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PROMOTING MENTAL WELL-BEING AND PRODUCTIVITY THROUGH CHAMOMILE TEA (MATRICARIA CHAMOMILLA L.) CONSUMPTION: ITS EFFECT ON SLEEP QUALITY

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ABSTRACT
Final-semester health-science students may experience substantial sleep disruption while completing undergraduate theses, clinical requirements, examinations, and preparing for transition to professional practice. Chamomile is a widely accessible herbal intervention, but evidence in final-semester students and in the form of a standardized tea preparation remains limited. To determine the change in sleep quality following 14 days of chamomile tea consumption among final-semester students at STIKES Advaita Medika Tabanan, Bali, Indonesia. A pre-experimental one-group pre-test–post-test study was conducted among 36 final-semester students selected by total sampling. Participants consumed one chamomile tea bag (2 g) brewed in 240 mL of hot water 30–60 minutes before bedtime for 14 consecutive days. Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI) before the intervention and on day 15. The PSQI is an established instrument with published evidence of validity and reliability in its original validation study. However, its reliability was not independently reassessed in the present sample. Paired scores were analyzed using the Wilcoxon signed-rank test. Before the intervention, 33 students (91.7%) had poor sleep quality, and the mean PSQI score was 10.69 ± 3.04. After the intervention, the mean PSQI score decreased to 6.03 ± 1.40, representing a mean reduction of 4.67 points (43.6%). The proportion of participants with good sleep quality increased from 8.3% to 38.9%. Thirty-three participants had lower post-test PSQI scores, none had a higher score, and three had unchanged scores. The Wilcoxon signed-rank test demonstrated a statistically significant paired difference ($Z = -5.028$, $p < 0.001$), with a large non-parametric effect estimate ($r = 0.84$). Fourteen days of chamomile tea consumption was associated with a statistically significant improvement in self-reported sleep quality among final-semester students at STIKES Advaita Medika Tabanan. The mean PSQI score decreased from 10.69 to 6.03, although most participants continued to experience poor sleep quality after the intervention. The findings indicate a substantial pre–post change in sleep quality but do not establish a definitive causal effect of chamomile tea.

Keywords: chamomile tea; complementary nursing intervention; matricaria chamomilla; pittsburgh sleep quality index; sleep quality; university students

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INTRODUCTION

Sleep is a multidimensional component of health that encompasses subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, the use of sleep medication, and daytime dysfunction. The Pittsburgh Sleep Quality Index (PSQI) was developed to assess these seven domains over a one-month recall period and to generate a global score from the seven component scores. In the original validation study, a global PSQI score greater than 5 differentiated good and poor sleepers with 89.6% sensitivity and 86.5% specificity (Buysse et al., 1989).

Sleep disturbances are common among university students and are closely associated with psychological stress during undergraduate education. A systematic review and meta-analysis of 34 studies reported a significant association between stress and poor sleep quality or insomnia

symptoms among undergraduate students, although substantial heterogeneity was observed across studies (Gardani et al., 2022). Among medical students, a systematic review and meta-analysis of 109 studies involving 59,427 participants estimated the pooled prevalence of poor sleep quality at 55.64% (95% CI [51.45, 59.74%]). The same review estimated an average sleep duration of approximately 6.5 hours per night, indicating that insufficient sleep is also a concern in this population (Binjabr et al., 2023).

The final semester may be particularly demanding for students in health-profession programs because academic requirements, examinations, clinical responsibilities, research completion, and preparation for professional practice may occur simultaneously. These demands may contribute to psychological stress and sleep disturbances, potentially affecting students' well-being and daily functioning (Gardani et al., 2022; Binjabr et al., 2023). In the setting of the present study, a preliminary assessment of 10 final-semester students at STIKES Advaita Medika Tabanan found that 8 students (80%) reported difficulty initiating sleep, nighttime awakenings, or non-restorative sleep. This preliminary finding provided a local rationale for investigating a feasible complementary approach to supporting sleep health among final-semester students.

