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Yoga-based mindfulness training on attention and hyperactivity in adults with ADHD: A pilot study

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Abstract
Background: Attention Deficit Hyperactivity Disorder (ADHD) frequently persists into adulthood and is associated with impairments in attention, impulse control, emotional regulation, and psychosocial functioning. Pharmacological therapies, although effective, may not be suitable or well tolerated by all individuals. Yoga-based mindfulness interventions have gained attention as complementary, non-pharmacological strategies for symptom management.
Objectives: To evaluate the effect of a 4-week yoga-based mindfulness training program on attention and hyperactivity in adults with ADHD, and to assess its impact on emotional regulation and perceived stress compared with standard care.
Methods: This pilot randomized controlled study included eight adults aged 18–40 years diagnosed with ADHD using the Adult ADHD Self-Report Scale (ASRS v1.1). Participants were randomly allocated to either a yoga-based mindfulness intervention group (n=4) or a standard care control group (n=4). The intervention consisted of supervised yoga postures and breathing practices conducted twice weekly for four weeks. Outcomes were assessed using ASRS v1.1, Conners' Continuous Performance Test (CPT), Difficulties in Emotion Regulation Scale (DERS), and Perceived Stress Scale (PSS). Anthropometric and vital parameters were also recorded. Statistical analysis was performed using appropriate parametric and non-parametric tests.
Results: Participants in the intervention group demonstrated significant improvement in attention and reduction in hyperactivity/impulsivity scores on ASRS ($p=0.043$) and CPT parameters ($p=0.0075$) compared with the control group. Improvements were observed in emotional regulation and perceived stress scores; however, these did not reach statistical significance. No significant changes were noted in anthropometric or vital parameters.
Conclusion: A short-term yoga-based mindfulness intervention demonstrated beneficial effects on core ADHD symptoms in adults. These findings support the potential role of yoga-based mindfulness as a complementary approach in adult ADHD management. Larger studies with longer follow-up are warranted.

Keywords: Attention Deficit Hyperactivity Disorder, yoga, mindfulness, attention, hyperactivity, non-pharmacological intervention

Introduction

Attention Deficit Hyperactivity Disorder (ADHD) is a chronic neurodevelopmental disorder characterized by inattention, hyperactivity, and impulsivity. Although traditionally considered a childhood condition, ADHD persists into adulthood in a significant proportion of individuals, with a global adult prevalence of approximately 2.5%. Adult ADHD is associated with functional impairments affecting academic performance, occupational stability, interpersonal relationships, and emotional well-being.

Pharmacological treatment, particularly stimulant medication, remains the cornerstone of ADHD management. However, adverse effects, contraindications, and patient preference often limit long-term adherence. Consequently, there is increasing interest in complementary and non-pharmacological interventions that emphasize self-regulation and holistic well-being.

Mindfulness-based interventions, including yoga, promote attentional control, emotional regulation, and stress reduction. Evidence from paediatric and adolescent populations suggests beneficial effects of yoga and mindfulness practices on ADHD symptoms. However, literature focusing on adult ADHD remains limited. The present pilot study was designed to evaluate the feasibility and preliminary effectiveness of a structured yoga-based mindfulness program in adults diagnosed with ADHD.

Objectives

Primary Objective

- To evaluate the effect of a 4-week yoga-based mindfulness training program on attention and hyperactivity in adults with ADHD.

Secondary Objectives

- To assess the impact of yoga-based mindfulness training on emotional regulation and perceived stress.
- To compare outcomes between the intervention group and standard care control group.

Methodology

Study Design

A randomized controlled pilot study was conducted with eight participants, equally allocated into intervention and control groups.

Study Population

Inclusion Criteria

- Adults aged 18–40 years diagnosed with ADHD using ASRS v1.1
- Ability to participate in yoga-based sessions

- Absence of severe psychiatric comorbidities
- Provision of informed consent

Exclusion Criteria
- Presence of major psychiatric disorders (e.g., psychosis, bipolar disorder)
- Current psychotherapy or pharmacological treatment for ADHD
- Pregnancy
- Cardiovascular or musculoskeletal contraindications to exercise

Sample Size
A pragmatic sample size of eight participants was chosen to assess feasibility and preliminary outcomes.

Intervention
The intervention group underwent yoga-based mindfulness training for four weeks, consisting of two 60-minute sessions per week.

1. **Yoga Postures (Asanas):** Physical postures designed to increase focus, reduce physical restlessness, and promote mindfulness.
2. **Breathing Techniques (Pranayama):** Controlled breathing exercises to help regulate emotional responses and improve concentration.

Sessions included yoga postures (asanas) and breathing techniques (pranayama).
The control group continued standard care (behavioural therapy and/or medication).

