Memory Changes in Patients with Major Depressive Disorder Treated with Electroconvulsive Therapy

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Abstract:

Introduction

Depression is the most common mental health condition in the general population. Approximately 6-7% of full-time U.S. workers experienced major depression (MDD) within the past year. Electroconvulsive therapy is a first-line treatment for severely depressed patients; it may cause a temporary deficit in the cognitive processes of information encoding, consolidation, and retrieval.

The present study aimed to:

1. Evaluate memory changes present in a sample of patients with major depressive disorder.
2. Differentiate the memory changes between unilateral electrode & bilateral electrode stimulation in patients with major depressive disorder.

Patients and Methods

The current study was an interventional study conducted at the Psychiatry Department, Asyut University Hospitals. From the 1st of October 2020, to the end of June 2021, the study included 40 patients aged 18-60 years old who presented with major depressive disorder according to DSM-5. Patients were assessed through (HAM-D), (MMSE), (MoCA)on admission, after treatment with ECT, and after 3-month follow-up.

Result and Discussion

It appears that there is no significant difference between unilateral & bilateral ECT stimulation in their efficacy of improving depression symptoms, and their effect in total cognitive function and memory affection as adverse events, however, the present study several parameters of ECT treatment and detailed study of cognitive functions are lacking, It is recommended to study a larger number of patients and details of cognitive functions have to be clarified in the future studies.

Keywords: ECT; Depression; Memory.

Introduction:

Depression is the most common mental health condition in the general population, characterized by sadness, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, feelings of tiredness, and poor concentration. In its most severe form, depression can lead to suicide and an increased risk of mortality. There are an estimated 350 million people of all ages who suffer from depression worldwide (1). In Egypt (2015), the prevalence of depression was estimated to be 3.5%. (93)

Cost-of-illness research has shown that depression is associated with an enormous economic burden, in the order of tens of billions of dollars each year in the U.S. alone (3).

Electroconvulsive therapy (ECT) is an effective treatment for severe depression but entails cognitive adverse effects, particularly the effects on memory. Electroconvulsive

therapy may cause a temporary deficit in the cognitive processes of information encoding, consolidation, and retrieval, transient memory disturbances are regarded as an inevitable adverse effect of therapeutic convulsions, There have been attempts to relate subjective memory disturbances after ECT to treatment variables such as electrode placement, number of treatments, waveform, and charge, various strategies have been tried to decrease the cognitive adverse effects while retaining the antidepressant effect, including the use of unilateral instead of bilateral electrode placement, changes in waveform, and reducing the electrical stimulus intensity, (5).

This contrasts with the evidence for objective cognitive measures, where higher electrical charge causes more adverse cognitive effects and stronger antidepressant effects than lower electrical charge. Moreover, some studies have indicated that bilateral electrode placement has higher efficacy and more cognitive adverse effects than unilateral electrode placement (*6*).

Patients and Methods

Major depressive disorder (MDD), according to the World Health Organization, is the leading cause of disability worldwide (World Health Organization 2012).

Study Design and Setting

The current study was an interventional study, a registered clinical trial (NCT03915821) conducted at the Psychiatry Department, Assiut University Hospital, Assiut University, IRB.n:17100764.The study was conducted from the 1st of October 2020 to the end of June 2021. The Neuro-Psychiatric Hospital provides and serves all Upper Egypt governorates, providing integrated tertiary health care and safe medical service accessible to all patients who are at low socio-economic states, and also all recruited patients in this study, based on inpatient hospital admission only.

Participant's Eligibility and Recruitment

The study included all patients who presented with major depressive disorder according to DSM-5, who had not received ECT previously within 6 months, and were admitted to the study site (Psychiatry department, in Assiut University Hospital, Assiut, Egypt). They recruited within 9 9-month period.

The patients classified into group I were treated with unilateral stimulation ECT, and group II were treated with bilateral stimulation ECT.

