PILOT STUDY

Effects of Somato® TOMATO Fruit Extract on Key Physiological and Psychological Domains Associated with Sleep Quality, Autonomic Function, and Health-Related Quality of Life: A Pilot Study

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ABSTRACT

Objective • This 28-day pilot study aimed to evaluate the effects of plant-based melatonin (phytomelatonin) derived from Somato® tomato fruit extract (Nutraland USA) on key physiological and psychological domains associated with sleep quality, autonomic function, and health-related quality of life (HRQoL).

Methods • Thirty-five healthy men and women (mean age: 42 years) were enrolled in a decentralized, open-label, real-world evidence study. Participants consumed 2 mg of phytomelatonin daily from Somato® oral strips for 28 days. Objective biometric data were collected using Oura Ring wearable devices. Validated participant-reported outcomes (e.g., Pittsburgh Sleep Quality Index (PSQI) and Short Form 36 Health Survey (SF-36)) helped to explore perceived tolerability, early efficacy signals, and mechanistic trends in a healthy adult population.

Results • Twenty-two participants completed the study and were included in the final analysis. Compared to baseline, supplementation with Somato® tomato fruit extract significantly improved percentage change of sleep latency (-33%, PSQI, P = .005; -11.55%, Oura ring, P = .016), time awake (Oura ring, -10.08%, P = .002), sleep efficiency (Oura ring, -1.21%, P = .011), and global PSQI score (-14.22%, P = .025). A significant improvement was also noted in emotional well-being (8.22%, P = .02) based on the SF-36 health-related quality of life questionnaire. Other SF-36 variables also showed improvements that did not reach statistical significance, including general health (3.22%), energy & fatigue (15.12%), limitations due to emotional problems (15.22%), pain (5.83%), social functioning (6.11%), and physical function (2.81%).

Conclusion • Supplementation with 2 mg/day of phytomelatonin from Somato® tomato fruit extract improved both physiological and psychological measures associated with sleep quality, autonomic function, and health-related quality of life. These findings support the feasibility of phytomelatonin as a plant-based sleep aid and warrant further investigation in a larger, randomized controlled trial. (*Altern Ther Health Med.* 2026;32(1):20-24).

Keywords • tomato, melatonin, phytomelatonin, sleep latency, sleep efficiency, Pittsburgh Sleep Quality Index, Short Form 36 Health Survey, Oura ring, emotional well-being, energy, fatigue, pain, social functioning, physical function

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INTRODUCTION

Melatonin (*N*-acetyl-5-methoxytryptamine) is a hormone primarily synthesized by the pineal gland in response to darkness.[1] Melatonin plays a central role in regulating circadian rhythms, endocrine signaling, and sleep patterns.[2,3] It is produced from the amino acid tryptophan, which is metabolized into serotonin and ultimately converted to melatonin.[2] Essentially, light exposure inhibits melatonin production, while darkness stimulates its release, helping to initiate and maintain sleep.[2]

Disruption in melatonin production has been observed in several populations. For example, individuals with limited exposure to natural light, such as older adults with reduced outdoor time may experience decreased endogenous melatonin secretion.[4] Additionally, certain chronic illnesses (e.g., chronic fatigue syndrome) and altered circadian regulation may contribute to insufficient melatonin levels, resulting in difficulties initiating or maintaining sleep.[5-10]

Beyond endogenous production, melatonin has been extensively studied in its supplemental form as a non-pharmaceutical intervention to support sleep health. This includes low-dose melatonin to help people fall asleep more

quickly,[11,12] to promote healthy rapid eye movement (REM) sleep,[13,14] to support morning "restedness",[15] and to support healthy sleep in general.[16,17] Researchers have also demonstrated that 3 to 5 mg of melatonin can likewise promote optimal sleep,[7,11,13,18-21] relieve occasional sleeplessness,[7,11,18-21] help people fall asleep more quickly,[11,22,23] promote sleep efficiency during the REM sleep cycle,[21] improve healthy sleep,[7,16] and help increase the amount of time spent asleep while in bed.[19]

As with animals, melatonin is also produced in many plant species. These plant-derived forms are referred to as phytomelatonin, with the highest concentrations typically found in generative organs, such as flowers, fruits, and especially seeds, often at levels markedly higher than those found in vertebrate tissues.[24.] Tomatoes are one such notable source.

