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A PROFILE OF SUBJECTIVE MEMORY IMPAIRMENTS DURING BRIEF-PULSE BILATERAL MODIFIED ECT IN PATIENTS WITH SEVERE DEPRESSION

Ritu Nehra, Subho Chakrabarti, Nitasha Khehra, Rajni Sharma, Nitesh Painuly

ABSTRACT

Objective: To examine the short term subjective and objective memory impairments in depressed patients during the course of ECT.

Design: prospective and cross sectional design.

Place & duration of study: The patients were recruited at the Department of Psychiatry, PGIMER, Chandigarh, for a period of 2 years and followed up for 1 month after treatment with ECT.

Subjects & Methods: Patients with severe depression (n = 32) were followed up while they were receiving ECT's, and up to a month after that. They were rated independently and blindly on the MMSE for global cognitive dysfunction, the PGI Memory Scale for objective memory loss, Squire Subjective Memory Questionnaire for subjective memory loss and the Montgomery-Asberg Depression rating Scale (MADRS) for severity of depression.

Results: The MMSE and PGIMS (objective memory) scores dipped during the course of ECT, but picked up in the week and month following cessation of treatment. MADRS scores registered a gradual decline as patients improved throughout the course of ECT. The SSMQ scores also showed a gradual improvement during the course of ECT. However, subjective memory scores did show consistent correlations with MMSE, MADRS and objective memory.

Conclusion: There is considerable subjective memory impairment during a course of ECT, even in the short term. However, subjective memory scores do improve with treatment.

Key words: Subjective Memory, Objective Memory, Depression

INTRODUCTION

The routine use of electroconvulsive therapy (ECT) has been through a hiatus that was associated with the impact of pharmacology and psychotherapy. However, the unmet clinical need of the severely mentally ill, who respond poorly to, or do not tolerate medication, has been the main driving force for its reemergence. ECT is a rapidly acting and highly effective treatment for severe and life threatening affective and psychotic disorders. Notwithstanding its therapeutic benefits, ECT remains controversial because of seizure induction, cognitive side effects, memory dysfunction and effects on cerebral physiology. These factors have raised the concern that ECT produces structural and functional brain damages. This issue continues to have a major impact on the acceptance of ECT as a therapeutic modality, both within the medical community and in public opinion (Prapotnik et al., 2006).

Four types of cognitive changes are usually associated with ECT including (i) immediate postictal confusion (ii) retrograde amnesia (memory loss for events prior to ECT) (iii) anterograde amnesia (difficulty learning new things after ECT) and (iv) longer-lasting subjective memory problems often with little or no objective loss.

Although interest in patients' subjective complaints about the adverse cognitive effects of ECT spans across several decades many issues remain to be resolved. For the most part, subjective assessments of memory

Ritu Nehra, M.A., Ph.D. (Clinical Psychology),Associate Professor, Department of Psychiatry, Postgraduate Institute of Medical Education & Research, Chandigarh-160012, India. E-mail: ritu_nehra@rediffmail.com

Subho Chakrabarti, Department of Psychiatry, Postgraduate Institute of Medical Education & Research, Chandigarh-160012, India.

Nitasha Khehra, Department of Psychiatry, Postgraduate Institute of Medical Education & Research, Chandigarh-160012, India.

Rajni Sharma, Department of Psychiatry, Postgraduate Institute of Medical Education & Research, Chandigarh-160012, India.

Nitesh Painuly, Department of Psychiatry, Postgraduate Institute of Medical Education & Research, Chandigarh-160012, India.

Correspondence:

Dr. Ritu Nehra

following ECT have relied on a single instrument, the Squire Subjective Memory Questionnaire (SSMQ). While older reports of subjective memory complaints following ECT suggested a detectable negative influence for certain treatment factors, such as combined bilateral electrode placement, use of sine wave stimulation, or other factors that increase the intensity of treatment, more recent studies indicate that subjective memory improves following ECT (Coleman et al., 1996). This shift in findings may be due to the change in practice from sine wave to brief-pulse ECT. While the impact of ECT on objective tests of memory is clear and reproducible, the relationship of objective findings to subjective memory assessment appears to be weak. Instead, subjective reports of cognitive function appear to be often strongly influenced by mood state. However, the paucity of research data and methodological issues such as small sample sizes are major obstacles to reaching any firm conclusions on this subject (Prudic et al, 2000).

