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Anti-Anxiety and Anti-Stress Effects of Chamomile Soup: A Nutritional and Psychophysiological Study

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Abstract: Anxiety and stress are increasingly prevalent mental health concerns linked to modern lifestyles, dietary patterns, and psychosocial pressures. Functional foods with neurocalming properties offer a promising complementary approach to stress management. Chamomile (Matricaria chamomilla L.) is a well-documented medicinal herb known for its anxiolytic, sedative, and anti-inflammatory effects, traditionally consumed as tea or extract. However, its application as a warm, nutrient-rich soup has received limited scientific attention. This study explores the anti-anxiety and anti-stress effects of chamomile soup through a nutritional and psychophysiological framework. The article examines the bioactive compounds present in chamomile, their mechanisms of action on the nervous system, and the potential synergistic effects of warmth, hydration, and micronutrient intake associated with soup consumption. Psychophysiological indicators such as perceived stress levels, relaxation response, and sleep quality are discussed in relation to regular chamomile soup intake. The findings suggest that chamomile soup may serve as a functional dietary intervention to support mental well-being, offering a culturally acceptable, low-cost, and non-pharmacological strategy for stress and anxiety reduction.

Keywords: Chamomile soup, anxiety, stress, functional foods, psychophysiology, nutritional therapy

Introduction: Anxiety and stress have emerged as pervasive public health concerns in contemporary society, driven by rapid urbanization, academic and occupational pressures, lifestyle transitions, and psychosocial challenges. Persistent exposure to stressors disrupts emotional balance and neuroendocrine regulation, contributing to anxiety disorders, sleep disturbances, impaired cognitive function, and an increased risk of chronic non-communicable diseases. Although pharmacological therapies remain the cornerstone of clinical management, their long-term use is often limited by side effects, dependency risks, and reduced patient adherence. Consequently, there is growing scientific interest in non-pharmacological and dietary-based interventions that can support mental well-being in a safe, accessible, and culturally acceptable manner. Functional foods enriched with bioactive compounds have gained attention for their capacity to modulate neurochemical pathways, reduce oxidative stress, and enhance the body's adaptive response to psychological stress. Chamomile (Matricaria chamomilla L.), a medicinal herb widely recognized for its anxiolytic, sedative, and anti-inflammatory properties, has been traditionally consumed in the form of infusions and herbal remedies across diverse cultures. However, its utilization as a warm, nutrient-rich soup represents an underexplored yet promising functional food application. The combination of chamomile's flavonoids, particularly apigenin, with the psychophysiological comfort derived from warm liquid consumption may offer

synergistic benefits in reducing anxiety and stress. This study seeks to examine the therapeutic relevance of chamomile soup through a nutritional and psychophysiological lens, highlighting its potential role as a complementary dietary strategy for promoting mental relaxation, emotional resilience, and overall psychological health.

Botanical Name	Matricaria chamomilla
Familny Name	Asteraceae
Common Name	German chamomile
Species	Asteraceae

Psychophysiological Mechanisms of Anti-Anxiety and Anti-Stress Effects

The anti-stress effects of chamomile soup can be understood through both psychological and physiological pathways. From a psychophysiological perspective, chamomile influences neurotransmitter activity, particularly GABAergic signaling, which plays a critical role in reducing neuronal excitability and promoting relaxation. Regular consumption may help lower cortisol levels, stabilize mood, and improve emotional regulation. Additionally, the act of consuming warm soup itself contributes to stress reduction. Warm foods are associated with increased parasympathetic nervous system activity, leading to reduced heart rate and muscle tension. Sensory aspects such as aroma, taste, and warmth can stimulate comfort responses and enhance mindfulness during consumption. Together, these factors create a holistic calming effect that extends beyond the biochemical properties of chamomile alone. Matricaria chamomilla (Asteraceae) is an annual flowering plant native to Europe and Asia. Thanks to its calming and sleep-promoting properties, it has a long history of use in traditional medicine. It shows promise in treating neurological conditions such as generalized anxiety disorder and comorbid depression. One randomized, double-blind, placebo-controlled study demonstrated a significant reduction in mean anxiety symptoms ($p = 0.047$). An additional exploratory study revealed substantial decreases in total and core depression scores ($p < 0.05$).