Several studies have quantified melatonin across tomato varieties. In the 'Journal of Chromatographic Science',[25] researchers reported that melatonin was undetectable in 18 tart cherry varieties, but present in 28 varieties of tomato. Another article in the journal 'Food Chemistry'[26] identified melatonin in 11 tomato varieties, at levels ranging between 4.11–114.52 ng/g, while another study [27] published in the same journal, reported concentrations between 7.5 and 250 ng/g (dry weight). A systematic review[28] on the melatonin content in Mediterranean foods and their impact on human health concluded that many Mediterranean diet staples, including tomatoes, contain high levels of melatonin. Consumption of these foods was shown to increase circulating melatonin levels and enhance plasma antioxidant status. Accordingly, tomato consumption has been associated with improved sleep outcomes.[29]

In addition to phytochemical profiling, the effects of tomato-derived melatonin on sleep are being explored in humans. An 8-week randomized controlled trial in 36 postmenopausal women with obesity found that daily ingestion of tomato two hours before bedtime significantly increased urinary 6-sulphatoxymelatonin (a primary melatonin metabolite) and improved overall sleep quality, as measured by the Pittsburgh Sleep Quality Index (PSQI).[29] Blood and urine samples were collected at the baseline and week 8. Results showed a significant decrease in the PSQI scores over time in the tomato group (P = .0297); all PSQI components had significantly improved, and 6-sulphatoxymelatonin levels were 10-fold higher compared to the control group.[29]

In another randomized controlled trial involving 70 adults with primary insomnia, participants were randomly assigned to one of two groups: an active intervention group or a placebo control group. Participants assigned to the intervention group consumed tomato extract capsules every night for 2 weeks, while the placebo group consumed placebo capsules.[30] All patients completed the Insomnia Severity Index (ISI) and PSQI questionnaires before and after the intervention. At the end of the study, the absolute value of the ISI score change in the intervention group was significantly higher than in the control group (P < .001). However, the absolute change in mean PSQI score did not differ significantly between the two groups (P > .05). These findings suggest that tomatoes represent a viable natural source of melatonin capable of influencing sleep physiology and perception.

The present study aimed to build upon this emerging body of research by evaluating the effects of a standardized phytomelatonin extract derived from tomatoes (Somato®, Nutraland USA) in a real-world setting. Specifically, this 28-day open-label pilot study investigated changes in both objective (wearable-based) and subjective (survey-based) sleep and health related quality of life (HRQoL) outcomes following the nightly use of 2 mg of phytomelatonin. Given the growing interest in plant-based, non-synthetic sleep aids, the study was designed to assess the feasibility, efficacy, and preliminary safety of this tomato-derived intervention in a general adult population.

METHODS

Study Design and Participants

This 28-day, open-label, single-arm pilot study evaluated the effects of Somato®, a phytomelatonin oral strip, on subjective and objective sleep outcomes in a real-world setting. A total of 35 adults (mean age: 42 years) were enrolled. The sample size was determined to align with the objectives of a pilot-level investigation, aimed at generating preliminary data and assessing feasibility. In keeping with this exploratory design, formal power calculations were not performed.

Participant inclusion criteria required participants to be aged 18-70 years, have a baseline Oura Sleep Score <75, and demonstrate ≥80% adherence to Oura Ring use in the 30 days prior to enrollment. Participants were excluded if they were pregnant or nursing, had used sleep supplements or medications in the past 30 days, had chronic medical conditions, or were taking medications known to influence mood or melatonin levels. The full list of inclusion and exclusion criteria are detailed in Table 1.

Participants were recruited remotely through Reputable Health's digital research platform from a pre-screened pool of users already connected via the Oura Ring. After completing a study-specific eligibility survey, individuals who met all inclusion criteria were invited to enroll in the study. Digital informed consent was obtained prior to any study-related activities.

Table 1. Inclusion/Exclusion Criteria

Main inclusion criteria:
• Adults aged 18 to 70 years.
• Willingness to wear the Oura Ring and maintain membership.
• Baseline Oura sleep score of <75.
• No recent major change to supplement routine.
• Subject was willing and able to comply with the study protocol.
• Subject gave voluntary, written, informed consent to participate in the study.
Main exclusion criteria:
• On any melatonin or other dietary supplement to promote sleep health.
• On any pharmaceutical to promote sleep health.
• Pregnant or nursing women.
• History of drug or alcohol dependency.
• Ongoing severe medical conditions.
• Use of mood-affecting or interacting medications.
• Known sensitivity to nightshades.

Study Setting and Intervention

This decentralized, real-world evidence study was conducted remotely using Reputable Health's (Wilmington, DE, USA) proprietary research platform. All procedures, including recruitment, consent, intervention delivery, and data collection, were executed digitally.

