ECRONICON OPEN ACCESS

EC NUTRITION
Research Article

Supplementation with Proprietary and Patented Black Seed Oil Improves Stress Resilience in Moderately Stressed Adults: An 8-Week Randomized, Placebo-Controlled Study

Shawn M Talbott* and Julie A Talbott

3 Waves Wellness, LLC, USA

***Corresponding Author:** Shawn M Talbott, 3 Waves Wellness, LLC, 73 Warren Ave., Plymouth, MA, USA.

Received: February 02, 2026; **Published:** March 05, 2026

Abstract

Background: Black seed oil (*Nigella sativa*) has a long history of traditional use as a tonic for vitality and resilience, and modern research supports roles in inflammatory balance, metabolic health, immune function, and stress physiology. Prior clinical work has focused primarily on clinical populations or highly stressed cohorts.

Objective: To evaluate the effects of a proprietary and patented black seed oil (P-BSO) supplementation on endocrine stress markers, sleep quality, and subjective vitality in moderately stressed but otherwise healthy adults.

Methods: In this 8-week randomized, placebo-controlled study, participants received either black seed oil (ThymoQuin®, TriNutra) or placebo. Outcomes assessed at baseline and week 8 included salivary cortisol, salivary dehydroepiandrosterone (DHEA), the DHEA:cortisol ratio, Profile of Mood States (POMS) Vigor, Pittsburgh Sleep Quality Index (PSQI), and a composite Stress Resilience Index (SRI).

Results: Black seed oil (P-BSO) supplementation produced coordinated improvements across endocrine, psychological, and sleep domains, including reductions in cortisol, increases in DHEA, improvements in the DHEA:cortisol ratio, higher vigor, and improved sleep quality. While not all individual endpoints reached statistical significance, the direction and magnitude of change were consistently favorable in the P-BSO group relative to placebo, resulting in a clear improvement in the composite SRI.

Conclusion: These findings suggest that black seed oil, particularly a standardized thymoquinone-rich low-FFA preparation (ThymoQuin®), supports stress resilience through gradual recalibration of stress physiology. Black seed oil may be considered an ancient adaptogen for modern stress-related challenges.

Keywords: *Nigella sativa; Patented Black Seed Oil (P-BSO); Dehydroepiandrosterone (DHEA); Profile of Mood States (POMS); Pittsburgh Sleep Quality Index (PSQI); Stress Resilience Index (SRI)*

Introduction

Black seed oil, derived from the seeds of *Nigella sativa*, has been used for centuries in Middle Eastern, African, and South Asian traditional medicine systems, where it was often described as a remedy that "supports everything but death." Historically, black seed oil has been employed to enhance vitality, support immune function, and improve recovery from physical and psychological stressors. This broad traditional use aligns with its modern characterization as a pleiotropic botanical with adaptogenic properties.

Contemporary research has identified multiple bioactive constituents in black seed oil, most notably thymoquinone, which exhibits antioxidant, anti-inflammatory, and metabolic regulatory activity. Human studies have demonstrated benefits of black seed oil supplementation for inflammatory balance, glycemic control, lipid metabolism, cardiovascular health, immune modulation, and subjective well-being. Increasing evidence also suggests that black seed oil may influence hypothalamic-pituitary-adrenal (HPA) axis function, a central regulator of the stress response [1-6,8-11].

In prior work, we investigated the effects of a unique proprietary and patented formulation of black seed oil (P-BSO branded as ThymoQuin®) supplementation in highly stressed endurance athletes, specifically marathon runners experiencing marked physiological and psychological stress. In that context, P-BSO was associated with reduced upper respiratory symptoms, improved recovery, and favorable modulation of stress-related biomarkers. While these findings supported a role for P-BSO in extreme stress conditions, it remained unclear whether similar benefits would extend to individuals experiencing more typical, moderate levels of daily stress [7-9].

Moderate chronic stress is increasingly recognized as a key contributor to impaired sleep, reduced vitality, and dysregulated endocrine signaling, even in otherwise healthy individuals. Unlike acute stress, which can be adaptive, sustained moderate stress may subtly shift cortisol and DHEA balance, impair recovery, and erode resilience over time. Interventions that gently rebalance stress physiology-rather than acutely suppress stress hormones-may therefore be particularly relevant for this population.

The present study was designed to evaluate whether P-BSO supplementation could support stress resilience in moderately stressed adults by promoting coordinated improvements across endocrine markers, sleep quality, and subjective vitality. We hypothesized that black seed oil would produce a coherent pattern of adaptive changes consistent with system-level stress rebalancing.