Sample Size Calculation:

All patients were admitted to the Psychiatry department, in Assiut University Hospital, Assiut, Egypt, who were diagnosed with MDD according to DSM-5 from 1st of October 2020 till the end of June 2021**, (**40) patients, 17 males and 23 females.

Inclusion Criteria:

1. Patients diagnosed with major depressive disorder according to DSM-5.
2. Patients aged 18-50 years of both sexes.

Exclusion Criteria*:*

1. History or current evidence of systemic medical illness, e.g., hepatic, renal, cardiovascular, endocrine, metabolic disorders.
2. History or current evidence of Neurological disease that might affect cognitive function, e.g., encephalitis, epilepsy.
3. Co-morbid psychiatric disorders other than depression.
4. Patients with Intellectual disability.
5. Patients who refused to participate in the study.

Study Tools

All patients were subjected to assessment through the following:

1. History taking and full general & neurological examination, and full psychiatric examination.
2. Hamilton Rating Scale for depression (HAM-D) (Appendix II) (maximum 52 points) grades: mild: 14- 18, moderate: 19-22, severe: more than 23. (73).

The Hamilton Depression Rating Scale (HAM-D) is used to measure the severity of depression. It was originally published by Max Hamilton in 1960 to measure the severity of depression in previously

diagnosed depressed inpatients with depression. (74)

Hamilton Rating Scale for Depression provides a reliable assessment of depression, considering all three types of reliability: internal consistency, inter-rater, and test-retest reliability. (88)

3. Montreal Cognitive Assessment (MoCA) (Appendix III) (maximum 30 points) grades: normal: 30-26, mild: 18-25, moderate: 10-17, severe: less than 10. (75)

The Montreal Cognitive Assessment (MoCA) is a cognitive screening instrument developed to detect mild cognitive impairment (MCI). It is a 10-minute paper-and-pencil test that assesses multiple cognitive domains, including memory, language, executive functions, visuo-spatial skills, calculation, abstraction, attention, concentration, and orientation. (76)

4. Mini-Mental State Examination (MMSE) (Appendix I) (maximum 30 points), grades: normal: 30- 25, mild: 21-24, moderate:10-20, severe: less than 10. (71)

The MMSE fulfilled its original goal of providing a brief screening test that quantitatively assesses the severity of cognitive impairment and documents cognitive changes occurring over time. (72)

5. Patients were clinically evaluated through the psychometric scales at admission, after ECT treatment, and after 3 months of follow-up.

Device: Electroconvulsive therapy.

Electroconvulsive therapy was administered by using bidirectional constant current, brief-pulse devices. During the procedure, the patients were sedated with propofol or thiopental. Succinylcholine (0.5–1.0 mg/kg) served as a muscle relaxant, and glycopyrrolate (0.2 mg) or atropine served as an anticholinergic agent when necessary (5). The model of the device is Nihon Kohde/Mecta Corporation Spectrum 4000 mc (Millicoulomb) made in the USA SN/13293 (https://mectaspectrum.com/products/mecta-spectrum/ MECTA | 503-612-6780 | mectasales@mectacorp.com). The mean charges were 253.4 mC for the unilateral electrode placement group and 417 mC for the bilateral electrode placement group, with an energy of 44.60220 J and frequency 40 HZ, with a duration of 7.920 sec.

Procedure

All participants were subjected to the following steps:

History taking and full general & neurological examination were done to exclude Neurological disease that might affect cognitive function, e.g, encephalitis, epilepsy.

- History taking and full psychiatric examination to exclude other psychiatric disorders, based on DSM-5 diagnostic criteria.
- Patients were classified into two groups: those who received ECT by unilateral stimulation (group I) & who received ECT by bilateral stimulation (group II).
- Mini-Mental State Examination (MMSE) (Appendix I), which is a scale for cognitive function measurement, with a maximum of 30 points, classified across the following degrees: normal (30-25), mild (21-24), moderate (10-20), severe (less than 10). (71)
- Hamilton Rating Scale for depression (HAM-D) (Appendix II), a scale for measuring the severity of depression, with a maximum of 52 points. Patients were classified across the following degrees: mild (14- 18), moderate (19-22), and severe (more than 23). (73)
- Montreal Cognitive Assessment, (MoCA) (Appendix III) which is a scale for measuring of cognitive function and its (maximum 30 points), they classified across the following degrees into, grades: normal: (30-26), mild: (18-25), moderate: (10-17), sever: (less than 10). (75)
- **(Group I):** In right unilateral ECT, one electrode is placed on a point just to the right of the point of intersection between a perpendicular line connecting two external auditory canals and a line connecting the nasion and inion, and the second electrode site is 2.5 to 3 cm above the point on a line drawn from the

