

Effect of a Twelve-Week Yoga Asana and Yoga Nidra Intervention on Overall ADHD Symptoms in Children: A Randomized Controlled Trial

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ABSTRACT:

Background: Attention-deficit/hyperactivity disorder (ADHD) is a common neurodevelopmental disorder of childhood, and concern about the adverse effects of stimulant medication has increased interest in non-pharmacological options such as yoga. Whether physical postures (Yoga Asana) and guided relaxation (Yoga Nidra) differ in their effect on ADHD symptoms is not well established.

Objective: To compare the effect of a twelve-week Yoga Asana and a twelve-week Yoga Nidra programme on the overall symptom burden of children with ADHD, relative to a control group.

Methods: From 56 children identified with ADHD on the ADHD Behaviour Rating Scale (ADHD-BR), 50 aged 7–12 years were enrolled and randomly allocated, in a pre-specified 2:2:1 ratio using computer-generated random numbers, to a Yoga Asana group (n = 20), a Yoga Nidra group (n = 20) or a waitlist control group (n = 10). Overall symptoms were measured by the ADHD Total Score (the sum of the inattention and hyperactivity–impulsiveness subscales) before and after the twelve-week programme. Forty-six children completed the study. A 3 (group) × 2 (gender) analysis of covariance was applied, with the pre-test score as covariate.

Results: The group effect was significant, $F(2, 39) = 13.93$, $p < .001$, $\eta^2 = .42$. Both the Yoga Nidra group ($p < .001$) and the Yoga Asana group ($p = .001$) had significantly lower adjusted total scores than the control group, while the two intervention groups did not differ from each other ($p = .31$). Gender and the group-by-gender interaction were non-significant.

Conclusion: Both yogic practices significantly reduced overall ADHD symptoms and were comparably effective. Yoga offers a promising, low-cost, school-compatible support for children with ADHD.

Keywords: ADHD; Yoga Asana; Yoga Nidra; children; analysis of covariance; randomized controlled trial

INTRODUCTION

Attention-deficit/hyperactivity disorder (ADHD) is one of the most frequently diagnosed neurodevelopmental disorders of childhood, marked by persistent inattention, hyperactivity and impulsivity that impair everyday functioning (American

Psychiatric Association, 2013). A widely cited synthesis estimated the worldwide prevalence at about 5% of children (Polanczyk et al., 2007), and a more recent meta-analysis reported a pooled prevalence of roughly 7.6% among children aged three to twelve years (Salari et al., 2023). Because the disorder involves several symptom domains that together shape a child's

overall impairment, clinicians and researchers commonly consider the total symptom burden, in addition to individual domains, when judging the effect of an intervention.

Stimulant medication is the most common pharmacological treatment, yet a large Cochrane review concluded that the certainty of evidence for its benefit is very low and that treatment is associated with non-serious adverse effects such as sleep disturbance and reduced appetite (Storebø et al., 2023). These concerns, together with parental reluctance to medicate young children, have encouraged the search for safe, non-pharmacological approaches that can be delivered in schools and homes.

Yoga is prominent among these approaches. It combines physical postures (Asanas), breath regulation (pranayama) and attentional focus (Dhyana), and controlled studies have reported reductions in ADHD symptoms and improvements in attention and behaviour in preschool and school-aged children (Cohen et al., 2018; Jarraya et al., 2019; Jensen & Kenny, 2004). Reviews and meta-analyses of mind-body and mindfulness-based interventions similarly report significant, if modest, reductions in ADHD symptoms (Cairncross & Miller, 2020; Vekety et al., 2021; Lee et al., 2022; Zhang et al., 2023), and evidence from Indian settings supports the feasibility and benefit of yoga as an add-on for childhood ADHD (Hariprasad et al., 2013).

Most of this work has examined physical yoga postures. A distinct practice, Yoga Nidra, consists of guided relaxation and a structured rotation of body awareness performed lying down, and has been shown in adults to reduce stress and to train sustained, focused attention (Ghai et al., 2026). Whether guided relaxation and physical postures differ in their effect on the overall symptom burden of children with ADHD, however, has rarely been tested in a controlled comparison. The present study addressed this question by comparing a twelve-week Yoga Asana programme and a twelve-week Yoga Nidra programme against a control group, using the ADHD Total Score as the index of overall symptom severity, with the pre-test score controlled as a covariate and gender examined as a second factor. It was hypothesised that both interventions would reduce the overall symptom burden relative to control; the comparison between the two practices was treated as an open question.

