



# The Effect of Chamomile on Common Psychological Disorders Including Depression, Anxiety, Stress and Sleep Disorders: A Narrative Review

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## Abstract

**Context:** It is estimated that 152 million individuals worldwide will be affected by psychiatric disorders by 2060. Depression, anxiety, stress, and sleep disorders are common psychological problems globally that can increase the risk of morbidity and mortality in affected individuals. Although it is suggested that chamomile may have some beneficial effects on psychological disorders by affecting neurotransmitter pathways such as serotonin,  $\gamma$ -amino butyric acid (GABA), noradrenaline, and dopamine in the brain through its components such as flavonoids and apigenin, the available evidence is controversial. Therefore, this review aimed to summarize and discuss the effects of chamomile on common psychological disorders.

**Evidence Acquisition:** Searches were conducted in various databases, such as PubMed, SID, Magiran, and Google Scholar, using multiple keywords including "Chamomile, Camomile, psychological disorders, mental disorders" with no restrictions on language or publication date. Initially, studies were screened based on their titles and abstracts. Then, the full text of relevant articles was further evaluated based on definite criteria such as having a clinical trial design and comparing the effect of chamomile on common psychological disorders versus a placebo/control in adults.

**Results:** Some clinical trials showed significant improvements in depression, anxiety, stress, and sleep with chamomile, while other trials reported no remarkable results.

**Conclusions:** Although chamomile may have some beneficial effects on common psychological disorders, further well-designed clinical trials are required to provide more precise and conclusive evidence in this area. Moreover, it is suggested to conduct more trials to determine an optimal and safe dosage as well as the duration for using chamomile.

Keywords: Camomile, Chamomile, Mental Disorders, Psychological Disorders

## 1. Context

According to available evidence, the annual incidence of psychological disorders is estimated to be approximately 10 - 15 per 100,000. Moreover, it is estimated that 152 million individuals worldwide will be affected by psychiatric disorders by 2060 (1). Psychological disorders can increase the risk of morbidity and mortality in affected individuals (1). Depression, anxiety, and stress are known as common mental health disorders, which have become a global

public health problem (2). Moreover, these disorders are among the main risk factors for other diseases such as stroke, cardiovascular disease (CVD), and some cancers worldwide (3, 4). According to the literature, approximately 280 million people in the world suffer from depression, including 5.0% of adults and 5.7% of the elderly over 60 years of age (5, 6). Sleep disorders are another common clinical problem observed in 33 - 50% of the adult population (7, 8). These common psychiatric disorders can adversely affect a person's normal physical, mental, social, and emotional functioning and

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consequently impact a person's health status as well as quality of life (4, 6, 7).

In the last few decades, due to significant challenges of pharmacological treatments for psychological disorders, including limited availability, costs, potential dependency, and side effects (such as headaches, weight gain, nausea, vomiting, sexual dysfunction, seizures), there has been growing interest in other therapeutic approaches such as traditional and complementary approaches (1, 9). Chamomile (*Matricaria chamomilla* L.) is a well-known medicinal plant from the Asteraceae family, traditionally used for health promotion worldwide and usually grown in Europe, Africa, Asia, and North America (10, 11). German chamomile (*M. chamomilla* L.) and Roman or English chamomile (*Chamaemelum nobile* syn. *Anthemis nobilis* L.) are two important species of chamomile (11). The United States Food and Drug Administration (USFDA) introduced chamomile as an active ingredient in over-the-counter (OTC) dietary supplements in the year 2000, and German chamomile was considered generally regarded as safe (GRAS) for use in food products (11).

