

# Spark of Hope: Unveiling the Transformative Power of Electroconvulsive Therapy (ECT) in Overcoming Major Depressive Disorder

Waleed Ahmad<sup>1</sup>, Sher Ayub Dawar,<sup>2</sup> Zainab Waheed<sup>3</sup>

<sup>1</sup>Assistant Professor, Department of Psychiatry, Lady Reading Hospital, Peshawar, Pakistan

<sup>2</sup>Assistant Professor, Department of Psychiatry, Khalifa Gulnawaz Teaching Hospital, Bannu Khyber Pakhtunkhwa, Pakistan.

<sup>3</sup>Lecturer, Psychiatry Department, Kabir Medical College, Peshawar, Pakistan

## Correspondence:

Dr Waleed Ahmad

Email: [dr.waleed@outlook.com](mailto:dr.waleed@outlook.com)

## Abstract

**Background:** Major Depressive Disorder (MDD) is a significant public health concern, characterized by persistent low mood, anhedonia, and cognitive impairments, leading to substantial morbidity. In Pakistan, the burden of MDD is exacerbated by limited access to effective treatments, particularly for patients who are resistant to conventional pharmacotherapy.

**Objective:** This study aimed to investigate the effectiveness of Electroconvulsive Therapy (ECT) as a treatment for Major Depressive Disorder (MDD) in Peshawar, Khyber Pakhtunkhwa, Pakistan.

**Material and Methods:** A quasi-experimental study was conducted from January to June 2023 at two major psychiatric Hospitals in Peshawar, Khyber Pakhtunkhwa. The sample size of 60 participants was calculated using a power analysis with an effect size of 0.8, a significance level of 0.05, and a power of 0.80. Participants were divided into the ECT group (n=30) and the control group (n=30). The ECT group received standard ECT treatment and routine care, while the control group received regular care alone. The Hamilton Depression Rating Scale (HDRS) was used to assess the severity of depressive symptoms at baseline and after the completion of ECT sessions (six weeks). The primary outcome measure was the change in HDRS scores between the two groups.

**Results:** The ECT group exhibited a significantly greater reduction in depressive symptoms than the control group. After six weeks of treatment, the mean reduction in HDRS scores was high in the ECT group (09.13±1.94) compared to the control group (12.23±4.30) ( $p < 0.001$ ). Likewise, the overall response rate (defined as a  $\geq 50\%$  reduction in HDRS scores) was significantly higher in the ECT group (75%) compared to the control group (25%) ( $p < 0.001$ ).

**Conclusion:** This study provides evidence of ECT's effectiveness as a treatment option for MDD in Peshawar, Khyber Pakhtunkhwa and demonstrated a substantial reduction in depressive symptoms and a higher response rate compared to routine care alone.

**Keywords:** Electroconvulsive Therapy, Major Depressive Disorder, Quasi-Experimental Study, Hamilton Depression Rating Scale, Treatment

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## Introduction

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Major Depressive disorders are increasingly recognized as a significant public health issue. Worldwide an estimated 121 million people currently suffer from depression.<sup>1</sup> Major Depressive Disorder (MDD) is a prevalent psychiatric condition

characterized by persistent and overwhelming feelings of sadness, loss of interest or pleasure, and a range of cognitive and physical symptoms. It is estimated that MDD affects approximately 4.4% of the global population, making it one of the leading causes

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of disability worldwide.<sup>2</sup> Over 90 per cent of mental health problems are anxiety and depression, and comorbidity is common.<sup>3</sup> The incidence of depressive disorders appears to be increasing, particularly in younger age groups.<sup>4</sup> Up to 15% of more severely depressed subjects commit suicide.<sup>5</sup> In Pakistan, 25 % to 30% of the study population suffers from depression.<sup>6</sup> It is a more severe issue, with an estimated 34 per cent of genetic and environmental factors playing an essential role in its pathogenesis.<sup>7</sup> Around 35.7% of Karachi, 43% of Quetta, and 53.4% of the Lahore population suffer from depression.<sup>8</sup>

