ORIGINAL RESEARCH

Efficacy of ketamine versus thiopentone-assisted modified electroconvulsive therapy in major depression

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ABSTRACT

Background: Depression is a mental health disorder characterized by persistent feelings of sadness, hopelessness, and a loss of interest or pleasure in activities. The present study was conducted to assess efficacy of ketamine versus thiopentone-assisted modified electroconvulsive therapy in major depression. **Materials & Methods:** 56 patients with major depressive disorder (Diagnostic and Statistical Manual of Mental Disorders-IV Text Revision) of both genderswere divided into two groups of 28 each. Group I received ketamine and group II received thiopentone as anesthetic agent. Hamilton Rating Scale for Depression (HAM-D) and Beck Depression Inventory (BDI) were recorded at baseline, completion of ECT and at 6 weeks follow up. **Results:** Themean number of ECT sessions was 5.9 in group I and 8.2 in group II. EEG seizure duration was 50.7 seconds in group I and 43.6 seconds in group II. Stimulus intensity was 82.1mCin group I and 92.8mC in group II. The difference was significant (P< 0.05). In group I and group II, HAM-D score at baseline was 29.5and 32.2, at completion of ECT was 1.9 and 1.8 and at 6 weeks follow up was 0.21 and 0.25 respectively. BDI score at baseline was 51.2 and 52.8, at completion of ECT was 6.5 and 7.2 and at 6 weeks follow up was 0.78 and 1.5 respectively. MMSE score at baseline was 27.4 and 27.9, at completion of ECT was 5.7 and 6.9, and at 6 weeks follow up was 1.3 and 2.7 respectively. Side effects were headache in 7 and 9, nausea/vomiting in 4and 1, emergence reactions in 3 and 1, and delirium in 2and 0 in group I and group II respectively. **Conclusion:** Ketamine anesthesia produced a quick recovery from depression symptoms, suggesting that it is a preferable choice for depressed individuals, particularly in cases where a quick response is required.

Keywords: Depression, ketamine, thiopentone

INTRODUCTION

Depression is a mental health disorder characterized by persistent feelings of sadness, hopelessness, and a loss of interest or pleasure in activities. It can affect how you think, feel, and handle daily activities, and it can lead to a variety of emotional and physical problems. Depression is a common and serious medical condition that can negatively impact various aspects of a person's life, including work, school, relationships, and physical health.[1]

Some common symptoms of depression include persistent sad, anxious, or "empty" mood, loss of interest or pleasure in hobbies and activities, feelings of worthlessness, guilt, or hopelessness, fatigue or decreased energy, difficulty concentrating, remembering, or making decisions, changes in appetite or weight, insomnia or oversleeping, restlessness or irritability, thoughts of death or suicide, suicide attempts, etc.[2]

The present generation of antidepressants has limited efficacy and a delay of action, which can lead to significant morbidity, including an increased risk of suicide. Recent research indicates that N-methyl-D-aspartate (NMDA) receptor antagonists, such as ketamine, have antidepressant effects in a number of animal models of depression.[3] Clinical studies also demonstrate that parenterally administered NMDA receptor antagonists cause a rapid-onset (within two hours) antidepressant response in patients with major depressive disorder. It's common knowledge that electroconvulsive therapy (ECT) accelerates the recovery from depression more quickly than

antidepressant drugs.[4] Ketamine as the anesthetic agent may speed up the recovery from depression treated with ECT. This hypothesis is also supported by some empirical research. Case reports have shown the superior efficacy of modified electroconvulsive therapy (MECT) using ketamine (an NMDA antagonist) as an anesthetic agent.[5]The present study was conducted to assess efficacy of ketamine versus thiopentone-assisted modified electroconvulsive therapy in major depression.

MATERIALS & METHODS

The present study consisted of 56 patients with major depressive disorder (Diagnostic and Statistical Manual of Mental Disorders-IV Text Revision) of both genders. All gave their written consent to participate in the study.

Data such as name, age, gender etc. was recorded. Patients were divided into two groups of 28 each. Group I received ketamine and group II received thiopentone as anesthetic agent. Hamilton Rating Scale for Depression (HAM-D) and Beck Depression Inventory (BDI) were recorded at baseline, completion of ECT and at 6 weeks follow up. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Baseline characteristics

Parameters	Group I	Group II	P value
Number of ECT sessions	5.9	8.2	0.05
EEG seizure duration (s)	50.7	43.6	0.04
Stimulus intensity (mC)	82.1	92.8	0.05

Table I shows that mean number of ECT sessions was 5.9 in group I and 8.2 in group II. EEG seizure duration was 50.7 seconds in group I and 43.6seconds in group II. Stimulus intensity was 82.1mCin group I and 92.8mC in group II. The difference was significant (P< 0.05).

