

Association between Seizure Threshold and Seizure Duration in Psychotic Individuals Treated With Electro Convulsive Therapy: A Retrospective Study

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Abstract:

Introduction: Seizure duration at electroconvulsive therapy (ECT) has been a focus of clinical and research attention for decades. Seizure duration is monitored at every ECT session and is used as reference for stimulus dosage adjustment. The current retrospective analysis focuses on the relationships between seizure duration and seizure threshold at ECT and impact of duration of illness in both old and new cases.

Aim: The aim of the study is to assess the relation between seizure threshold, duration of seizure and duration of illness.

Methods: This is a retrospective study conducted at Government Hospital for Mental care, Visakhapatnam. The sample includes 60 subjects of acute and transient psychosis, schizophrenia and mood disorders, who were administered ECT. Sociodemographic data, illness variables and ECT variables were collected from the records available and correlation between seizure threshold, duration of seizure and duration of illness is assessed using SPSS software version 23.

Results: On regression analysis of the data, the results showed that there is a positive relation between the seizure threshold and duration of the seizure but the p value is 0.8342, which shows that the relation is not significant. The dependent variable is duration of the seizure and the independent variable is seizure threshold, the slope on regression analysis is 0.02785. On analyzing the relation between the duration of illness and seizure duration the results showed a negative relation with a p value of 0.8922, which is not significant.

Conclusion: The salient features of the study were: i) the seizure duration do not increase with the increase in seizure threshold, ii) the duration of illness has no effect on seizure duration. An increase in the seizure threshold does not invariably increase seizure duration and duration of illness has no effect on seizure threshold.

Keywords: Electroconvulsive therapy, Seizure threshold, Seizure duration.

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I. Introduction

Seizure duration at electroconvulsive therapy (ECT) has been a focus of clinical and research attention for decades. Seizure duration is monitored at every ECT session and is used as reference for stimulus dosage adjustment. Short seizures have been thought to be inadequate⁽¹⁾ and prolonged seizures may be associated with medical and cognitive complications. A common recommendation for motor seizure duration shorter than 15,⁽²⁾ 25⁽³⁾ or 20–30s⁽⁴⁾ is an increase of stimulus dosage, whereas for seizures longer than 60s, some ECT practitioners suggest dosage reduction. A few studies have cast doubt on the usefulness of seizure duration as an index of clinical effectiveness of ECT and a marker for stimulus dosage adjustment.⁽⁵⁾⁽⁶⁾ Neither mean seizure duration nor percentage change in seizure duration during a course of ECT are related to ECT efficacy.⁽⁷⁾⁽⁸⁾ The current retrospective analysis focuses on the relationships between seizure duration and seizure threshold and stimulus intensity at ECT in both old and new cases.

Aim: The aim of the study is to assess the relation between seizure threshold, duration of seizure and duration of illness.

II. Materials And Methods

Study design: Retrospective study

Sampling method: convenience sampling

Study Group:

The study group consisted of 75 Subjects diagnosed with schizophrenia, mood disorders, acute transient psychosis admitted in Government Hospital For Mental Care for treatment and given Electroconvulsive therapy as a part of treatment.

Inclusion criteria:

- Age: 20 years to 45 years
- Diagnosis of schizophrenia, mood disorders,
- Subjects who were treated with electroconvulsive therapy for their illness.

Exclusion criteria:

- Subjects with other co morbid chronic medical or neurological illness
- Subjects with any disability.
- Subjects using anticonvulsant drugs and benzodiazepines

Operational Procedure:

Subjects fulfilling the inclusion criteria and their primary care givers were taken up for the study. The socio-demographic data and illness history of the subjects were obtained from the records.

Ethical Issues:

The sample is collected from records. Prior consent was obtained from the subjects before giving Electroconvulsive therapy. Those who gave their consent were included in the study.

Study Tools:

Socio-demographic data sheet.

Clinical profile sheet.

Statistical analysis: Statistical analysis of the data was carried out using SPSS software version 23. Mean and standard deviation were presented for all the continuous variables.

III. Results

Statistical analysis of the data was carried out using SPSS software version 23. Mean and standard deviation were presented for all the continuous variables. To examine the association between seizure threshold and seizure duration and duration of illness using relevant statistics.

Total sample of the study is 75. Among the sample 42 were males and 33 were females. Mean age of the sample is 24.69 years with a standard deviation of 6.12. Mean age of the males was 26.263 years with a standard deviation of 8.28. Mean age of the females was 24.04 years with a standard deviation of 6.96. In the sample only 34 subjects were illiterate, 15 subjects studied up to primary education, 14 studied up to secondary education, 10 studied up to intermediate and 2 of the sample were graduates. According to Modified Kuppuswamy scale in the sample, 36 subjects belonged to lower socioeconomic status, 8 belonged to the upper lower group, 16 belonged to the lower middle group, and 15 subjects belonged to the upper middle group.

