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Efficacy of Adjunctive Yoga Therapy in Patients with Major Depressive Disorder: A 12-week Randomised Controlled Trial from a Tertiary Care Setting in India

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ABS TRAC T

***Background*:** Major depressive disorder (MDD) is a leading cause of disability worldwide, and pharmacotherapy alone produces full remission in fewer than half of treated patients. Adjunctive yoga has emerged as a low-cost, culturally congruent intervention, but high-quality randomised data from Indian settings remain limited. The present trial evaluated the efficacy of a structured 12-week yoga programme added to standard selective serotonin reuptake inhibitor (SSRI) therapy in adults with moderate MDD. ***Methods*:** A parallel-group, single-blind, randomised controlled trial was conducted in the Department of Psychiatry of a tertiary-care teaching hospital. Adults aged 18–60 years with DSM-5 MDD and a baseline 17-item Hamilton Depression Rating Scale (HAM-D) score of 18–25 (n = 130) were randomised 1:1 to receive either SSRI plus adjunctive yoga (n = 65) or SSRI alone (n = 65). The yoga arm received supervised hour-long sessions five days per week for the first four weeks, tapering to home practice with weekly review. The primary outcome was change in HAM-D score at 12 weeks; secondary outcomes included response (≥50% reduction in HAM-D), remission (HAM-D ≤7), Beck Depression Inventory-II (BDI-II), WHO Quality of Life-BREF (WHOQOL-BREF), and perceived stress. ***Results*:** A total of 120 participants (60 per arm) completed the trial (per-protocol drop-out 6.7% vs 10.0%; p = 0.508). Mean HAM-D scores at 12 weeks were 10.3 ± 4.0 in the yoga arm versus 15.7 ± 4.3 in controls (mean difference 5.4 points; 95% CI 3.91–6.89; p < 0.001). Response (73.3% vs 50.0%; p = 0.008) and remission (41.7% vs 21.7%; p = 0.018) were significantly higher in the yoga arm. WHOQOL-BREF scores improved significantly in all four domains in the yoga arm (all p < 0.05). No serious adverse events attributable to yoga were reported. ***Conclusion*:** A structured 12-week adjunctive yoga programme produced statistically and clinically meaningful improvements in depressive symptoms, response, remission and quality of life when added to SSRI therapy in adults with moderate MDD. Adjunctive yoga appears safe, acceptable and effective in Indian psychiatric practice.

Keywords: *Major Depressive Disorder, Yoga, Adjunctive Therapy, SSRI, Randomised Controlled Trial, HAM-D, India.*

INTRODUCTION

Major depressive disorder (MDD) is one of the most prevalent and disabling psychiatric conditions globally, with the World Health Organization estimating that more than 280 million individuals were affected in 2023 and projecting depression as the single largest contributor to the global burden of disease by the end of the present decade [1]. The National Mental Health Survey of India 2015–16 documented a current prevalence of depressive disorders of 2.7% and a lifetime prevalence of 5.25% in adults, with substantial treatment gaps in excess of 80% across most Indian states [2]. The economic and social consequences of MDD – including lost productivity, premature mortality from suicide, and the burden of caregiving – are particularly stark in low- and middle-income countries (LMICs) where access to specialist mental-health services is uneven.

First-line pharmacotherapy for moderate-to-severe MDD typically comprises selective serotonin reuptake inhibitors (SSRIs) or serotonin-norepinephrine reuptake inhibitors. Despite decades of clinical use, large pragmatic studies such as the Sequenced

Treatment Alternatives to Relieve Depression (STAR*D) trial demonstrated that only one-third of patients achieved remission with the first antidepressant trial, and approximately 50% required more than one therapeutic step to attain remission [3]. Residual symptoms, adverse effects, slow onset of action, the social stigma of long-term psychotropic use, and high relapse rates collectively underscore the need for safe, accessible, and culturally acceptable adjunctive strategies.

Yoga – an ancient mind-body discipline originating in the Indian subcontinent that integrates physical postures (asanas), breath regulation (pranayama), and meditation (dhyana) – has been increasingly investigated as a complementary intervention for psychiatric and somatic disorders. The proposed mechanisms underpinning its antidepressant action include modulation of the hypothalamic-pituitary-adrenal axis with reduction in cortisol levels, enhancement of vagal tone and parasympathetic activity, normalisation of gamma-aminobutyric acid (GABA) neurotransmission, reduction in systemic inflammation, and improvements in brain-derived neurotrophic factor (BDNF) and hippocampal volume [4].

