JPSIM Journal of Pakistan Society of Internal Medicine

Original Article

The Efficacy of Behavioral Activation Therapy (BAT) and Pharmacologic Intervention in Postpartum Depression: A PHQ-9 Trajectory Analysis Using Protocol-Defined Remission Criteria

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Abstract

Objective: To compare and assess the efficacy of pharmacologic treatment and Behavioral Activation Therapy PPD in females diagnosed with postpartum depression.

Methods: In this prospective observational study, newly diagnosed females obtained either pharmacological therapy or BAT. PHQ-9 baseline and follow-up scores were used to measure the results. Demographic and clinical history and outcome of treatment were gathered. There was a comparison of descriptive statistics, paired t-tests and between-group comparisons.

Results: The pharmacological group reported an average decrease of PHQ-9 of 11.2 ± 2.89 to 5.8 ± 2.64 and BAT group reported an average decrease of 10.8 ± 2.65 to 5.29 ± 1.99 at six weeks. The remission, response and partial remission was requested in BAT group, as well as in the two groups. Trends were represented as bar, line and scatter plots.

Conclusion: Both interventions significantly improved depressive symptoms, with BAT showing a marginally higher remission rate and lower standard deviation. The findings support the inclusion of BAT as a viable first-line non-pharmacologic intervention for PPD, particularly in resource-limited settings or when pharmacotherapy is declined.

Keywords: Postpartum depression, Pharmacologic treatment, Behavioral Activation Therapy, PHQ-9, Mental health, Comparative effectiveness

How to cite this:

Zainab G, SundasK, Nargis S, Eatsham MU, Khalid A, Rajput NR. The Efficacy of Behavioral Activation Therapy (BAT) and Pharmacologic Intervention in Postpartum Depression: A PHQ-9 Trajectory Analysis Using Protocol-Defined Remission Criteria. J Pak Soc Intern Med. 2026;7(2): 109-115

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Received: 09-04-2025 **Revised:** 12-04-2026 **Accepted:** 04-05-2026 **DOI:** https://doi.org/10.70302/jpsim.v7i2.2622

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Introduction

Postpartum depression (PPD) is an important issue of women health as around 13-19 percent of new mothers are affected by this problem.[1] PPD is characterized by continued low mood, worthlessness, and desolation in new mothers. Compared to the transient baby blues, which occur in almost half of women within days after giving birth and last not more than 10 days, PPD is chronic and more serious.[1,2] By (ICD) International Classification of Diseases, Postpartum Depression is categorized by depressive symptoms which occur within the first 6 weeks of childbirth. Nevertheless, different studies have caused the modifications in this period, and some guidelines extend the onset period to the first six months, and others perceive up to one year postpartum as the time window when PPD may occur.[3] The precise pathogenesis of PPD is unknown, but there are a number of models. The biological model is credited to sudden drops in pregnancy related hormones like cortisol, estradiol and progesterone. The withdrawal model also postulates that the abrupt postpartum decrease in reproductive and stress hormones creates chaos in system regulation that leads to the development of PPD[4]. Such models are not entirely descriptive of the relationship between hormone withdrawal and depressive symptoms, even those developing during pregnancy. The depression model focuses on abnormal levels of cortisol whereas the recent literature also suggests

dysregulated dopaminergic pathways as a causative factor in PPD pathophysiology.[5] The literature in the recent past has suggested that abnormal dopaminergic regulation might be involved in the pathophysiology of postpartum depression (PPD).[6] Risk factors of PPD have always been sociocultural (life stress, childcare stress, prenatal anxiety, prior PPD, marital conflict and single parenthood).[7] It was long thought that PPD only affected women of western societies and that culture was what defined with the postnatal mood disorders.[8] Nonetheless, other countries have also identified conditions with similar symptoms as well.[9] PPD is similar in all societies, but differs by region. Generally, rates are less in Europe and Australia, more in the Americas, and most in Asia and South Africa.[10] PPD symptoms are similar to other depressive disorders but distinguished by some characteristics, such as constant low mood, sleep and appetite problems, mood swings, deficiency in concentration, irritability, and guilt about a failure in looking after the child.[11] Recent statistics indicate that postpartum psychiatric illness may be considered to be continuous with psychiatric illness at other times of the woman life.[12]

PPD is treated using a multimodal intervention including pharmacotherapy, psychotherapy, peer support, and complementary therapy. Electroconvulsive therapy is used as a last resort and hospitalization is required in the presence of suicide risk[13]. A research study conducted in the United Kingdom revealed that three short visits at home involving counseling methods helped in improving the speed of recovery in women with PPD[14].