Moreover, complaints of poor memory are common in psychiatric patients (particularly depressed ones), but their significance is often difficult to fathom. A major task in both clinical and research settings is the determination of whether complaints of impaired memory after ECT are related to a sense of impaired memory which was present before treatment, or whether such complaints are actually caused by ECT. Then again, irrespective of its cause, cognitive impairment following ECT is a major source of distress for patients and it can lead to refusal or non-compliance with treatment. Investigating subjective memory complaints thus becomes an important endeavor with major implications on practice of ECT.

This prompted the current study which aimed to examine the nature and extent of subjective memory complaints during brief-pulse bilateral modified ECT in patients with severe depression. The relationship of subjective memory deficits with other objective parameters of post-ECT cognitive dysfunction, mood state and technical aspects of ECT administration were also explored.

SUBJECTS AND METHODS

Patients

Consecutive inpatients/ outpatients with an ICD-10 DCR (WHO, 1992) diagnosis of depressive episode, recurrent depressive disorder, or bipolar disorder-currently depressed, of 18-60 years of age and receiving ECT were inducted. Those with comorbid psychiatric disorders, organic brain syndromes, substance dependence (except nicotine dependence), and those who had received ECT in the 6-month period prior to the study, were excluded.

ECT administration

All patients were administered brief-pulse, bilateral, modified ECT 2-3 times a week. Stimulus parameters included electrical energy ranging from 36-135 Joules and stimulus duration ranging from 0.5-3.8 seconds. Atropine (0.2-0.3 mg) was used for induction and succinyl choline (30-60 mg) for muscle relaxation. The cuff method was used to estimate seizure duration.

Assessments

The ECT register and case notes were used to record demographic, clinical and treatment details. Depression was rated on the Montgomery-Asberg Depression Rating Scale (MADRS; Montgomery and Asberg, 1979). The MMSE was used to assess post-ECT (global) cognitive impairment. Objective memory functions were examined using the PGI Memory Scale (PGIMS; Pershad, 1979), which is an Indian adaptation of the Wechsler Memory Scale (Wechsler, 1987) with adequate psychometric characteristics and local population norms. Subjective memory functions were evaluated using the Squire Subjective Memory Questionnaire (SSMQ; Squire et al., 1979). SSMQ is an 18-item self-rating scale of memory functions and for each item, subjects rated themselves on a 9 point scale from − 4 (worse than ever before), and though 0 (same as before), to 4 (better than ever before). Thus, the before-ECT test attempted to assess memory problems of recent mental set, presumably related to depression and the after-ECT tests attempted to assess the residual effects of depression and the effects of ECT on memory. The test has sufficient evidence to prove its good psychometric properties (Coleman et al., 1996; Prudic et al., 2000; Kho et al., 2006). The MMSE, MADRS and the SSMQ were administered by a research assistant or psychiatric trainee on the day following the ECT at the same time each morning. Shortly following these assessments an experienced consultant clinical psychologist who was blind to the MADRS/MMSE/SSMQ scores and other treatment details, completed the PGIMS. All assessments were done prior to administration of ECT and repeated after the second, fourth, sixth and eighth ECTs, as well as 1 week and 1 month after the course of ECT was completed.

Consent/Approval

The plan of the study was approved by the Institute Research and Ethics Committees. Written informed consent was taken from patients (wherever possible) and their relatives agreeing to participate in the study. Other ethical safeguards such as confidentiality and right to refusal were maintained during the conduct of the study.