MATERIAL AND METHODS

Design and participants

A pre-test–post-test randomised control group design with a 3 (group) $\times$ 2 (gender) structure was used. From a school setting, children showing symptoms of ADHD were screened with the ADHD Behaviour Rating Scale (ADHD-BR; Bhargava, 2017), on which 56 children were identified as eligible. Of these, 4 children were excluded as they did not meet the inclusion criteria on detailed assessment, and the parents of 2 children declined to participate, leaving 50 children aged 7–12 years who formed the sample. A pre-specified allocation ratio of 2:2:1 (Yoga Asana : Yoga Nidra : waitlist control) was adopted, giving planned group sizes of 20, 20 and 10, as approved in the study protocol. The random allocation sequence was generated by a person not involved in delivering the intervention, using a computer-based random number generator. The Yoga Asana group comprised 13 male and 7 female children, the Yoga Nidra group 13 male and 7 female, and the waitlist control group 5 male and 5 female. During the intervention period, the waitlist control group followed the normal school routine and, on ethical grounds, was offered the Yoga Nidra programme after the post-test data had been collected. Children with major medical conditions, or those already receiving pharmacological or behavioural treatment, were not included. Four children from the intervention groups discontinued the programme, leaving 46 completers (Yoga Asana 18, Yoga Nidra 18, Control 10).

Interventions and measure

Both interventions were delivered over twelve weeks, four days per week, on the school premises by a certified yoga instructor. The Yoga Asana group practised a graded sequence of ten age-appropriate postures: Tadasana, Vrikshasana, Garudasana, Hastapadasana, Gomukhasana, Ushtrasana, Balasana, Chakrasana, Bhujangasana and Makarasana with three rounds of each posture and a ten-second rest between rounds. The practice was progressive, with the total session duration increasing gradually from about 15 minutes in the initial weeks to about 30 minutes by the end of the programme. The Yoga Nidra group practised a single guided session on each session day, comprising a structured rotation of body awareness and breath awareness, with the session length increasing from 15 minutes in weeks 1–3 to 30 minutes in weeks 10–12. The waitlist control group followed the normal school routine during the

intervention period. Overall symptoms were measured with the ADHD Behaviour Rating Scale (ADHD-BR; Bhargava, 2017), a standardised Indian instrument completed by the children's parents. The scale comprises 20 items across three parts: Inattention (10 items), Hyperactivity (6 items) and Impulsivity (4 items), each rated Always (2),

Sometimes (1) or Never (0). Following the manual, the Hyperactivity and Impulsivity parts are summed to form the hyperactivity-impulsiveness dimension, and the ADHD Total Score is the sum of all three parts (range 0–40), with higher scores indicating greater symptom severity. The same rating procedure was followed at pre-test and post-test.

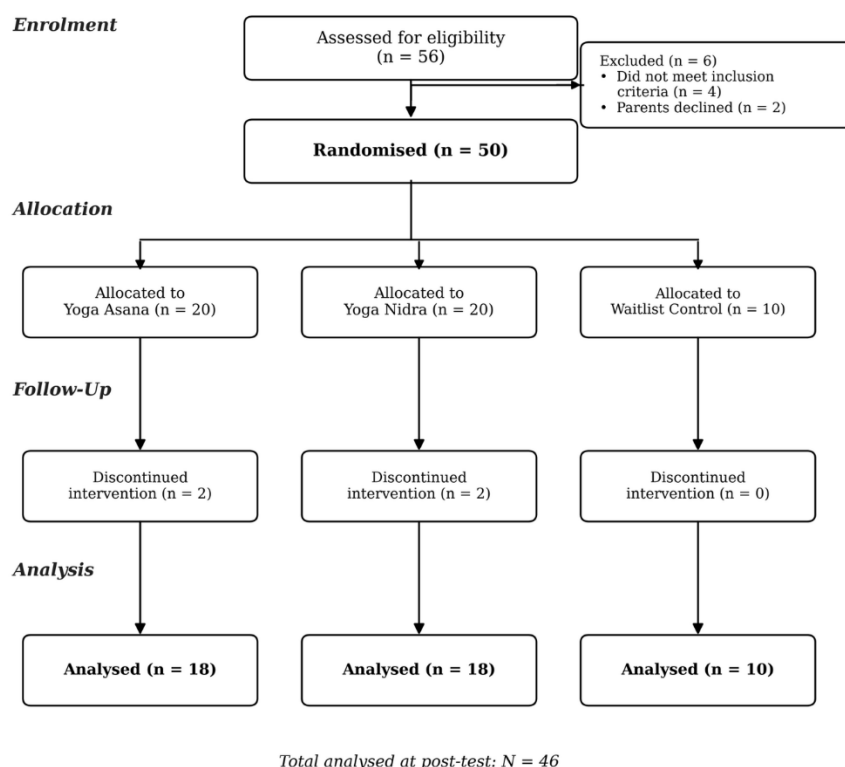


Figure 1. CONSORT flow diagram showing participant recruitment, allocation, follow-up, and analysis.