Methods

Study design

This study employed an 8-week, randomized, placebo-controlled, parallel-group design. Participants were assigned to receive either black seed oil (P-BSO) supplementation (500 mg) ThymoQuin which contains 3.15% Thymoquinone, 1.2% P-Cymene, 0.04% Carvacrol and Free Fatty acid 0.82% (calculated as Oleic acid) or a matched placebo. All outcome measures were assessed at baseline and again at week 8.

Participants

Participants were moderately stressed but otherwise healthy adults. Moderate stress status was determined based on self-reported stress levels and screening questionnaires. Individuals with major medical conditions, use of medications known to affect cortisol or adrenal function, or current use of adaptogenic supplements were excluded.

Intervention

The active intervention consisted of black seed oil (P-BSO) provided as ThymoQuin® (TriNutra, USA). ThymoQuin® is a patented high-potency black seed oil standardized for high standardized 3% thymoquinone content and low (< 1.25%) free fatty acid (FFA) levels, reflecting careful seed selection, cold processing, and controlled extraction. This standardization is intended to preserve bioactive compounds while minimizing oxidative degradation.

Participants consumed the assigned supplement daily for 8 weeks. The placebo was matched in appearance and sensory characteristics.

Outcome measures

Assessments were conducted at baseline and week 8 and included the following:

- **Salivary cortisol:** A marker of basal HPA-axis activity and physiological stress load.
- **Salivary DHEA:** A counter-regulatory adrenal hormone associated with stress buffering, anabolic balance, and resilience.
- **DHEA:Cortisol ratio:** An integrative indicator of adrenal balance and stress adaptation.
- **POMS vigor:** A subscale of the Profile of Mood States reflecting subjective energy, motivation, and vitality.
- **Pittsburgh sleep quality index (PSQI):** A validated measure of global sleep quality, with lower scores indicating better sleep.
- **Stress resilience index (SRI):** A composite index integrating endocrine, psychological, and sleep outcomes to capture system-level stress adaptation.

Stress resilience index construction

Percent change from baseline was calculated for each outcome. Measures for which lower values indicate improvement (cortisol and PSQI) were direction-corrected so that positive values consistently reflected improved resilience. Changes were standardized using baseline standard deviations and averaged to produce the SRI, providing a balanced summary of multi-system adaptation.

Statistical analysis

Due to the exploratory nature and modest sample size of the study, analyses focused on within- and between-group changes over time, effect sizes, and consistency of directional effects across outcomes. Differences between groups across time were evaluated using analysis of variance (ANOVA), with group (black seed oil vs placebo) and time (baseline vs week 8) included as factors for each outcome measure. This approach was used to detect main effects of treatment, time, and group-by-time interactions for salivary cortisol, DHEA, the DHEA:cortisol ratio, POMS Vigor, PSQI, and the composite Stress Resilience Index. Meaningfulness was interpreted in the context of biological plausibility and system-level coherence rather than reliance on isolated statistical p-values alone.

Results

Briefly, black seed oil (P-BSO) supplementation was associated with:

- A reduction in salivary cortisol (~23%).
- An increase in salivary DHEA (~10%).
- A substantial improvement in the DHEA:cortisol ratio (~29%).
- Increased POMS Vigor (~27%).
- Improved sleep quality as assessed by PSQI (~31%).

These coordinated changes resulted in a clear improvement in the composite Stress Resilience Index in the P-BSO group, with minimal change observed in the placebo group.

Endocrine outcomes

At week 8, P-BSO was associated with a coordinated endocrine pattern characterized by lower cortisol, higher DHEA, and a more balanced DHEA:cortisol ratio relative to placebo. Cortisol levels declined over the 8-week intervention in the P-BSO group ($p = 0.26$), whereas changes in the placebo group were minimal. This suggests a gradual down-regulation of basal HPA-axis output, consistent with adaptive recalibration of stress physiology. Lower resting cortisol is indicative of reduced allostatic load and improved stress recovery capacity, supporting the interpretation that P-BSO supplementation enhanced physiological stress resilience.