MDD results in the ratio of functional impairment in numerous life domains and is a leading predictor of increased morbidity and mortality.<sup>9</sup> Major depressive disorder in the US has a lifetime prevalence rate of 4.9-16.2%. Severe depression can impair the quality of life and lead to death by suicide.<sup>10</sup> In Pakistan, the use of ECT is shaped by unique cultural, social, and healthcare dynamics. Mental health services in Pakistan face significant challenges, including stigma, a shortage of trained professionals, and limited access to modern treatment modalities. Despite these challenges, ECT remains a commonly employed intervention in psychiatric hospitals across the country, particularly for patients with severe MDD who do not respond to medications.<sup>11</sup>

The management of MDD typically involves a combination of pharmacotherapy, psychotherapy, and psychosocial interventions. However, many individuals with MDD do not achieve full remission with these conventional approaches or experience adverse effects that limit their tolerability and effectiveness.<sup>12</sup> This treatment resistance underscores the need for alternative interventions to relieve these individuals and improve their well-being. One such intervention that has shown promise in treating severe and treatment-resistant MDD is Electroconvulsive Therapy (ECT).<sup>13</sup> ECT involves the induction of controlled seizures using an electric current under general anesthesia.<sup>14</sup> Despite its longstanding use and established efficacy in various global settings, including Western countries, ECT remains underutilized and stigmatized in many parts of the world, including Pakistan.<sup>15</sup>

Despite the availability of various treatment modalities, a significant proportion of individuals with

MDD do not achieve full remission or experience intolerable side effects with conventional therapies.<sup>16</sup> Electroconvulsive Therapy (ECT) has been recognized as an effective treatment option for severe and treatment-resistant MDD.<sup>17</sup> However, its effectiveness in the Peshawar population remains relatively unexplored. This quasi-experimental research study aims to evaluate the effectiveness of ECT for MDD in Peshawar, Khyber Pakhtunkhwa.

## Material and Method:

**Study Design:** This study employed a quasi-experimental design with two groups: an Electroconvulsive Therapy (ECT) group and a control group. The study aimed to evaluate the effectiveness of ECT in reducing depressive symptoms among patients diagnosed with Major Depressive Disorder (MDD).

**Study Area and Period:** The study was conducted at two major psychiatric hospitals in Peshawar, Khyber Pakhtunkhwa, Pakistan. The data collection period spanned from January to June 2023.

**Sample Size Calculation:** The sample size was determined using a power analysis. Considering an effect size of 0.8, a significance level of 0.05, and a power of 0.80, a total of 60 participants were required. Participants were equally divided into the ECT group (n=30) and the control group (n=30).

**Inclusion Criteria:**

Participants aged 20-65 years.

Diagnosed with MDD based on DSM-5 criteria.

**Exclusion Criteria:**

Individuals with a history of other psychiatric disorders (e.g., bipolar disorder, schizophrenia).

Patients with medical contraindications for ECT (e.g., recent myocardial infarction, severe hypertension).

Patients who had undergone ECT within the last six months.

**Study Variables**

The severity of depressive symptoms was measured by the HDRS (dependent variable). The treatment group (ECT group vs. control group), Age, gender, and baseline HDRS scores (Independent Variables).

**Operational Definitions**

**Major Depressive Disorder (MDD):** A clinical diagnosis characterized by persistent low mood,

anhedonia, and other cognitive and physical symptoms, diagnosed according to DSM-5 criteria.

**Electroconvulsive Therapy (ECT):** A medical treatment that involves the administration of electrical currents to the brain under anesthesia to induce brief seizures, used to treat severe depression.

**Response Rate:** Defined as a  $\geq 50\%$  reduction in HDRS scores from baseline to post-treatment.

**Data Collection Instruments:**

Hamilton Depression Rating Scale (HDRS) was used which is a clinician-administered scale that assesses the severity of depressive symptoms. It includes multiple items covering mood, physical symptoms, and cognitive disturbances.

**Procedure:** Participants were recruited from the psychiatric outpatient departments of the two hospitals. Following informed consent, participants were screened for eligibility based on the inclusion and exclusion criteria. The allocation to the ECT or control group was determined based on the availability of ECT facilities in the respective hospitals. The ECT Group; Participants received standard ECT treatment along with routine psychiatric care. The ECT sessions were conducted thrice weekly for six weeks, following a standard protocol involving general anesthesia and muscle relaxants. The Control Group; Participants in the control group received routine psychiatric care alone, including pharmacotherapy and psychotherapeutic interventions as per standard clinical practice.

