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Janut Prog	Original Research Paper	Psychiatry	
Prese Prese	COMPARISON OF EFFICACY AND MEMORY DOMAINS OF PULSE WIDTH OF 0.5 MS AND 1.0 MS IN PATIENTS WITH S	FECT BETWEEN CHIZOPHRENIA	
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ABSTRACT

Electroconvulsive therapy transformed the management of psychiatric disorders. Continuous improvement in the efficacy and cognitive outcome of ECT has been made possible by continuous research to understand the mechanism and different techniques of ECT. It was understood earlier that the components of electroconvulsive therapy were not important if seizures were induced. Numerous experiments later disclosed that the

components, when changed, impact the side-effects and effectiveness of ECT. This study was conducted to evaluate the effects of brief pulse width 0.5ms and 1.0ms in patients with schizophrenia on symptoms and memory domains. In our study, patients receiving ECT were assessed on Positive and Negative Scale for Schizophrenia (PANSS), Wechsler memory scale and Autobiographical memory interview SF before ECT, the day after the 3rd ECT and the day after the 6th ECT. There were no significant differences found in the sociodemographic profile of the two groups. Significant difference was seen over time in both the groups. There were no significant differences found between the groups in time * group. We observed that over time, deterioration in memory function was present in the entire sample, but difference in the groups over time was not observed. A higher sample size would be required to further study the effects of pulse width.

KEYWORDS:

Electroconvulsive therapy transformed the management of psychiatric disorders. In the later decades of the 20th century however, various other treatment modalities in the form of psychotropic drugs and other brain stimulation techniques were introduced. Despite these advances, as we enter the 21st century, electroconvulsive therapy holds a major place in the management of psychiatric disorders. Continuous improvement in the efficacy and cognitive outcome of ECT has been made possible by continuous research to understand the mechanism and different techniques of ECT. It is hence imperative for ECT practitioners to be kept up to date with all the recent advances in ECT. Recent research has put some light on the mechanisms involved in ECT. Changes have been made in ECT techniques to improve the efficacy as well as to reduce the side effects(1, 2). Components of ECT like pulse width, shape, amplitude, polarity, frequency and duration have been studied. ECT is guantified in terms of millicoulombs(mC) (3). It was understood earlier that the components of electroconvulsive therapy were not important if seizures were induced (4). Numerous experiments later disclosed that the components, when changed, impact the side-effects and effectiveness of ECT (5). If ECT is quantified with only mC, the significance of other components are concealed. The total charge does not consider the polarity or direction, which could be bidirectional or unidirectional (6, 7). In this study, the unilateral brief-pulse electroconvulsive therapy showed lesser impairment in recall compared to the other groups assessed two to three days after electroconvulsive therapy (8). A few studies have checked for autobiographical memory and these deficits have the patients more worried. More studies are required to assess autobiographical memory (8).

This study was conducted to evaluate the effects of brief pulse width 0.5ms and 1.0ms in patients with schizophrenia on symptoms and memory domains.

Objectives of the study

To assess the difference in efficacy and memory domains between pulse width of 0.5ms and 1.0ms in ECT.

Tools used

1. Sociodemographic and clinical data sheet including the

name, age, sex, religion, educational qualification, occupation, income, marital status, family type, residence and clinical variables like age of onset, duration of illness, treatment history and family history.

- Positive and Negative Scale for Schizophrenia (PANSS) (9).
- 3. Autobiographical memory interview SF(10).

Procedure

- Inpatients fulfilling the inclusion and exclusion criteria 1. were taken up for the study.
- 2. After explaining the procedure in detail, written informed consent was taken from the patient and or guardians.
- 3. ECT was administered under short GA using Inj. Propofol and Inj. Succinylcholine as a muscle relaxant in doses fixed by anaesthetist after evaluation.
- 4. Bifrontal electrode placement was used, electrodes being placed 5 centimetres above the lateral angle of the orbit.
- 5. Patients receiving ECT were assessed on Autobiographical memory interview SF before ECT, the day after the 3rd ECT and the day after the 6th ETC.

RESULTS

There were no significant differences found in the sociodemographic profile of the two groups.

VARIABLE		GROUP 1 (1 ms) Mean ± SD n=15	GROUP 2 (0.5 ms) Mean ± SD n=15	f(pillai's trace)	Ρ
Autobiogra	PRE	51.46 ± 4.05	49.93 ± 4.13	Time	< 0.001
phical memory sf	POST ECT 1	48.86±4.61	47.66±4.60	106.79	
	POST ECT 2	44.46±4.37	44.53±4.54	Time * group 1.71	0.198

Significant difference was seen over time in both the groups. There were no significant differences found between the groups in time * group.