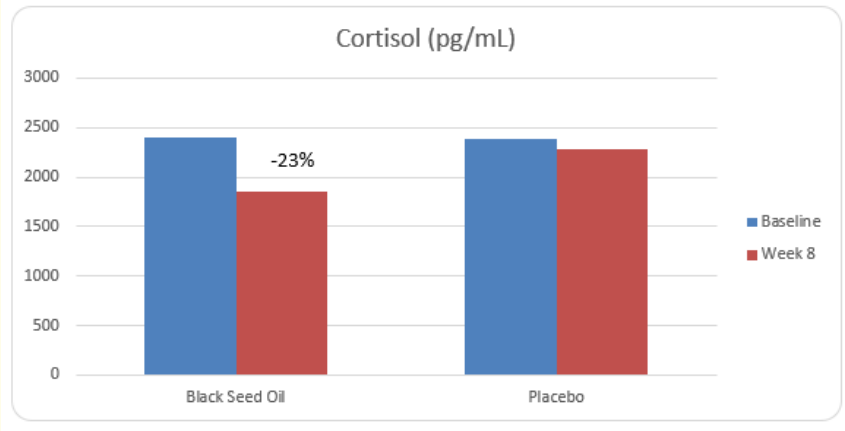

Figure 1

DHEA concentrations increased over the intervention period in the BSO group (p = 0.24), while remaining relatively stable in the placebo group. DHEA is often considered a counter-regulatory hormone to cortisol, supporting anabolic processes, neuroprotection, and stress buffering. The observed increase suggests improved adrenal balance and reserve, particularly in the context of declining cortisol. This shift toward higher DHEA availability may contribute to enhanced resilience by supporting mood, energy, and recovery under stress.

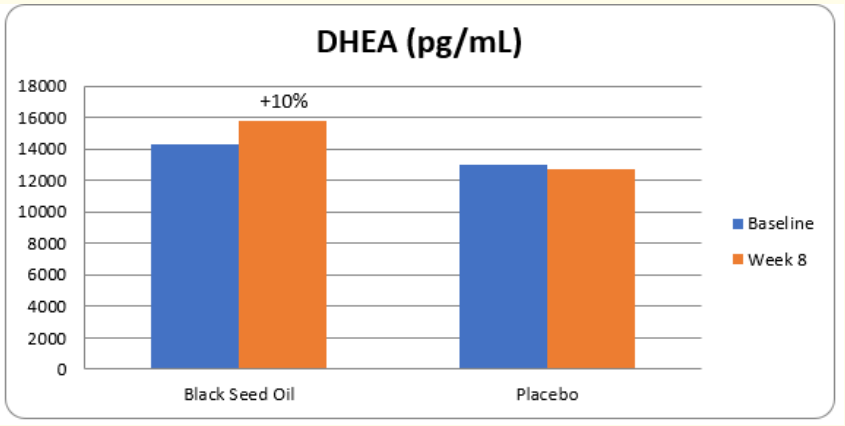

Figure 2

The DHEA:cortisol ratio and the composite stress resilience index (SRI) provide complementary views of stress-system adaptation, with the ratio reflecting endocrine balance and the SRI integrating endocrine, psychological, and sleep domains.

The DHEA:cortisol ratio increased substantially in the P-BSO group (p = 0.25) compared with placebo, providing a clear integrative signal of improved endocrine balance. Unlike cortisol or DHEA alone, the ratio reflects the relative dominance of protective versus catabolic

adrenal signaling. The increase in this ratio indicates a shift away from a stress-dominant hormonal profile toward one more conducive to adaptation and recovery. This measure emerged as one of the most sensitive indicators of intervention effects, aligning closely with the composite stress resilience index.

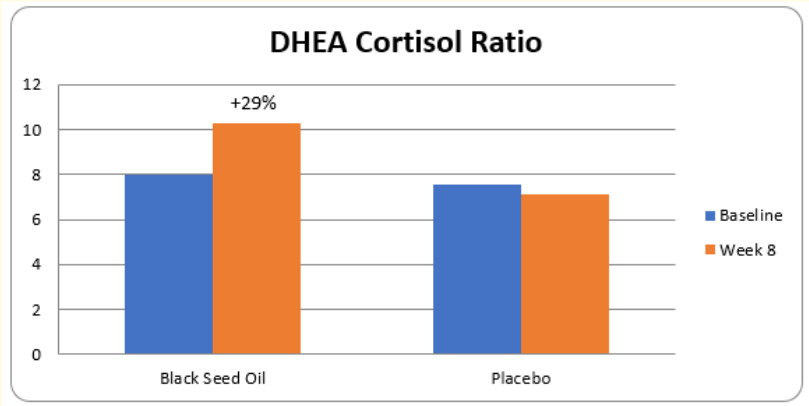

Figure 3

Psychological outcomes

POMS vigor scores increased by week 8 in the P-BSO group ($p = 0.04$), with minimal change observed in the placebo group. Vigor reflects subjective energy, motivation, and mental vitality, and is often sensitive to both physiological stress burden and recovery status. This suggests that improvements in endocrine balance and sleep support improvements in perceived energy, consistent with a model of cumulative physiological adaptation.