tragus of ear to the outer angel of eye on either side. (77)

- **(group II):** of patients had their treatment with a bitemporal electrode.
- Patients were clinically evaluated through the psychometric scales (MMSE, HAM-D, MoCA) at admission, after ECT treatment: one day after the last session of ECT treatment (82), and after 3 months of follow-up.
- Socio-demographic data, such as age, gender, level of education, occupation, residence, and marital status, were collected.
- The average course of treatment for a patient in the study is six treatments.
- Patients were discharged based on the specialist's clinical evaluation.
- It should be clarified that patients in the study had a medical treatment alongside with ECT treatment as antidepressant (SSRIs), as in long use of antidepressants shows side effects are represented by decreased emotional response to both adversive and pleasurable events, some cognitive impairments (94), as it was worse with TCAs than with SSRIs/SNRIs (95),& atypical antipsychotics as (risperidone - olanzapine-quetiapine) but quetiapine seemed to be less associated with impairment in measures of cognitive functions than olanzapine or risperidone (96).

Ethical Consideration

- The study was approved by the Assiut Faculty of Medicine medical ethical committee by IRB local approval number: 17100764.
- Written consent was obtained from the patient or their caregivers.
- Risk-benefit assessment: all risks and side effects have been disclosed to the patients who participated in the study.
- Confidentiality (dealing with data and data dissemination should be confidential): The confidentiality of patients' information will be maintained throughout the study.
- Informed consent: The protocol of this study was submitted to the ethical committee of the Faculty of Medicine, Assiut University. Also, written consent from all participants or their caregivers will be obtained after a description of the aim of the study and methods, before participation in the study.

Statistical Analysis:

SPSS for Windows version 16.0 (http://www.spss.com, SPSS Inc., Chicago, Illinois, USA) was used in the statistical analyses. Descriptive statistics were performed with frequency and cross-tabulations for categorical variables. Means and standard deviations were measured for numerical variables. The chi-square test and Kruskal-Wallis test are used to compare independent categorical variables. An independent samples t-test is run for multiple groups if comparisons will not meet the chi-square criteria; a Paired Samples t-test is used to compare the groups. Student's t-test is used to compare the numerical data displaying normal distribution; Fisher's Exact test is performed for the numerical variables that do not display normal distribution. Pearson correlation is used to find the correlation between multiple groups.

Results

This study included 40 patients diagnosed as having major depressive disorder according to DSM-5(APA, 2013). The patients were enrolled into two groups: Group I, composed of 17 patients, received unilateral stimulation, and Group II, composed of 23 patients, received bilateral stimulation.

The result of this study will be presented as follows:

I. Socio-demographic data of the patients (Table 1).
II. II- Comparison between two groups regarding psychometric scales (Tables 2 to 6).
III. Correlation between Hamilton Depression Scale and the Montreal Cognitive Assessment and Mini-Mental State Examination and their memory sub-scales (Table 7).

Table 1: Socio-demographic data of the studied patient groups.

