

## REVIEW ARTICLE

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# Concept of Electroconvulsive Therapy in India: A Narrative Review

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## Abstract

Electroconvulsive therapy (ECT) is one of the pivotal treatment modalities used in modern psychiatry. This treatment modality involves applying electrical stimulus with the help of an electrical device to induce a seizure. The induced seizure is used as the vital element for curative effect. This paper reviews the ECT research published in various journals, majority of these articles have focused on establishing the efficacy in different disorders. Significant numbers of papers describe the ECT procedure, ECT machine, adverse effects of ECT and amendments in mental health laws. Majority of papers from India focus on legal aspects of ECT and long term follow-up of ECT-treated patients. Despite the strict legislations made, ECT is considered as one of the most beneficial treatment procedure for depression during the COVID-19 pandemic. ECT continues to be a debatable treatment modality in modern psychiatry in context of its ethical caveats.

**Keywords:** ECT; Research; Seizure; India

## Introduction

From a historical perspective László Meduna, Hungarian Neuropsychiatrist was the first to introduce convulsive therapy (COT) to treat a patient named L. Zoltán with 4 years of catatonic stupor. The Convulsive Therapy (COT) resulted in the remission of the catatonic stupor and psychotic symptoms. Initially intramuscular camphor was used to induce convulsions, later replaced with Cardiazol. Later these circumstances inspired Ugo Cerletti and Lucio Bini to use elec-

tricity as tool for inducing seizures. The growing database of research evidence for neurobiological mechanisms exerting the therapeutic effects has replaced Meduna's earlier concept regarding the antagonistic relationship between schizophrenia and epilepsy<sup>1</sup>.

Electroconvulsive therapy (ECT) can ameliorate the neuropsychiatric symptoms providing rapid, significant improvement in a few mental health conditions<sup>2</sup>. Even after 80 years ECT is still used for treatment<sup>3</sup> of:

- Major depression, especially if it is associated with psychosis and suicidal ideation
- Severe dementia
- Catatonia, characterized by a lack of movement, rapid or abnormal movement, mutism, and other symptoms.

Mental Healthcare Act 2017 replaced the extant Mental Healthcare Act 1987 which had been broadly critiqued for banning “ECT as an emergency treatment option” and for implementing “unmodified ECT”. In addition, ECT in minors is anticipated to come under stringent regulation. The new clauses of bill made ECT, to include under the “advance directives”<sup>4</sup>.

## Role of Electroconvulsive Therapy (ECT) in Modern Psychiatry

During the COVID-19 pandemic ECT still remains as critical and life saving treatment modality for in the following set of patients<sup>5</sup>:

- Treatment resistant depression
- Depression with suicidal ideation
- Geriatric depression
- Bipolar depression
- Psychotic depression
- Post-partum depression
- Schizophrenia

Convulsive therapy was initially used as a curative procedure for schizophrenia. Nevertheless, it was soon found to be even more effective for the treatment of affective disorders. Severe depression is the most common indication for ECT. Apart from treating depression cases ECT is also useful in treating suicidal cases. Therefore, in patients at high risk of suicide ECT is recommended as the first choice of treatment. In several developing countries ECT remains the treatment of choice for schizophrenia even in India<sup>3</sup>.

Although antipsychotic medications are similarly successful in treating schizophrenia, resistance to pharmacotherapy and financial constraints gives the rationale for common application of ECT in India. The augmentation of antipsychotic drugs with ECT may enhance their effect which was observed in clozapine-resistant patients. Catatonia, pregnancy depression and postpartum psychotic states are conditions that respond well to ECT<sup>3</sup>.

Electroconvulsive Therapy is a procedure, done under anesthesia where a brief electrical stimulation of the brain is done. It is typically administered by a team of trained medical experts that comprises an anesthesiologist, psychiatrist and a nurse.

## Mechanism of Electroconvulsive therapy

- ECT increases the levels of Gamma amino butyric acid (GABA) in the occipital cortex which facilitates the glutamate normalizing effect. This in turn modulates the effects on neurotransmitters especially the serotonin and dopamine systems<sup>6</sup>.
- Pro-inflammatory state is concomitant with increased gene expression of cytokines and when conceptualized with depression as a consequence of inflammation ECT mainly acts on cytokines, thereby reducing the inflammation and normalizing the levels of interleukin-6, Tumor Necrosis Factor- $\alpha$  and cortisol<sup>7</sup>.
- ECT causes ephemeral blood-brain barrier permeability which may also exert a pivotal role in its desired therapeutic effect<sup>8</sup>.
- Brain plasticity is known to be altered by ECT wherein the Brain-Derived Neurotrophic Factor (BDNF) helps in neuronal growth, proliferation and repair.
- ECT as an active stimulator of neurogenesis by aggrandizing the proliferation of stem cells is recently identified as a key factor in conceptualizing the mechanism of action of ECT<sup>9</sup>.

