Journal of Complementary Medicine And Alternative Healthcare
ISSN: 2572-1232

Research article
Volume 13 Issue 2- December 2024
DOI: 10.19080/JCMAH.2024.13.555859

J Complement Med Alt Healthcare

The Combined Effects of Tart Cherry Powder and Magnesium L-Threonate Supplementation on Cognitive Function and Sleep Architecture: A Pilot Study in Healthy Adults

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Submission: December 06, 2024; **Published:** December 20, 2024

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Abstract

Background: Sleep quality and cognitive function are critical to overall health and daily productivity. Sleep disturbances and cognitive decline are interconnected, creating a cycle that exacerbates both issues. Tart cherry (Prunus cerasus) and magnesium L-threonate have been independently studied for their positive effects on sleep and cognitive health. Tart cherry is known to enhance sleep through its high melatonin content, while magnesium L-threonate supports neuroplasticity and cognitive performance. However, the combined effects of these two supplements remain unexplored.

Objective: This pilot study aimed to evaluate the combined effects of tart cherry and magnesium L-threonate supplementation on cognitive function and sleep architecture in healthy adults.

Methods: Seven healthy adults (aged 25-64 years, mean = 31.3 ± 14.4) completed a 30-day supplementation protocol. Participants took two capsules nightly, each containing 800 mg of tart cherry powder and 800 mg of magnesium L-threonate. Cognitive function was assessed via electroencephalography (EEG), measuring brain voltage (μV) and latency (ms). Sleep quality was tracked using the Oura Ring, monitoring total sleep duration, deep sleep, and REM sleep.

Results: Post-supplementation and cognitive performance showed significant improvements. Average voltage increased by 4.7 μV, while latency decreased by 8.43 milliseconds. Sleep metrics also improved, with total sleep duration increasing by 25 minutes, deep sleep by 15 minutes, and REM sleep by 5 minutes. Participants reported subjectively feeling more restorative sleep and quicker sleep onset.

Conclusions: These preliminary findings suggest that tart cherry and magnesium L-threonate supplementation can enhance both cognitive function and sleep quality in healthy adults. Further research with larger sample sizes and controlled designs is warranted to confirm these results and explore potential clinical applications.

Keywords: Sleep quality; Cognitive function; Sleep-related disorders; Polysomnography

Introduction

Cognitive function and sleep quality are interdependent pillars of human health. Sleep is essential for memory consolidation, emotional regulation, and physical restoration, while cognitive function is critical for decision-making, attention, and executive processes (Asif). Disturbances in either domain create a cascade of negative effects, with poor sleep impairing cognition and cognitive stress disrupting sleep patterns [1]. Tart cherry has gained attention as a natural intervention for improving sleep due to its high melatonin content [2]. Melatonin regulates the circadian rhythm and has been shown to enhance sleep quality, particularly in populations with insomnia or disrupted sleep cycles. Additionally, tart cherry contains polyphenolic compounds and antioxidants that reduce oxidative stress, a factor implicated in poor sleep and cognitive decline [3]. Magnesium L-threonate, a unique and highly bioavailable form of magnesium, has demonstrated neuroprotective effects in preclinical and clinical studies. Unlike other forms of magnesium, L-threonate crosses the blood-brain barrier, directly influencing synaptic density, neuroplasticity, and neurotransmitter activity [4]. Research has shown that magnesium L-threonate improves memory, reduces cognitive decline, and supports relaxation, which in turn enhances

sleep quality [5]. Despite the individual benefits of cherry and magnesium L-threonate, their combined effects remain unexplored. This pilot study evaluates the potential synergy between these two supplements in improving sleep quality and cognitive performance in healthy adults.

Study Objective

The primary objective of this study was to determine whether a 30-day regimen of tart cherry powder and magnesium L-threonate could improve cognitive function, as assessed by EEG metrics, and sleep architecture, as measured by total sleep duration, deep sleep, and REM sleep.

Methods

Study Design

This study utilized a prospective, pre-post intervention design. Participants consumed two capsules nightly for 30 days, with each capsule containing 800 mg of tart cherry powder and 800 mg of magnesium L-threonate. Baseline data were collected during the week prior to supplementation, and post-supplementation data were collected during the final week.

Participants

A convenience sample of seven healthy adults, aged 25 to 64 years (mean = 31.3 ± 14.4), was recruited for this study. Participants were selected based on strict inclusion and exclusion criteria to ensure that the sample consisted of individuals in good general health without conditions that could potentially confound the results. To be eligible for participation, individuals had to be free of any neurological, psychiatric, or sleep disorders, and they were required to have no history of conditions such as insomnia, sleep apnea, or other sleep-related disorders. Additionally, participants who were currently using medications or supplements known to influence cognitive function or sleep, such as sedatives, stimulants, antidepressants, or cognitive enhancers, were excluded from the study.

