Short-Term Effects of a Botanical Supplement on Anxiety, Mood, and Cognition: A Single-Arm Pilot Study

Original Research

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Abstract

Introduction: Psychological stress and cognitive fatigue are increasingly prevalent in contemporary life, leading to greater interest in natural interventions that support mental well-being and cognitive performance. Botanicals such as Bacopa monnieri, Withania somnifera (ashwagandha), and Salvia officinalis (sage) have been traditionally used for their adaptogenic and nootropic effects [1,2].

Methods: This pilot trial examined the short-term effects of a multi-ingredient botanical supplement containing Withania somnifera (ashwagandha), Bacopa monnieri, huperzine A, sage, and B vitamins on stress, anxiety, cognition, mood, and sleep over 14 days in healthy adults. Twenty-five participants (M = 30.0, SD = 12.9) consumed two caplets daily for 14 days. Primary outcomes were perceived stress and state anxiety. Secondary endpoints included cognitive performance, Profile of Mood States, Pittsburgh Sleep Quality Index, and salivary cortisol. Pre- and post-intervention data were analyzed using paired-samples *t*-tests.

Results: Significant reductions were observed in perceived stress (12.3±7.1 to 9.7±6.1; $p = 0.001$) ($p < .05$) and state anxiety (31.8±9.6 to 28.9±6.7; p = 0.046). Mood profiles were enhanced, with lower Total Mood Disturbance (3.4±24.6 to -2.4±20.4; p = 0.192) and reduced tension (6.6±5.6 to 4.6±3.6; p = 0.091) and depression (2.9±4.1 to 1.9±4.3; p = 0.273). No significant changes were observed in sleep quality or cortisol levels.

Conclusions: These findings suggest potential benefits of short-term botanical supplementation on mood and stress in healthy adults, warranting larger, controlled trials.

Key Words: Stress, botanicals, ashwagandha

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Introduction

Psychological stress and cognitive fatigue are increasingly prevalent in contemporary life, leading to greater interest in natural interventions that support mental well-being and cognitive performance. Psychological distress responses may negatively influence emotional regulation, cognitive performance, and overall perception of well-being [3]. The theory of Braden-and-Build states that positive emotions improves mood, elicits a reduction in stress that can broaden attentional scope and cognitive flexibility, wherein supporting improved decision-making and improved coping

behaviors [4]. Self-regulation models support the theory that individuals experiencing lower psychological distress may demonstrate improved cognitive efficiency and improved emotional control during more demanding tasks [5]. Therefore interventions (including the use of botanicals) that may improve perceived stress, anxiety, cognitive function and mood should be researched and possibly utilized.

Botanicals such as Bacopa monnieri, Withania somnifera (ashwagandha), and Salvia officinalis (sage) have been traditionally used for their adaptogenic and nootropic effects [1,2]. There is evidence that Withania somnifera may positively affect health through immune-modulation, cardioprotection, as a diuretic, a sedative, antioxidant, antimicrobial, anti-cancerous agent, and anti-inflammatory therapy [6,7]. These compounds are believed to influence neurotransmitter regulation, reduce oxidative stress, and modulate the hypothalamic-pituitary-adrenal (HPA) axis, thereby enhancing resilience to stress and improving cognition[8,9]. Ashwagandha has been utilized therapeutically in psycho-somatic disorders including anxiety, stress-related disorders, and depression [9], and other neurological disorders including insomnia [10]. Salvia officinalis has been studied as natural treatment for conditions such as unsteadiness, paralysis, tremors, diarrhea, inflammation, hyperglycemia, and rheumatism [11,12]. As with Withania somnifera, Salvia officinalis has been utilized in treating many cognitive disorders [13]. As with the two previously mentioned natural compound extracts, Bacopa monnieri has been used as an anti-inflammatory, anticancer, antidepressant, antianxiety, and treatment for other neurological disorders [14]. Bacopa monnieri is routinely utilized in Ayurvedic medicine for a variety of neurological disorders and in therapeutics to enhance memory [15].