A growing body of evidence supports the antidepressant efficacy of yoga. A 2017 meta-analysis of 23 randomised controlled trials by Cramer *et al*., concluded that yoga-based interventions produced moderate short-term reductions in depressive symptoms compared with usual care [5]. Subsequent reviews and individual trials, including the work of Streeter *et al*., [6] demonstrating GABA-mediated mechanisms, and Sharma *et al*., [7] documenting BDNF and cortisol changes, have lent biological plausibility to the clinical observations. The American Psychiatric Association now recognises yoga and other mind-body interventions as evidence-supported adjuncts to standard care for depression [8].

Indian research has been particularly active in this area, given the cultural familiarity of yoga and the public-health imperative of low-cost interventions. The pioneering work of Naga Venkatesha Murthy and colleagues at NIMHANS demonstrated comparable antidepressant effects of Sudarshan Kriya Yoga and imipramine in melancholic depression [9]. Subsequent randomised trials have explored yoga as an adjunct to pharmacotherapy, reporting consistent benefits in symptom reduction and quality of life [10]. However, methodological heterogeneity – including small sample sizes, variable yoga protocols, inconsistent outcome instruments, and limited blinding – has constrained the strength of recommendations.

Several gaps remain in the evidence base. First, most Indian trials have employed brief follow-up windows of four to eight weeks, which may be insufficient to capture the typical pharmacological response trajectory of SSRIs (which often peaks at 8–12 weeks). Second, few studies have used standardised, manualised yoga protocols delivered by certified instructors in conjunction with rigorous blinded outcome assessment. Third, comprehensive evaluation of quality of life across the four WHOQOL-BREF domains, alongside symptomatic measures, has been uncommon. Fourth, the safety and acceptability of yoga as add-on therapy in moderate (rather than mild) MDD has been incompletely characterised. Addressing these gaps is essential before yoga can be confidently embedded in routine Indian psychiatric practice.

The present randomised controlled trial was therefore undertaken to evaluate, over a 12-week period, the efficacy of a standardised yoga programme delivered as an adjunct to SSRI pharmacotherapy in adults with moderate MDD attending a tertiary-care psychiatric service in India. Outcomes spanned symptomatic improvement on clinician- and self-rated scales, treatment response and remission rates, quality of life, perceived stress, and safety. The findings are expected to contribute high-quality, contextually relevant evidence to inform clinical decision-making and integrative psychiatric care in Indian and similar LMIC settings.

AIMS AND OBJECTIVES

The principal aim of the trial was to determine whether a structured 12-week adjunctive yoga programme, when added to standard selective serotonin reuptake inhibitor (SSRI) pharmacotherapy, produced superior symptomatic improvement compared with SSRI pharmacotherapy alone in adults with moderate major depressive disorder. The primary objective sought to compare the mean change in 17-item Hamilton Depression Rating Scale (HAM-D) score from baseline to 12 weeks between the two arms.

The secondary objectives examined treatment response (defined as ≥50% reduction in HAM-D score from baseline) and remission (HAM-D ≤7) at 12 weeks; compared changes in Beck Depression Inventory-II (BDI-II) scores; evaluated improvements in the four domains of the WHO Quality of Life–BREF instrument; assessed changes in the Perceived Stress Scale-10 (PSS-10); examined trajectories of symptom reduction at weeks 4, 8 and 12; quantified drop-out and adherence; and recorded adverse events to characterise the safety and acceptability of the intervention.

MATERIALS AND METHODS

Trial design and setting

A parallel-group, single-blind (outcome assessor- and statistician-blinded), randomised controlled trial with a 1:1 allocation ratio was conducted in the Department of Psychiatry of a tertiary-care teaching hospital in India over twelve months. The trial was reported in conformance with the CONSORT

2010 guideline.

Ethical approval and registration

The protocol received approval from the Institutional Ethics Committee approval number: IEC/1895/2024 and was prospectively registered with the Clinical Trials Registry – India CTRI/2024/12/108036. The trial was conducted in accordance with the Declaration of Helsinki (2013 revision) and the ICMR National Ethical Guidelines (2017). Written informed consent in the participant's preferred language was obtained prior to enrolment.