Due to the presence of special chemical compounds in chamomile, there are various uses of chamomile in the food and beverage, pharmaceutical, and beauty industries, as well as medical applications (10-12). Moreover, chamomile has shown many beneficial effects regarding health promotion and disease control, including antibacterial, anti-ulcer, antispasmodic, strengthening the nervous and immune systems, useful impacts in menstrual disorders and chronic diseases, and anti-inflammatory and antioxidant activity, which have mainly been attributed to its compounds such as sesquiterpenes, apigenin, flavonoids, and coumarins (12-17). Accordingly, numerous studies have been extensively developed to evaluate the effect of chamomile on common mental disorders, including depression, anxiety, stress, and sleep disorders (16, 18, 19).

It seems that chamomile may have some useful effects on psychological disorders by modulating the function of the hypothalamic-pituitary-adrenocortical axis, antioxidant and anti-inflammatory activity, as well as affecting neurotransmitter pathways such as serotonin,  $\gamma$ -amino butyric acid (GABA), noradrenaline, and dopamine in the brain using its components such as flavonoids and apigenin (18, 20). Nevertheless, the findings of clinical trials in this area are controversial.

Some trials reported significant beneficial effects of chamomile regarding psychiatric disorders (21-24), while others observed no remarkable effects on psychological problems (8, 25-27). For example, the results of one clinical trial on patients with generalized anxiety disorder (GAD) showed that intake of chamomile (500 mg, 3 times a day) was significantly related to fewer GAD symptoms in comparison to the placebo (22). Furthermore, the rate of disease recurrence was lower in the chamomile group than in the placebo group in the mentioned study (22).

Several clinical trials in Iranian elderly reported that consumption of chamomile plant extract (400 mg, twice a day) for 4 weeks was related to a significant improvement in sleep quality compared with the control group (21, 28). In another trial, researchers found that consumption of chamomile tea significantly reduced the intensity of anxiety in patients suffering from chronic heart failure (23). Moreover, a three-blind randomized clinical trial (RCT) indicated that using chamomile extract syrup (400 mg daily) for four weeks significantly improved sleep quality in hemodialysis patients (24). However, one RCT among a sample of menopausal women found no significant impact of consuming chamomile extract on sleep quality and sleep efficiency after 4 weeks (26). Similarly, Zick et al. observed no significant effect of chamomile supplementation (270 mg, twice a day) on total sleep time (TST), sleep efficiency, sleep latency, wake after sleep onset (WASO), sleep quality, and number of awakenings after 28 days in patients with chronic insomnia (8).

Therefore, given the controversy of evidence about the effect of chamomile on common psychological problems, as well as a limited number of review studies in this field, this review aimed to discuss the effects of chamomile on common psychological disorders, including depression, anxiety, stress, and sleep disorders, as well as relevant possible mechanisms. Moreover, this study can help clarify the path for more trials in the future to provide more evidence for using chamomile in clinical approaches.

## 2. Evidence Acquisition

In the present review, relevant studies examining the effects of chamomile on common psychological disorders, including depression, anxiety, stress, and sleep disorders, were identified and reviewed. Searches

were performed across multiple databases such as PubMed, Google Scholar, SID, and Magiran using a combination of various keywords: (Chamomile OR Camomile) AND (“psychological disorders” OR “psychological problems” OR “psychiatric disorders” OR “psychiatric problems” OR “mental disorders” OR “mental problems” OR depression OR “depressive disorders” OR anxiety OR “anxious disorders” OR stress OR sleep OR “sleep disorders”). No restrictions were imposed on language or publication date during the search process. Initially, studies were screened based on their titles and abstracts, and then the full texts of relevant articles were further evaluated. Our main criteria for including a study in the present narrative review were having a clinical trial design and comparing the effect of chamomile on common psychological disorders (depression, anxiety, stress, sleep disorders) versus a placebo/control in the adult human population. In the present narrative review, the main data extracted included the study authors, study year, study design, study population, type of intervention, study duration, and study results.

### 3. Results

Several clinical trials in Iranian elderly populations investigated the effect of chamomile plant extract on sleep quality. Participants were studied in the intervention group (taking 400 mg chamomile extract capsules twice a day) and a control group (without any intervention) for four weeks (21, 28). The researchers illustrated that sleep quality improved significantly in the chamomile group compared with the control group (21, 28).