Participants self-administered one oral strip nightly for 28 consecutive nights. Each strip contained 2 mg of phytomelatonin derived from whole tomato fruit extract (Somato®, Nutraland USA, Irvine, CA, USA). Study product was shipped directly to participants, and compliance was tracked daily via self-tagging in the Reputable Health app. Participants recording <80% adherence to the study intervention were automatically withdrawn from the study.

Outcomes and Assessments

Study outcomes focused on both subjective and objective sleep metrics, including: objective Oura Ring data (sleep latency, sleep staging, and sleep quality), subjective PSQI scores, and Short Form 36 Health Survey (SF-36) scores.

The primary objective outcomes were continuously captured and monitored via Oura Ring Gen3 wearable devices. Data streams included sleep latency, time awake, sleep efficiency, total sleep, sleep staging durations (REM, deep, and light sleep), resting heart rate, and heart rate variability. For analytic consistency, baseline (Day 0) and end-of-study (Day 28) data were isolated and used for statistical comparison. Participants were required to maintain continuous Oura data collection throughout the intervention.

Subjective sleep quality was assessed using the PSQI, a scientifically validated self-report questionnaire that assesses sleep quality over a one-month period. PSQI includes seven components, each scored from 0 to 3, with higher scores indicating poorer sleep. The global PSQI score, which ranges from 0 to 21, is calculated by summing the seven component scores. A global PSQI score >5 is commonly used as a cut-off to distinguish between good and poor sleepers.[31]

Secondary outcomes were derived from the SF-36, a validated self-report questionnaire assessing health-related quality of life. Eight subdomains (physical functioning, role limitations due to physical problems, role limitations due to emotional problems, social functioning, mental health, energy/vitality, pain, and general health perceptions) were assessed and summarized into two summary scores, a Physical Component Summary (PCS) and a Mental Component Summary (MCS), by combining the original eight domain scores.[32] All participant-reported measures were collected at baseline (Day 0) and again at end-of-study (Day 28).

Ethical Approval

This study protocol was reviewed and approved by an independent Institutional Review Board (BeyondBound IRB; IRB00013542; IORG0009904), which is registered with the U.S. Department of Health & Human Services and holds a Federalwide Assurance (FWA). All participants provided digital informed consent before enrollment.

Data Management and Statistical Analysis

All participant data were de-identified and exported as a single CSV file from the Reputable platform at study conclusion. Analyses were conducted using SPSS version 30.0.0.0 (IBM Corporation, Armonk, NY, USA). The Shapiro-Wilk test was used to assess normality due to the small sample size (n=35). Depending on the distribution of each outcome, paired t-tests or Wilcoxon Signed-Rank tests were used to evaluate within-subject differences between Day 0 and Day 28. All tests were two-tailed with α=0.05. Effect sizes (Cohen's d or r) were calculated to quantify the magnitude of observed changes. A *P* value < .05 was considered statistically significant. Descriptive statistics were also computed for all outcome variables.

RESULTS

Of the 35 participants enrolled in the study receiving the intervention product, 5 never formally started the study, defined as failing to begin compliance tracking within the Reputable App. An additional 2 participants were deemed non-compliant during the study period, 3 reported mild reactions to taking the supplement, and 1 was excluded due to wearable-related data-collection issues. Furthermore, 2 participants were removed from analysis after reporting use of supplements or medications that would have disqualified them during the eligibility process. As a result, the final analytic sample included 22 participants.

Primary Outcomes

Primary outcomes are presented in Tables 2 and 3, with corresponding visual representation in Figure 1. Table 2 outlines mean percentage changes in objective sleep metrics derived from wearable devices between baseline (Day 0) and end-of-study (Day 28). Statistically significant improvements were observed in sleep latency (-11.55%, *P* = .016), time awake (-10.08%, *P* = .002), and sleep efficiency (-1.21%, *P* = .011).