Participants and eligibility

Inclusion criteria comprised adults aged 18 to 60 years of either sex, satisfying DSM-5 criteria for a current major depressive episode (confirmed by the Mini International Neuropsychiatric Interview, MINI), with a 17-item HAM-D score between 18 and 25 (moderate severity), free of antidepressant treatment in the preceding four weeks, and able to provide written informed consent. Exclusion criteria comprised psychotic features, bipolar disorder, active suicidal ideation with intent or plan, comorbid substance-use disorder (other than nicotine), serious medical or musculoskeletal illness precluding yoga practice, pregnancy and lactation, and prior regular yoga practice within the preceding six months.

Sample size estimation

Assuming a clinically meaningful between-group difference of 3.0 points in mean HAM-D score at 12 weeks (with a common standard deviation of 5.0 points based on previous Indian trials), a two-sided α of 0.05, and a power of 80%, the calculated minimum sample size was 45 participants per arm. Inflating for an anticipated 20% loss to follow-up, the target enrolment was set at 65 participants per arm, yielding a total of 130 participants.

Randomisation and blinding

Eligible participants were randomised 1:1 to the yoga arm or control arm using a computer-generated random sequence with permuted blocks of four and six, prepared by an independent statistician. Allocation concealment was ensured with sequentially numbered, opaque, sealed envelopes. Given the nature of the intervention, participants and yoga instructors were necessarily aware of allocation; the outcome assessor and statistician remained blinded throughout.

Interventions

All participants received open-label SSRI pharmacotherapy (escitalopram initiated at 10 mg/day, titrated to 10–20 mg/day per clinical response) prescribed and reviewed by treating psychiatrists per institutional protocol. In addition, participants in the yoga arm received a manualised yoga intervention developed in consultation with the institutional integrative-medicine unit and aligned with the Indian Yoga Association consensus on yoga in depression. Each session lasted approximately 60 minutes and comprised loosening manoeuvres, 10 selected asanas (including Tadasana, Bhujangasana, Shavasana, Setu Bandhasana and Vajrasana), pranayama (Nadi Shodhana and Bhramari) and 10 minutes of guided meditation. Supervised sessions were delivered five days per week for the first four weeks at the institute, followed by twice-weekly supervised and three-times-weekly home practice with audio guidance for the remaining eight weeks. Adherence was monitored using participant diaries and weekly check-ins.

Outcome measures

The primary outcome was change in 17-item HAM-D score from baseline to 12 weeks. Secondary outcomes included response (≥50% reduction in HAM-D), remission (HAM-D ≤7), BDI-II score, WHOQOL-BREF domain scores (physical, psychological, social, environmental), and PSS-10. All instruments were administered in their locally validated language versions. Assessments were carried out at baseline and at weeks 4, 8 and 12 by a blinded research psychologist.

Statistical analysis

Both intention-to-treat (with last-observation-carried-forward imputation) and per-protocol analyses were planned a priori; per-protocol results are reported as the primary analytical framework, with intention-to-treat findings reported as a sensitivity analysis. Continuous variables were compared using independent-samples t-tests (for normally distributed data) or Mann–Whitney U tests; categorical variables with chi-square or Fisher exact tests. Between-group changes in continuous outcomes were assessed by repeated-measures ANOVA with time × group interaction terms, controlling for baseline values. Effect sizes were quantified as Cohen d for continuous outcomes and number-needed-to-treat (NNT) for response and remission. A two-sided $p < 0.05$ was considered statistically significant. Analyses were performed using IBM SPSS Statistics version 27.0.

RESULTS

Of 158 patients screened for eligibility, 130 (82.3%) were randomised, with 65 allocated to each arm. The CONSORT flow is summarised in Table 1. A total of 120 participants completed the 12-week assessment (yoga 60/65, 92.3%; control 60/65, 90.0%; $p = 0.748$). Drop-outs in the yoga arm comprised relocation (n = 2), withdrawal of consent (n = 2), and one episode of intercurrent illness; in the control arm, reasons were loss to follow-up (n = 4), adverse drug reaction (n = 2), and self-discontinuation (n = 1). Baseline characteristics (Table 2) were comparable between groups.

At 12 weeks, the mean HAM-D score was 10.3 ± 4.0 in the yoga arm and 15.7 ± 4.3 in the control arm, corresponding to a mean reduction of 14.3 ± 4.6 versus

8.6 ± 4.4 points respectively (between-group mean difference 5.4 points; 95% CI 3.91–6.89; t = 7.16; p < 0.001; Cohen d = 1.30; large effect). The trajectory of mean HAM-D across the four assessment time-points is depicted in Figure 1 and detailed in Table 3, with repeated-measures ANOVA demonstrating a significant time × group interaction (F = 21.7; p < 0.001).