Statistical analysis

Data were analysed using a 3 (group) $\times$ 2 (gender) analysis of covariance (ANCOVA), with the post-test ADHD Total Score as the dependent variable and the pre-test score as the covariate. The assumptions of normality (Shapiro–Wilk test), homogeneity of variances (Levene's test) and homogeneity of regression slopes were examined and found tenable. Where the group effect was significant, adjusted means were compared using Bonferroni-corrected pairwise tests. Partial eta squared (η^2) is

reported as the effect-size index, and the significance level was set at .05. Analyses were conducted in jamovi version 2.6.26.0 using Type III sums of squares.

RESULTS

Table 1 presents the pre-test and post-test descriptive statistics for the ADHD Total Score by group. The three groups were closely matched at baseline. At post-test, both intervention groups showed lower mean scores than at baseline, whereas the control group showed a slight increase.

Table 1. Descriptive statistics for the ADHD Total Score by group

Group	N	Pre-test M (SD)	Post-test M (SD)
Yoga Asana	18	19.14 (1.79)	17.97 (2.25)
Yoga Nidra	18	19.24 (1.71)	17.23 (2.25)
Control	10	19.00 (1.63)	19.80 (0.92)

The covariate (pre-test score) was strongly related to the post-test score, $F(1, 39) = 65.92$, $p < .001$, $\eta^2 = .63$. After adjustment, the main effect of group was significant, $F(2, 39) = 13.93$, $p < .001$, $\eta^2 = .42$ (Table 2). Neither the main effect of gender, $F(1, 39) = 1.29$, $p = .262$, nor the group-by-gender interaction, $F(2, 39) = 0.45$, $p = .640$, was significant.

Table 2. Summary of 3×2 factorial ANCOVA of the ADHD Total Score

Source	df	SS	MS	F	p	η^2
Group (A)	2	44.38	22.19	13.93	< .001	.417
Gender (B)	1	2.06	2.06	1.29	.262	.032
A $\times$ B	2	1.44	0.72	0.45	.640	.023
Covariate (pre-test)	1	104.99	104.99	65.92	< .001	.628
Error	39	62.11	1.59			

Table 3 reports the adjusted means and the Bonferroni comparisons. Both the Yoga Nidra group ($p < .001$) and the Yoga Asana group ($p = .001$) had significantly lower adjusted total scores than the control group. The two intervention groups did not

differ significantly from each other ($p = .308$). Both yogic interventions therefore reduced overall symptoms relative to the control condition, and were comparable to one another. Figure 2 displays the adjusted means with 95% confidence intervals.

Table 3. Adjusted mean ADHD Total Scores and Bonferroni comparisons

Group	Adjusted M	SE	95% CI	Comparison (p)
Yoga Asana	18.0	0.31	17.4–18.6	YA vs Control = .001
Yoga Nidra	17.3	0.32	16.6–17.9	YN vs Control < .001
Control	20.0	0.40	19.1–20.8	YA vs YN = .308