The severity of depressive symptoms was assessed using the HDRS at baseline and after the completion of ECT sessions (six weeks).

**Data Analysis:** Data were analyzed using SPSS version 26. Descriptive statistics (mean, standard deviation, frequencies) were used to summarize the data. Independent samples t-tests were conducted to compare the mean change in HDRS scores between the ECT and control groups. The response rate was compared between groups using chi-square tests. Statistical significance was set at  $p < 0.05$ .

**Ethical Considerations** Ethical approval for the study was obtained from the Institutional Review Board (IRB) of Gandhara University, Peshawar. Informed consent was obtained from all participants before enrollment in the study. Participants were assured of confidentiality, and their right to withdraw from the study at any time without any consequences

was emphasized. The study adhered to the ethical principles outlined in the Declaration of Helsinki.

**Results:**

Results demonstrated a significantly greater reduction in depressive symptoms in the ECT group compared to the control group. After the treatment, the mean reduction in HDRS scores was higher in the ECT group ( $p < 0.001$ ). These findings suggest a substantial and clinically significant improvement in depressive symptoms with ECT treatment (shown in Table 2). Furthermore, the overall response rate (defined as a  $\geq 50\%$  reduction in HDRS scores) was significantly higher in the ECT group (75%) compared to the control group (25%) ( $p < 0.001$ ). These results indicate a significantly higher likelihood of response to ECT treatment (shown in Figure 1).

Gender	n(%)
Male	19 (31.7)
Female	41 (68.3)
Socioeconomic Status	
Low	12 (20.0)
Middle	41 (68.3)
Upper	07 (11.7)
Marital Status	
Unmarried	07 (11.7)
Married	42 (70.0)
Widow	07 (11.7)
Divorced	04 (06.7)

Variable	Post-intervention HDRS Score (Mean $\pm$ SD)	Sum of Squares	df	F-value	p-value
ECT group	9.07 $\pm$ 1.61	83.09	1	7.09	0.010
Control group	11.42 $\pm$ 4.57				

Baseline scores of ECT group = 16.80 $\pm$ 1.60 and Control group = 16.97 $\pm$ 1.62 (p-value= $\geq 0.05$ )

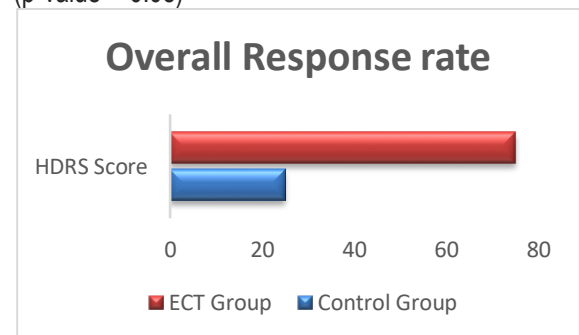


Figure 1: The overall response rate (defined as a  $\geq 50\%$  reduction in HDRS scores) between ECT and Control Group.

## Discussion:

Major depressive disorder (MDD) is a common and debilitating mental illness affecting millions worldwide.

Despite the availability of various pharmacological and psychotherapeutic treatments, a significant proportion of patients with MDD do not respond adequately to these interventions. Electroconvulsive therapy (ECT) is a highly effective treatment for MDD, particularly for those who have not responded to other therapies or are experiencing severe symptoms such as suicidal ideation or psychosis.<sup>18</sup> ECT involves the induction of a seizure by applying an electrical current to the brain, typically under general anesthesia. While ECT has been used for decades, there is still some controversy surrounding its use due to concerns about potential side effects such as memory loss.<sup>19</sup>

Several studies have demonstrated the efficacy of ECT in the treatment of MDD. For example, a systematic review found that ECT was highly effective in treating MDD, with response rates ranging from 60% to 90%.<sup>20</sup> These findings suggest that ECT may be a valuable treatment option for patients with MDD who have not responded to other treatments.<sup>21</sup> Similarly, a study reported that ECT was highly effective in treating MDD and bipolar disorder.<sup>22</sup>

It is important to carefully weigh ECT's potential benefits and risks when considering it as a treatment option for MDD. In addition to treating MDD, ECT has also been used to treat other psychiatric disorders, such as bipolar and schizophrenia. A study reported successful ECT management of MDD in a patient with deep brain stimulation.<sup>23</sup> ECT is a safe and highly effective treatment for various serious mental disorders, particularly for major depressive episodes resistant to multiple interventions with treatment alternatives.<sup>24</sup> These findings suggest that ECT may be a valuable treatment option for various psychiatric disorders. Overall, the evidence indicates that ECT is a highly effective treatment for MDD, particularly for patients who have not responded to other treatments or are experiencing severe symptoms.