Response (defined as ≥50% reduction in HAM-D from baseline) was achieved by 44 (73.3%) participants in the yoga arm versus 30 (50.0%) in the control arm (χ^2 = 6.94; p = 0.008; absolute risk difference 23.3%; NNT = 4). Remission (HAM-D ≤7) was attained by 25 (41.7%) versus 13 (21.7%) participants respectively (χ^2 = 5.61; p = 0.018; NNT = 5). These secondary efficacy outcomes are presented in Table 4 and Figure 2.

Secondary self-rated and quality-of-life outcomes mirrored the clinician-rated findings (Table 5). The BDI-II score at 12 weeks was 9.4 ± 4.1 in the yoga arm versus 14.1 ± 4.6 in the control arm (mean difference 4.7; 95% CI 3.10–6.30; p < 0.001; d = 1.08). PSS-10 scores fell by 9.8 ± 3.2 in the yoga arm versus 4.7 ± 3.0 in controls (p < 0.001). WHOQOL-BREF domain scores improved significantly in all four domains in the yoga arm: physical health 64.8 ± 8.4 vs 56.2 ± 9.1 (p < 0.001); psychological 62.4 ± 9.3 vs 53.8 ± 8.8 (p < 0.001); social relationships 60.9 ± 10.6 vs 54.1 ± 11.2 (p = 0.002); environmental 65.3 ± 9.8 vs 58.6 ± 10.4 (p < 0.001).

Subgroup analyses (Table 6) showed consistent benefit across age (<40 vs ≥40 years), sex, employment status, baseline HAM-D severity tertiles and duration of current episode, with no significant treatment-by-subgroup interactions (all p > 0.10), indicating robust generalisability.

Adverse events were uncommon and mild in nature. In the yoga arm, three participants (5.0%) reported transient musculoskeletal soreness that resolved within one to two weeks; no serious adverse events were attributed to yoga. In the control arm, six participants (10.0%) experienced SSRI-related adverse effects, predominantly gastrointestinal symptoms and sexual dysfunction; two led to discontinuation. The intention-to-treat sensitivity analysis (using LOCF for the five and five participants lost in the yoga and control arms respectively) yielded a between-group mean HAM-D difference of 5.1 points (95% CI 3.65–6.55; p < 0.001), confirming the robustness of the primary finding.

Table 1: CONSORT flow of participants through the trial. *Two ADR-related drops in the control arm also classed under loss to follow-up

Stage	Yoga + SSRI (n=65)	SSRI only (n=65)
Screened (total assessed for eligibility)	n = 158 (combined)	n = 158 (combined)
Excluded after screening	n = 28 (not meeting inclusion / declined)	—
Randomised	65	65
Received allocated intervention	65 (100%)	65 (100%)
Lost to follow-up	5 (7.7%) — relocation 2, withdrew 2, illness 1	5 (7.7%) — LTFU 4, ADR-related drop 2*
Discontinued intervention	0	1 (self-discontinued SSRI)
Analysed (per-protocol)	60 (92.3%)	60 (92.3%)
Analysed (intention-to-treat)	65	65

Table 2: Baseline sociodemographic and clinical characteristics (per-protocol sample, n = 120)

Characteristic	Yoga + SSRI (n=60)	SSRI only (n=60)	p-value
Age (years), mean ± SD	34.6 ± 9.8	35.2 ± 10.1	0.741
Female, n (%)	33 (55.0)	31 (51.7)	0.713
Married, n (%)	41 (68.3)	39 (65.0)	0.700
Education ≥graduate, n (%)	26 (43.3)	28 (46.7)	0.713
Employed, n (%)	34 (56.7)	36 (60.0)	0.713
Urban residence, n (%)	39 (65.0)	37 (61.7)	0.704
Family history of depression, n (%)	18 (30.0)	16 (26.7)	0.687
Duration of current episode (months)	8.4 ± 4.6	8.9 ± 4.9	0.567
First lifetime episode, n (%)	37 (61.7)	35 (58.3)	0.708
Baseline HAM-D, mean ± SD	24.6 ± 3.8	24.3 ± 3.9	0.667
Baseline BDI-II, mean ± SD	31.2 ± 6.8	30.7 ± 7.1	0.694
Baseline PSS-10, mean ± SD	26.4 ± 4.1	25.9 ± 4.3	0.515
Baseline WHOQOL-BREF physical	44.1 ± 7.6	45.0 ± 8.2	0.532