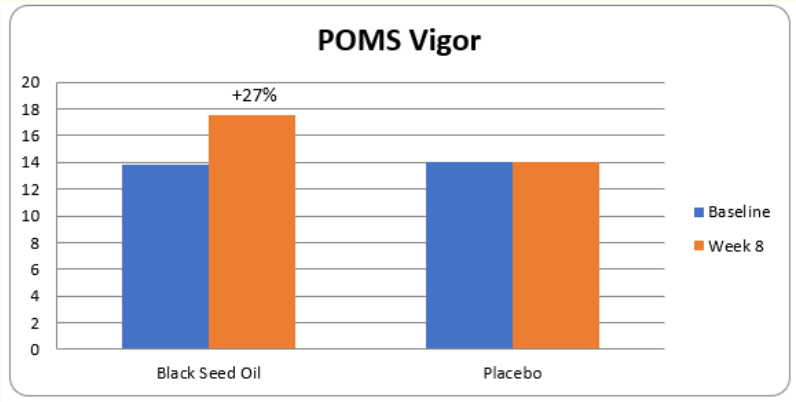

Figure 4

Sleep outcomes

Global PSQI scores improved (e.g. lower) over the intervention period in the P-BSO group ($p = 0.02$), indicating better overall sleep quality, compared to no changes in the placebo group. Because lower PSQI scores reflect improved sleep, the observed reduction suggests

enhanced sleep continuity and restorative quality rather than sedation. Improved sleep is a critical component of stress resilience, as sleep both reflects and reinforces HPA-axis regulation. These findings support the notion that P-BSO supplementation may facilitate recovery processes that manifest behaviorally as improved sleep quality over time.

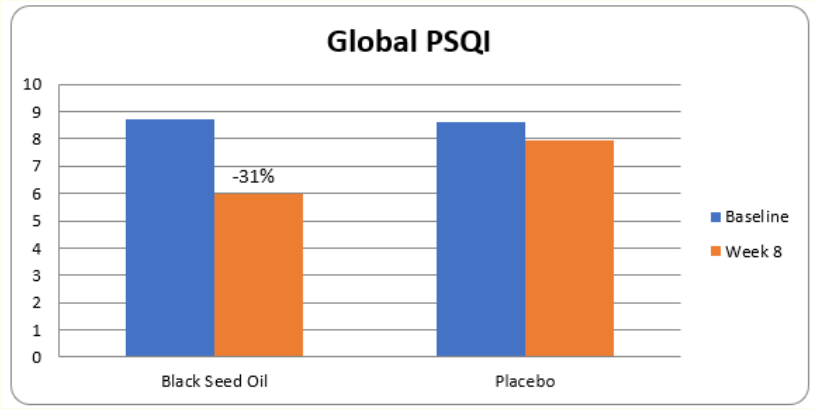

Figure 5

Stress resilience index

The stress resilience index (SRI) is an exploratory composite score designed to provide an integrated summary of these multi-system changes. As such, it illustrates that P-BSO supplementation produced a cumulative advantage over placebo by week 8 when endocrine, psychological, and sleep outcomes are considered together as a coordinated and integrated system.

In addition to individual endpoint analyses, we calculated the experimental stress resilience index (SRI) to summarize coordinated adaptation across multiple physiological and functional domains. In our view, the SRI attempts to integrate changes in endocrine regulation (cortisol, DHEA, and DHEA:cortisol ratio), subjective energy (POMS Vigor), and sleep quality (Global PSQI) into a single baseline-anchored metric. For each component, percent change from baseline was calculated, ensuring that baseline values were fixed at zero and subsequent values reflected cumulative adaptation rather than relative ranking. Measures for which lower values indicate improvement, specifically cortisol and PSQI, were direction-corrected so that higher values consistently represented improved stress resilience. To ensure comparability across domains and prevent any single outcome from disproportionately influencing the composite, percent-change scores were standardized using the baseline standard deviation of each measure. The resulting SRI reflects the average standardized change across systems, providing a systems-level indicator of stress resilience that captures gradual recalibration of stress physiology and function over time. While experimental and needing further validation in larger clinical trials, this approach is particularly well-suited for interventions expected to promote adaptive resilience rather than acute or isolated effects, and it may offer an interpretable summary of cumulative stress-buffering capacity that complements traditional single-endpoint analyses.