Our study results also showed that the ECT effectively treats major depressive disorder patients. The ECT group exhibited a significantly greater reduction in depressive symptoms than the control group. After six weeks of treatment, the mean reduction in HDRS scores was high in the ECT group ( $09.13 \pm 1.94$ ) compared to the control group ( $12.23 \pm 4.30$ ) ( $p < 0.001$ ). Likewise, the overall response rate (defined as a  $\geq 50\%$  reduction in HDRS scores) was significantly higher in the ECT group (75%) compared to the control group (25%) ( $p < 0.001$ ). Similarly, studies reported that ECT is an

effective treatment for MDD patients.<sup>25,26</sup> These studies prove that ECT is an effective treatment option for patients with MDD who have not responded to standard treatments. While there are concerns about the potential side effects of ECT, the benefits of ECT in improving depressive symptoms cannot be ignored. Further research is needed to determine ECT's long-term efficacy and safety in treating MDD.

## Conclusion:

This study provides evidence of ECT's effectiveness as a treatment option for MDD in Peshawar, Khyber Pakhtunkhwa. ECT demonstrated a substantial reduction in depressive symptoms and a higher response rate compared to routine care alone. These findings suggest that ECT should be considered a viable treatment option for individuals with MDD who have not responded to other interventions.

## References:

1. Depression WH. Other common mental disorders: global health estimates. Geneva: World Health Organization. 2017 Feb;24(1).
2. Reddy MS. Depression: the disorder and the burden. Indian journal of psychological medicine. 2010 Jan;32(1):1-2.
3. Bonadiman CS, Malta DC, de Azeredo Passos VM, Naghavi M, Melo AP. Depressive disorders in Brazil: results from the Global Burden of Disease Study 2017. Population health metrics. 2020 Sep;18:1-3.
4. Moitra M, Santomauro D, Collins PY, Vos T, Whiteford H, Saxena S, Ferrari AJ. The global gap in treatment coverage for major depressive disorder in 84 countries from 2000–2019: A systematic review and Bayesian meta-regression analysis. PLoS medicine. 2022 Feb 15;19(2):e1003901.
5. Mullins N, Bigdeli TB, Børghlum AD, Coleman JR, Demontis D, Mehta D, Power RA, Ripke S, Stahl EA, Starnawska A, Anjorin A. GWAS of suicide attempt in psychiatric disorders and association with. American Journal of Psychiatry.
6. Dodani S, Zuberi RW. Center-based prevalence of anxiety and depression in women of the northern areas of Pakistan. Journal of Pakistan Medical Association. 2000;50(5):138.
7. Azam SI. Prevalence and Factors associated with Anxiety and Depression among Family Practitioners in Karachi, Pakistan.
8. Khalid A, Qadir F, Chan SW, Schwannauer M. Adolescents' mental health and well-being in developing countries: a cross-sectional survey from Pakistan. Journal of Mental Health. 2019 Jul 4;28(4):389-96.
9. Karrouri R, Hammani Z, Benjelloun R, Otheman Y. Major depressive disorder: Validated treatments and future challenges. World journal of clinical cases. 2021 Nov 11;9(31):9350..
10. Sawyer MG, Reece CE, Sawyer AC, Johnson SE, Lawrence D. Has the prevalence of child and adolescent mental disorders in Australia changed between 1998 and 2013 to 2014?. Journal of the American Academy of

