



ELECTRO CONVULSIVE THERAPY: A STUDY OF RELATIONSHIP BETWEEN STIMULUS INTENSITY, SEIZURE DURATION & AGE

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ABSTRACT Electro convulsive therapy is a safe and effective procedure used to treat psychiatric conditions. In ECT, brief electrical stimulation is given to the brain while patient is under general anesthesia, which produces generalized seizures. The mechanism of action of ECT is not fully known. Seizure threshold is one of the parameter which differs in each patient. This study aims to find out relationship among stimulus intensity and seizure duration and whether age influence stimulus intensity or seizure duration.

KEYWORDS : Electro Convulsion Therapy (ECT), Stimulus intensity, Seizure duration.

INTRODUCTION

Electro Convulsive Therapy (ECT) is one of the oldest methods used in the treatment for various psychiatric disorders. Electro Convulsive Therapy is safe and effective treatment for severe psychiatric disorders. Brain stimulation techniques are considered additional option for the treatment of Pharmaco-resistant severe psychiatric illnesses. Schizophrenia, Major Depression and Bipolar mood disorder are the most common indications shows in Indian survey of practice of ECT. Depending on clinical situation ECT is given 2 to 3 times per week and 5 to 12 sessions^{1,2}. Electro convulsive therapy is one of the oldest frequently used treatments for controlling the symptoms of psychiatric disorders^{3,4}. Brief pulse devices delivering current in short pulses are most commonly used, where frequency of pulses, pulse width and duration of pulse train are parameters that can be used to vary the stimulus dosage. In modified ECT procedure, certain degree of electric current is applied to human brain for few seconds using brief pulse machine with intravenous anaesthetic agent and muscle relaxant. The current produces convulsion, which means that the neurons of the brain are depolarized at the same time. In ECT minimum stimulus intensity needed to induce adequate seizure is called seizure threshold. There is a tradition of expressing the quantity of the electric stimulus delivered as energy - joules (J) or, as charge - mill coulomb (mc). Substantial evidence indicates that current density in neuronal tissue is critical factor for seizure production and neurobiological effect of the electrical stimulation. During ECT it is not possible to measure it. When electrode site preparation and positioning are standardized, anatomical factor become the major determinant of impedance. If these factors are also constant during the treatment, impedance can reflect density in brain tissue. The ECT seizure duration has derived attention on many counts. Seizure duration decreases across the ECT course and changes inversely as age increases. Some studies have reported a strong positive correlation between age and seizure threshold. Charge is commonly used to measure the intensity of the stimulus used in the treatment and can easily be computed from the parameters of a brief pulse device^{5,6}. We will like to review how seizure duration is influenced by the stimulus of electrical energy, age and gender in our population.

METHODS

The aim of this study was to evaluate retrospective data to find out correlation among the stimulus intensity, age and gender and seizure duration. Retrospective review of ECT record of all the patients who were hospitalised with diagnosis of severe psychiatric disorder according to DSM IV diagnostic criteria, with indication of ECT, from January 2017 to October 2018. This study consisted of 39 cases (21 male, 18 female) with Schizophrenia (N=24), Bipolar mood disorder (N=7) and Major Depressive disorder (N=8). The Patients with comorbid psychiatric and neurological illness were excluded. Informed consent for ECT was obtain in writing for ECT procedure. Modified ECT treatment was provided with anaesthetic agent

Thiopental Sodium (2 mg/Kg intravenous) and muscle relaxant Succinylcholine (1 mg/Kg intravenous bolus) administered with bilateral electrode placement of Brief pulse devices, on alternate day (thrice weekly). The duration of seizure was determined by clinical observation of tonic – clonic movements in all the parts of body by using stopwatch. Irrespective of its duration, if a convulsion occurred it is consider as successful ECT. The result obtain after successful ECT was recorded in the form of duration of seizure in second(S) and delivered energy in joules (J). This is retrospective study and data are retrieved from Department of Psychiatry of a tertiary care centre affiliated to medical college.

Statistical Analysis

All case data were analyzed by SPSS 17 version for mean, Standard deviation, t test and correlation analysis to look for any statistical significance.