RESULTS

Demographic, clinical and treatment details

Consecutive sampling over a 1-year period yielded 36 patients who met selection criteria. Two patients refused consent and 2 dropped out of treatment

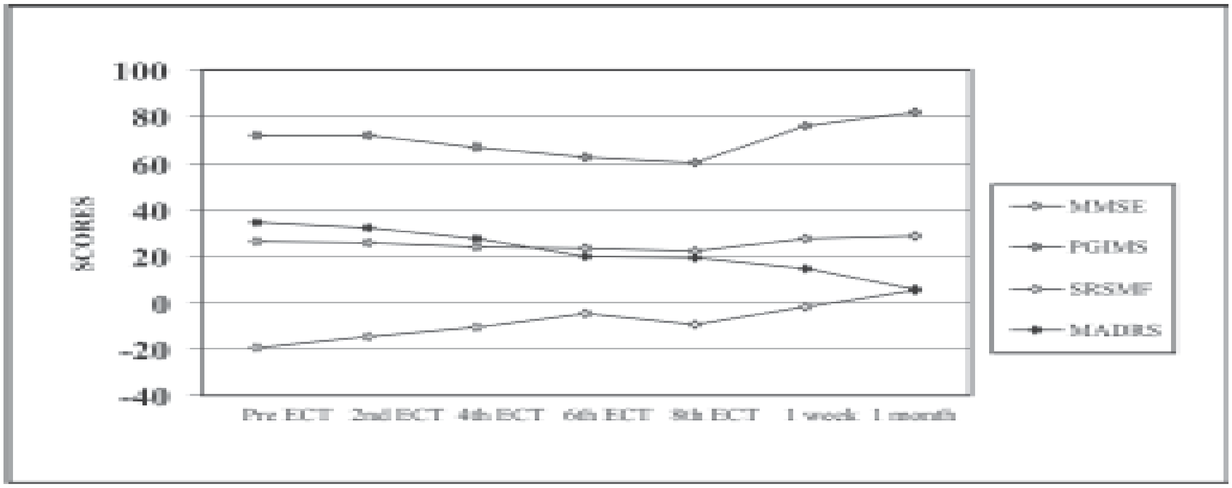

Fig. 1: Showing the MMSE, PGIMS, SSMQ and PGIMS scores during ECT

leaving 32 patients who eventually completed the study. The mean age of the cohort was 37.65 years with equal number of patients from both the genders. Majority were married (24), had educational qualification above 10 yrs of schooling (22) and were employed (16). Among the clinical parameters, their mean duration of illness was 3.78 years, with majority being diagnosed with unipolar depression (recurrent) (18), with current episode being severe without psychotic symptoms (17). The most commonly prescribed drugs were antidepressants (30), followed by antipsychotics (15). The mean number of ECT treatments were 5.88 and mean seizure duration was 32.99.

Trends of scores on MMSE, PGIMS, SSMQ and MADRS

The scores on the MMSE, PGIMS, SSMQ and MADRS prior to, during and after ECT are depicted by Figure No 1. As expected MMSE scores show a decline during the ECT but started to pick up one week and one month following end of treatment. The PGIMS scores show a similar trend, whereas the SSMQ scores improved continuously till the 6th week, but showed a peculiar fall in scores at the 8th week to pick up again after 1 week and 1 month of treatment (Table No.1). The MADRS scores continued to decline throughout the course of ECT, as well as 1 week and 1 month after stopping treatment.

Table No. 1

The descriptive analysis of the scores on subjective memory as derived from Self Rating Scale of Memory Functions (Squire et al., 1979) following a course of ECT (n = 32)

	Subjective Memory (SFRS scores)(m ± SD)
Pre ECT	-19.57 ± 20.51
After 2nd ECT	-14.93 ± 24.24
After 4th ECT	-10.40 ± 18.77
After 6th ECT	-4.85 ± 22.33
After 8th ECT	-9.17 ± 19.18
After 1 week	-1.54 ± 20.27
After 1 month	5.46 ± 15.48