An SRI value of 0.68 in the P-BSO group indicates a fairly robust, coordinated improvement across stress-related systems, while the much smaller change in the placebo group reflects minimal overall adaptation. This way of looking at the data matters because resilience is a systems-level property. Small changes across multiple domains can add up to meaningful improvement in how the body handles stress day to day. By summarizing these changes into a single index, we hope that the SRI can help to reveal patterns of adaptation that may not be obvious when each measure is viewed in isolation, potentially making it a useful tool for understanding whole-person stress resilience rather than isolated symptoms.

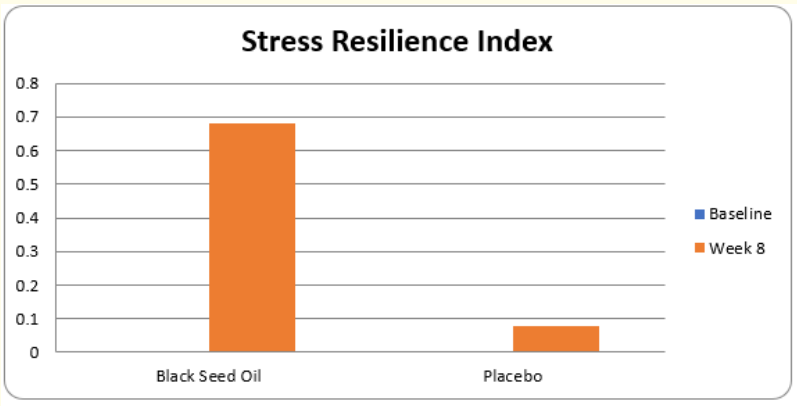

Figure 6

Discussion

The present study demonstrates that a proprietary and patented black seed oil (P-BSO) supplementation produces a coherent pattern of adaptive changes across multiple domains of stress resilience in moderately stressed adults. Although not all individual endpoints reached conventional statistical significance, the consistency of direction across endocrine, psychological, and sleep-related outcomes strongly suggests a biologically meaningful effect.

The lack of widespread statistical significance is best interpreted in the context of the modest sample size and the inherent inter-individual variability characteristic of stress-related biomarkers such as cortisol and DHEA. Importantly, variability did not obscure the overall signal: nearly all measured outcomes shifted in a favorable direction in the P-BSO group relative to placebo. Such convergence across independent systems is unlikely to occur by chance alone [3-6,10].

The endocrine profile observed - with declining cortisol alongside rising DHEA and an improved DHEA:cortisol ratio - clearly suggests recalibration of HPA-axis tone. This pattern is consistent with improved stress buffering capacity and reduced allostatic load. The alignment of endocrine changes with concomitant improvements in sleep quality and vigor further supports a model of physiological adaptation rather than stimulant or sedative effects [4,8,9].

Black seed oil, and particularly the proprietary and patented P-BSO used in this trial, contains bioactive compounds with anti-inflammatory and antioxidant properties. A plausible mechanism is that reduced inflammatory and oxidative load improves cellular energy efficiency and neuroendocrine signaling, thereby recalibrating the HPA axis. This recalibration may facilitate improved sleep quality and higher daytime vigor, culminating in enhanced stress resilience [3,5-7].

Stress resilience is not controlled by a single hormone, symptom, or behavior. It reflects how well multiple systems in the body and brain work together to respond to stress and recover afterward. The novel and exploratory Stress Resilience Index (SRI) was created to capture this broader picture by combining five related measures into one integrated summary score: cortisol, DHEA, the DHEA-to-cortisol ratio, self-reported sleep quality and psychological vigor. Each of these measures reflects a different aspect of stress regulation, and when considered together they may provide a more complete view than any single outcome alone [4,7-9].

When viewed through the lens of traditional medicine, these findings are particularly compelling. Black seed oil has long been regarded as a general tonic and resilience-enhancing remedy. Modern research now supports this ancient perspective, demonstrating benefits for

inflammatory balance, glucose metabolism, cardiovascular health, immune function, and, as shown here, stress resilience [1-6,10]. In this sense, black seed oil - and the ThymoQuin® brand specifically - can be considered an "ancient adaptogen for modern times" - bridging traditional wisdom with contemporary systems biology.