Najafi Mollabashi et al. evaluated the effect of chamomile on premenstrual syndrome (PMS) among 118 Iranian students in a double-blind, randomized controlled trial (RCT) (29). In this study, participants were randomly divided into two groups: The first group received chamomile capsules (250 mg every eight hours), and the other group received a placebo (29). Participants were asked to start taking the capsules seven days before menstruation until the beginning of menstrual flow for one month. According to the findings, the decrease in the severity of mental mood symptoms in the chamomile group was significantly greater than in the placebo group (29).

Similarly, Sharifi et al. conducted a double-blind RCT among a group of Iranian students with symptoms of

PMS (30). They concluded that taking chamomile capsules three times a day (each capsule containing 100 mg) during two menstrual cycles was more effective in reducing the overall severity of PMS symptoms, especially its psychological symptoms, compared to 250 mg mefenamic acid capsules three times a day (as a control group) (30).

In another clinical study, the role of chamomile capsules in preventing the recurrence of GAD symptoms in a group of patients aged  $\geq 18$  years was evaluated (22). This study was conducted in two steps. During the first step, patients received 1500 mg of chamomile extract daily (500 mg capsules 3 times a day) for 12 weeks. In the next step, some participants were re-evaluated in a parallel double-blind RCT (22). In the second phase, patients were divided into two groups consuming chamomile or placebo for 26 weeks. During the follow-up, the chamomile group had fewer GAD symptoms compared to the placebo group ( $P = 0.003$ ). The average recurrence period was  $11.4 \pm 8.4$  weeks for the chamomile group and  $6.3 \pm 3.9$  weeks for the placebo group (22). Furthermore, the risk of recurrence in the chamomile group was significantly lower than in the placebo group (hazard ratio, 0.52; 95% confidence interval, 0.20 - 1.33;  $P = 0.16$ ) (22).

Based on the results of a clinical trial among patients who referred to the Endoscopy Department of Imam Reza Hospital, Mashhad, Iran, inhalation of chamomile essential oil significantly reduced pre-endoscopy anxiety versus inhalation of sesame oil (as a placebo) in the patients (31).

In one three-blind RCT from Iran, the effect of oral chamomile extract on the sleep quality of hemodialysis patients was investigated (24). Participants were randomly divided into two groups receiving chamomile syrup (400 mg) ( $n = 55$ ) or placebo (400 mg of saccharin syrup) ( $n = 55$ ) daily for four weeks (24). According to the results, consumption of chamomile was significantly related to the improvement of sleep quality versus the placebo (24).

However, in another RCT, although consuming recutita extract (270 mg of high-grade chamomile extract) twice a day for 4 weeks improved sleep quality and reduced sleep latency in a group of adults with insomnia ( $n = 34$ ), the results were not statistically significant (8).

Several RCTs showed that consumption of 1500 mg chamomile extract daily for 8 weeks resulted in a

significant reduction in the clinical symptoms of GAD among patients with GAD (32, 33). Similarly, one double-blind RCT evaluated the effect of oral chamomile extract among individuals with GAD, including patients who had anxiety with depression ( $n = 19$ ), anxiety with a history of depression in the past ( $n = 16$ ), and anxiety without current or past depression ( $n = 22$ ) (34). Participants were randomly assigned into two groups consuming chamomile extract capsules or placebo (lactose monohydrate). In the first, second, third, and fourth weeks, one, two, three, and four capsules (each capsule containing 220 mg of chamomile extract) were administered daily for the study groups (34). From the fifth to the eighth week, participants received five capsules per day. According to the results, a significant decrease was observed in the total Hamilton Rating Scale for Depression (HRSD) in the chamomile group versus the placebo (34).

Another double-blind RCT assessed the effect of chamomile extract (daily 1500 mg) versus a placebo among a group of GAD adults with ( $n = 79$ ) and without ( $n = 100$ ) depression during an eight-week period (35). The findings showed that generally, anti-anxiety effects were seen in the chamomile group versus the placebo group (35).