Correlation of MADRS, PGIMS and SSMQ scores during ECT

Table No. 2 revealed the association between MADRS, PGIMS and SSMQ scores by tabulating Spearman's correlation coefficients. Results revealed a positive significant correlation between SSMQ scores at Pre ECT and PGIMS scores after 2nd ECT and after 1 month. Additionally, between the SSMQ scores after 2nd ECT and PGIMS scores after 8th ECT. However, the correlations between the MADRS scores and SSMQ scores did not follow a consistent pattern. Positive significant correlations were found between SSMQ scores after 2nd ECT and MADRS scores after 1 month of treatment with ECT. On the other hand, negative yet significant correlations were found between scores on SSMQ (after 2nd ECT) and MADRS (after 4th ECT) ; SSMQ (after 8th ECT) and MADRS (after 8th ECT); and SSMQ (after 8th ECT) and MADRS (after 1 month) of treatment course with ECT. Additionally, such a pattern was seen among the correlations between SSMQ (after 1 week) and MADRS (after 6th ECT); SSMQ (after 8th ECT) and MADRS (after 1 month); and SSMQ (after 1 week) and MADRS (after 1 month).This draws attention to the improvement in subjective memory as well as decline in depression scores over the course of treatment. There were positive and significant correlations between SSMQ scores (Pre-ECT) and MMSE scores (after 2nd ECT, after 4th ECT, after 6th ECT and after 1 month). Additionally similar pattern was observed among the SSMQ scores (after

Table 2
Correlation between SSMQ, PGIMS, MMSE, MADRS scores and clinical variables (Spearman correlation coefficients)

	SSMQ[1] Pre ECT	SSMQ 2nd ECT	SSMQ 4th ECT	SSMQ 6th ECT	SSMQ 8th ECT	SSMQ 1 week	SSMQ 1 month
MMSE[2] Pre-ECT		0.359*					
MMSE 2nd ECT	0.417*						
MMSE 4th ECT	0.531*				0.862**		
MMSE 6th ECT	0.458*						
MMSE 8th ECT			0.522*				
MMSE 1 month	0.401*						
PGIMS 2nd ECT	0.485**						
PGIMS 8th ECT		0.664**					
PGIMS 1 month	0.413*						
MADRS 4th ECT		-0.595**					
MADRS 6th ECT						-0.422*	
MADRS 8th ECT					-0.548**	-0.608**	
MADRS 1 week							-0.464*
MADRS 1 month		0.417*			-0.694**		
Duration of Illness				.414*			
No. of ECT's given				.	.712**		

SSMQ – Squire Subjective Memory Questionnaire
PGIMS – PGI Memory Scale
Duration of Illness (in months)
MMSE – Mini-Mental Status Examination
MADRS – Montgomery-Asberg Depression Rating Scale
* $p < 0.05$; ** $p < 0.01$

8th ECT) and MMSE scores (after 8th ECT); and SSMQ scores (after 8th ECT) and MMSE scores (after 4th ECT).

Correlation of SSMQ scores with ECT parameters

The present study found no correlations among SSMQ scores and stimulus intensity and seizure duration. Additionally, a positive significant correlation was found between SSMQ scores (after 6th ECT) and duration of illness and between SSMQ scores (after 8th ECT) and number of ECTs given.

DISCUSSION

In the current study, the overall pattern is suggestive of a gradual improvement during & immediately following ECT. Though the previous literature (with bilateral, sine wave ECT) has reported increased subjective memory impairment (Fleminger et al., 1970; Small, 1974; Hughes et al., 1981). Two other studies of patients' attitudes towards ECT reported significant adverse effects in samples where bilateral ECT was the predominant treatment given (Freeman and Kendell, 1980; Malcolm, 1989). However, Coleman et al. (1996) reported that although patients reported poorer memory functioning pre-ECT than controls, there was marked improvement post-ECT and there were no differences due to electrode placement. Thus, older studies reported that bilateral ECT results in increased subjective memory complaints, but more recent studies (brief pulse ECT) have shown little effect of electrode placement, and general improvement in subjective memory evaluations within a few days of ECT.