Although several randomized controlled trials have examined individual botanical compounds such as ashwagandha or Bacopa monnieri, considerably less research has evaluated multi-ingredient formulations designed to target multiple neurocognitive pathways simultaneously. Furthermore, most investigations have focused on longer intervention periods, leaving the short-term psychological effects of combined botanical supplementation largely unexplored. Therefore, the purpose of this pilot study was to evaluate the short-term effects of a multi-ingredient botanical supplement on perceived stress, anxiety, cognition, mood, and sleep in healthy adults.

Methods

Participants

Twenty-five healthy adults (15 female, 10 male) aged 18 to 60 years (M = 30.0, SD = 12.9) participated in the study. Inclusion criteria required participants to be generally healthy and free from major psychiatric disorders or current use of mood-altering medications or supplements.

Intervention

Participants consumed two caplets daily of a botanical supplement containing vitamin C (250 mg), vitamin B6 (25 mg), pantothenic acid (25 mg), Bacopa monnieri (320 mg), huperzine A (200 μg), Withania somnifera (600 mg), and sage extract (334 mg) for 14 days (Akeso LLC, Westlake Village, CA). Participants were instructed to maintain their normal dietary habits, exercise routines, and sleep schedules throughout the study period. They were asked to refrain from initiating new supplements or medications and to maintain consistent caffeine intake during the intervention. Participants were also instructed to avoid consuming other nootropic or adaptogenic supplements during the study period.

Measures

Primary outcomes included the Perceived Stress Scale (PSS) and the State-Trait Anxiety Inventory (STAI). Secondary measures included the Profile of Mood States (POMS), and the Pittsburgh Sleep Quality Index (PSQI). All measures were taken on day 1 before supplementation began, and at the conclusion of the study on day 14.

Procedure

After gaining IRB approval through Concordia University St. Paul (IRB#2025_002), subjects signed informed consents before beginning the procedures of the study. Assessments were conducted at baseline (Day 1) prior to ingesting the botanical supplement, and after two weeks of supplementation (Day 14). Questionnaires were self-administered, and biological measures were collected following standardized procedures. The questionnaires consisted of the PSS, the STAI, the POMS, and the PSQI. The participants also had their body composition measured through an InBody 270 BIA (it was approved by the IRB and was in the informed consent), but the measurements were of no value to the study but were of interest to the researchers.

Data Analysis

Paired-samples *t*-tests were conducted to evaluate pre- to post-intervention changes. Statistical significance was set at $p < .05$. Assumptions of normality for paired-samples t-tests were evaluated using Shapiro-Wilk tests and visual inspection of Q-Q plots. Effect sizes were calculated using Cohen's d to estimate the magnitude of pre-post changes.

Results

Demographics

Participants' mean (SD) anthropometric characteristics were: (mean and SD) age 30.0±12.9 years, height 170.2 ±12.9 cm, weight 76.4 ±15.5 kg, and BMI 26.3 ±4.5 kg/m².

Perceived Stress and Anxiety

Perceived stress decreased significantly from pre to post (12.3±7.1 to 9.7±6.1; $p = 0.001$) Cohen's ($d_z = -0.77$) (a large effect size). State anxiety decreased significantly from pre to post (31.8±9.6 to 28.9±6.7; p = 0.046) Cohen's ($d_z = -0.33$) (a small effect size). Anger decreased significantly (3.6±4.9 to 1.9±2.8; p = 0.010) Cohen's ($d_z = -0.59$) (a medium affect size). See Figures 1 and 2. Trait anxiety demonstrated a slight, nonsignificant decrease pre to post (33.2±11.7 to 31.4±10.2; p = 0.176). Among the POMS subscales, only anger demonstrated a statistically significant reduction following supplementation (p = 0.01). Other mood variables showed nonsignificant trends toward improvement.

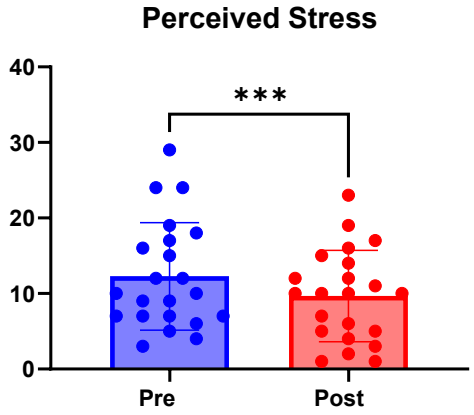

Figure 1. Changes in Perceived Stress Scale scores from baseline to Day 14 (n = 25). Values represent mean ± SD. Statistical comparisons were performed using paired-samples t-tests. Perceived stress decreased significantly from pre to post (12.3±7.1 to 9.7±6.1; $p = 0.001$) Cohen's ($d_z = -0.77$) (a large effect size).