Baseline data	Total (n= 40)	Unilateral stimulation (n= 17)	Bilateral stimulation (n= 23)	P-value
Age: (years)				
Mean ± SD	31.90 ± 9.61	30.47 ± 13.06	32.96 ± 6.09	
Median (Range)	32.0 (18.0-50.0)	22.0 (18.0-50.0)	33.0 (22.0-46.0)	0.111
Sex: No. (%)				
Male	17 (42.5%)	8 (47.1%)	9 (39.1%)	0.616
Female	23 (57.5%)	9 (52.9%)	14 (60.9%)	
Occupation: No. (%)				
Not working	14 (35.0%)	7 (41.2%)	7 (30.4%)	
Skilled worker	9 (22.5%)	3 (17.6%)	6 (26.1%)	0.831
Housewife	11 (27.5%)	5 (29.4%)	6 (26.1%)	
Employee	6 (15.0%)	2 (11.8%)	4 (17.4%)	
Education: No. (%)				
Can read & write or illiterate	17 (42.5%)	6 (35.3%)	11 (47.8%)	
Secondary school	15 (37.5%)	8 (47.1%)	7 (30.4%)	0.559
University	8 (20.0%)	3 (17.6%)	5 (21.7%)	
Residence: No. (%)				
Rural	8 (20.0%)	3 (17.6%)	5 (21.7%)	1.000
Urban	32 (80.0%)	14 (82.4%)	18 (78.3%)	
Marital status: No. (%)				
Single	18 (45.0%)	8 (47.1%)	10 (43.5%)	
Married	19 (47.5%)	8 (47.1%)	11 (47.8%)	0.936
Divorced	3 (7.5%)	1 (5.9%)	2 (8.7%)	
Age of onset: (years)				
Mean ± SD	29.95 ± 8.75	29.65 ± 12.76	30.17 ± 4.16	
Median (Range)	31.0 (18.0-50.0)	21.0 (18.0-50.0)	31.0 (22.0-36.0)	0.197

Chi-square test, Kruskal-Wallis test, skilled workers (carpenter, plumber)

The table shows the mean age of the studied sample (31.9±9.61), and 42.5% of them can read and write or are illiterate.

There is no significant difference between the two groups with regard to different socio-demographic data.

Table 2: Comparison of the total score of the Hamilton depression scale (HAM-D) in the studied patients.

Hamilton-D	Unilateral stimulation (n= 17)	Bilateral stimulation (n= 23)	P-value[1]
Before treatment:			
Mean ± SD	32.06 ± 4.94	30.65 ± 5.58	0.414
Range	24.0-40.0	20.0-39.0	
At discharge:			
Mean ± SD	22.18 ± 1.67	20.87 ± 2.32	0.056
Range	18.0-25.0	14.0-23.0	
P-value[2]	0.000*	0.000*	
After 3 months:			
Mean ± SD	18.65 ± 1.90	17.48 ± 2.56	0.121
Range	14.0-22.0	12.0-20.0	
P-value[3]	0.000*	0.000*	

P[1]: Comparison between groups (Independent samples t-test)

P[2]: Comparison of "Before treatment" with "At discharge" and p3: Before treatment with" After 3 months". (Paired Samples t-test)

Before treatment, there is no significant difference between the two groups of patients, with regard to the total score of HAM-D (32.06 ± 4.94 & 30.65 ± 5.58), respectively.

At discharge & after 3 months follow-up: there is no significant difference between the groups

As regards the difference among (group I) before treatment & at discharge, there was a statistically significant difference as regards the total score of HAM-D (p-value[2] 0.000) and after 3months (p-value[3] 0.000)

As regards the difference among (group II) before treatment & at discharge, there was a statistically significant difference as regards the total score of HAM-D (p-value[2] 0.000) and after 3months (p-[value3]0.000).

Table 3: Comparison of the total score of the Montreal Cognitive Assessment (MoCA) Scale among the studied patients.

MoCA scale	Unilateral stimulation (n= 17)	Bilateral stimulation (n= 23)	P-value[1]
Before treatment:			
Mean ± SD	14.06 ± 5.74	15.39 ± 4.89	0.433
Range	0.0-22.0	5.0-27.0	
At discharge:			
Mean ± SD	17.65 ± 3.32	17.43 ± 4.11	0.862
Range	12.0-22.0	11.0-29.0	
P-value[2]	0.013*	0.001*	
After 3 months:			
Mean ± SD	19.71 ± 3.20	19.13 ± 3.72	0.611
Range	13.0-24.0	15.0-29.0	
P-value[3]	0.000*	0.000*	

P[1]: Comparison between groups (Independent samples t-test)
P[2]: Comparison of "before treatment" with "At discharge" and P-value[3]: before treatment with" After 3 months". (Paired Samples t-test)

Before treatment, there is no significant difference between the patients' groups, regarding the total score of MoCA (14.06 ± 5.74& 15.39 ± 4.89), respectively.