Rahimi et al. from Jahrom, Iran, reported that consumption of chamomile tea three times a day (one tea bag of 20 g of chamomile in 50 cc of boiling water) with common treatment (diuretics and anxiolytics) for 4 weeks was related to a significant reduction in the intensity of anxiety versus common treatment as a control in outpatients suffering from chronic heart failure (23).

Another double-blind RCT among a sample of postmenopausal women ( $n = 110$ ) in Arak, Iran, indicated a significant decrease in the average sleep disorder score and a significant increase in sleep quality following intake of chamomile extract capsules twice a day (each capsule containing 400 mg of chamomile extract) for one month versus the control group (36). Similarly, one RCT in 60 elderly individuals living in Kahrizak Charity Sanatorium in Karaj, Iran, reported that taking two capsules of chamomile extract (each capsule containing 200 mg) twice a day for 28 days was related to increased sleep quality compared to the placebo group (7).

Although one RCT from North America in 106 menopausal women ( $n = 53$  in each group) indicated

that chamomile supplementation (30 oral drops mixed with 50 mL of water of Plant Therapy German Chamomile) was related to significant improvements in sleep latency, time of waking after sleep onset, number of awakenings, and TST in the chamomile group versus the placebo group, no significant findings were detected about sleep quality and sleep efficiency (26).

Another RCT among 74 depressed patients with type II diabetes in 2017 demonstrated that intake of chamomile tea (3 tea bags daily, each tea bag containing 2.5 g of chamomile) for 12 weeks was associated with a decreased depression score versus black tea (as a control) (37).

Moeini Ghamchini et al. in a single-blind RCT among 110 cancer patients treated with chemotherapy ( $n = 55$  in each group), reported that consumption of chamomile tea once a day for 2 weeks was related to a significant decrease in depression score versus the control group, while no significant results were observed in terms of anxiety (25).

The exact mechanisms of some beneficial effects of chamomile on mental disorders, such as depression, anxiety, and sleep disorders, are still unknown. However, some flavonoid compounds in the chamomile plant may play a role in this field by affecting neurotransmitters such as gamma-aminobutyric acid, norepinephrine, dopamine, and serotonin, as well as by modulating the hypothalamic-pituitary-adrenocortical axis (38). For example, researchers, based on animal studies, reported that chrysanthemic acid, a specific flavonoid in chamomile, had anti-anxiety effects and could be one of the effective compounds in chamomile as a sleep aid. An increase in serotonin levels following the use of chamomile products may also be related to the anxiolytic effects of the chamomile plant (39, 40). Moreover, chamomile could have benzodiazepine-like hypnotic activity since it contains apigenin, a flavonoid compound, which can bind to benzodiazepine receptors in the brain and improve sleep disorders (41, 42). Meanwhile, chamomile could reduce adrenocorticotropic hormone (ACTH) levels in plasma and consequently decrease stress levels (43). It should be noted that, despite some beneficial effects of chamomile in improving mental disorders, consumption of chamomile in specific populations, such as pregnant women and patients with allergies, should be avoided (39). Table 1 shows the human studies regarding the effect of chamomile on common mental disorders,

**Table 1.** Clinical Trials Over the Effect of Chamomile on Common Mental Disorders Including Anxiety, Depression, Stress, and Sleep Disorders