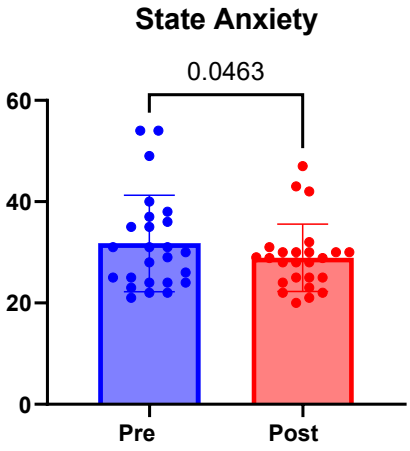

Figure 2. The State Anxiety Scale is shown as the mean and standard deviation. Individual data points are shown as circles. State anxiety decreased significantly from pre to post (31.8±9.6 to 28.9±6.7; p = 0.046) Cohen's ($d_z = -0.33$) (a small effect size).

Mood

There were no significant differences pre to post for any of the assessments except Anger (Table 1 and Figure 3).

Table 1. Profile of Mood States.

	Pre	Post	*p*-value
TDMS	3.4±24.6	-2.4±20.4	0.192
Anger	3.6±4.9	1.9±2.8	0.010*
Confusion	4.6 ±3.9	4.0±3.3	0.392
Depression	2.9±4.1	1.9±4.3	0.273
Fatigue	4.7±5.5	3.7±4.3	0.351
Tension	6.6 ±5.6	4.6±3.6	0.091
Vigor	19.0±5.9	18.5±6.2	0.677

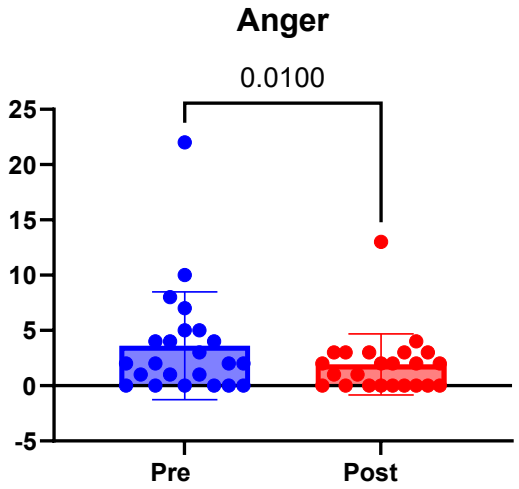

Figure 3. The Anger component of the POMS questionnaire is shown as the mean and standard deviation. Individual data points are shown as circles. Anger decreased significantly (3.6±4.9 to 1.9±2.8; p = 0.010) Cohen's (d_z=-0.59) (a medium effect size).

Sleep

Sleep quality assessed by the Pittsburgh Sleep Quality Index did not significantly change following the intervention (pre 6.5±3.0 vs post 6.0±3.1; p=0.062). Although the mean value demonstrated a small numerical decrease, the change did not reach statistical significance. This finding suggests that the short duration of supplementation may have limited the potential for measurable changes in sleep quality.

Discussion

As a pilot investigation, the primary objectives of this study were to evaluate feasibility of the supplementation protocol, participant compliance, and preliminary effect size estimates that may inform the design of a future randomized controlled trial. The present pilot trial investigated the short-term effects of a multi-ingredient botanical supplement containing Withania somnifera, Bacopa monnieri, huperzine A, sage extract, and B vitamins on perceived stress, anxiety, mood, cognition, and sleep in healthy adults. After 14 days of supplementation, participants demonstrated significant reductions in perceived stress and state anxiety, as well as decreased anger, as measured by the Profile of Mood States. These findings suggest that even a brief period of supplementation may yield measurable benefits for psychological well-being, particularly stress regulation and emotional balance, in otherwise healthy individuals.