Behavioral Activation Therapy (BAT) is a brief, structured psychotherapeutic intervention that assumes depression is sustained by reduced participation in positive activities, avoidance and the disruption of daily routines. BAT is particularly pertinent for women after childbirth as the perinatal period can lead to changes in sleep, social interactions, self-care, work or other roles and sense of control. The treatment typically involves identifying and monitoring avoided activities, recording daily mood-activity relationships, scheduling small and valued activities, reducing passive disengagement, and reintroducing routine activities. BAT can be delivered in a more straightforward and structured manner than other psychotherapies, making it ideal for low-resource clinical settings where psychological services may be scarce. Recent research suggests that behavioral activation may be an effective approach to treating postnatal depression, but more comparative studies are required to determine its efficacy relative to pharmacotherapy and treatment-as-usual [15].

In this study, we observed the effectiveness of Behavioral Activation Therapy (BAT) and Pharmacotherapy in Post-Partum Depression diagnosed women under the supervision of medical and psychiatry experts in Tertiary care hospital.

Methods

Current study is a prospective-observational study among mothers with postpartum depression (PPD) diagnosed based on the DSM-5 criteria and clinically diagnosed using the PHQ-9 questionnaire. Females between 20-35 years; with a clinically diagnosed postpartum depression (PPD) and meeting the DSM-5 criteria. Women who scored PHQ-9 20 or more were categorized as severely depressed and referred to the specialized psychiatric care units, and therefore could not participate in the study. The research study was approved by the ethics committee of Bahawalpur Hospital (Approval Number: 311). Informed consent was obtained in writing by all of them before they were included in the study.

Women with postpartum depression were recruited (n=84) and 42 each randomly allocated to two subgroups Behavioral Activation Therapy (BAT) and pharmacological treatment. All participants needed to be 20-40 years old and less than two months after childbirth, without psychosis, drug use, or major comorbidity. Treatment was based on pharmacological therapy, the most frequent being sertraline (25-50mg/day, with gradual increase to the highest dose in weekly intervals) or escitalopram (10-20mg/day). PHQ-9 was used to determine depression severity (at baseline and six weeks) following treatment. Primary outcome was the change in PHQ-9 score that was evaluated using paired t-tests and absolute/percentage changes. Categorical outcomes included Response (50% or more reduction), Partial Response (30-49% reduction) and Remission (PHQ-9 <5).

Pharmacological intervention (Pharmacological Group)

The Google Sheets and IBM SPSS (v27.05) were used to perform statistical analysis of the 42 pharmacological group patients. Demographic and baseline information (age, education, clinical and obstetric history) was summarized descriptively. The PHQ-9 scores were noted at baseline and at follow-up with treatment efficacy measured by the difference in mean scores, standard deviations and percentage improvement: Percentage Improvement = (Baseline Follow-up)/Baseline) x 100. The patients were divided into Partial Response (less than 50% improvement), Response (50 percent), and Remission (65 percent and above) categories. Bar charts were used to illustrate the results.

Behavioral Activation Therapy (BAT) Group

The BAT group received a clinician-supervised behavioral activation (BAT) intervention. The intervention targeted the link between mood, avoidance, decreased activity,

and decreased reinforcement. The intervention involved psychoeducation about postpartum depression, identification of avoidant or withdrawn behaviours, daily activity monitoring, linking activity and mood, scheduling simple and manageable activities, and re-integration into personal, family and social activities in a gradual manner.

BAT sessions were about 30-45 minutes in length. Treatment was provided weekly for six weeks.

The BAT plan was tailored to each participant's role in the postpartum period, family support, level of fatigue, childcare responsibilities, and cultural background. Simple activity homework tasks included self-care activities, brief social interactions, household chores, light to moderate physical activity (if medically appropriate), pleasurable activities, and activities that produce a sense of mastery.

The statistical analysis has been divided into two groups; Behavioral Activation Therapy (BAT) Group and Pharmacological intervention (Medicine Group). The analysis of data was provided with Google Sheets and IBM SPSS Statistics (Version 25.0, IBM Corp.,). Baseline characters were done using descriptive statistics, frequency distributions and graphical presentation whereas comparison of treatment outcomes was done using inferential statistics.