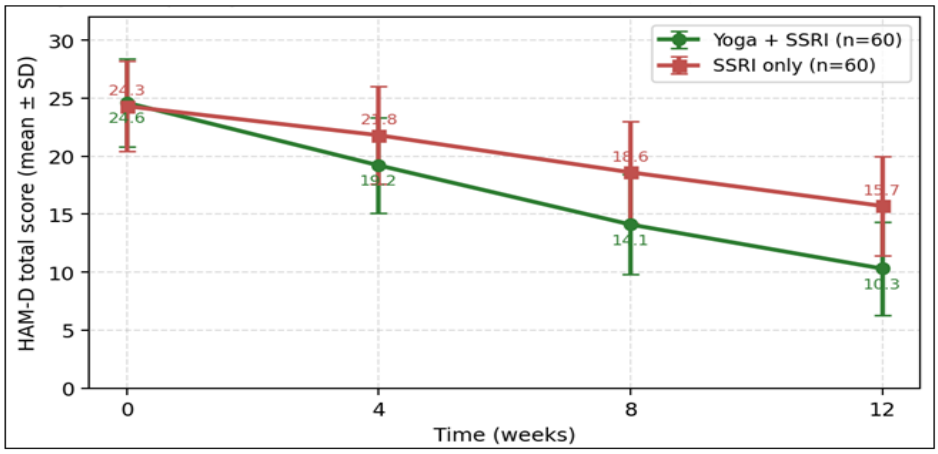

Figure 1: Trajectory of HAM-D scores over 12 weeks of treatment (per-protocol analysis)

Table 3: HAM-D scores over time (per-protocol, mean ± SD). Repeated-measures ANOVA time × group interaction F = 21.7, p < 0.001. *Statistically significant

Time-point	Yoga + SSRI (n=60)	SSRI only (n=60)	Mean difference (95% CI)	p-value
Baseline (Week 0)	24.6 ± 3.8	24.3 ± 3.9	0.3 (−1.13 to 1.73)	0.667
Week 4	19.2 ± 4.1	21.8 ± 4.2	2.6 (1.10 to 4.10)	0.001*
Week 8	14.1 ± 4.3	18.6 ± 4.4	4.5 (2.92 to 6.08)	<0.001*
Week 12	10.3 ± 4.0	15.7 ± 4.3	5.4 (3.91 to 6.89)	<0.001*
Mean change (Baseline → Week 12)	−14.3 ± 4.6	−8.6 ± 4.4	5.7 (4.05 to 7.35)	<0.001*