Chamomile (Matricaria chamomilla L.) has been investigated as a complementary approach to sleep problems because its flowers contain bioactive constituents, including flavonoids such as apigenin. Experimental and mechanistic literature suggests that apigenin may interact with gamma-aminobutyric acid (GABA)-related pathways and may contribute to anxiolytic or sleep-related effects. However, the extent to which these proposed mechanisms translate into clinically meaningful benefits in humans remains uncertain (Borrás-Linares et al., 2021; Sharman et al., 2024). Therefore, biological plausibility should be distinguished from demonstrated clinical efficacy.

Clinical evidence regarding chamomile and sleep is promising but heterogeneous. A 2024 systematic review and meta-analysis of 10 clinical studies involving 772 participants reported a significant reduction in PSQI scores associated with chamomile interventions (weighted mean difference = −1.88, 95% CI [−3.46, −0.31]). However, heterogeneity in the PSQI analysis was high (I^2 = 88.4%), and improvements were not consistent across all sleep-related outcomes, including sleep onset, daytime functioning, sleep efficiency, and nighttime awakenings (Kazemi et al., 2024). These findings suggest that the observed outcomes may vary according to population characteristics, intervention formulation, dosage, duration, and outcome measurement.

Individual clinical trials further illustrate this variability. In a randomized controlled trial involving 80 sleep-disturbed postnatal women, a two-week chamomile tea intervention improved selected sleep-related outcomes compared with usual postpartum care, although the benefits were not maintained at the four-week assessment (Chang & Chen, 2016). In contrast, a randomized, double-blind, placebo-controlled pilot trial involving 34 adults with chronic primary insomnia found no significant between-group differences in sleep-diary measures following 28 days of standardized chamomile extract (Zick et al., 2011). These contrasting findings highlight the importance of considering differences in populations, underlying sleep problems, formulations, intervention durations, and outcome measures when interpreting the potential benefits of chamomile.

Evidence concerning sleep interventions in university students also indicates that sleep disturbances should be approached as a multifactorial health issue rather than solely as a problem requiring herbal intervention. A 2025 systematic review and meta-analysis of 22 randomized trials involving 6,179 university students found that psychological interventions improved sleep quality compared with control conditions, with a pooled effect size of g = 0.50 (95% CI [0.26, 0.73]). Cognitive behavioral therapy for insomnia (CBT-I) showed a larger pooled effect than mindfulness interventions (Tadros et al., 2025). A systematic review has also examined psychological

interventions for sleep problems among medical and paramedical students, further supporting the relevance of non-pharmacological approaches in health-profession education (Mariappan & Mukhtar, 2025). Accordingly, complementary approaches such as chamomile tea should be considered within a broader student sleep-health perspective that recognizes the potential contributions of sleep hygiene, stress management, and evidence-based psychological interventions. Evidence specific to final-semester students in Indonesia remains limited and context-dependent. A 2021 Indonesian undergraduate study had already examined chamomile tea consumption before bedtime and sleep quality among final-semester students at STIKes Widya Dharma Husada Tangerang (Kamaludin, 2021). Therefore, the research gap addressed by the present study is not that chamomile tea has never been investigated among students. Rather, the gap concerns the evaluation of a clearly defined oral chamomile tea protocol among final-semester nursing and midwifery students in Bali, Indonesia, with adherence monitoring during the intervention period. The practical relevance of this setting lies in the overlapping academic, clinical, and professional-transition demands experienced by students approaching graduation.

The present study addressed this contextual and implementation-focused gap by examining within-person changes in sleep quality following 14 consecutive days of a standardized bedtime chamomile tea routine. The intervention consisted of one 2-g chamomile tea bag brewed in 240 mL of hot water and consumed 30–60 minutes before bedtime, with daily adherence monitoring. This approach was intended to evaluate changes in self-reported sleep quality within a specific educational setting rather than to establish definitive causal efficacy. In addition, because the PSQI assesses sleep over the preceding month, its one-month recall period should be considered when interpreting changes measured after a 14-day intervention (Buysse et al., 1989).