At discharge & after 3 months follow-up, the two groups have no significant difference.

As regards the difference among (group I) before treatment & at discharge, there was a statistically significant difference as regards the total score of MoCA (p-value2 0.013) and after 3months (p-value3 0.000).

As regards the difference among (groupII) before treatment & at discharge, there was a statistically significant difference as regards the total score of MoCA (p-value[2] 0.001) and after 3months (p-[value3]0.000).

Table 4: Comparison of the total score of the Memory subscale among the studied patients according to the Montreal Cognitive Assessment.

Memory	**Unilateral stimulation (n= 17)**	**Bilateral stimulation (n= 23)**	**P-value[1]**
Before treatment:			
Mean ± SD	2.24 ± 1.15	2.26 ± 1.32	0.949
Range	0.0-4.0	0.0-4.0	
At discharge:			
Mean ± SD	2.76 ± 0.90	2.70 ± 1.02	0.825
Range	1.0-4.0	1.0-4.0	
P-value[2]	0.008*	0.015*	
After 3 months:			
Mean ± SD	3.29 ± 0.92	2.91 ± 0.79	0.168
Range	2.0-5.0	2.0-4.0	
P-value[3]	0.001*	0.010*	

P[1]: Comparison between groups (Independent samples t-test)
P[2]: Comparison of "before treatment "with "At discharge" & P-value[3]: before treatment with" After 3 months". (Paired Samples t-test)

Before treatment, there is no significant difference between the two groups of patients, as regards the total score of the memory subscale of MoCA (2.24 ± 1.15& 2.26 ± 1.32), respectively.

At discharge & after 3 months follow-up: The two groups have no significant difference.

As regards the difference among (group I) before treatment & at discharge, there was a statistically significant difference as regards the total score of the memory subscale of MoCA (p-value[2] 0.008) and after 3months (p-value[3] 0.001)

As regards the difference among (groupII) before treatment & at discharge, there was a statistically significant difference as regards the total score of memory subscale of MoCA (p-value[2] 0.015) and after 3months (p-[value3]0.010)

Table 5: Comparison of the total score of the Mini-Mental State Examination scale among studied patients.

MMSE	**Unilateral stimulation (n= 17)**	**Bilateral stimulation (n= 23)**	**P-value[1]**
Before treatment:			
Mean ± SD	18.71 ± 7.02	21.09 ± 4.94	0.215
Range	0.0-27.0	5.0-28.0	
At discharge:			
Mean ± SD	22.35 ± 3.64	22.43 ± 3.24	0.941
Range	16.0-30.0	15.0-29.0	
P-value[2]	0.024*	0.065	
After 3 months:			0.729
Mean ± SD	23.88 ± 3.08	23.57 ± 2.66	
Range	18.0-30.0	20.0-29.0	
P-value[3]	0.004*	0.003*	

P[1]: Comparison between groups (Independent samples t-test)
P[2] Comparison of " before treatment" with "At discharge" and P-value[3]: before treatment with" After 3 months" (Paired Samples t-test)

Before treatment, there is no significant difference between the two patient groups, regarding the total score of MMSE (18.71 ± 7.02& 21.09 ± 4.94), respectively.

At discharge & after 3 months follow-up, the two groups have no significant difference.

As regards the difference among (group I) before treatment & at discharge, there was a statistically significant difference as regards the total of MMSE (p-value2 0.024) and after 3months (p-value3 0.004).

Regarding the difference among (group II) after 3months & at discharge, there was a statistically significant difference regarding the total of MMSE (p-$^{value\ 3}$0.003).