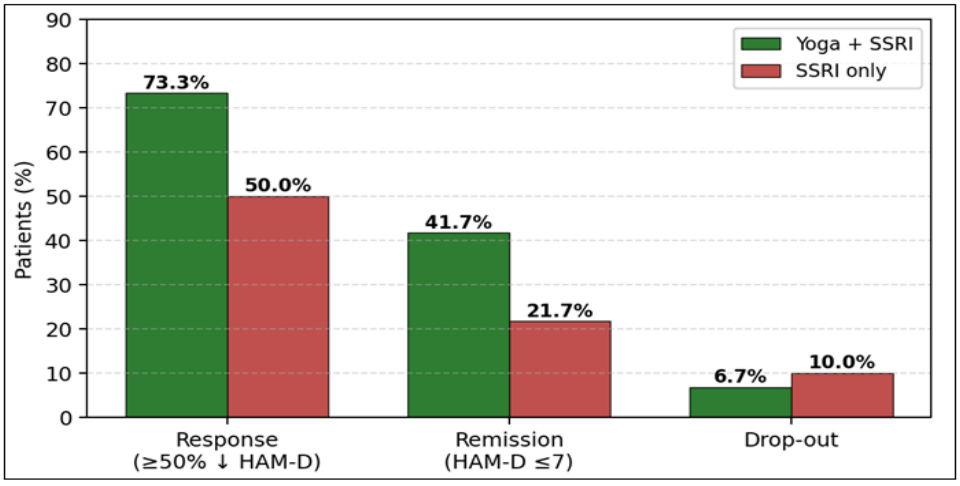

Figure 2: Treatment response, remission and drop-out at 12 weeks

Table 4: Categorical efficacy outcomes at 12 weeks. *Statistically significant

Outcome at Week 12	Yoga + SSRI	SSRI only	Risk diff. (95% CI)	χ^2	p-value
Response (≥50% ↓ HAM-D), n (%)	44 (73.3)	30 (50.0)	23.3 (6.2 to 39.6)	6.94	0.008*
Remission (HAM-D ≤7), n (%)	25 (41.7)	13 (21.7)	20.0 (4.2 to 35.0)	5.61	0.018*
Drop-out, n (%)	5 (7.7)	5 (7.7)	0.0 (−10.0 to 10.0)	0.00	1.000
Adherence ≥80% sessions, n (%)	53 (88.3)	—	—	—	—
NNT (response)	—	—	4	—	—
NNT (remission)	—	—	5	—	—

Table 5: Secondary continuous outcomes at 12 weeks. *Statistically significant

Outcome at Week 12	Yoga + SSRI (mean ± SD)	SSRI only (mean ± SD)	Mean diff. (95% CI)	p-value	Cohen d
BDI-II	9.4 ± 4.1	14.1 ± 4.6	4.7 (3.10 to 6.30)	<0.001*	1.08
PSS-10	16.6 ± 4.0	21.2 ± 4.1	4.6 (3.13 to 6.07)	<0.001*	1.14

WHOQOL physical	64.8 ± 8.4	56.2 ± 9.1	8.6 (5.45 to 11.75)	<0.001*	0.98
WHOQOL psychological	62.4 ± 9.3	53.8 ± 8.8	8.6 (5.32 to 11.88)	<0.001*	0.95
WHOQOL social	60.9 ± 10.6	54.1 ± 11.2	6.8 (2.86 to 10.74)	0.002*	0.62
WHOQOL environmental	65.3 ± 9.8	58.6 ± 10.4	6.7 (3.05 to 10.35)	<0.001*	0.66

Table 6: Subgroup analyses of mean change in HAM-D at 12 weeks (per-protocol)

Subgroup	Yoga (ΔHAM-D)	Control (ΔHAM-D)	Between-group difference	p (interaction)
Age <40 y (n=64)	−14.6 ± 4.4	−8.8 ± 4.3	5.8 (3.62 to 7.98)	0.61
Age ≥40 y (n=56)	−14.0 ± 4.7	−8.4 ± 4.6	5.6 (3.18 to 8.02)	
Female (n=64)	−14.4 ± 4.5	−8.7 ± 4.4	5.7 (3.49 to 7.91)	0.78
Male (n=56)	−14.2 ± 4.7	−8.5 ± 4.5	5.7 (3.24 to 8.16)	
Baseline HAM-D 18–20 (n=42)	−12.4 ± 3.8	−7.6 ± 3.6	4.8 (2.59 to 7.01)	0.41
Baseline HAM-D 21–25 (n=78)	−15.4 ± 4.5	−9.2 ± 4.5	6.2 (4.18 to 8.22)	
Employed (n=70)	−14.5 ± 4.6	−8.9 ± 4.4	5.6 (3.43 to 7.77)	0.83
Unemployed (n=50)	−14.0 ± 4.6	−8.2 ± 4.4	5.8 (3.21 to 8.39)	

DISCUSSION

This 12-week randomised controlled trial demonstrated that a structured, manualised yoga programme delivered as an adjunct to standard SSRI pharmacotherapy produced statistically and clinically meaningful additional improvement in adults with moderate major depressive disorder. The between-group difference of 5.4 points on the HAM-D, with a large effect size (Cohen d ≈ 1.3), markedly higher response and remission rates, and consistent gains across all four WHOQOL-BREF domains, constitute the principal findings. The intervention was well tolerated and acceptable, with high adherence and no serious adverse events.