Table 3 summarizes percent changes in subjective sleep quality using the PSQI, where a lower score indicates an improvement. Significant improvements were observed in

Table 2. Primary Outcomes – Oura Ring

Variable	Baseline Mean	End-of-Study Mean	Mean % Change	*P* value
Sleep Latency (min)	18.49	16.35	-11.55	.016[a]
Time Awake (min)	81.88	73.63	-10.08	.002[a]
Sleep Efficiency (%)	7.134	6.197	-1.21	.011[a]

[a]Statistically significant at *P* < .05

Note: Wilcoxon Signed-Rank

Table 3. Primary Outcomes – PSQI

Variable	Baseline Mean	End-of-Study Mean	Mean % Change	*P* value
Sleep Latency	2.045	1.364	-33.33	.005[a]
Global PSQI Score	9.273	7.955	-14.22	.025[a]
Use of Sleep Meds	0.682	0.409	-40.00	.256
Sleep Quality	1.364	1.091	-20.00	.109
Sleep Disturbance	1.545	1.364	-11.76	.206
Daytime Dysfunction	2.227	2.045	-8.16	.403

[a]Statistically significant at *P* < .05

Note: Wilcoxon 2-tailed. In the Pittsburgh Sleep Quality Index (PSQI), a lower score indicates an improvement

Figure 1. Primary Outcomes

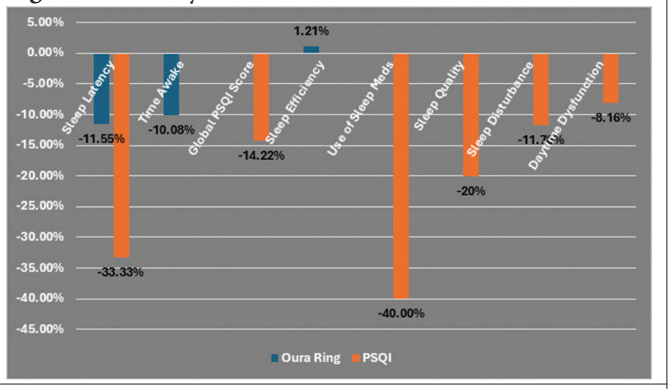


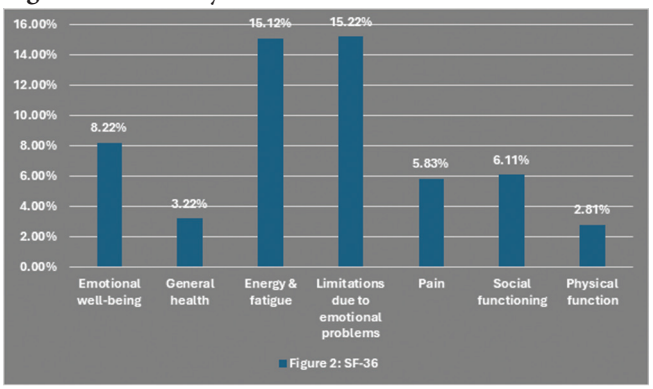
Table 4. Secondary Outcomes – SF-36

Variable	Baseline Mean	End-of-Study Mean	% Change	*P* value
Emotional well-being[a]	68.55	74.18	8.22	.020[c]
General health[a]	68.41	70.68	3.22	.404
Energy & fatigue[b]	46.59	53.64	15.12	.090
Limitations due to emotional problems[b]	69.70	80.30	15.22	.120
Pain[b]	79.09	78.41	5.83	.217
Social functioning[b]	74.43	78.98	6.11	.327
Physical function[b]	89.09	91.59	2.81	.634

[a]*t* tests
[b]Wilcoxon Signed-Rank Test
[c]Statistically significant at $P < .05$

Note: In SF-36 health-related quality of life, a higher score indicates improvement

Figure 2. Secondary Outcomes



subjective sleep latency (-33.3%, $P = .005$) and the global PSQI score (-14.22%, $P = .025$). Other PSQI subdomains also demonstrated improvements that did not reach statistical significance, including use of sleep meds (-40%), sleep quality (-20%), sleep disturbance (-11.76%), and daytime dysfunction (-8.16%).

Secondary Outcomes

Secondary outcomes are presented in Table 4 and Figure 2, providing mean percentage changes from baseline to end-of-study in HRQoL, as measured by the SF-36. A statistically significant improvement was observed in emotional well-being (8.22%, $P = .02$). Other SF-36 domains showed improvements that did not reach statistical significance, including general health (3.22%), energy & fatigue (15.12%), limitations due to emotional problems (15.22%), pain (5.83%), social functioning (6.11%), and physical function (2.81%).

Safety and Adverse Effects

Overall, Somato® tomato fruit extract was well-tolerated over the 28-day intervention period. Three subjects discontinued the use of the supplement due to self-reported mild gastrointestinal discomfort. No serious adverse events were reported, and no other safety concerns emerged during the study.