Outcome Measures
- **ADHD symptoms:** ASRS v1.1, Conners' CPT
- **Emotional regulation:** DERS
- **Stress:** PSS
- **Anthropometric and vital parameters:** BMI, blood pressure, heart rate, respiratory rate, and related indices

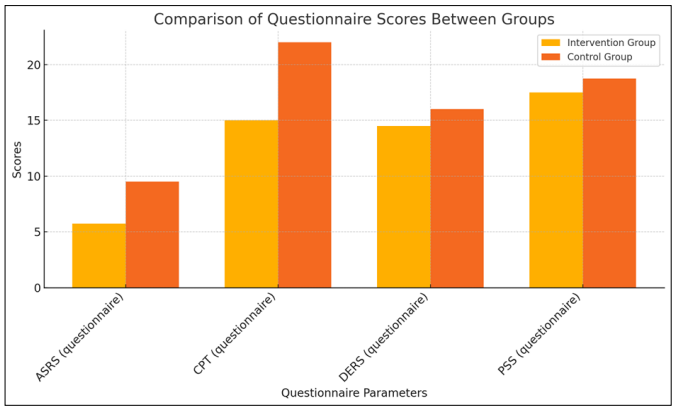
Results
The study analysed the impact of a 4-week yoga-based mindfulness program on adults diagnosed with ADHD. A total of 8 participants completed the study, evenly split between the intervention and control groups (4 in each). Individuals in the intervention group showed notable improvements in their ADHD symptoms, particularly in areas of inattention and hyperactivity/impulsivity, as measured by the Adult ADHD Self-Report Scale (ASRS) & Conners' Continuous Performance Test (CPT). These improvements weren't just noticeable—they were statistically significant ($p < 0.05$), suggesting real changes beyond chance. Beyond core ADHD symptoms, the benefits extended to emotional well-being. Participants reported reduced stress and improved emotional regulation, as reflected in better scores on the Difficulties in Emotion Regulation Scale (DERS) and the Perceived Stress Scale (PSS). These findings suggest that the intervention supported not only attention and behavior but also the emotional ups and downs often experienced by adults with ADHD.
A comparative analysis was performed between the intervention group and the control group across multiple physiological, anthropometric, and psychological parameters.

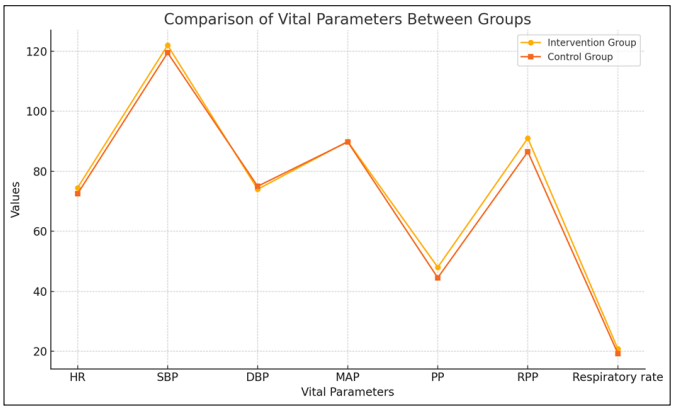
Anthropometric & Vital Parameters
No statistically significant differences were noted between the groups in BMI, waist-hip ratio, mid-arm circumference, forearm circumference, thigh circumference, chest expansion, heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP), pulse pressure (PP), rate pressure product (RPP), and respiratory rate ($p > 0.05$). These are typically influenced by longer-term lifestyle interventions.

Cognitive and Emotional Outcomes
- **Adult ADHD Self-Report Scale (ASRS):** Significant reduction in scores was observed in the intervention group ($p = 0.043$), indicating improved attention and decreased hyperactivity/impulsivity.
- **Conners' Continuous Performance Test (CPT):** Marked improvements were noted in sustained attention and response inhibition, with a highly significant p-value of 0.0075.
- **Difficulties in Emotion Regulation Scale (DERS) and Perceived Stress Scale (PSS):** While both scales demonstrated improvement trends in the intervention group, statistical significance was not reached ($p = 0.7834$ and $p = 0.5551$, respectively).