## Patient Preparation

The patient shall be evaluated thoroughly before subjecting to ECT. The following are carried out:

- Medical history
- General physical examination
- Psychological testing
- Routine hematological investigations
- Electrocardiogram (ECG)
- The risks of anesthesia shall be deliberated

The duration of ECT procedure usually takes about 5 to 10 minutes, with extra time to prepare and recover. ECT is done as an inpatient procedure.

Before commencing the procedure, the patient is administered general anesthesia. Electrode pads are positioned on the patient's head. ECT can be one-sided, where electrical currents applied on only one side of the brain (right unilateral placement), or two sides (bitemporal), where the brain receives concentrated electrical currents to both sides<sup>10</sup>.

Patient is administered IV medications including an anesthetic and a muscle relaxant while starting the procedure. During the process the doctor shall monitor the heart rate, blood pressure, brain, and oxygen level. The patient is provided with safety measures for oral protection to prevent from teeth and other intra oral injuries. Internally, activity in patient's brain increases acutely. An electroencephalogram (EEG) test records the electrical activity of the brain. Patient

Placement			Location	Comments
Bitemporal (BT)			Electrodes are placed midline between the eye and ear on both sides of the head	Stimulus is administered at 1.5 times a patient's seizure threshold. Often used for patients who do not respond to several seizures with RUL
Right	Unilateral	Placement	1 electrode positioned just lateral to the vertex and the other at the right temple	When stimulus is administered in doses 6 times a patient's seizure threshold, RUL is as effective as BT but avoids cognitive disruption. Offers only modest effects when stimulus is administered in doses close to a patient's seizure threshold
(RUL)				

is shifted to recovery room after the procedure is over and monitored.

### Adverse effects of ECT

Few of the adverse effects of ECT<sup>11</sup> include:

- Confusion — which may last minutes to hours
- Memory loss
- During the treatment, the most common adverse effects are nausea, headache, temporomandibular joint pain and myalgia
- Medical complications like cardiac arrest

Attempts have been made to reduce the cognitive side effects of memory impairment by shifting from brief to ultra-brief pulse stimulation<sup>12</sup>. While a few patient summaries reported long lasting and severe memory disturbances after ECT. Psychological tests could not detect significant memory deficits beyond period of six months following a course of ECT.

The patient can recommence the normal activities a few hours after the treatment. However, few individuals may be instructed not to resume working, making important decisions and driving for up to one to two weeks after 24 hours after one treatment during maintenance therapy. Alleviation of confusion and improvement of memory loss dictate resumption of day to day activities by the individual.

### Outcomes

After about six treatment series with electroconvulsive treatment majority of patients, improvement in their symptoms are observed. However, complete improvement may take a long time and ECT might not be effective in a few<sup>10</sup>. The exact mechanism as to how ECT helps in the treatment of affective disorders, schizophrenia and psychotic states is not clear. It is well-known; however, that many of the chemical components of brain function are altered during a coma. Along with the earlier discussed mechanisms the ECT may be effective.

### Legal viewpoint in India

Indian mental health professionals are worried about the limitations placed on ECT and the insufficient mental health resources. It is essential that all parties, especially those responsible for funding, receive more education on the Mental Healthcare Act of 2017 to avoid restricting ECT in India<sup>13</sup>.

The Mental Healthcare Act of 2017 (MHCA) has significantly changed India's mental health laws to align with the United Nations Convention on the Rights of Persons with Disabilities (CRPD). This law prioritizes patient-centered mental health rights and represents a paradigm shift. The implementation of CRPD and MHCA has faced criticism, and many psychiatrists have concerns about the changes, particularly in regards to electroconvulsive therapy (ECT)<sup>4,14,15</sup>.

The implementation of the Mental Healthcare Act of 2017 (MHCA) will significantly affect the use of electroconvulsive therapy (ECT) in India. The new law replaces involuntary admissions with supported admissions (Sections 89-90), and while ECT can be administered to supported patients, it involves several regulatory and administrative requirements. The MHCA's Section 95 prohibits unmodified ECT (i.e., without anesthesia), and ECT can only be performed on minors with the consent of their guardians and the Mental Health Review Board (MHRB). Additionally, Section 94 prohibits ECT in emergency situations outside of mental health institutions<sup>14</sup>.

ECT is a common treatment method in India, with one survey of 66 hospitals identifying nearly 20,000 patients who underwent over 110,000 ECT sessions in one year. Over half of these patients received unmodified ECT. Some psychiatrists are concerned that the restrictions on ECT in the MHCA could result in certain patients being denied life-saving treatments. However, others have raised ethical concerns about ECT in India, and negative media portrayals have increased stigma surrounding the practice<sup>16</sup>.

## Conclusion

- Even during the pandemic of COVID-19, an effective therapeutic modality in Psychiatry was Electroconvulsive therapy. Nevertheless, the public perception of ECT is deleterious and remains controversial.
- This preconceived notion has deterred the use of ECT thereby denying patient's right to effective and plausibly lifesaving treatment.
- During the pandemic of COVID-19 there is tremendous stress on mental health and possibly triggered new onset psychiatric illnesses necessitating the continued usage of ECT.

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