DISCUSSION

The use of phytomelatonin offers a potential natural alternative to synthetic melatonin for supporting sleep and circadian health. Unlike synthetic formulations, phytomelatonin is derived from plant-based sources and may provide additional health benefits through co-existing entourage compounds that may offer synergistic or complementary effects. In the case of Somato®, the formulation includes small quantities of lycopene, a carotenoid associated with both antioxidant capacity and sleep regulation. Notably, lower dietary intake of lycopene has been associated with shorter sleep duration (<5 hours)[33] and increased sleep-related issues.[34]

Conversely, synthetic melatonin preparations are often produced via chemical synthesis methods that may result in residual compounds or byproducts, which are not necessarily desirable. There are four common production methods for manufacturing synthetic melatonin, including the use of relevant precursors such as 5-methoxy-3-indolylacetonitrile, 5-methoxy-3-(2-nitroethyl)-indole, 5-methoxytriptamine, and phthalimide (1,3-dihydro-1,3-dioxoisoindole). Each of these methods generate byproducts at trace levels (e.g., below 0.5%).[35] Among the most egregious of these byproducts are 1,1'-ethylidenebis-(L-tryptophan), commonly referred to as "peak E,"[36] has been implicated in the pathogenesis of eosinophilia-myalgia syndrome "through bimodal mechanism, including IL-5 generation by T cells and potentiation of eosinophil functional activation".[36] 1,1'-ethylidenebis-(L-tryptophan) has also been reported in the peripheral blood mononuclear cells in patients with functional somatic syndromes.[37] Although 1,1'-ethylidenebis (L-tryptophan) in most commercial melatonin products is likely to be present at low levels based upon the aforementioned 0.5% collective level of byproducts which might be present at standard dosing (≤10 mg), it is unclear how its levels might change with increasing availability of high-dose melatonin products, some containing up to 60 mg per serving.

Furthermore, melatonin is occasionally used under physician supervision for off-label applications, including the treatment of some cancer patients. In this context, a growing number of researchers have proposed phytomelatonin as a potentially safer and more physiologically aligned alternative. For example, in the journal article titled "Phytomelatonin versus synthetic melatonin in cancer treatments",[36] the authors propose that phytomelatonin may help reduce the risk of unintended side effects associated with synthetic byproducts and improve therapeutic outcomes due to its more comprehensive phytochemical profile. They stated, "The interest of this proposal arose from the need to avoid the unwanted by-products present in synthetic melatonin

preparations. The substitution of synthetic melatonin by phytomelatonin in medical treatments could also lead to substantial improvements in the results." [35]

The current 28-day pilot study adds to this growing body of evidence by demonstrating that 2 mg/day of phytomelatonin from Somato® tomato fruit extract leads to significant improvements in both physiological and psychological measures of sleep quality. These findings were supported by improvements in sleep latency, time awake, and sleep efficiency, as measured by wearable data, as well as improvements in global PSQI and emotional well-being as assessed by validated, participant-reported questionnaires. These multidimensional effects suggest potential benefits not only for sleep architecture, but also for psychological health and HRQoL.

While these results are encouraging, limitations inherent to the study design, including the pilot-level sample size, open-label format, short duration, and lack of follow-up period, warrant cautious interpretation. Nevertheless, the consistent directionality of improvements across multiple domains supports the feasibility and potential efficacy of phytomelatonin supplementation in a general adult population. These findings justify the need for a larger, placebo-controlled randomized trial to confirm the observed benefits, further explore dose-response effects, and evaluate long-term safety and adherence in broader populations.

CONCLUSION

The use of synthetic melatonin as a dietary supplement for promoting sleep is well established. Although phytomelatonin is the same chemical compound as synthetic melatonin, there has been a paucity of research demonstrating its effects. The current 28-day pilot study evaluated the effects of 2 mg/day phytomelatonin derived from Somato® tomato fruit extract (Nutraland USA) in 22 healthy subjects, with results showing significantly improved sleep latency, time awake, sleep efficiency, global PSQI score, and emotional well-being. Other outcomes that did not reach statistical significance include percentage change improvements in general health, energy and fatigue, limitations due to emotional problems, pain, social functioning, and physical function. These findings demonstrate that 2 mg/day of phytomelatonin from Somato® tomato fruit extract improve both physiological and psychological measures associated with sleep quality, autonomic function, and health-related quality of life, and support the need for further investigation in a larger, randomized controlled trial.

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AUTHOR DISCLOSURE STATEMENT

Gene Bruno, DBM, MS, RH(AHG) is the Chief Scientific Officer for Nutraland USA.

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