Cognitive Function Assessment

Cognitive performance was assessed using EEG, a non-invasive technique that measures electrical activity in the brain. The primary cognitive measures were brain voltage (μV) and latency (ms), which reflect cognitive processing efficiency and response time, respectively [6]. EEG readings were taken before the supplementation began (baseline) and after 30 days of supplementation. Voltage is indicative of neural engagement, while latency provides insight into the speed of cognitive processing [7].

Sleep Quality Assessment

Sleep quality was monitored using the Oura Ring, a wearable device that tracks key sleep metrics such as total sleep duration, deep sleep, and REM sleep. The Oura Ring has been validated against polysomnography, the gold standard for sleep measurement, and has been shown to provide accurate and reliable data on sleep architecture [8]. Sleep data were recorded nightly throughout the study, with baseline measurements taken during the week before the supplementation period and follow-up data collected after 30 days of supplementation.

Results

In this pilot study, the effects of tart cherry and magnesium L-threonate supplementation on cognitive function and sleep quality were assessed by comparing pre- and post-supplementation measurements. The results indicate significant improvements in both cognitive performance and sleep metrics following the 30-day supplementation period.

Cognitive Function

Post-supplementation, participants demonstrated a significant improvement in EEG metrics. Voltage increased from 13.0 μV to 17.7 μV, reflecting enhanced neural engagement. Latency decreased from 280 ms to 271.6 ms, indicating faster cognitive processing. These changes are consistent with magnesium L-threonate's documented effects on synaptic plasticity and cognitive efficiency.

Sleep Quality

Table 1: Demographics of Study Participants.

Variable	Category
Total: N = 7	
Age	
25-65	Mean = 31.3, SD = 14.4
Gender	
Male	4
Female	3
N/A	0
Education	
None	0
High School or Equivalent (GED)	1
Associates/Technical Degree	0
College Diploma	6
Master's	0
Doctorate	0
N/A	0
Diagnosed Sleep Disorder	
Yes	0
No	7
Currently Taking Sleep Aids	
Yes	0
No	7
SD: Standard Deviation	

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Objective sleep metrics improved across all domains. Total sleep duration increased from 488 minutes to 513 minutes, representing an average gain of 25 minutes. Deep sleep increased from 87 minutes to 102 minutes, a phase crucial for physical restoration and immune function. REM sleep increased from 117 minutes to 122 minutes, a critical stage for memory consolidation and emotional regulation [9]. Participants also reported subjective improvements, including quicker sleep onset and more restorative sleep, aligning with the objective findings. Table 1 presents the pre- and post-supplementation results for EEG metrics, including brain voltage and latency. Voltage (measured in microvolts, μV) reflects the brain's neural engagement, while latency (measured in milliseconds, ms) indicates the time required for cognitive processing [10]. Post-supplementation, participants demonstrated an increase in average voltage from 13.0 μV to 17.7 μV, suggesting enhanced neural activity [11] . Similarly, a decrease in latency from 280 ms to 271.6 ms reflects faster cognitive response times, indicating improved cognitive efficiency [12].

Figure 2: Changes in Sleep Metrics Pre- and Post-Supplementation. Changes in sleep metrics pre- and post-supplementation show improvements in total sleep duration (488 to 513 minutes), deep sleep duration (87 to 102 minutes), and REM sleep duration (117 to 122 minutes), reflecting enhanced sleep quality and architecture. The analysis of Figure 2., shows sleep metrics pre- and post-supplementation revealed significant improvements across total sleep duration, deep sleep duration, and REM sleep duration. Total sleep duration increased from a pre-supplementation average of 488 minutes to 513 minutes post-supplementation, representing an average improvement of 25 minutes. This increase, though moderate, is clinically meaningful as even small enhancements in total sleep duration have been associated with better overall health outcomes.