Study	Study type	Study Population	Type of Intervention	Study Duration	Results
Abbasinia et al. (2016) (36)	A parallel double-blind RCT	110 menopausal women within the age range of 50-60 years	The intervention group received 400 mg capsules containing chamomile extract twice a day; The control group received no intervention.	1 mo	The average sleep disorder score decreased while the sleep quality increased significantly in the chamomile group.
Amsterdam et al. (2012) (34)	A parallel double-blind RCT	57 patients with mild to moderate GAD, the patients who had anxiety with depression (n = 19), anxiety with a history of depression in the past (n = 16), and anxiety without current or past depression (n = 22)	220 mg capsules containing chamomile extract: Week 1: One capsule daily; Week 2: Two capsules daily and in the same way up to 5 capsules a day in weeks 5 to 8; Control group: The placebo	8 wk	Significant reduction in total anxiety and depression scores in chamomile group (especially in individuals with anxiety disorder and depression versus the placebo group)
Amsterdam et al. (2020) (35)	A parallel double-blind RCT	179 people over 18 years of age, of which 100 people had anxiety disorder without depression and 79 people had anxiety disorder with depression.	1500 mg of chamomile extract daily versus the placebo	8 wk	Significant reduction of anxiety and depression scores in the chamomile group versus the placebo group
Najafi Mollabashi et al. (2021) (29)	A parallel double-blind RCT	118 students with PMS	Chamomile capsules (250 mg every 8 h) or placebo	1 mo	The decrease in the severity of psychological mood symptoms in the chamomile group was significantly more than the placebo group.
Zick et al. (2011) (8)	A parallel double-blind RCT	34 people aged 18 to 65 years with sleep disorders	Recutita oral extract (high-grade chamomile extract, 270 mg, twice daily) versus the placebo	28 d	No significant effect was found.
Mao et al. (2014) (38)	Randomized, double-blind, placebo-controlled clinical trial	93 patients ≥ 18 years with GAD	During phase 1: Treatment with 1500 mg of chamomile extract (500 mg capsule 3 times a day); In phase 2: The participants responded to the treatment, were randomly assigned to two groups of chamomile extract and placebo.	The first phase is 12 wk; The second phase is 26 wk	In phase 1: The risk of GAD recurrence in the follow-up period was significantly lower in the chamomile group versus the placebo group; In phase 2: Participants in the chamomile group showed significantly less GAD symptoms than the placebo group.
Keefe et al. (2016) (32)	Double-blind randomized controlled clinical trial	179 people with GAD	At least one daily dose of 500 mg chamomile extract capsules versus placebo	8 wk	Almost 25% of patients responded quickly to chamomile intake and showed at least 50% reduction in anxiety scores.
Keefe et al. (2018) (33)	Randomized, double-blind, parallel clinical trial	Adults (over 18 years) with GAD, 179 people started the trial. The last 49 people who entered the trial were evaluated	Chamomile extract 1500 mg/day versus placebo	8 wk	GAD symptoms and salivary cortisol levels were lower in the chamomile group than in the placebo group.
Tabaraei et al. (2018) (31)	Randomized, double-blind, placebo-controlled clinical trial	152 patients candidate for endoscopy	Chamomile group: Inhalation of seven drops of chamomile essential oil (by dissolving in sesame oil, it reached a concentration of 10%); Control group: Inhalation of seven drops of sesame oil	Inhale for 20 min	The average anxiety score decreased in both groups but the decrease was significantly higher in the chamomile group than the control group.
Moeini Ghamchini et al. (2015) (24)	A triple-blind RCT	110 patients of hemodialysis	Chamomile group: 400 mg chamomile syrup daily; Placebo group: Sarkharin syrup	4 wk	Significant improvement of sleep quality in chamomile group compared with placebo
Adib-Hajbaghery and Mousavi (2017) (7)	A single-blind randomized controlled clinical trial	195 elders with 60 years of age and older living in nursing homes	Chamomile extract capsules (200 mg) twice a day versus the control group (wheat flour capsules)	28 d	Significant improvement of sleep quality in the chamomile group versus the placebo group
Rahimi et al. (2018) (23)	A controlled, single-blind RCT	60 patients with chronic heart failure	Intervention group: In addition to the common treatment, they received chamomile tea three times a day; Control group: Common treatment including diuretics and antidepressants	4 wk	Severity of anxiety was lower in the chamomile group than the control group.
Abdollahzade and Naji (2014) (28)	Quantitative, semi-experimental and clinical trial	80 elderly people with sleep disorders	Intervention group: Receiving 400 mg of chamomile extract twice a day; Control group: Did not receive any intervention.	4 wk	Oral consumption of chamomile plant extract was associated with improving the sleep quality versus control.
Sharifi et al. (2014) (30)	Double-blind RCT	90 women with PMS symptoms	Intervention group: 100 mg chamomile oral capsule three times a day; Control group: 250 mg mefenamic acid capsule three times a day; In both groups, the consumption continued from the 21st day of the menstrual period until the beginning of the next menstrual period and for two cycles	6 mo	Chamomile extract was more effective than mefenamic acid in reducing the overall severity of PMS symptoms, especially psychological symptoms.
Abdollahzade and Naji (2014) (28)	Clinical trial	80 elderly people with sleep disorders	Intervention group: Receiving 400 mg of chamomile extract twice a day; Control group: Did not receive any intervention.	4 wk	Oral consumption of chamomile plant extract was related to improving the sleep quality versus control.
Moeini Ghamchini et al. (2019) (25)	Single blind RCT	Intervention (55 people) and control (55 people) group	Intervention group: Chamomile tea once a day; Control group: Did not receive any intervention.	2 wk	A significant decrease was found after consumption of chamomile tea. However, no significant results were observed in terms of anxiety.
Rasool et al. (2019) (36)	Randomized controlled clinical trial	106 menopausal women (n = 53 in each group)	Intervention group: 30 oral drops mixed, 50 mL of water of high grade extract of chamomile (Plant Therapy German Chamomile), twice daily; Placebo group	4 wk	Significant improvements were found in sleep latency, time of waking after sleep onset, number of awakenings and TST in the chamomile group versus the placebo group. However, no significant findings were detected about sleep quality and sleep efficiency.
Kermanian et al. (2018) (37)	RCT	74 depressed patients with type II diabetes (n = 37 in each group)	Intervention group: Chamomile tea (3 daily tea bags, each tea bag contained 2.5 g chamomile); Control group: Black tea (3 daily tea bags)	12 wk	Consumption of chamomile tea versus black tea was related to decreased depression score.

