table/Fig-2]: Improvement in various psychiatric disorders after ECT.

Applying chi-square test, p-value was calculated to be <0.05 and was statistically significant. ECT=Electroconvulsive therapy; BSIS=Becks suicide intent scale; MADRS=Montgomery asberg depression rating scale; YMRS=Young's mania rating scale; BFCRS=Bush francis catatonia rating scale; CGI(S)=Clinical global improvement (severity index); YBOCS=Yale brown obsessive compulsive scale, MDE=Major depressive episode, BPAD=Bipolar affective disorder.

Psychiatric disorder	Total patients	Number of patients improved (>50% response)
Unipolar depression	16 (100%)	11 (68.75%)
Bipolar depression	04 (100%)	03 (75%)
Mania	10 (100%)	09 (90%)
Schizophrenia	04 (100%)	03 (75%)
OCD	04 (100%)	02 (50%)
Mental retardation	2 (100%)	2 (100%)

[Table/Fig-3]: Response to electroconvulsive therapy in various psychiatric disorders.

OCD: Obsessive compulsive disorder

Cumulative seizure duration	Number of patients	Response to treatment
<200 seconds	21	Remission in 18 patients (85.7%) 50% response in 3 patients (14.3%)
>200 seconds	19	Remission in 15 patients (78.9%) 50% response in 4 patients (21.05%)

[Table/Fig-4]: Relation of seizure duration and response.

Applying chi-square test, p-value calculated was 0.57 (not significant).

months but, patients needed reassurance regarding the temporary nature of their memory impairment.

DISCUSSION

Electroconvulsive therapy is widely used to treat psychiatric disorders and has stood the test of time for proving effective in various conditions especially in some life-threatening ones like Suicidality, catatonia, refusal to feed [15].

In present study, majority of patients were in fourth decade of their life which is about one decade earlier age as compared to that of western nations [16,17], but is similar to the results seen in Indian studies [18]. Also, similar results have been found in a study done in Thailand [19]. Among our patients, sex ratio was about 1:1 which is also seen in other studies done on ECT [20,21]. Majority of our patients were married which may be due to late age of onset of unipolar depression which forms the major indication for ECT [22].

In present study, majority of patients were receiving ECT for treatment of affective disorders which formed about 75% of total

patients receiving ECT. Similar pattern has been seen in a study done in USA where they found that about 72-92% of patients receiving ECT were having affective disorders [23,24]. Affective disorders have been the main diagnosis in Australia and New-Zealand [25,26]. An Indian analysis on the practice of ECT revealed that following schizophrenia, major depression (both bipolar and unipolar) and mania are the main indications for performing ECT [27].

The less number of schizophrenics receiving ECT in present study could be due to various reasons like newly launched long-acting antipsychotics which help in keeping such patients stable, poor patient preference for the procedure, bias of including more patients with affective disorders due to their good response to ECT.

Among patients with unipolar depression, about 72% patients showed more than 50% response as assessed by MADRS which is in concordance with the results shown in other studies [28,29]. Randomised controlled trials have revealed that up to 70% of patients with depression who do not respond to antidepressants may respond favorably to ECT [30]. Resistant depression is one of the few conditions approved as per (NICE) guidelines as an indication for administering ECT. However, among patients of resistant depression, only 60-70% of patients show remission even after administering ECT [31]. Among patients suffering from depressive phase of bipolar illness, about 75% patients showed >50% response as assessed by MADRS with the remaining showing 25-50% response to ECT. This shows the effectiveness of ECT in treating such severe cases which is also supported by a study done by Kho KH et al., [32]. In patients suffering from manic phase of bipolar affective disorder, almost 90% showed >50% response as assessed by YMRS which is similar to the rates seen in other studies done on bipolar patients [33,34].

In a study done in 2012 from Northern part of India, it was found that 90% patients of mania showed >50% response to ECT [35]. Similar results were found by Alexander RC and Strömgren IS who found good results with ECT in bipolar patients in manic phase not responding to drugs [36,37]. A rapid response was seen in catatonic symptoms in schizophrenia even after administering 2 sessions of modified ECT, although 4-6 sessions were given for complete

remission in above patients. Schizophrenia has been one of the first indications for administering ECT [38].

It has been seen that in acute phase of schizophrenia, ECT given in combination with antipsychotics brings faster recovery as compared to drugs alone [39,40]. Among schizophrenics, those with affective symptoms respond equally to ECT and antipsychotics [41]. In present study, catatonia resolved completely with few (2-3) sessions of ECT, while higher number of ECT sessions were needed in affective symptoms and agitation in which >50% response was seen.

A review of literature regarding OCD treatment shows that use of ECT in treatment resistant OCD is quite sparse. To the best of the knowledge of the authors, only isolated case reports showing efficacy of ECT in OCD have been reported. The primary indications in all case reports for ECT use would be OCD with severe depression [42,43]. In present study, patients with OCD had comorbid depression (3 patients) and suicidality (1 patient) which improved but the core symptoms of OCD did not improve much, although mild improvement in symptoms of OCD was seen in our patients.

Regarding the number of ECT sessions received by our patients, majority of patients received around 6-9 sessions with few needing more number of sessions. Same has been studied in other studies done in Asia [44]. The number of sessions described above was in reference to the acute phase of ECT while maintenance phase was not included. It was due to the fact that we wanted to study the response of various psychiatric illnesses to ECT which was achieved at the end of acute phase. Also, maintenance phase would require longer follow-up which was difficult.

Seizure Duration and Response to ECT

Majority of our patients received a mean of 8 ECT treatments during the acute phase. Maintenance phase ECT sessions were not included in present study since our primary aim was to see the response of various psychiatric disorders to ECT in the acute phase. It has been seen that motor seizure of <15 seconds are not effective for inducing remission [45]. No significant relation was seen between cumulative seizure duration and the response to ECT. A number of studies show positive correlation between seizure duration and response [46] however, some others do not find any relationship between seizure duration and response rate [47]. The data regarding relationship between seizure duration and response to ECT has been conflicting due to many factors like concurrent medications, underlying conditions for which ECT is administered and other comorbidities present in patients seen in clinical settings for ECT.

LIMITATION

The study did not include maintenance ECT sessions which could have an impact on course of illness and give us an idea about the relapse rates in different psychiatric disorders on maintenance ECT. Also, we did not take into account the medications our patients were taking which can influence the response to ECT in various disorders. Another limitation was the small sample size; higher number of patients would give us better insight into effectiveness of ECT in various disorders.

CONCLUSION

The present study substantiates the role of ECT in treating psychiatric disorders especially affective disorders where remission is achieved in the majority of patients. Also, ECT is life saving in some conditions like catatonia, suicidality and severe depression with refusal to take orals. In OCD, the core symptoms did not improve much, however the comorbid depression responded to ECT.

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