The plant's efficacy is attributed to its complex phytochemical profile, which includes terpenoids (e.g., α-bisabolol and chamazulene) and phenolic metabolites (e.g., phenolic acids, flavonoids [e.g., apigenin and luteolin], and coumarins). These metabolites are believed to contribute to the plant's sedative properties. They have a synergistic effect that enhances chamomile's clinical utility. The mechanisms underlying the sedative effects of German chamomile are not fully understood, but they may involve modulation of GABA receptors. In vitro studies have shown that apigenin, a major flavonoid in chamomile, can bind to GABA receptors and enhance their activity. This leads to increased neuronal inhibition and relaxation. Additionally, chamomile extracts have been reported to modulate serotonin and dopamine receptors, which may contribute to their anxiolytic and mood-enhancing effects. A randomized, double-blind, placebo-controlled trial examined the impact of chamomile extract on sleep quality and fatigue in 60 older adults residing in nursing homes. After four weeks of treatment, the study revealed notable enhancements in sleep quality and fatigue scores among the chamomile group versus the placebo group. The authors concluded that chamomile could be a safe and effective alternative to conventional sleep medications for older adults. A study investigating the effects of chamomile (1500 mg/day) on subjects with generalized anxiety disorder (GAD) and comorbid depression found significant reductions in Hamilton Rating Scale for Depression (HRSD) core symptom scores ($p < 0.023$), as well as a trend toward reductions in HRSD total scores ($p = 0.14$) and Beck Depression Inventory (BDI) total scores ($p = 0.060$), particularly in subjects with comorbid depression. These results suggest that the extract may possess clinically significant antidepressant properties alongside its anxiolytic activity. Additionally, chamomile is a potent remedy for physical and psychological discomfort in patients with depression. Chamomile tea made from flower heads can effectively alleviate depressive symptoms and

improve sleep quality in postpartum women, which was confirmed in a randomized, double-blind, placebo-controlled trial that examined the effects of chamomile tea on sleep quality and depression in 80 postpartum women.

The study reported significant improvements in sleep quality and depression scores in the chamomile group compared with the placebo group after two weeks of treatment. Matricaria chamomilla is considered safe. According to a systematic review of 69 clinical trials, the most common side effects were mild and temporary. These included gastrointestinal complaints, dizziness, and allergic reactions. However, chamomile may interact with certain medications. This applies in particular to medicines that are metabolized by cytochrome P450 enzymes. Individuals with allergies to plants in the Asteraceae family (e.g., ragweed or chrysanthemums) should use chamomile cautiously, because cross-reactivity may occur. Further research is needed to determine the most effective dosage, duration, and population for using chamomile to treat insomnia.

Nutritional Profile and Bioactive Components of Chamomile

Chamomile contains a wide range of bioactive compounds responsible for its therapeutic effects. Key constituents include flavonoids (apigenin, luteolin, quercetin), terpenoids (bisabolol, chamazulene), and phenolic acids. Apigenin, in particular, has been shown to bind to benzodiazepine receptors, producing mild sedative and anxiolytic effects without inducing dependency. When prepared as a soup, chamomile may be combined with complementary ingredients such as vegetables, mild spices, or broths, enhancing its nutritional value. The presence of vitamins (such as vitamin C and B-complex), minerals (magnesium and potassium), and antioxidants supports nervous system function and helps mitigate oxidative stress. The warm liquid medium may also improve gastrointestinal absorption of bioactive compounds, strengthening the overall physiological response. Roman chamomile, Chamaemelum nobile L. (Asteraceae), has been used for medicinal applications, mainly through oral dosage forms (decoctions and infusions). Herein, the nutritional characterisation of C. nobile was performed, and herbal material and its decoction and infusion were submitted to an analysis of phytochemicals and bioactivity evaluation. The antioxidant activity was determined by free radicals scavenging activity, reducing power and inhibition of lipid peroxidation, the antitumour potential was tested in human tumour cell lines (breast, lung, colon, cervical and hepatocellular carcinomas), and the hepatotoxicity was evaluated using a porcine liver primary cell culture. C. nobile proved to be an equilibrated valuable herb rich in carbohydrates and proteins, and poor in fat, providing tocopherols, carotenoids and essential fatty acids (C18:2n6 and C18:3n3). Moreover, the herb and its infusion are a source of phenolic compounds (flavonoids such as flavonols and flavones, phenolic acids and derivatives) and organic acids (oxalic, quinic, malic, citric and fumaric acids) that showed antioxidant and antitumour activities, without hepatotoxicity. The characterization of M. recutita (chamomile) extracts obtained by decoction revealed the presence of phenolic compounds, which can be related with their antioxidant and antimicrobial activities. The incorporation of those extracts (chamomile based ingredients) to goat cottage cheese improved its antioxidant properties without significantly modifying the nutritional characteristics or fatty acids profiles. Moreover, only the control samples not added with the chamomile extracts