Results

In total n=84 females were recruited in this study. The average age in years and the standard deviation of the participants were 30 (SD = 3.6) respectively with a range of 25-36 years. Most of the respondents attended either matriculation (42.9%) or intermediate education (41.7%) with 15.5% being graduates. All of the participants were married. The average income per month per family was PKR 43,024 and the lowest and highest incomes were PKR 12,000 and 75,000 respectively. The average number of children of participants was 1.8 and the average order of pregnancy was 2.8 as presented in Table 1.

Depression History of Participants: One in five (72.6) participants indicated they had been depressed in the past, with 59.5% having been diagnosed with PPD. But only 40% had been previously treated.

Relationship of Depression with Demographic and Socioeconomic Variables: Older women experienced the effects of the symptoms more severely, and there was a negative correlation between age and PHQ-9 scores. This could be indicative of differences in mental health literacy, coping skill, and access to psychosocial support, and education probably plays a role in PPD severity as shown in comparison table.

Pharmacological Group: Out of 84 patients, 42 were recruited in Pharmacological group

Depression History (Pharmacological Group): Among the pharmacological group, 76.2 percent of the respondents had history of depression and 52.4 percent of the respondents had history of postpartum depression (PPD).

Table 1: *Data Summary of Participants, n=84*

Variable	Category	n (%) / Mean ± SD
Age (years)	Mean	30
	SD	3.6
	Range	25–36
Education Level	Matriculation	36 (42.9%)
	Intermediate	35 (41.7%)
	Graduate	13 (15.5%)
Marital Status	Married	84 (100%)
	Divorced/ Other	0 (0%)
Family Income	Mean (PKR)	43,024
	Min - Max	23,000–65,000
No. of Children	Mean	1.9
Pregnancy Order	Mean Pregnancy Number	2.8
Clinical History of Participants		
Previous Depression History	yes	61 (72.60)
	No	23 (27.40%)
Previous PPD Diagnosis	Yes	50 (59.50)
	No	34 (40.50)
History of Depression Treatment	Yes	31 (40)
	No	53 (63)
Type of Treatment received	Pharmacological	34 (40)
	Non Pharmacological	0 (0)
Recent PPD Diagnosis	Confirmed	84 (100)
Depression Severity		
	Mild (5–9)	29 (34.50)
	Moderate (10–14)	45 (53.60)
	Severe (≥15)	10 (11.90)

Depression Severity in Pharmacological Group: The PHQ-9 scores indicated that most of the participants in the pharmacological group were found to be in moderate depression (n=23, 55%). The mild depression was prevalent in 33 percent (n=14), and the severe depressive symptom was observed in 12 percent (n=5).

Outcomes (Pharmacological Group): Out of the 42 patients in this group, many successfully entered the remission or response category, with fewer ones staying in the partial or no response group.