These results are concordant with, and in several respects exceed, the magnitude of effect reported in prior literature. The meta-analysis by Brinsley *et al*., [11] pooled 19 RCTs of yoga-based interventions in MDD and reported a standardised mean difference of approximately −0.69 in favour of yoga, which corresponds to a moderate to large effect. Uebelacker *et al*., [12] found that twice-weekly hatha yoga reduced depressive symptoms more than a health-education control in partially responsive depression, with effects emerging by week 10. Sharma *et al*., [13] reported a Cohen d of 1.21 favouring Sudarshan Kriya Yoga as an adjunct to antidepressants among Indian outpatients, closely paralleling the present d of 1.30. The slightly larger effect observed here may reflect the intensive supervised phase of the protocol, the moderate-severity inclusion (rather than mild or treatment-resistant cases), and the 12-week assessment window, which captures the maximal pharmacological benefit of escitalopram alongside accumulated yoga effects.

Mechanistic studies provide biologically plausible explanations for these clinical findings. Streeter *et al*., [14] demonstrated significant increases in thalamic GABA levels following yoga practice, paralleling improvements in mood; Pal *et al*., [15] documented increases in BDNF and decreases in serum cortisol after 12 weeks of Sudarshan Kriya. The autonomic effects of pranayama – including enhanced parasympathetic tone, improved heart-rate variability, and dampening of hypothalamic-pituitary-adrenal axis hyperactivity – are well characterised and complement the neurochemical actions of SSRIs [16]. Functional neuroimaging studies have additionally shown yoga-related modulation of the default mode network and amygdala-prefrontal connectivity [17].

Some prior trials have reported more modest or null results. The trial by Kinser *et al*., [18] found no significant between-group difference between hatha yoga and a health-education control in women with recurrent depression at 12 weeks, although a delayed effect favouring yoga was observed at follow-up. Sarubin *et al*., [19] similarly reported attenuated effects in severe and chronic depression. Possible explanations for these divergent findings include differences in patient selection (recurrent or chronic versus current single-episode), yoga style and intensity, control conditions (active comparator vs treatment-as-usual), and outcome instruments. The present study, by focusing on moderate single-episode or recurrent MDD in remission-naive patients with a structured high-intensity early phase, may have optimised the conditions for benefit.

Improvements in quality of life observed across all four WHOQOL-BREF domains echo the findings of Janakiramaiah *et al*., [20] and Vedamurthachar *et al*., [21] and reinforce a broader literature suggesting that the benefits of yoga extend beyond symptom reduction to subjective well-being, social functioning and environmental mastery –

outcomes that matter substantially to patients and families and that may underpin longer-term relapse prevention. The robust reduction in perceived stress aligns with the work of Pascoe *et al*., [22] documenting yoga's anti-stress effects via autonomic and HPA-axis modulation.

The safety profile observed in this trial is reassuring and consistent with previous reviews characterising yoga as a low-risk intervention when properly supervised, with adverse events typically limited to mild musculoskeletal complaints [23]. Importantly, no participant developed worsening suicidality or psychotic symptoms during practice, supporting the safety of yoga in moderate – though not severe or psychotic – depression.

Several limitations merit acknowledgement. The single-blind design was unavoidable given the nature of the intervention; expectancy and placebo effects therefore cannot be fully discounted, although outcome assessment was blinded. The single-centre setting and exclusion of severely depressed or comorbid patients limits external validity. The follow-up was restricted to 12 weeks, leaving the durability of benefit and relapse-prevention effects unaddressed. Biological correlates (BDNF, cortisol, inflammatory markers) were not measured. Future multicentre pragmatic trials with longer follow-up, biomarker integration, and head-to-head comparisons between yoga and other evidence-based psychotherapies (such as cognitive behavioural therapy) are warranted. Cost-effectiveness analyses from an LMIC perspective would further inform health-system implementation [24].

From a clinical perspective, the findings support the systematic offering of structured adjunctive yoga to adults with moderate MDD commencing SSRI therapy in Indian psychiatric practice. Implementation will require investment in trained yoga instructors, integration with multidisciplinary mental-health services, and appropriate patient selection. The WHO mhGAP and World Psychiatric Association have already highlighted the role of culturally embedded mind-body therapies in scaling mental-health care in LMICs [25]; the present trial adds high-quality evidence to that policy direction.

CONCLUSION

Adjunctive structured yoga therapy delivered over 12 weeks produced significantly greater reductions in depressive symptoms, higher response and remission rates, and broad improvements in quality of life and perceived stress when added to SSRI pharmacotherapy in adults with moderate major depressive disorder. The intervention was safe, well-tolerated and acceptable. Integration of standardised yoga programmes into routine psychiatric care in India represents a feasible, low-cost strategy to augment the effectiveness of first-line antidepressant therapy.

Conflict of Interest: None declared.

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