Therefore, this study aimed to determine changes in sleep quality, as measured by the PSQI, before and after 14 consecutive days of chamomile tea consumption among final-semester students at STIKES Advaita Medika Tabanan, Bali, Indonesia. Given the one-group pre-test–post-test design, the study evaluated pre–post changes associated with the intervention rather than establishing a definitive causal effect of chamomile tea.

METHOD

Study design and setting

A pre-experimental one-group pre-test–post-test design was used. Sleep quality was measured at baseline (day 0), followed by 14 consecutive days of chamomile tea consumption, and reassessed on day 15. The study was conducted at STIKES Advaita Medika Tabanan, Bali, Indonesia, during April–May 2026. Participants were final-semester students in the S1 Nursing (semester VIII) and DIII Midwifery (semester VI) programs.

Participants and sampling

The target population comprised all 36 final-semester students in the two programs, and total sampling was used. The final sample therefore consisted of 36 participants. The cohort included 21 S1 Nursing students (58.3%) and 15 DIII Midwifery students (41.7%). The age range was 20–24 years, and 33 participants (91.7%) were women.

Intervention

Participants received one commercially available chamomile tea bag per day. According to the study SOP, one tea bag contained 2 g of chamomile and was prepared with 240 mL hot water, allowed to steep for approximately 2–3 minutes, and consumed warm without added sugar or creamer 30–60 minutes before bedtime. The intervention lasted 14 consecutive days. Adherence was monitored daily through an observation sheet and WhatsApp communication; participants were considered adherent when they consumed the tea on at least 11 of 14 days (≥80%). All 36 participants met this adherence threshold.

Outcome measurement
Sleep quality was assessed using the PSQI. The instrument contains 19 self-rated items aggregated into seven component scores and a global score ranging from 0 to 21. Consistent with the original PSQI convention used in the research, a global score ≤5 was categorized as good sleep quality and >5 as poor sleep quality. The same instrument was administered at baseline and on day 15.

Data analysis
Descriptive statistics were used for participant characteristics and PSQI distributions. Because the paired outcome was not assumed to satisfy parametric assumptions and the research protocol treated sleep quality as an ordinal outcome, the Wilcoxon signed-rank test was used to compare pre-test and post-test scores. Statistical significance was set at $\alpha = 0.05$. The standardized non-parametric effect estimate was calculated as $r = |Z|/\sqrt{N}$. Based on the reported Z statistic and N = 36, r = 0.84.

Ethical considerations
Ethical approval was obtained from the Health Research Ethics Committee of Wangaya Regional General Hospital, Denpasar, Bali (No. 0009.2/1092/RSUDW), dated 16 April 2026, with validity through 16 April 2027. Written informed consent was obtained from participants. Confidentiality, anonymity, voluntary participation, and the right to withdraw were addressed in the study protocol.

RESULT

Participant characteristics
The largest age group was 22 years (16/36, 44.4%), followed by 21 years (12/36, 33.3%). Most participants were enrolled in S1 Nursing (58.3%) and were female (91.7%). The cohort was therefore relatively homogeneous in age and educational stage, although sex distribution was strongly skewed toward women.

Sleep quality before and after intervention
At baseline, 33 participants (91.7%) had poor sleep quality, with a mean PSQI score of 10.69 ± 3.04 (range 4–16). After 14 days, the mean PSQI score fell to 6.03 ± 1.40 (range 4–9). Thus, the mean score decreased by 4.67 points, corresponding to a 43.6% reduction from baseline. The number classified as having good sleep quality increased from 3 (8.3%) to 14 (38.9%), while poor sleep quality decreased from 33 (91.7%) to 22 (61.1%). The raw participant-level data also showed a consistent direction of change: 33 participants had lower post-test PSQI scores than pre-test scores, no participant had a higher score, and three participants had unchanged scores. The median PSQI decreased from 11 (IQR 9–12.25) to 6 (IQR 5–7), providing an additional description of the distributional shift.