The observed reductions in perceived stress and state anxiety are consistent with prior literature on the adaptogenic properties of Withania somnifera and Bacopa monnieri. Several randomized controlled trials have demonstrated that Withania somnifera reduces both subjective stress and cortisol levels by modulating the hypothalamic-pituitary-adrenal (HPA) axis and GABAergic signaling pathways [2,16], while best known for its cognitive-enhancing properties, has also been shown to reduce anxiety and improve emotional resilience, possibly through serotonergic modulation and antioxidant effects [17]. The combination of these adaptogens, together with sage extract—a compound known to

improve mood and cognitive performance via cholinergic and monoaminergic mechanisms [18] may underlie the improvements observed in this study.

Interestingly, mood enhancement was most evident in the anger domain, while other POMS subscales showed nonsignificant trends toward improvement. This selective effect might reflect early, domain-specific changes in emotional regulation that precedes broader mood stabilization. Previous evidence indicates that mood effects from adaptogenic botanicals often emerge gradually and may require several weeks to fully manifest [2], suggesting that longer supplementation durations could yield stronger effects.

Cognitive outcomes demonstrated slight, nonsignificant improvements in reaction time and performance accuracy, aligning with previous findings on Bacopa Monnieri's cognitive benefits, which are typically observed after extended administration [17]. Although slight improvements in cognitive performance were observed, these changes were not statistically significant. Therefore, the present findings should be interpreted primarily as preliminary descriptive data that may help inform sample size calculations and protocol design for future controlled trials.

No significant changes in sleep quality were observed. This may indicate that the psychophysiological benefits observed were primarily subjective or emotional rather than physiological within the short timeframe. Alternatively, the participants' baseline sleep quality may have been within normal ranges, reducing the potential for measurable change. Collectively, these findings provide preliminary data that support the feasibility of investigating this hypothesis in a larger randomized controlled trial that multi-ingredient botanical formulations may provide early benefits for stress and mood regulation, even in non-clinical populations. Because the present study utilized a single-arm design without a placebo control group, expectancy effects cannot be ruled out. Psychological outcomes such as perceived stress and state anxiety are particularly susceptible to placebo responses and participant expectations. Therefore, the reductions observed in this study should be interpreted cautiously and primarily viewed as feasibility data supporting the design of future placebo-controlled trials. While the effect magnitudes were modest, they align with the emerging view that complex botanical blends may exert synergistic effects through complementary neurochemical and endocrine pathways.

Several limitations should be considered when interpreting the findings of this pilot study. First, the single-arm design without a placebo control group prevents causal inference and does not allow differentiation between treatment effects and expectancy responses. Second, the relatively small sample size limits statistical power and generalizability. Third, several outcomes relied on self-reported psychological measures, which may be influenced by response bias. Fourth, the 14-day intervention period may not have been sufficient to detect changes in certain outcomes such as sleep quality or trait anxiety. Finally, the study was funded by the supplement manufacturer, and although no influence on study design or analysis occurred, independent replication is necessary to confirm these findings.

Conclusions

In conclusion, this single-arm pilot study provides preliminary evidence that short-term supplementation with a multi-ingredient botanical formulation may reduce perceived stress, state anxiety, and anger in healthy adults. Although effects on cognition, sleep, and physiological stress markers were limited over the 14-day intervention, the observed improvements in psychological outcomes support the potential adaptogenic and mood-regulating properties of the supplement. Given the study's exploratory nature, small sample size, and lack of a control group, these findings should be interpreted cautiously. Nonetheless, the results justify further investigation in larger, randomized, placebo-controlled trials with longer intervention periods to clarify efficacy, mechanisms of action, and clinical relevance.

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Conflict of Interest. Jose Antonio, PhD is the CEO and co-founder of the International Society of Sports Nutrition (ISSN), an academic non-profit (501c3) that has been sponsored by companies that manufacture, market, and sell dietary supplements. He is also a scientific advisor to brands including Forbes®, Bear Balanced®, Create®, Liquid Youth®, Algae to Omega™, and ENHANCED Games®. No other authors have conflicts to disclose.

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