Adjusted (estimated marginal) mean ADHD Total score by group

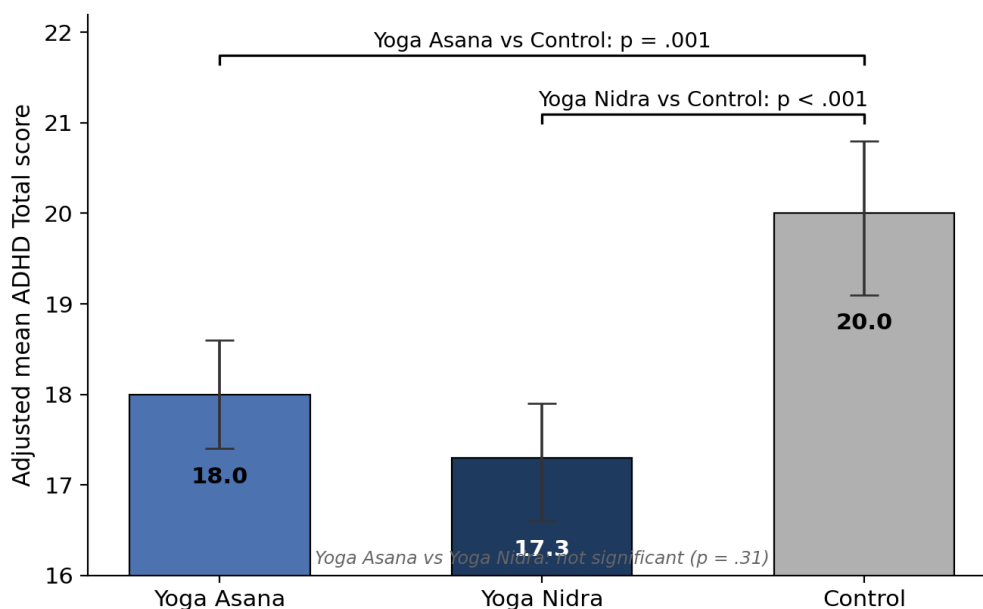


Figure 2. Adjusted (estimated marginal) mean ADHD Total Scores by group, with 95% confidence intervals.

DISCUSSION

This study compared two yogic practices as interventions for the overall symptom burden of

children with ADHD. Both the Yoga Asana and the Yoga Nidra programmes produced significant reductions in the ADHD Total Score relative to the control group, and the two practices were comparably

effective, with no significant difference between them. The effect of group was large ($\eta^2 = .42$), indicating that the interventions accounted for a substantial share of the variance in post-test symptom scores after adjustment for baseline.

These findings add to a growing body of evidence that yoga and related mind-body practices reduce ADHD symptoms in children. They are consistent with earlier controlled studies of yoga in children with ADHD (Cohen et al., 2018; Jarraya et al., 2019; Jensen & Kenny, 2004), with Indian intervention research (Hariprasad et al., 2013), and with meta-analytic syntheses reporting significant symptom reductions following mindfulness- and meditation-based practices (Cairncross & Miller, 2020; Lee et al., 2022; Zhang et al., 2023). The large effect observed here may partly reflect the use of a waitlist control condition and the adjustment for baseline severity, which increases the precision of the group comparison.

That both practices were equally effective on the overall score is itself informative. Physical postures and guided relaxation differ in their proposed mechanisms the former emphasising motor control and physical exertion, the latter emphasising sustained attention and relaxation (Ghai et al., 2026) yet each reduced the total symptom burden to a similar degree. This suggests that, at the level of overall symptoms, more than one route may lead to benefit, and that the two practices may act on partly different symptom domains that nonetheless converge on a comparable reduction in total severity. Because the ADHD Total Score is a composite of the inattention and hyperactivity-impulsiveness domains, the overall reduction reported here should be understood as reflecting improvement across these domains rather than as an independent effect.

Several limitations temper these conclusions. The sample was small and drawn from a single school, and once divided by group and gender the cells were very small, which limited the power to detect gender and interaction effects; the non-significant results for those terms should be read as inconclusive rather than as evidence of no difference. Allocation was to unequal groups, and symptoms were measured by parent ratings rather than by objective or multi-informant methods, which are susceptible to expectancy effects. The study also lacked a follow-up assessment, so the durability of the benefit is unknown, and blinding of parents to group allocation was not feasible.

Future research should recruit larger, more balanced samples across multiple sites, add teacher

ratings and objective measures, include a follow-up phase, and report the individual symptom domains alongside the total so that domain-specific effects can be distinguished. Notwithstanding its limitations, the present study indicates that both Yoga Asana and Yoga Nidra can meaningfully reduce the overall symptom burden of childhood ADHD and are well suited to low-cost, school-based delivery.

CONCLUSION

In this controlled study of children with ADHD, a twelve-week programme of Yoga Asana and a twelve-week programme of Yoga Nidra each significantly reduced the overall ADHD symptom burden relative to a control condition, and the two practices were comparably effective. The effect was consistent across boys and girls. Although the sample was small and the outcome relied on parent ratings, the results support yoga as a promising, low-cost, non-pharmacological support for children with ADHD and justify larger, more rigorous trials that track individual symptom domains over time.

DECLARATIONS

Ethics Approval and Trial Registration

This study was approved by the Institutional Ethics Committee of Lakshmi Bai National Institute of Physical Education, Gwalior (IEC/LNIPE/128/08) and was registered with the Clinical Trials Registry of India (CTRI/2025/02/081373). All procedures involving human participants were carried out in accordance with the ethical standards of the Institutional Ethics Committee of LNIPE, Gwalior. Written informed consent was obtained from the parents or legal guardians of all participants, and written assent was obtained from all participating children prior to enrolment.

Availability of Data and Materials

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Conflict of Interest

The authors declare no conflict of interest.

Author Contributions

VKS conceptualized and supervised the study. SK collected the data and wrote the manuscript. MS analyzed the data. All authors read and approved the final manuscript.

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