RESULTS

Table-1 shows the result of the independent t test indicated that there was no significant difference between male and female patients in stimulus intensity (p value =0.9) and seizure duration (p value = 0.2). Figure-1 shows there was significant correlation between age and seizure duration ($r = 0.8, p < 0.000$). Figure 2 indicates that, there was a significant correlation between age and seizure duration ($r = -0.6, p < 0.000$). Figure 3 shows that, there was a significant correlation between stimulus intensity and duration of seizure ($r = -0.6, p < 0.000$).

Table: 1 Mean (SD) Age, Stimulus Intensity, Seizure Duration.

| Mean (SD) | Male (n=21) | Female (n=18) | t test | p value |
|----------------------------|-------------|---------------|--------|---------|
| Age (year) | 33.1(12) | 34.8(9.5) | 0.4 | 0.6 |
| Stimulus Intensity (joule) | 28.7(8.8) | 28.4(5.5) | 0.12 | 0.9 |
| Seizure Duration (sec) | 23.6(6.6) | 21.4(5.0) | 1.1 | 0.2 |

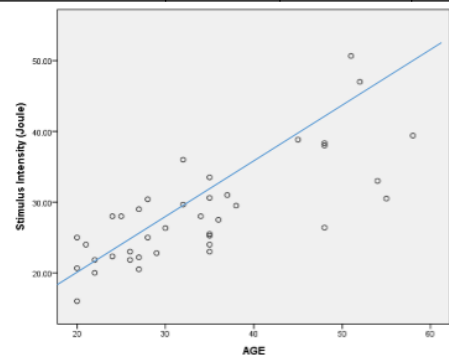


Figure: 1 Correlation of Age and Stimulus intensity.

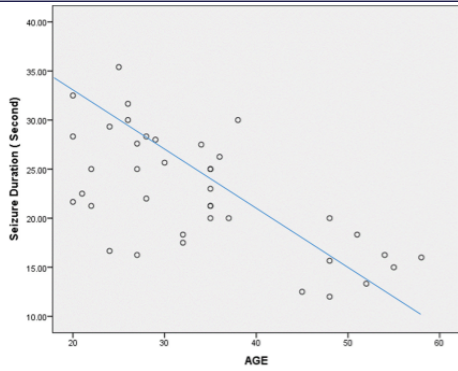


Figure: 2 Correlation of seizure duration with Age.

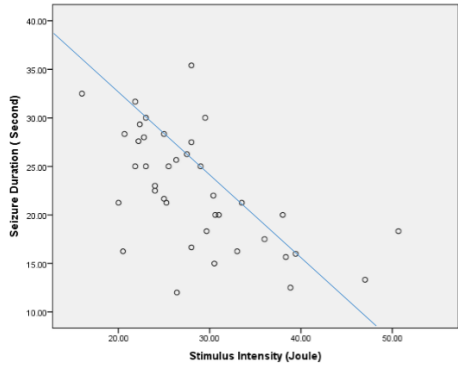


Figure 3: Correlation between Stimulus intensity with Seizure duration.

DISCUSSION

ECT is widely used to treat many psychiatric disorders. It is more frequently used in India to reduce hospital stay in severe psychiatric illness. During ECT progressive rise in threshold had been demonstrated. Some study shows that direct relationship between seizure duration and the effectiveness of ECT. But recent research suggests that length of the seizure activity is not related to clinical effectiveness.^{2,3,7}

Present data suggest that there is a negative correlation between seizure duration and age. This result is congruent with previous studies. Previous studies suggest that older patients have shorter seizure duration. Younger patients had longer seizure with lower intensity of stimulus^{4,8,9}. In our study seizure threshold was correlated with age but not gender. When seizure threshold increases, seizure duration decreases. Some studies shows a rise in seizure threshold occurred in old age patient with bilateral electrode placement, it means stimulus intensity correlated with age and seizure duration was shorter as age increase.

CONCLUSION

There is strong positive correlation between age and stimulus intensity & relationship exist between seizure duration and age. Seizure duration was short in elderly patients.

Limitation of this study is: it is retrospective, limited sample size so further research is needed.

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