Paired inferential analysis

Table 1.
Respondent characteristics (n=36)

Respondent characteristics	n	%
Age		
20 years	5	13.9
21 years	12	33.3
22 years	16	44.4
23 years	2	5.6
24 years	1	2.8
Program		
S1 Nursing, semester VIII	21	58.3
DIII Midwifery, semester VI	15	41.7
Sex		
Female	33	91.7
Male	3	8.3

The Wilcoxon signed-rank test demonstrated a statistically significant difference between pre-test and post-test PSQI scores ($Z = -5.028$, $p < 0.001$). The negative direction of the Z statistic is consistent with lower post-test scores. The calculated effect estimate was $r = 0.84$, which is conventionally interpreted as a large standardized effect. However, because this was a single-group pre–post study, the magnitude should not be interpreted as proof that chamomile alone caused the entire observed change.

Table 2.
Sleep quality before and after intervention

Measure	Pre-test	Post-test	Absolute change	Relative change
Mean PSQI ± SD	10.69 ± 3.04	6.03 ± 1.40	−4.67	−43.6%
Minimum–maximum	4–16	4–9	—	—
Good sleep, n (%)	3 (8.3%)	14 (38.9%)	+11 (+30.6 pp)	—
Poor sleep, n (%)	33 (91.7%)	22 (61.1%)	−11 (−30.6 pp)	—

Table 3.
Wilcoxon signed-rank test results

Wilcoxon result	n	Statistic	p-value
Negative ranks (post < pre)	33	Mean rank 17.00	
Positive ranks (post > pre)	0	Mean rank 0.00	
Ties	3	—	
Overall paired test	36	Z = −5.028	<0.001

DISCUSSION

From a nursing and health-promotion perspective, the findings provide preliminary evidence that a low-cost complementary bedtime routine may be worth investigating further for students with sleep complaints.[5,8,11] However, current evidence indicates that student sleep problems are multifactorial and may benefit from behavioral, psychological, and educational interventions in addition to complementary approaches.[2,5] Routine clinical recommendation should therefore await stronger randomized evidence with standardized chamomile preparations, appropriate control conditions, objective sleep outcomes, longer follow-up, and safety monitoring.[8,10]

Interpretation of the PSQI findings also requires attention to the instrument's recall period.[1] The original PSQI assesses sleep during the preceding one month, whereas the present intervention lasted 14 days.[1] Consequently, the post-test score reflects a recall period that extends beyond the intervention window, which may complicate attribution of the measured change specifically to the 14-day intervention.[1] Future studies should therefore consider combining PSQI with daily sleep diaries or objective measures such as actigraphy to provide more temporally precise assessment of intervention-related changes.[1]

Despite the improvement, 61.1% of participants still had poor sleep quality after the intervention. This residual burden indicates that chamomile tea did not normalize sleep quality for most participants and supports the interpretation that sleep disturbance in students is multifactorial.[2,5] A 2025 systematic review and meta-analysis of 22 randomized trials involving 6,179 university students found that psychological interventions improved sleep quality compared with controls ($g=0.50$, 95% CI 0.26–0.73), while CBT-I showed a larger pooled effect than mindfulness interventions.[5] These findings support a multimodal student sleep-health approach in which complementary strategies may be considered alongside sleep hygiene, stress management, and evidence-based psychological interventions rather than as replacements for them.[2,5]

The intervention was pragmatic because participants consumed one chamomile tea bag before bedtime for 14 consecutive days and adherence was monitored during the intervention. All 36 participants met the predefined adherence threshold of at least 80%, according to the study records. A simple bedtime tea routine may be feasible in student settings because it does not require specialized equipment or clinical administration.[8,11] Nevertheless, feasibility and adherence do not establish effectiveness, and self-reported adherence may be affected by reporting bias.[8]