Table (6): Comparison of the total score of the Memory subscale according to the Mini-Mental State Examination (MMSE) among studied patients.

Memory	**Unilateral stimulation (n= 17)**	**Bilateral stimulation (n= 23)**	**P-value**
Before treatment:			
Mean ± SD	1.65 ± 1.06	1.61 ± 0.94	0.904
Range	0.0-3.0	0.0-3.0	
At discharge:			
Mean ± SD	2.35 ± 0.70	2.04 ± 0.77	0.199
Range	1.0-3.0	1.0-3.0	
P-value^2	0.001*	0.005*	
After 3 months:			
Mean ± SD	2.65 ± 0.61	2.43 ± 0.59	0.273
Range	1.0-3.0	1.0-3.0	
P-value^3	0.000*	0.000*	

P^1: Comparison between groups (Independent samples t-test)
P^2: Comparison of "before treatment" with "At discharge" and P-value^3: before treatment with" After 3 months" (Paired Samples t-test)

Before treatment, there is no significant difference between the groups of patients with regard to the total score of the memory subscale of MMSE (1.65 ± 1.06& 1.61 ± 0.94), respectively.

At discharge & after 3 months follow-up, the two groups have no significant difference.

As regards the difference among (group I) before treatment & at discharge, there was a statistically significant difference as regards the total of memory subscale of MMSE (p-value2 0.001) and after 3months (p-value3 0.000)

As regards the difference among (group II) before treatment & at discharge, there was a statistically significant difference as regards the total score of the memory subscale of MMSE (p-value^2 0.005) and after 3months (p-^{value3}0.000).

Table (7): Correlation between Hamilton Depression Scale and Montreal Cognitive Assessment, Mini-Mental State Examination, and their memory sub-scales.

Before treatment

	HAM-D	
	r-value	**P-value**
Memory/ MoCA	-0.311	0.050
MoCA	**-0.395**	**0.012***
Memory/ MMSE	**-0.382**	**0.015***
MMSE	-0.284	0.075

Pearson correlation

Shows statistically significant difference between total score HAM-D & MoCA, memory subscale of MMSE.

Discussion

In the present study, the sample's mean age is 31.9 years old; 42.5% of them can read and write, or are illiterate. There is no significant difference between patients who received unilateral stimulation ECT group and those who received bilateral stimulation ECT group, with regard to different socio-demographic data; also, the mean age of onset was 29 years old.

In the present study, both groups of patients showed improvement of their score on the Hamilton depression rating scale (HAM-D) and continued this improvement after 3 months of follow-up; however, this change in the illness from severe degree to moderate degree became mild after 3months of follow-up.

Semkovska's study shows that the eligible patients, 69, were assigned to bitemporal ECT and 69 to unilateral ECT. High-dose unilateral ECT was noninferior to bitemporal ECT regarding the 24-item HAM-D scores after the ECT course (56).

Also, Sackheim and Prudic (2000) found that the efficacy of right unilateral ECT is contingent on electrical dosage. A higher dosage of right unilateral ECT was considerably more effective than a low dose. Although the high-dose right unilateral ECT did not match the efficacy of bilateral ECT, it provided less severe cognitive effects. (90)

A study of Tatjana Balint shows that Bifrontal and unilateral ECT electrode placements are equally efficacious in improving depressive symptoms in patients suffering from major depressive disorder (MDD). (91)

The difference in results is due to another aspect, during this study: the patients' medical treatment during the treatment period, and even after 3 months of follow-up.

In the present study total score of the Montreal Cognitive Assessment (MoCA) Scale & Mini-Mental State Examination scale in the studied patients showed that both groups improved after ECT courses, as evidenced by an increase in total score of MoCA & MMSE, patients who classified as moderate cognitive impairment before treatment to become classified as mild cognitive impairment after treatment and after 3months follow up.

A study performed by K. Hebbrecht confirms the findings of previous studies that ECT does not cause persistent global cognitive dysfunction at a group level; however, some critical considerations of earlier findings and their own must be addressed first, because major depression has a known negative influence on cognitive functioning, an improvement in mood is expected to induce an improvement in cognitive functioning (81).