Among the sample 32 subjects were diagnosed with schizophrenia, 25 subjects were diagnosed with depression and 18 subjects were diagnosed with mania.

The mean seizure duration is 34.736 seconds. The duration of the seizure ranges from 15 to 50 seconds in our study. The mean seizure duration in females is 34.161 seconds. The mean seizure duration in males is 35.710 seconds.

The mean seizure threshold is 24.416 joules. Mean seizure threshold in males is 25 joules. The mean seizure threshold in females is 23.645 joules. Our study shows that the seizure threshold in males is higher than females.

In this study, the association between seizure threshold and seizure duration and duration of illness was studied. On regression analysis of the data, the results showed that there is a positive relation between the seizure threshold and duration of the seizure but the p value is 0.8342, which shows that the relation is not significant. The dependent variable is duration of the seizure and the independent variable is seizure threshold, the slope on regression analysis is 0.02785.

On analyzing the relation between the duration of illness and seizure duration the results showed a negative relation with a p value of 0.8922, which is not significant.

The mean duration of the illness of the subjects with schizophrenia is 2.479 years, the mean duration of illness of the subjects with mania is 3 months, the mean duration of illness of the subjects diagnosed with depression is 4.732 months.

On using regression analysis for each diagnosis separately subjects with schizophrenia, there is a positive relation between duration of illness and seizure duration, with a p value of 0.732, which is not significant. And the subjects diagnosed with mania and depression, showed a negative relation with an insignificant p value.

Total sample	n=75 (100%)
Number of males	42
Number of females	33
Subjects diagnosed with schizophrenia	32
Subjects diagnosed with depression	25
Subjects diagnosed with mania	18

Table 1: Demographic data of the sample.

	Males (n=42)	Females (n=33)	Total (n=75)
Mean seizure threshold	25	23.645	24.416
Mean seizure duration	35.170	34.161	34.736

Table 2: Mean values of the seizure threshold and seizure duration.

Mean duration of illness	
For schizophrenia(in years)	2.479 (SD=1.12)
For depression (in months)	3 (SD=1.83)
For mania(in months)	4.732 (SD=2.51)

Table 3: Mean duration of illness and their standard deviations.

IV. Discussion

Seizure duration at electroconvulsive therapy (ECT) has been a focus of clinical and research attention for decades. Seizure duration is monitored at every ECT session and is used as reference for stimulus dosage adjustment. Short seizures have been thought to be inadequate⁽¹⁾ and prolonged seizures may be associated with medical and cognitive complications.

A common recommendation for motor seizure duration shorter than 15 seconds⁽²⁾, 25 seconds⁽³⁾ or 20–30 seconds⁽⁴⁾ is an increase of stimulus dosage, whereas for seizures longer than 60 seconds, some ECT practitioners suggest dosage reduction.

A few studies have cast doubt on the usefulness of seizure duration as an index of clinical effectiveness of ECT and a marker for stimulus dosage adjustment^{(5),(6)}. Neither mean seizure duration nor percentage change in seizure duration during a course of ECT are related to ECT efficacy^{(7),(8)}.

In our study we observed that subjects receiving stimulus dosage at seizure threshold had a variable seizure duration ranging from 15 to 50 seconds. Seizure threshold, defined as the minimal electrical dosage necessary to elicit adequate generalized seizure⁽⁹⁾. For seizure to be adequate after giving ECT it must last for 25 seconds. So in our study we assessed whether any relation exists between seizure threshold and seizure duration but it appeared no significant relation between them.

The mean seizure threshold for men is 35.173 joules and the mean seizure threshold for women is 34.161 joules. Some studies stated that seizure threshold for men is high compared to females. Our study is in line with studies done by Swartz CM et al⁽¹⁰⁾ and Coffey C. Edward⁽¹¹⁾ et al regarding this finding.

The mean seizure duration is 34.736 seconds. The duration of the seizure ranges from 15 to 50 seconds in our study. The mean seizure duration in females is 34.161 seconds. The mean seizure duration in males is 35.710 seconds. In this study the mean seizure duration for males is higher than that of females.

On analysing the data no significant relation was found between the duration of illness and seizure threshold and there is no impact of illness duration on seizure duration.

Conclusions: The salient features of the study were: i) the seizure duration do not increase with the increase in seizure threshold, ii) the duration of illness has no effect on seizure duration.

An increase in the seizure threshold does not invariably increase seizure duration and duration of illness has no effect on seizure threshold.

Limitations: A larger sample would have more practical implications. As the study was carried out in a tertiary care hospital, it cannot be generalized to community. The retrospective nature of the study is a major limitation.

Conflict of Interest: Authors declare no conflict of interest.

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