- Child & Adolescent Psychiatry. 2018 May 1;57(5):343-50.
11. Javed MA, Ahsan W, Khattak UK, Afzal S. Stigma Associated with Seeking Psychiatric Care Among the General Population of Islamabad, Pakistan. *Pakistan Journal of Public Health*. 2024 Mar 29;14(1):33-7.
  12. Jacobsen PB, Jim HS. Psychosocial interventions for anxiety and depression in adult cancer patients: achievements and challenges. *CA: a cancer journal for clinicians*. 2008 Jul;58(4):214-30.
  13. Mathew SJ, Wilkinson ST, Altinay M, Asghar-Ali A, Chang LC, Collins KA, Dale RM, Hu B, Krishnan K, Kellner CH, Malone DA. ELEctroconvulsive therapy (ECT) vs. Ketamine in patients with Treatment-resistant Depression: The ELEKT-D study protocol. *Contemporary clinical trials*. 2019 Feb 1;77:19-26.
  14. Naqvi H, Khan MM. Use of electroconvulsive therapy at a university hospital in Karachi, Pakistan: a 13-year naturalistic review. *The Journal of ECT*. 2005 Sep 1;21(3):158-61.
  15. Chang SS. *Electroconvulsive therapy in Asia. Electroconvulsive and neuromodulation therapies*. Cambridge Univ. Press, New York. 2009 Mar 2:256-65.
  16. Goldberg JF. Electroconvulsive therapy: still the gold standard for highly treatment-resistant mood disorders. *CNS spectrums*. 2022 Oct;27(5):525-6.
  17. Ali SA, Mathur N, Malhotra AK, Braga RJ. Electroconvulsive therapy and schizophrenia: a systematic review. *Complex psychiatry*. 2019 Apr 2;5(2):75-83.
  18. Chu CW, Chien WC, Chung CH, Chao PC, Chang HA, Kao YC, Chou YC, Tzeng NS. Electroconvulsive therapy and risk of dementia—a nationwide cohort study in Taiwan. *Frontiers in psychiatry*. 2018 Sep 7;9:397.
  19. Satomoto M. Ketamine Anesthesia in Electroconvulsive Therapy. In *Ketamine Revisited-New Insights into NMDA Inhibitors* 2021 Nov 18. IntechOpen.
  20. Bukowski N, Laurin A, Laforgue EJ, Preterre C, Rouaud T, Damier P, Raoul S, Dumont R, Loutrel O, Guitteny M, Derkinderen P. Efficacy and safety of electroconvulsive therapy in patients with deep brain stimulation: literature review, case report for patient with essential tremor, and practical recommendations. *The Journal of ECT*. 2022 Sep 1;38(3):e29-40.
  21. Weiner R, Lisanby SH, Husain MM, Morales OG, Maixner DF, Hall SE, Beeghly J, Greden JF. Electroconvulsive therapy device classification: response to FDA advisory panel hearing and recommendations. *The Journal of clinical psychiatry*. 2013 Jan 15;74(1):6334.
  22. Qiu H, Li X, Luo Q, Li Y, Zhou X, Cao H, Zhong Y, Sun M. Alterations in patients with major depressive disorder before and after electroconvulsive therapy measured by fractional amplitude of low-frequency fluctuations (fALFF). *Journal of affective disorders*. 2019 Feb 1;244:92-9.
  23. stergaard SD, Speed MS, Kellner CH, Mueller M, McClintock SM, Husain MM, Petrides G, McCall WV, Lisanby SH. Electroconvulsive therapy (ECT) for moderate-severity major depression among the elderly: data from the pride study. *Journal of affective disorders*. 2020 Sep 1;274:1134-41.
  24. Ferreira-Garcia R, da Rocha Freire RC, Appolinário JC, Levitan MN, Halkjær-Lassen RD, Bueno JR, Nardi AE. Tranylcypromine plus amitriptyline for electroconvulsive therapy-resistant depression: a long-term study. *Journal of Clinical Psychopharmacology*. 2018 Oct 1;38(5):502-4.
  25. Blackburn TP. Depressive disorders: Treatment failures and poor prognosis over the last 50 years. *Pharmacology research & perspectives*. 2019 Jun;7(3):e00472.
  26. Rybak YE, Lai KS, Ramasubbu R, Vila-Rodriguez F, Blumberger DM, Chan P, Delva N, Giacobbe P, Gosselin C, Kennedy SH, Iskandar H. Treatment-resistant major depressive disorder: Canadian expert consensus on definition and assessment. *Depression and anxiety*. 2021 Apr;38(4):456-67.