Parameters	Intervention Group	Control Group	P Value	95% CI
BMI	21.5 (2.897)	20.775 (3.532)	0.7336	-5.453 to 6.903
Waist-hip ratio	0.79 (0.0271)	0.8175 (0.0411)	0.3955	-0.1160 to 0.061
Mid arm circumference	26.75 (2.217)	26.45 (2.374)	0.8093	-3.324 to 3.924
Forearm circumference	25.425 (2.485)	24.75 (2.044)	0.5856	-2.853 to 4.203
Thigh circumference	47.35 (1.814)	42.300 (3.700)	0.1261	-2.590 to 12.690
Chest expansion	4.4 (0.316)	3.9 (0.294)	0.1911	-0.446 to 1.446
HR	74.5 (3.42)	72.5 (4.12)	0.4228	-4.87 to 8.87
SBP	122 (3.27)	119.5 (7.19)	0.5158	-8.33 to 13.33
DBP	74 (1.63)	75 (4.16)	0.6042	-6.51 to 4.51
MAP	89.95 (1.886)	89.8 (4.463)	0.9225	-4.368 to 4.668
PP	48 (2.83)	44.5 (6.19)	0.4573	-9.59 to 16.59
RPP	91 (4.69)	86.5 (8.1)	0.2915	-6.71 to 15.71
Respiratory rate	20.75 (4.03)	19.25 (1.50)	0.5651	-5.91 to 8.91
ASRS (questionnaire)	5.75 (1.71)	9.50 (3)	0.043	-7.28 to -0.22
CPT (questionnaire)	15 (2.45)	22 (2.94)	0.0075	-10.44 to -3.56
DERS (questionnaire)	14.5 (2.89)	16 (7.44)	0.7834	-17.39 to 14.39
PSS (questionnaire)	17.5 (2.08)	18.75 (4.11)	0.5551	-7.26 to 4.76

Figure shows a comparison of physiological and psychological parameters between intervention and control group post intervention.





Significant improvements in attention and hyperactivity were observed in the intervention group as measured by ASRS and CPT. Emotional regulation and stress scores showed improvement trends but did not reach statistical significance. No significant changes were observed in anthropometric or physiological parameters.

Discussion

The findings of this pilot study suggest that yoga-based mindfulness training may positively influence core ADHD symptoms in adults. Improvements in attention and inhibitory control may be attributed to enhanced executive functioning facilitated by mindfulness practices. While emotional regulation and stress reduction did not reach statistical significance, the observed trends are clinically relevant and warrant further investigation. The short intervention duration and small sample size may explain the limited physiological changes observed.

In line with previous findings, the intervention group exhibited significant improvements in core ADHD symptoms (inattention, hyperactivity, impulsivity). Emotional regulation and stress reduction, while improved, did not achieve statistical significance. This suggests that longer intervention periods or larger samples might be required to demonstrate definitive changes in these domains. Physiological parameters remained stable, which is consistent with other short-duration mind-body intervention studies, indicating that longer durations are essential for observable somatic adaptations.

The observed improvements in attentional control and behavioural inhibition can be attributed to enhanced self-regulatory capacities fostered by mindfulness practices. Neurocognitively, mindfulness is known to activate prefrontal cortical networks responsible for executive functioning, which are often underactive in individuals with ADHD. The deliberate focus on breath, posture, and present-moment awareness may have strengthened participants' top-down cognitive control, mitigating habitual patterns of distractibility and impulsivity.

Furthermore, the reductions in stress and emotional dysregulation resonate with existing literature suggesting that yoga influences autonomic nervous system balance, reducing sympathetic overactivation and promoting parasympathetic tone. This physiological shift likely contributed to the improvements in emotional stability and stress perception, which are intricately linked to ADHD symptomatology.

For adults seeking non-pharmacological, self-empowering strategies, yoga-based mindfulness offers a low-cost, accessible option with minimal adverse effects. However, while these findings are promising, they should be interpreted with caution given the pilot nature of the study. Larger, rigorously designed trials are warranted to validate these outcomes and explore the long-term sustainability of benefits.

Conclusion

This study adds to the growing body of evidence suggesting that yoga-based mindfulness training can be a valuable complementary approach in managing adult ADHD. Even within a short duration of four weeks, participants experienced noticeable improvements in attention, impulse control, emotional regulation, and stress levels. The intervention was not only effective but also well-received, with high satisfaction and adherence rates. While traditional pharmacological and behavioural therapies remain central to ADHD management, mindfulness-based practices like yoga offer a gentle, holistic option for those seeking non-pharmacological support. This study demonstrates that integrating mindfulness into daily life can empower adults with ADHD to better navigate their challenges, fostering a sense of calm, focus, and self-awareness that extends beyond clinical symptoms.

Yoga-based mindfulness training appears to be a feasible and effective complementary intervention for adults with ADHD. Even a short-term program resulted in meaningful improvements in attention and hyperactivity. Larger randomized trials with extended follow-up are needed to confirm these findings.

Limitations

The small sample size, short intervention duration, lack of blinding, and reliance on self-reported measures limit generalizability. The exclusion of participants receiving pharmacological treatment restricts applicability to real-world clinical settings.

Recommendations

Future studies should involve larger, multi-center trials with longer intervention and follow-up periods. Integration of neurophysiological assessments and digital mindfulness platforms may enhance accessibility and adherence.

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