Abbreviations: GAD, generalized anxiety disorder; RCT, randomized control trial; PMS, premenstrual syndrome; TST, total sleep time.

including anxiety, depression, stress, and sleep disorders.

#### 4. Conclusions

The results of numerous clinical trials show that chamomile, as a complementary treatment, may have some beneficial effects on common psychological disorders, including depression, anxiety, stress, and sleep disorders. However, some trials indicated no significant effect of chamomile in this regard. Moreover, the relevant studies had some limitations, such as small

sample sizes, short durations, and insufficient research designs. The method of assessing psychological disorder status in the majority of studies was self-administered. Additionally, confounding factors such as physical activity levels and dietary intakes were not evaluated in some studies. Therefore, more well-designed clinical trials with larger sample sizes and longer durations are recommended to provide more accurate and conclusive evidence linking the effects of chamomile on psychological problems and related mechanisms. It is also suggested to conduct more trials to determine an

optimal and safe dosage, as well as the duration for using chamomile in clinical conditions. Although no serious side effects of chamomile have been reported in controlled dosages, other events such as allergic reactions and drug interactions (such as with sedative, anticoagulant, and antiplatelet drugs) should be noted, especially in high-risk groups. Moreover, the protocols for producing chamomile extract or the purification of its active compounds must be standardized.

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## Footnotes

**Authors' Contribution:** Z. S. S. and A. P. designed the study. M. Y. and Z. R. N. conducted the search and initially screened the related studies. S. S. P., F. J. S., and S. S. read full text of articles and selected the included articles. Z. S. S. and A. P. wrote the draft of manuscript. Z. S. S. and A. P. critically revised the manuscript and confirmed the final version of it to submit. All authors read and approved the final version of manuscript.

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