Table II Comparison of parameters

Parameters	Variables	Group I	Group II	P value
HAM-D score	Baseline	29.5	32.2	0.05
	completion of ECT	1.9	1.8	
	6 weeks follow up	0.21	0.25	
BDI score	Baseline	51.2	52.8	0.03
	completion of ECT	6.5	7.2	
	6 weeks follow up	0.78	1.5	
MMSE score	Baseline	27.4	27.9	0.04
	completion of ECT	5.7	6.9	
	6 weeks follow up	1.3	2.7	

Table II, graph I shows that in group I and group II, HAM-D score at baseline was 29.5and 32.2, at completion of ECT was 1.9 and 1.8 and at 6 weeks follow up was 0.21 and 0.25 respectively. BDI score at baseline was 51.2 and 52.8, at completion of ECT was 6.5 and 7.2 and at 6 weeks follow up was 0.78 and 1.5respectively.MMSE score at baseline was 27.4 and 27.9, at completion of ECT was 5.7 and 6.9, and at 6 weeks follow up was 1.3 and 2.7respectively.

Graph I Comparison of parameters

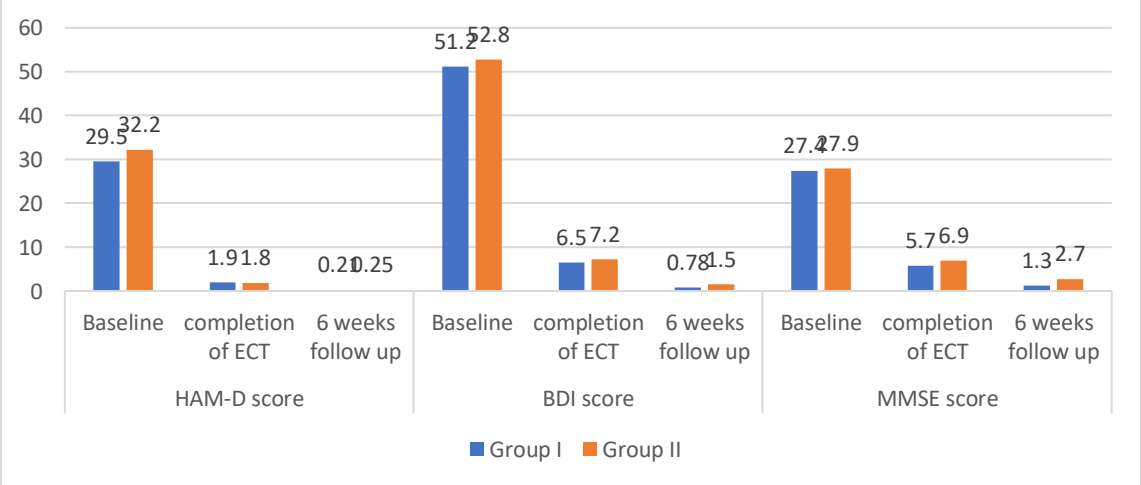
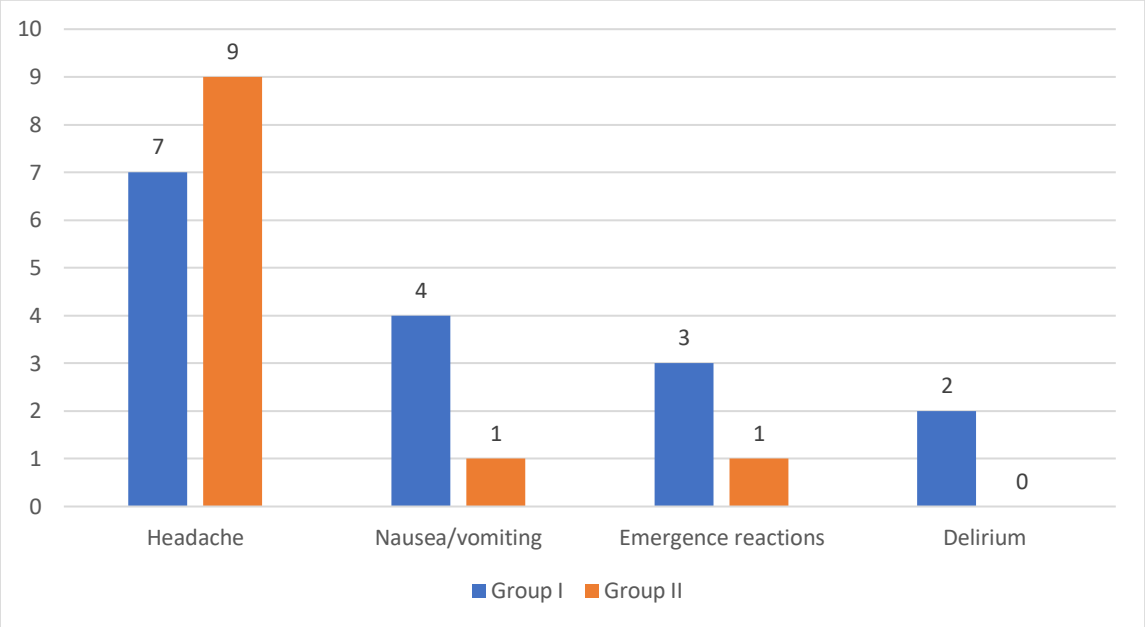