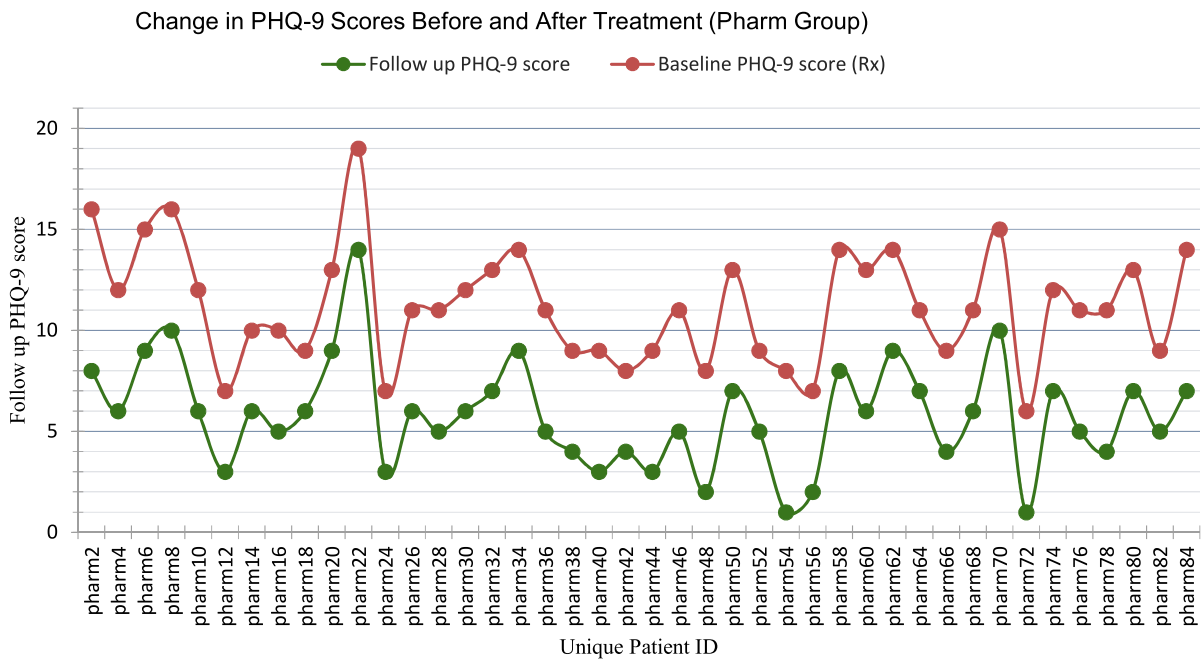

Figure 1: *Line Graph Comparing the effect of Pharma-cotherapy Baseline vs Follow-up*

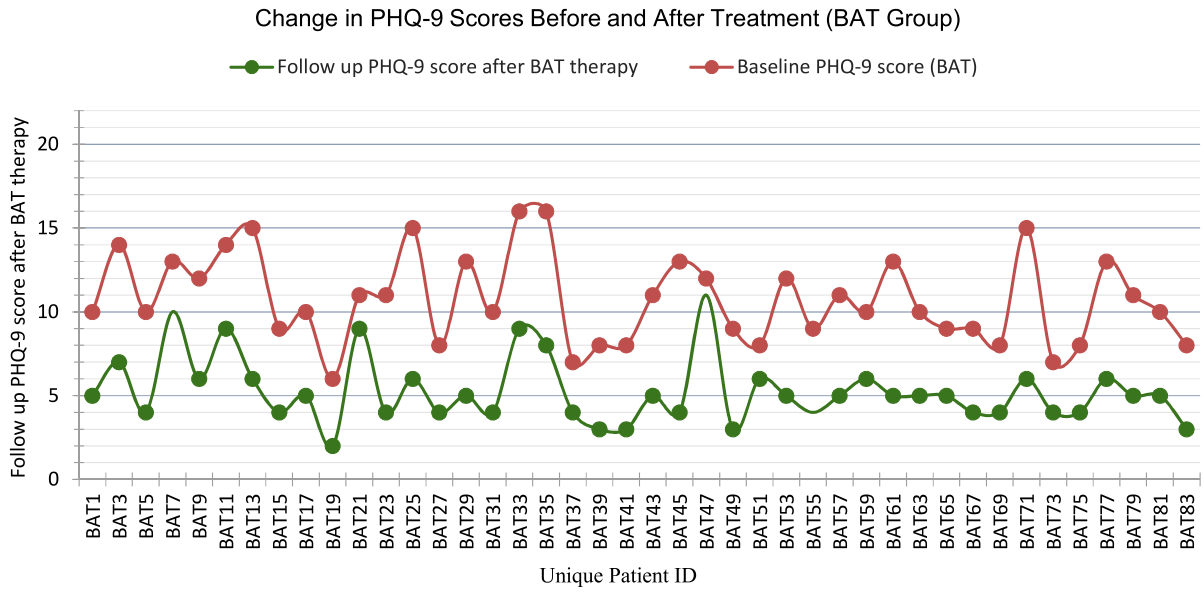

Figure 2: *Line Graph Comparing Baseline and Follow-up PHQ-9 Score*

PHQ-9 Outcome Categories – Pharmacological Group: There were 28.5% (n=12) in the pharmacological group who experienced full remission, 26.3% (n=11) experienced significant response but not full remission, and 45.2% (n=19) experienced a partial response. These findings show that there is significant improvement in symptoms after pharmacologic treatment.

PHQ-9 Score Improvement – Post Treatment (Pharmacological Group): Pharmacological group PHQ-9 score significantly decreased the mean score of 11.2 ± 2.89 to 5.8 ± 2.64 at the follow-up. The reduction means that there is a great reduction in depressive symptoms once treatment is done.

Behavioral Activation Therapy (BAT) Group: Out of 84 patients, 42 were recruited in BAT group.

Depression History (BAT Group): Of the respondents who took part in the BAT group (n=42), 69 percent (n=29) had a history of depression as well as 66 percent (n=28) had a history of postpartum depression (PPD) prior to the study. But 36% (n=15) had a previous PPD treatment of some kind.

Depression Severity in BAT Group: The majority of the subjects in the BAT group presented moderate

depression (52%, n=22) at baseline followed by mild depression (36%, n=15). Fewer participants (12%, n = 5) were severely depressed (PHQ-9 15).