Future studies with larger sample sizes, longer durations, and mechanistic endpoints will be important to confirm and extend these findings. Nevertheless, the present results provide a coherent physiological narrative supporting ThymoQuin® black seed oil as a safe, multi-targeted intervention for enhancing everyday stress resilience [4,11].

Conclusion

Supplementation with a proprietary and patented black seed oil (P-BSO; ThymoQuin®) for 8 weeks produced coordinated improvements in endocrine balance, sleep quality, and subjective vitality in moderately stressed adults. Despite limited statistical power, the consistency and coherence of the observed effects support the conclusion that P-BSO promotes system-level stress rebalancing. These findings position P-BSO as a promising adaptogenic intervention for modern stress-related challenges.

Acknowledgements

The authors gratefully acknowledge TriNutra for providing the black seed oil supplements (ThymoQuin®) and matching placebo materials, as well as funding to support this research. The study was independently conducted by 3 Waves Wellness. The authors also thank Bret Stephens, PhD, and Marc Oddou of Rincon Biosciences for their assistance with cortisol and DHEA assay analyses, and Aaron R. Caldwell, PhD, for his support with statistical analysis and data interpretation. Finally, we sincerely thank all study participants for their time, commitment, and efforts in participating in this study.

Conflict of Interest

TriNutra provided funding and study materials (ThymoQuin® black seed oil and matching placebo) for the present study. 3 Waves Wellness conducted the research and data collection independently. The authors declare no additional financial or commercial relationships that could be construed as a potential conflict of interest.

Bibliography

1. Fallah Huseini H., *et al*. "Blood pressure lowering effect of *Nigella sativa* L. seed oil in healthy volunteers: A randomized, double-blind, placebo-controlled clinical trial". *Phytotherapy Research* 27.12 (2013): 1849-1853.

2. Karaarslan O., *et al*. "The efficacy of *Nigella sativa* oil in the prophylaxis and treatment of upper respiratory tract infections in children". *Journal of Functional Foods* 116 (2024): 106193.

3. Mahdavi R., *et al*. "*Nigella sativa* oil with a calorie-restricted diet can improve biomarkers of systemic inflammation in obese women: A randomized double-blind, placebo-controlled clinical trial". *Journal of Clinical Lipidology* 10.5 (2016): 1203-1211.

4. Mohan ME., *et al*. "A proprietary black cumin oil extract (*Nigella sativa*) (BlaQmax®) modulates stress-sleep-immunity axis safely: Randomized double-blind placebo-controlled study". *Frontiers in Nutrition* 10 (2023): 1152680.

5. Razmpoosh E., *et al*. "A crossover randomized controlled trial examining the effects of black seed (*Nigella sativa*) supplementation on IL-1β, IL-6 and leptin, and insulin parameters in overweight and obese women". *BMC Complementary Medicine and Therapies* 24 (2024): 22.

6. Shoaei-Hagh P., *et al*. "A randomized, double-blind, placebo-controlled clinical trial to evaluate the benefits of *Nigella sativa* seeds oil in reducing cardiovascular risks in hypertensive patients". *Phytotherapy Research* 35.8 (2021): 4388-4400.

7. Talbott SM and Talbott JA. "Black cumin seed oil plus fish oil combination modulates the gut-immune axis". *EC Nutrition* 17.7 (2021): 18-27.

8. Talbott SM and Talbott JA. "Combination of black cumin seed oil and astaxanthin supports gut-immune-brain-axis and improves mood". *Scholarly Journal of Food and Nutrition* 4.3 (2022).

9. Talbott SM and Talbott JA. "Effect of ThymoQuin black cumin seed oil as a natural immune modulator of upper-respiratory tract complaints and psychological mood state". *Food Science and Nutrition Research* 5.1 (2022): 1-6.

10. Tavakoli-Rouzbehani OM., *et al*. "Effects of *Nigella sativa* oil supplementation on selected metabolic parameters and anthropometric indices in patients with coronary artery disease: A randomized, double-blind, placebo-controlled clinical trial". *Phytotherapy Research* 35.7 (2021): 3988-3999.

11. Thomas JV., *et al*. "A phase I clinical trial to evaluate the safety of thymoquinone-rich black cumin oil (BlaQmax®) on healthy subjects: Randomized, double-blinded, placebo-controlled prospective study". *Toxicology Reports* 9 (2022): 999-1007.

Volume 21 Issue 3 March 2026