A plausible biological explanation involves apigenin and GABAergic signaling.[6,7] Reviews of chamomile and other herbal sleep interventions describe apigenin as a flavonoid that may interact with GABAergic pathways, while mechanistic evidence remains substantially preclinical.[6,7] The present study did not measure apigenin exposure, GABAergic activity, cortisol, melatonin, or objective sleep architecture, so the biological mechanism cannot be established from the observed PSQI change.[6,7] The mechanism should therefore be presented as a plausible explanation rather than a demonstrated mediator of the intervention effect.[6,7]

The present findings also differ from the randomized placebo-controlled pilot trial by Zick et al., which enrolled 34 adults with chronic primary insomnia and found no significant between-group differences in total sleep time, sleep efficiency, sleep latency, wake after sleep onset, subjective sleep quality, or number of awakenings after 28 days of standardized chamomile extract.[10] This negative trial is important because it demonstrates that chamomile does not necessarily improve every sleep outcome in every population.[10] Differences in clinical diagnosis, formulation, dose, placebo control, intervention duration, and outcome measurement may partly explain the discrepancy between studies.[8,10] These differences also reinforce the need for controlled trials before drawing causal conclusions about chamomile in student populations.[8,10]

The direction of the present finding is consistent with the randomized controlled trial of chamomile tea among 80 sleep-disturbed postnatal women, in which the two-week intervention improved selected sleep-related outcomes compared with usual care.[9] However, the same trial reported that the positive effects were not maintained at four weeks, suggesting that short-term improvement may not necessarily represent a durable effect.[9] The present study did not include a post-intervention follow-up assessment, so the persistence of the observed improvement cannot be determined.[9]

The magnitude of improvement observed in the present study was larger than the pooled PSQI effect reported in the 2024 systematic review and meta-analysis of chamomile interventions, which estimated a weighted mean difference of −1.88 points (95% CI −3.46 to −0.31).[8] The present mean reduction of 4.67 points should therefore be interpreted cautiously rather than assumed to represent a typical chamomile effect.[8] The meta-analysis included heterogeneous populations and preparations and reported high statistical heterogeneity (I^2=88.4%), which limits direct comparison of its pooled estimate with a small single-group study.[8] In addition, the present study had no control group, so regression to the mean, expectancy effects, concurrent behavioral changes, and changes in academic stress may have contributed to the observed improvement.[2,8]

The baseline burden was high, with 91.7% of participants having PSQI scores >5. This proportion is higher than the pooled prevalence of 55.64% reported among medical students across 95 studies contributing to the PSQI prevalence analysis.[3] The difference should not be interpreted as evidence that final-semester students universally have poorer sleep than other medical students because the present study included only 36 students from one institution and used total sampling.[3] Nevertheless, the finding is consistent with evidence that sleep problems are common in health-profession students and that stress and poor sleep are closely related among university students.[2,3] This study found a substantial within-person improvement in self-reported sleep quality after 14 days of chamomile tea consumption. The mean PSQI score decreased from 10.69 ± 3.04 to 6.03 ± 1.40, representing a reduction of 4.67 points or 43.6% from baseline. The proportion of participants classified as having good sleep quality increased from 8.3% to 38.9%, while the proportion with poor sleep quality decreased from 91.7% to 61.1%. The Wilcoxon signed-rank test demonstrated a statistically significant paired difference ($Z=-5.028$, $p<0.001$), and the calculated rank-based effect estimate was large ($r=0.84$). These results indicate a marked pre–post change in subjective sleep quality, although the one-group design does not allow the observed change to be attributed exclusively to chamomile.

Strengths and Limitations

Strengths included total sampling of the available final-semester cohort, a clearly defined 14-day oral tea protocol, daily adherence monitoring, repeated measurement within the same participants, and use of a widely recognized sleep-quality instrument. The participant-level master data also demonstrated a consistent direction of change in almost all participants. The main limitation is the absence of a control group, which prevents strong causal inference. Additional limitations include the small single-institution sample, predominantly female participants, self-reported adherence, absence of objective sleep measures, short follow-up, and the mismatch between the PSQI's one-month recall window and the 14-day intervention. The study also did not control statistically for academic stress, caffeine consumption, screen time, physical activity, or other behavioral determinants of sleep.