Outcomes (BAT Group): A significant difference was observed in the depressive symptoms of participants, who were the recipients of the Behavioral Activation Therapy (BAT). The average baseline PHQ-9 score was 10.76 and the improvement at the follow-up became 5.29, with the average difference being 5.48. The paired t-test indicated that this change was statistically significant ($p < 0.0001$) and this fact speaks in favor of high evidence that the therapy worked. The standard deviation of the difference was 1.98, which showed that the individual response to the intervention was of moderate level.

PHQ-9 Outcome Categories – BAT Group: The participants of the BAT group demonstrated positive clinical changes as per the PHQ-9 outcome categories. The remission and response rates were 40.5 percent (n=17) which means that most of them experienced significant symptom decrease. Partial response was demonstrated in a lesser percentage (9.5%), whereas the lack of response was reported in 9.5 percent of respondents, indicating BAT was effective in a substantial majority of postpartum women with moderate to severe depressive symptoms.

PHQ-9 Score Improvement – Post Treatment (BAT Group): The Behavioral Activation Therapy (BAT) group was identified as having a very large reduction in depressive symptoms. The PHQ-9 score reduced significantly at follow-up (5.29; SD = 1.99) compared with the baseline (10.8; SD = 2.65) and there was a clinically significant improvement after the intervention.

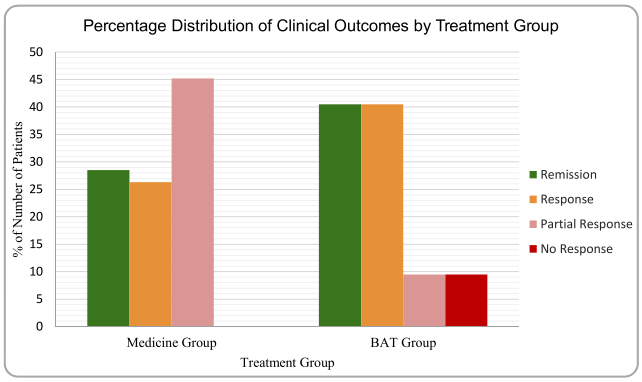

Figure 3: *PHQ-9 Improvement Category Comparison between Treatment Groups*

Discussion

This study examined PHQ-9 symptom trajectories of postpartum women who were treated with Behavioral Activation Therapy (BAT) or pharmacotherapy. There were significant reductions in depressive symptoms from baseline to follow-up for both groups. The study suggests pharmacological treatment and BAT are both effective interventions in the treatment of PPD. But the proportion of remitters and responders was significantly higher in the BAT group in this study, and the proportion

Table 3: *Demographic comparison among total Sample and Study Groups*

Variable		Total Sample (n=84)	BAT Group (n=42)	Pharmacological Group (n=42)	p-value
Age (years)	Mean ± SD	30 ± 3.6	30.3 ± 3.5	30.4 ± 3.3	0.893 (t-test)
	Range	25–36	25–36	25–36	—
Mean Monthly Income (PKR)		43,024	40,600	44,000	0.523
Education, *n* (%)	Matriculation	36 (42.9%)	18 (43%)	18 (43%)	—
	Intermediate	35 (41.7%)	21 (50%)	14 (33.3%)	
	Graduate	13 (15.5%)	3 (7%)	10 (23.8%)	—
Mean Number of Children		1.80	1.70	1.90	—
Clinical Characteristics Comparison among total Sample and Study Groups					
Baseline PHQ-9 Score (Mean ± SD)		11 ± 2.74	10.8± 2.63	11.2 ± 2.85	—
Depression Severity, *n* (%)	Mild (5–9)	29 (34.5%)	15 (35.7%)	14 (33%)	—
	Moderate (10–14)	45 (53.5%)	22 (52.3%)	23 (55%)	—
	Severe (≥15)	10 (12%)	5 (12%)	5 (12%)	—
Previous PPD History, *n* (%)		50 (62%)	28 (66%)	22 (52%)	—
PHQ-9 Improvement	Remission		17 (40.4%)	12 (28.5%)	—
	Response		17 (40.4%)	11 (26.3%)	—
	Partial Response		4 (9.5%)	19 (45.2%)	—
	No Response		4 (9.5%)	0 (0%)	—
Pre-post comparison	Baseline		10.8 ± 2.65	11.2 ± 2.89	—
	Follow-up		5.29 ± 1.99	5.83 ± 2.64	—

of partial responders was higher in the pharmacological group.