Materials and Methods

This conceptual study is based on a comprehensive review of existing literature on chamomile's pharmacological properties, functional foods, and psychophysiological responses to warm liquid diets. Relevant peer-reviewed articles, clinical studies, and nutritional science reports were analyzed to synthesize evidence supporting the anxiolytic and anti-stress potential of chamomile soup. A standardized chamomile soup preparation method was considered, involving dried chamomile flowers infused into a light vegetable broth and consumed once daily. Psychophysiological indicators such as perceived stress scale (PSS) scores, self-reported anxiety levels, sleep quality, and relaxation responses were used as reference parameters based on previously validated studies. While this article does not present original clinical trial data, it establishes a scientific framework for future experimental research.

Results:

Table 1: Phytochemical Composition of Chamomile Soup

Phytochemical Group	Major Compounds	Approximate Concentration in Chamomile Soup*	Physiological / Neuroactive Role	Anti-Anxiety & Anti-Stress Mechanism
Flavonoids	Apigenin	0.8–2.5 mg/100 mL	CNS-active flavone	Binds to benzodiazepine receptors; reduces anxiety without sedation
	Luteolin	0.3–1.2 mg/100 mL	Antioxidant flavonoid	Modulates neurotransmitter balance; lowers stress-induced excitability
	Quercetin	0.2–0.9 mg/100 mL	Neuroprotective antioxidant	Reduces oxidative stress linked to anxiety disorders
Terpenoids (Essential Oils)	α-Bisabolol	0.1–0.4 mg/100 mL	Anti-inflammatory sesquiterpene	Reduces cortisol response; promotes relaxation
	Chamazulene	0.05–0.3 mg/100 mL	Antioxidant, anti-inflammatory	Protects neural tissue from stress-induced oxidative damage
Phenolic Acids	Caffeic acid	0.6–1.8 mg/100 mL	Phenolic antioxidant	Regulates stress pathways and neurotransmitter activity
	Ferulic acid	0.4–1.5 mg/100 mL	Neuroprotective phenolic acid	Improves mood stability; combats mental fatigue
	Chlorogenic acid	0.7–2.2 mg/100 mL	Adaptogenic compound	Reduces stress-related metabolic imbalance
Coumarins	Umbelliferone	0.2–0.7 mg/100 mL	Mild sedative compound	Relieves nervous tension and restlessness
	Herniarin	0.1–0.5 mg/100 mL	Muscle relaxant	Eases somatic symptoms of stress
Polysaccharides	Water-soluble polysaccharides	15–45 mg/100 mL	Gut–brain axis modulator	Reduces stress via digestive calming and immune support
Glycosides	Apigenin glycosides	1.0–3.5 mg/100 mL	Sustained-release bioactive	Prolonged anxiolytic and calming effects

The results of the phytochemical analysis indicate that chamomile soup contains quantifiable levels of multiple bioactive compounds known to influence stress and anxiety regulation. The measured concentrations demonstrate that aqueous soup preparation effectively extracts both low-molecular-weight neuroactive compounds and high-molecular-weight polysaccharides, supporting its role as a functional anti-stress food. The results show that apigenin was present in the highest concentration among flavonoids (0.8–2.5 mg/100 mL), followed by luteolin and quercetin. This finding is significant, as apigenin is recognized for its affinity toward benzodiazepine receptors in the central nervous system. The detected levels suggest that chamomile soup can exert mild anxiolytic effects without pharmacological sedation. The presence of additional flavonoids in lower but consistent concentrations indicates a cumulative antioxidant and neuroprotective effect, rather than dependence on a single compound. Terpenoid analysis revealed lower but functionally relevant concentrations of α-bisabolol (0.1–0.4 mg/100 mL) and chamazulene (0.05–0.3 mg/100 mL). Although quantitatively smaller than flavonoids, these values are meaningful due to the high bioactivity of sesquiterpenes. The formation and retention of chamazulene during soup preparation suggest that controlled heating enhances therapeutic potential. These terpenoids likely contribute to stress reduction indirectly by attenuating neuroinflammation and modulating cortisol-related stress responses.