We did not find correlation of SSMQ with MMSE, PGI Memory Scale. Equivocal studies in the previous literature suggested overall weak and poorly replicated association between subjective memory function and objective neuropsychological measures. Squire and Chace (1975) failed to detect a relationship between subjective memory assessment on a structured interview and a more extensive battery of objective tests, including immediate and delayed recall and recognition, incidental learning, and remote memory in a group of patients evaluated 6 to 9 months following ECT. Weiner et al. (1986) and Coleman et al. (1996)

also reported deficits on objective tests of anterograde and retrograde memory from pre-ECT to post-ECT, but improvements on the SSMQ. Calev et al. (1991) reported that impairments on objective tests of memory were associated with a "slight but nonsignificant" subjective report of decreased memory functioning. Overall, there are, at best, only weak and poorly replicated associations between subjective assessment of memory and performance on objective memory tests.

The present study reported no association of subjective memory with stimulus intensity, seizure duration and number of treatments. On the contrary, a few previous studies were suggestive of association between stimulus intensity & number of ECT's but possibly for sine wave ECT. But there were a number of methodological problems. In addition to findings on electrode placement, Small (1974) reported that frequency of memory complaint was related to increased number of treatments. Squire et al. (1979) reported that number of treatments did not correlate with memory complaint either shortly following ECT or 6 months later. Weiner et al. (1986) found uniform improvement on the SSMQ from pre-ECT to post-ECT without an effect of stimulus waveform or electrode placement, and no differences with non-ECT depressed controls. Here again an older, less rigorous methodology suggests an effect of sine wave ECT producing more complaints than brief-pulse ECT, not replicated in more recent and more rigorously controlled research. A second observation can also be made: the older research used simple inquiries about memory complaint, while the more recent research employed the SSMQ. Only one report has examined the relationship of subjective memory to stimulus intensity relative to seizure threshold. Coleman et al. (1996) performed analyses that controlled for clinical state, and found that intensity close to threshold resulted in greater improvement in the SSMQ than intensity 150% above threshold regardless of electrode placement. An overview of this literature presents a picture of mixed findings of the impact of manipulations of the technical parameters of ECT on patients' assessments of their memory and cognitive function. There is a suggestion that there may be more complaints of impairment with bilateral sine wave treatment if the questions posed are simple or direct and confined to subjective memory alone. Finally, the studies on treatment number and stimulus intensity are suggestive but too few in number and, in the case of treatment number, lacking in sufficient methodological rigor to draw conclusions.

The current study found some Association between subjective memory impairment with mood state. Although the previous literature suggests a strong contribution of mood-state to self-ratings of memory function – though no association has been found in some studies (e.g., a study by Squire & Chance, 1975 using SSMQ). In the one exceptional report, Calev et al. (1991) did not find a significant correlation between scores on the SSMQ and symptoms of depression on the HRSD. The results of later systematic research have been consistent in documenting a positive relationship between severity of depressive symptoms and subjective evaluations of memory. For example, Coleman et al. (1996) found that severity of depressive symptoms was very strongly associated with reports of memory dysfunction. The reason for this null result is unclear, but may relate to their small sample size. Overall there appears to be a strong contribution of mood state to self-ratings of memory function in ECT samples.

LIMITATIONS

The major drawbacks of the present study are its small sample, all patients received bilateral ECT and all the patients had severe depression. Additionally, similar to the previous literature, for the present study the subjective assessments of memory following ECT have relied on a single instrument, the SSMQ. Broad assessments of subjective memory tap far more than knowledge of and ability to monitor memory function, which is only a component of subjective memory, and so such a small component cannot be assessed reliably. Thus, SSMQ might not tap all aspects of subjective memory.

CONCLUSIONS & IMPLICATIONS

Subjective memory deficits during ECT are common, although they seem to improve during and immediately following ECT. At present, apart from mood state there are very few consistent predictors of subjective memory deficits during ECT. The tasks ahead include an attempt to find reliable predictors of subjective memory deficits with better designed studies (larger numbers, more in-depth studies, etc). Also, to examine the effect of subjective memory deficits in the broader context of patient's experience of receiving ECT.

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