CONCLUSION

Among 36 final-semester students at STIKES Advaita Medika Tabanan, 14 days of chamomile tea consumption was associated with a significant reduction in PSQI scores from 10.69 ± 3.04 to 6.03 ± 1.40 (Wilcoxon $Z = -5.028$, $p < 0.001$). The proportion with good sleep quality increased from 8.3% to 38.9%, and the estimated non-parametric effect size was large ($r = 0.84$). These findings support further investigation of chamomile tea as a feasible complementary intervention for student sleep health.

REFERENCES

Binjabr, M. A., Alalawi, I. S., Alzahrani, R. A., Albalawi, O. S., Hamzah, R. H., Ibrahim, Y. S., et al. (2023). The worldwide prevalence of sleep problems among medical students by problem, country, and COVID-19 status: A systematic review, meta-analysis, and meta-regression of 109 studies involving 59,427 participants. Current Sleep Medicine Reports. https://doi.org/10.1007/s40675-023-00258-5

Borrás-Linares, I., et al. (2021). Herbal remedies and their possible effect on the GABAergic system and sleep. International Journal of Molecular Sciences, 22(4), Article 1733.

Buysse, D. J., Reynolds, C. F., III, Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. Psychiatry Research, 28(2), 193–213. https://doi.org/10.1016/0165-1781(89)90047-4

Chang, S. M., & Chen, C. H. (2016). Effects of an intervention with drinking chamomile tea on sleep quality and depression in sleep disturbed postnatal women: A randomized controlled trial. Journal of Advanced Nursing, 72(2), 306–315. https://doi.org/10.1111/jan.12836

Gardani, M., Bradford, D. R. R., Russell, K., Allan, S., Beattie, L., Ellis, J. G., et al. (2022). A systematic review and meta-analysis of poor sleep, insomnia symptoms and stress in undergraduate students. Sleep Medicine Reviews, 61, Article 101565. https://doi.org/10.1016/j.smrv.2021.101565

Kamaludin, A. (2021). Pengaruh mengkonsumsi teh bunga chamomile sebelum tidur terhadap kualitas tidur pada mahasiswa semester akhir di STIKes Widya Dharma Husada Tangerang. STIKES Widya Dharma Husada.

Kazemi, A., Shojaei-Zarghani, S., Eskandarzadeh, P., & Hashempur, M. H. (2024). Effects of chamomile (Matricaria chamomilla L.) on sleep: A systematic review and meta-analysis of clinical trials. Complementary Therapies in Medicine, 84, Article 103071. https://doi.org/10.1016/j.ctim.2024.103071

Mariappan, V. A., & Mukhtar, F. (2025). Psychological interventions for sleep problems among medical and paramedical students: A systematic review. Journal of Clinical Psychology, 81(6), 399–409. https://doi.org/10.1002/jclp.23781

Sharman, M., et al. (2024). Apigenin: A natural molecule at the intersection of sleep and aging. Frontiers in Nutrition, 11, Article 1359176. https://doi.org/10.3389/fnut.2024.1359176

Tadros, M., Newby, J. M., Li, S., & Werner-Seidler, A. (2025). A systematic review and meta-analysis of psychological treatments to improve sleep quality in university students. PLOS ONE, 20(2), Article e0317125. https://doi.org/10.1371/journal.pone.0317125

Zick, S. M., Wright, B. D., Sen, A., & Arnedt, J. T. (2011). Preliminary examination of the efficacy and safety of a standardized chamomile extract for chronic primary insomnia: A randomized placebo-controlled pilot study. BMC Complementary and Alternative Medicine, 11, Article 78. https://doi.org/10.1186/1472-6882-78