DISCUSSION

There might be various mechanisms and effects of ECT yet to be found. Factors affecting cognitive side effects of ECT include ECT technique (e.g., electrode placement and dosage), number and frequency of treatments, type of anaesthetic agent, patient characteristics (such as age, general intellect, socioeconomic status, and comorbid neurological conditions) and wave form of stimulus; sine wave stimulus is known to cause more cognitive impairment, while brief pulse ECT is associated with lesser impairment. A recent modification, with ultra-brief pulse, has shown minimal cognitive impairment. Cognitive impairments are greater with bilateral as compared to unilateral ECT. Anterograde and retrograde memory is more impaired with bilateral ECT relative to right unilateral ECT. Cognitive impairment remains a common side effect of brief pulse electroconvulsive therapy (ECT), and its minimization has been the motivation for many different treatment modifications over the decades. The level of impairment has been shown to vary according to different technical parameters of ECT including, but not limited to, electrode placement, dosage, and waveform, as well as patient factors. Most past research has focused the assessment on memory impairments associated with ECT (11). Despite various treatment modifications aimed at its minimization, it remains a limiting side effect of modern brief pulse ECT. Electroconvulsive therapy can also result in memory disturbance and poor recall of information learned before the ECT, which is worse when ECT is administered using bilateral compared with right unilateral electrode placement and high as opposed to low dosage. The impairment encompasses memory loss for both autobiographical and impersonal material. In addition, a temporal gradient, whereby recent memories are more vulnerable to disruption and loss compared with more remote memories, has been reported in some studies (12-14).

In relation to anterograde memory, most studies have examined memory function that is declarative in nature and have shown substantial memory disturbance in the first few days after ECT (14-16). In a study, significant improvement had been observed to take place over the weeks and months after ECT endpoint, but the time at which full recovery was achieved remains unclear. Retrograde memory loss has been reported especially after bilateral ECT (11). In our study, we observed that over time, deterioration in memory function was present in the entire sample, but difference in the groups over time was not observed. Peterchev et al 2010 compared ultrabrief and brief pulse bitemporal ECT, and found reduced efficacy for ultra-brief ECT. Another study comparing ultra-brief bitemporal ECT with brief pulse bitemporal and right unilateral ECT found that there was reduced efficacy in ultra-brief bitemporal group; also, there were more cognitive side effects. Sienaert et al (2009) found slightly low efficacy for ultra-brief bifrontal ECT then ultra-brief right unilateral ECT (17).

In a study done by Loo et al 2007, thirty patients were assessed and rated. Right unilateral ECT was given at six times seizure threshold to two groups where one received one millisecond pulse width and the other received 0.3 millisecond pulse width. Mood and neuropsychological functioning were rated. In the group of ultra-brief electroconvulsive therapy, lesser cognitive side effects were observed. No difference was observed within group in this study, but more number of sessions had to be given for the group of right unilateral ultrabrief electroconvulsive therapy (18). Our study shows that even when the pulse width of the two groups varied, the total current was the same. This can be argued as a cause for no difference in the deficit of memory. A study done by McCall et al found that when two groups were given right unilateral ECT at eight times the seizure threshold and bilateral ECT at 1.5 times the seizure threshold, there were similar memory effects. In a retrospective study done by Kaster et al, when ECT was given, a good response rate was observed (76.7%). This study showed that electroconvulsive therapy is effective in schizophrenia and that the cognitive impairment observed

was not as severe as seen when electroconvulsive therapy was given to patients with depression (19). Our study displayed that there was significant improvement with ECT in patients.

Memory problems which are caused by electroconvulsive therapy have been shown to improve slowly. A review done by Rose et al showed that a significant number of patients who received electroconvulsive therapy reported disturbances in memory. Consistent improvement in memory was observed after a few months of treatment; only a few reported lasting impairment in memory. The reported period for lasting effects on memory differs, depending on the type of assessment. Memory impairment reported subjectively lasts longer than that observed from objective measures (8, 20).

It is important to assess the patient's memory and other cognitive functions at different intervals. In a study by Weiner et al, effects on retrograde memory of electroconvulsive therapy with change in the electrode placement (bilateral or unilateral) and different waveforms (sine wave or brief pulse) were studied. In this study, unilateral brief-pulse electroconvulsive therapy showed lesser impairment in recall compared to the other groups assessed two to three days after electroconvulsive therapy (8). A few studies have checked for autobiographical memory and these deficits have the patients more worried. More studies are required to assess autobiographical memory (8).

We observed that the improvement in symptoms with 0.5 ms pulse-width of ECT was comparable as with 1 ms of pulse-width. The deficit in memory function was not significant in the two groups over time.

Many studies have shown that autobiographical memory deficits remain when compared to other types of memories. A study done by lisanby et al showed otherwise. It was a double blind randomized study of bilateral and unilateral electroconvulsive therapy and it studied the effect of ECT on autobiographical memory. This study showed that patients after ECT recalled less detail of events than the controls. Even after two months, the patients had difficulty in autobiographical memory (13). A study conducted by Squire found that the autobiographical memory deficit remained even after seven months of electroconvulsive therapy, events which had occurred two years before the ECT being less remembered than the memories which were present earlier (21).

CONCLUSION

ECT induced memory difficulty is reported to depend on various components of ECT, pulse width being one of them. The difference between pre and post on memory functions was studied in two groups, with 1 ms and 0.5 ms pulse width in bilateral ECT. The pulse width did not show significant difference between the two groups over time. A higher sample size would be required to further study the effects of pulse width.

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