Both groups generally had moderate PHQ-9 scores, which reflected prevalence rates of postpartum on a global scale. The distribution of the severity was similar (mild, moderate, severe), which meant an equal distribution. Of particular interest is that 60 percent had a history of PPD, which is consistent with the observation that history incidences are a strong predictor of recurrence.[16]

The drug group also had significant improvement in PHQ-9 scores. This suggests a beneficial role of antidepressants, particularly selective serotonin reuptake inhibitors, for treating postpartum depression when it is indicated and acceptable to the patients. However, adherence to medication in the postpartum period may be affected by concerns about breastfeeding, adverse effects, family and societal views, stigma and lack of follow-up. These may have contributed to the higher proportion of partial responders in the pharmacological group. Recent reviews highlight that management of postpartum depression should be tailored to the patient's needs and preferences, availability of treatment and its safety, using a combination of pharmacological, psychological and psychosocial interventions based on the severity of symptoms.[17]

Total PHQ-9 scores significantly decreased in both groups ($p < 0.001$) and remission in the BAT group was also higher (40.5%) compared to the pharmacological group (28.5%). This is consistent with the findings that cognitive-behavioral interventions have the potential to alleviate symptoms of PPD and improve maternal quality of life.[18] In this study BAT showed a little more decrease in depressive symptoms as compared to pharmacotherapy within the same time period applied for the therapy. The results of our study aligns with the research and that the psychotherapy showed the better results than pharmacological therapy.[19] This study highlighted a very interesting fact about the mothers in our study who were older showed disproportionately greater signs of depression, in line with existing data that indicated that women older than 35 had an increased risk of PPD. Moreover, participants with lower education (primary level) scored higher in PHQ-9, which supports the findings of other studies that education is negatively related to the risk of postpartum depression.[16] In this study, it was observed that mothers with low family income had more depressive symptoms as compared to mothers who had more stable family income. An inverse proportion was found in PHQ-9 score of mothers with low family income fig.8. Similar kind of observation was also seen in a study that low-income urban mothers (42%) had severe symptoms of postpartum depression and posttraumatic stress (30%).[20] In both BAT and pharmacologic groups, there were clinically significant improvements, which is consistent with prior literature reports that have documented moderate to large effect sizes of structured psychotherapies and antidepressants. BAT can be used as a primary or adjunctive education, especially in cases when the adherence to the drug is low or when pharmacotherapy is not an option, e.g. in nursing mothers.[21]

In both BAT and pharmacologic intervention, clinically significant changes in depressive symptoms. The reduction seen here is in line with previous literature that demonstrates that structured psychotherapeutic interventions and antidepressant medications have moderate-to-large effect sizes in the management of postpartum depression.[22] The remission rate was higher (40.4% vs. 28.5%) and the full responder rate was similar (40.4% vs. 26.3%) in BAT group compared to medication alone in some patients, implying that BAT could be helpful in resolution of the symptoms and improvement of functional outcomes in a higher number of patients than medications alone. Although pharmacologic therapy is effective in decreasing core depressive symptoms, it does not necessarily cover psychosocial impediments to recovery, which may be the reason behind the increased partial response rate. In addition, cultural perspectives on the utilization of medication in the postpartum process, especially among breastfeeding mothers, could have an impact on adherence, which would moderate outcomes.

The existing evidence shows that BAT may be regarded as a possible first-line or adjunctive treatment of postpartum depression, especially in those settings where drug adherence is not likely or in situations when there is reluctance to rely on pharmacologic treatment for example in nursing mothers.

Conclusion

The study adds to the comparative efficacy literature on the BAT versus pharmacologic treatment by showing that structured activity-based therapy can induce remission in a reasonable proportion of patients. The results justify individual treatment optimization and the possible use of BAT in clinical practice. Those observations should be reinforced by larger studies with longer follow-ups to inform policy-level recommendations.

Ethical Approval: The IRB/EC approved this study via letter no. 311/DME/QAMC Bahawalpur Dated August 12, 2025.

Conflict of Interest: None

Funding Source: None

Authors' Contribution

GZ: Conception.

KS, SN, MUE: Design of the work.

AK, NRR: Data acquisition, analysis, or interpretation.

KS, SN, MUE, AK: Draft the work.

GZ, NRR: Review critically for important intellectual content.

All authors approve the version to be published.

All authors agree to be accountable for all aspects of the work.

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