Table III Assessment of side effects

Side effects	Group I	Group II	P value
Headache	7	9	0.51
Nausea/vomiting	4	1	0.03
Emergence reactions	3	1	0.05
Delirium	2	0	0.15

Table III, graph II shows that side effects were headache in 7 and 9, nausea/vomiting in 4 and 1, emergence reactions in 3 and 1, and delirium in 2 and 0 in group I and group II respectively.

Graph II Assessment of side effects



DISCUSSION

Depression can be caused by a combination of genetic, biological, environmental, and psychological factors.[6] Certain life events, such as trauma, loss, or stress, can trigger or contribute to depression. Additionally, changes in brain chemistry and neurotransmitter imbalances, particularly involving serotonin and norepinephrine, are thought to play a role in the development of depression.[7,8] Treatment for depression typically involves a combination of medication, psychotherapy, lifestyle changes, and support from loved ones. Antidepressant medications, such as selective serotonin reuptake inhibitors (SSRIs), serotonin-norepinephrine reuptake inhibitors (SNRIs), and others, are commonly prescribed to help alleviate symptoms of depression by restoring the balance of neurotransmitters in the brain.[9] Psychotherapy, such as cognitive-behavioral therapy (CBT), interpersonal therapy (IPT), or psychodynamic therapy, can help individuals learn coping skills, identify negative thought patterns, and address underlying issues contributing to their depression.[10] The present study was conducted to assess efficacy of ketamine versus thiopentone-assisted modified electroconvulsive therapy in major depression.

We found that mean number of ECT sessions was 5.9 in group I and 8.2 in group II. EEG seizure duration was 50.7 seconds in group I and 43.6 seconds in group II. Stimulus intensity was 82.1mCin group I and 92.8mC in group II. Jagtiani et al[11] compared the outcome of modified electroconvulsive therapy (MECT) in major depressive disorder patients undergoing MECT with ketamine versus thiopentone anesthesia.Sixty hospitalized patients (age: 18–45 years) with major depressive disorder (Diagnostic and Statistical Manual of Mental Disorders-IV Text Revision) were randomly allocated to either of the two MECT groups (30 patients each) receiving ketamine or thiopentone as anesthetic agent. The participants were assessed on a weekly basis on Hamilton Rating Scale for Depression (HAM-D) and Beck Depression Inventory (BDI).Ketamine group required significantly lesser number of MECT sessions for achieving remission and had rapid improvement in HAM-D and BDI scores compared to the thiopentone group. Furthermore, the stimulus intensity required to elicit seizures was significantly less and seizure duration was longer in ketamine group compared to the thiopentone group.

We found that in group I and group II, HAM-D score at baseline was 29.5and 32.2, at completion of ECT was 1.9 and 1.8 and at 6 weeks follow up was 0.21 and 0.25 respectively. BDI score at baseline was 51.2 and 52.8, at completion of ECT was 6.5 and 7.2 and at 6 weeks follow up was 0.78 and 1.5 respectively. MMSE score at baseline was 27.4 and 27.9, at

completion of ECT was 5.7 and 6.9, and at 6 weeks follow up was 1.3 and 2.7 respectively.Yoosefi et alin a randomized, double-blind clinical trial compared the effects of ketamine (N = 15) and thiopental (n = 14) administration during electroconvulsive therapy in patients with major depressive disorder. They found that at the end of the study (after 6 ECT sessions), depression improved significantly in both groups. However, a significant difference in depression improvement was noted only before the second ECT with ketamine compared with thiopental.We found that side effects were headache in 7 and 9, nausea/vomiting in 4 and 1, emergence reactions in 3 and 1, and delirium in 2and 0 in group I and group II respectively. Gamble et al[12]enrolled patients with treatment-resistant MDD. The study was terminated as significant results were found after the first planned interim analysis with 12 patients in each of the ketamine (intervention) and propofol (control) groups. All ketamine patients achieved at least a 50% MADRS reduction after a median of two ECT treatments whereas ten propofol patients (83%) achieved the same outcome after a median of four ECT treatments. All ketamine patients and seven propofol patients (58%) achieved MDD remission (MADRS $\leq$ 10). Log rank tests showed that both time-to-50% reduction and remission differed significantly between groups. Adverse events and recovery time were similar between groups.
The limitation of the study is the small sample size.

CONCLUSION

Authors found that Ketamine anesthesia produced a quick recovery from depression symptoms, suggesting that it is a preferable choice for depressed individuals, particularly in cases where a quick response is required.

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