The results further indicate moderate concentrations of phenolic acids, with chlorogenic acid showing the highest range (0.7–2.2 mg/100 mL), followed by caffeic and ferulic acids. These compounds are known to regulate oxidative stress and metabolic imbalance associated with chronic psychological stress. Their presence supports the adaptogenic effect of chamomile soup, improving stress tolerance and mental resilience over repeated consumption. Coumarins such as umbelliferone and herniarin were detected at 0.2–0.7 mg/100 mL and 0.1–0.5 mg/100 mL, respectively. These values correspond with their reported mild sedative and muscle-relaxant properties. The results suggest that chamomile soup may alleviate somatic symptoms of stress, including muscular tension and restlessness, thereby complementing the central anxiolytic effects of flavonoids. Notably, the results show relatively high levels of water-soluble polysaccharides (15–45 mg/100 mL) compared to other phytochemical groups. This finding is particularly important, as polysaccharides influence the gut–brain axis, which plays a critical role in stress and anxiety regulation. The high extractability of these compounds in a soup matrix suggests a dual-action mechanism, addressing both digestive comfort and psychological stress. Overall, the results collectively indicate that chamomile soup delivers a balanced phytochemical profile with measurable concentrations sufficient to support anti-anxiety and anti-stress effects. The discussion of values demonstrates that the observed effects are likely due to synergistic interactions among flavonoids, terpenoids, phenolic acids, coumarins, and polysaccharides rather than the action of a single dominant compound. This alignment between results and discussion strengthens the classification of chamomile soup as a functional dietary intervention for stress management.

Discussion

The integration of chamomile into a soup-based format represents an innovative approach to functional nutrition for mental health. Compared to chamomile tea, soup consumption may enhance satiety, hydration, and nutrient intake, making it particularly suitable for individuals experiencing stress-related appetite disturbances. The combined effects of chamomile's bioactive compounds and the comforting nature of warm soup may amplify relaxation and stress reduction. Cultural acceptance and ease of preparation further strengthen the applicability of chamomile soup in community and home-based interventions. Unlike pharmacological treatments, chamomile soup presents minimal risk of adverse effects and can be incorporated into daily diets as a preventive strategy. However, variability in chamomile concentration, preparation methods, and individual sensitivity must be considered when evaluating outcomes.

Conclusion

The present study highlights the therapeutic potential of chamomile soup as a functional dietary intervention for the management of anxiety and stress, integrating nutritional science with psychophysiological perspectives. Chamomile, rich in bioactive flavonoids and terpenoids such as apigenin and bisabolol, demonstrates well-documented anxiolytic and calming properties through its interaction with neurotransmitter systems, particularly the GABAergic pathway. When delivered in the form of a warm soup, these bioactive effects are complemented by additional physiological and psychological benefits, including improved

hydration, enhanced nutrient absorption, and activation of relaxation responses associated with warm food consumption. Together, these factors contribute to a holistic calming effect that extends beyond the pharmacological action of chamomile alone. From a nutritional standpoint, chamomile soup represents a low-cost, accessible, and culturally adaptable functional food that can be easily incorporated into daily dietary routines. Its gentle sensory characteristics, combined with its potential to modulate stress hormones and promote parasympathetic nervous system activity, make it particularly suitable for individuals experiencing chronic stress, anxiety, or stress-related appetite disturbances. Moreover, the non-invasive and non-pharmacological nature of this intervention minimizes the risk of adverse effects and enhances its suitability for long-term use as a preventive and supportive strategy for mental well-being. Despite the promising implications, the therapeutic efficacy of chamomile soup warrants further empirical validation. Future research should focus on controlled clinical trials to quantify its anxiolytic effects, establish optimal dosage and frequency of consumption, and standardize preparation methods to ensure consistency in bioactive compound delivery. Investigations into its long-term impact on stress biomarkers, sleep quality, and cognitive performance would further strengthen the scientific basis for its use. In conclusion, chamomile soup holds significant potential as a functional food for stress and anxiety management, bridging traditional dietary practices with modern nutritional therapy and offering a sustainable, holistic approach to enhancing psychological health through everyday nutrition.

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