Richard J. Porter (2020), Meta-analyses found that cognitive function is not affected after ECT treatment, except that new learning is impaired immediately following ECT; however, cognitive function improved after improvement in mood symptoms. (45)

A study by Jasmien Obbels M. (2019) found that MMSE scores improved significantly during ECT and remained

stable for the total group after 6 months of ECT. In the group of patients with a low MMSE score (<24) at baseline, the MMSE score improved significantly during ECT, whereas in the group of patients with a normal MMSE score (≥24) at baseline, the score did not change considerably during ECT. In both groups, MMSE scores still increased slightly after ECT was discontinued (72)

In the present study, the total score of the memory subscale of MoCA & MMSE showed a significant change in memory subscale among both groups, as shown in the memory subscale of MoCA & MMSE after treatment and after 3 months of follow-up.

Semkovska and McLoughlin (52), when measured between 4 and 14 days, most tests had improved significantly compared with baseline, and none were significantly below baseline.

Glenn E Smith's study showed no memory outcome differences between unrelapsed recipients of treatment continuation-ECT and continuation-pharmacotherapy, consistent with clinical experience. Memory effects have only a small role in the choice between continuation-ECT and continuation-pharmacotherapy (32).

Robert Sigström (2020) found that although subjective memory improved more often than it worsened when assessed before and after ECT, most patients reported that ECT negatively affected their memory when retrospectively asked how ECT affected it. This might suggest that some patients attribute pre-existing subjective memory impairment to ECT. Clinicians should be aware that negative expectations are associated with subjective worsening of memory after ECT (78).

In the study of Correlation between Hamilton Depression rating Scale and Montreal Cognitive Assessment and the Mini-mental State Examination and their memory sub-scales, before treatment, the higher the score of HAM-D, the lower the MoCA & memory sub-scale score of MMSE.

Lisa M. McDermott found that significant correlations between depression severity and cognitive performance were found in the domains of episodic memory, executive function, and processing speed. For both timed and untimed cognitive measures, there were equally significant correlations with depression severity. (92)

Conclusion and Recommendation

It appears that there is no significant difference between unilateral & bilateral ECT stimulation in their efficacy of improving depression symptoms, and their effect in total cognitive function and memory affection as adverse events, however, the present study several parameters of ECT treatment and detailed study of cognitive functions are lacking, It is recommended to study a larger number of patients and details of cognitive functions have to be clarified in the future studies.

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Conflicts of interest

There are no conflicts of interest.

References:

1. Lim GY, Tam WW, Lu Y, et al. Prevalence of depression in the community from 30 countries between 1994 and 2014. Sci Rep. 2018;8(1):2861.
2. Kessler RC, Akiskal HS, Ames M, et al. Prevalence and effects of mood disorders on work performance in a nationally representative sample of U.S. workers. Am J Psychiatry. 2006;163(9):1561-8.
3. Brus O, Nordenskjöld A. Self-assessed remission rates after electroconvulsive therapy of depressive disorders. Eur Psychiatry. 2017;45:154-60.
4. Sienaert P, Vansteelandt K, Demyttenaere K. Ultra-brief pulse ECT in bipolar and unipolar depressive disorder: differences in speed of response. Bipolar Disord. 2009;11(4):418-24.