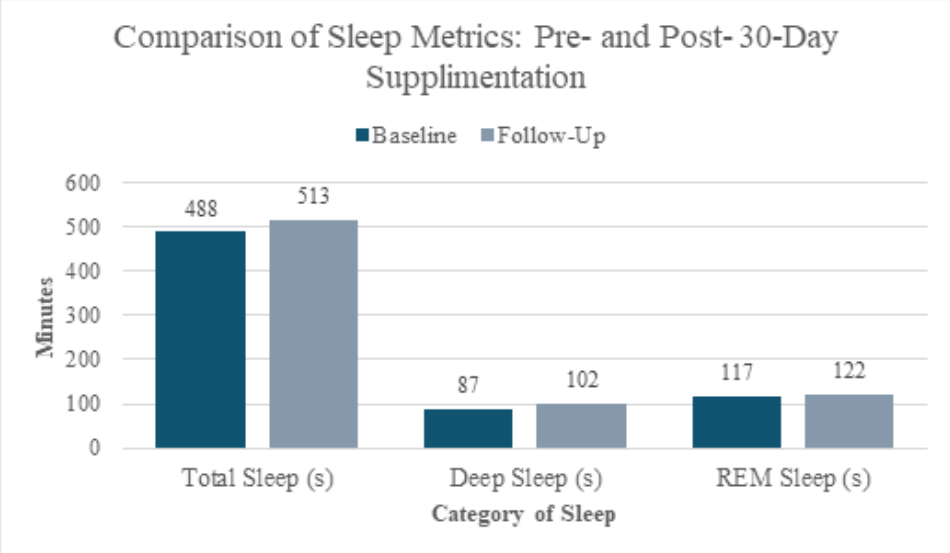

Figure 1: Changes in Sleep Metrics Pre- and Post-Supplementation. Changes in sleep metrics pre- and post-supplementation show improvements in total sleep duration (488 to 513 minutes), deep sleep duration (87 to 102 minutes), and REM sleep duration (117 to 122 minutes), reflecting enhanced sleep quality and architecture.

Table 2: EEG Metrics Pre- and Post-Supplementation.

EEG Metric	Pre-Supplementation	Post-Supplementation
Voltage (μV)	13	17.7
Latency (ms)	280	271.6

Deep sleep duration, a critical phase for physical restoration and immune system functioning [12], increased from 87 minutes pre-supplementation to 102 minutes post-supplementation. The 15-minute improvement suggests a meaningful enhancement in the restorative quality of sleep, likely influenced by the melatonin-regulating properties of tart cherry and the calming effects of magnesium on neurotransmitter function [13].

REM sleep duration also improved, rising from 117 minutes to 122 minutes. While this 5-minute increase is modest, it aligns with the supplementation's potential to enhance the sleep stages associated with memory consolidation, emotional processing, and cognitive recovery [14]. Overall, these findings underscore the efficacy of tart cherry and magnesium L-threonate supplementation in improving both the quantity and quality of sleep. The observed increases across all three metrics reflect enhancements in sleep architecture, particularly in the phases most relevant to physical and mental restoration. These changes, coupled with participants' subjective reports of quicker sleep onset and more restorative sleep, provide compelling evidence for supplementation's impact on sleep health.

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Discussion

This pilot effects provides evidence that tart cherry and magnesium L-threonate supplementation can positively affect both cognitive function and sleep quality in healthy adults. The observed increase in brain voltage and decrease in latency suggest enhanced cognitive processing and neural efficiency. These results are consistent with previous studies showing the neuroprotective and cognitive-enhancing effects of magnesium L-threonate. Additionally, the observed improvements in sleep quality, particularly the increase in total sleep duration, deep sleep, and REM sleep, support the potential of tart cherry supplementation as an effective sleep aid, particularly for improving sleep architecture. The findings of this study are promising; however, there are several limitations that must be addressed. First, the small sample size limits the generalizability of the results. A larger study with a randomized controlled design would be necessary to confirm these findings and assess the effectiveness of this supplementation across diverse populations. Furthermore, the short duration of the study prevents the evaluation of long-term effects, and future research should include follow-up assessments to explore the sustainability of the observed benefits.

Conclusions

The results of this pilot study suggest that supplementation with tart cherry powder and magnesium L-threonate can improve both cognitive function and sleep quality in healthy adults. These findings support the potential of this natural combination as a viable option for enhancing cognitive performance and sleep regulation. However, further research with larger sample sizes and controlled trials is necessary to validate these results and assess their long-term impact.

Implications

These findings highlight the potential of combining natural supplements to address common issues related to sleep and cognition in healthy adults. The results have implications for populations experiencing mild cognitive impairment or sleep disturbances, as well as those seeking non-pharmacological interventions for optimizing health.

Limitations and Future Research

The small sample size and lack of a control group limit the generalizability of the findings. Future studies should include randomized controlled trials with larger, diverse cohorts and exploring long-term effects.

Data Availability Statement

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

Acknowledgments

We would like to sincerely thank all the participants in this study for their time, commitment, and valuable contributions. Their dedication to this research made it possible to explore the effects of tart cherry and magnesium L-threonate supplementation on cognitive function and sleep quality. Without their participation, this study would not have been possible.

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