5. Smith GE, Rasmussen KG Jr, Cullum CM, et al. A randomized controlled trial comparing the memory effects of continuation electroconvulsive therapy versus continuation pharmacotherapy: results from the Consortium for Research in ECT (CORE) study. J Clin Psychiatry. 2010;71(2):185-93.
6. Husain MM, McClintock SM. The efficacy of acute electroconvulsive therapy in atypical depression. J Clin Psychiatry. 2004;65(9):1286-7.
7. Porter RJ, Baune BT, Morris G. Cognitive side-effects of electroconvulsive therapy: what are they, how to monitor them and what to tell patients. BJPsych Adv. 2020;26(4):214-22.
8. Semkovska M, McLoughlin DM. Objective cognitive performance associated with electroconvulsive therapy for depression: a systematic review and meta-analysis. Biol Psychiatry. 2010;68(6):568-77.
9. Semkovska M, Landau S, Dunne R, et al. Bitemporal versus high-dose unilateral twice-weekly electroconvulsive therapy for depression (EFFECT-Dep): a pragmatic, randomized, non-inferiority trial. Am J Psychiatry. 2016;173(4):408-17.
10. Pangman VC, Sloan J, Guse L. An examination of psychometric properties of the Mini-Mental Status Examination and the Standardized Mini-Mental Status Examination: implications for clinical practice. Appl Nurs Res. 2000;13(4):209-13.
11. Obbels J, Vanbrabant K, Verwijk E, et al. MMSE changes during and after ECT in late-life depression: a prospective study. Am J Geriatr Psychiatry. 2019;27(9):934-44.
12. Sharp R. The Hamilton Rating Scale for Depression. Occup Med (Lond). 2015;65(4):340.
13. Faries D, Herrera J, Rayamajhi J, et al. The responsiveness of the Hamilton Depression Rating Scale. J Psychiatr Res. 2000;34(1):3-10.
14. Rosenzweig A. Montreal Cognitive Assessment (MoCA) test for dementia. 2022.
15. Julayanont P, Nasreddine ZS. Montreal Cognitive Assessment (MoCA): concept and clinical review. In: Larner AJ, editor. Cognitive screening instruments. Springer; 2017:139-95.
16. Swartz CM, Nelson AI. Rational electroconvulsive therapy electrode placement. Psychiatry (Edgmont). 2005;2(7):37-43.
17. Sigström R, Nordenskjöld A, Wålinder J, et al. Long-term subjective memory after electroconvulsive therapy. BJPsych Open. 2020;6(1):e8.
18. Hebbrecht K, Bouckaert F, Obbels J, et al. Cognitive change after electroconvulsive therapy in mood disorders measured with the Montreal Cognitive Assessment. J ECT. 2020;36(2):106-12.
19. Kalisova L, Kubinova M, Michalec J, et al. Cognitive functioning in patients treated with electroconvulsive therapy. Neuropsychiatr Dis Treat. 2018;14:3025-31.
20. Goran Trajković G, Starčević V, Latas M, et al. Reliability of the Hamilton Rating Scale for Depression: a meta-analysis over a period of 49 years. Psychiatry Res. 2011;189(1):1-9.
21. Sackeim HA, Prudic J, Devanand DP, et al. A prospective, randomized, double-blind comparison of bilateral and right unilateral electroconvulsive therapy at different stimulus intensities. Arch Gen Psychiatry. 2000;57(5):425-34.
22. Balint T, Khan RN, Hooke G. The relative effectiveness of bilateral and unilateral electrode placement in electroconvulsive therapy (ECT) in patients with major depressive disorder: a retrospective cohort study. Cureus. 2023;15(8):e42938.
23. McDermott LM, Ebmeier KP. A meta-analysis of depression severity and cognitive function. J Affect Disord. 2009;119(1-3):1-8.
24. World Health Organization. Depression and other common mental disorders:

global health estimates. Geneva: WHO; 2017.
25. Marazziti D, Mucci F, Tripodi B, et al. Emotional blunting, cognitive impairment, bone fractures, and bleeding as possible side effects of long-term use of SSRIs. Clin Neuropsychiatry. 2019;16(2):75-85.
26. Nagane A, Baba H, Nakano Y, et al. Comparative study of cognitive impairment between medicated and medication-free patients with remitted major depression: class-specific influence by tricyclic antidepressants and newer antidepressants. Psychiatry Res. 2014;218(1-2):101-5.
27. Torrent C, Martinez-Arán A, Daban C, et al. Effects of atypical antipsychotics on neurocognition in euthymic bipolar patients. Compr Psychiatry. 2011;52(6):613-22.