Medicinal Plant Research 2024, Vol.14, No.2, 107-116
http://hortherbpublisher.com/index.php/mpr

Review Article Open Access

Chamomile Tea: An In-Depth Analysis of Its Bioactive Compounds, Therapeutic Applications, and Historical Usage

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Medicinal Plant Research, 2024, Vol.14, No.2 doi: 10.5376/mpr.2024.14.0009
Received: 27 Feb., 2024
Accepted: 30 Mar., 2024
Published: 17 Apr., 2024

Preferred citation for this article:
Wang X.C., and Zhang L.M., 2024, Chamomile tea: an in-depth analysis of its bioactive compounds, therapeutic applications, and historical usage, Medicinal Plant Research, 14(2): 107-116 (doi: 10.5376/mpr.2024.14.0009)

Abstract Chamomile tea has been consumed for centuries due to its cultural significance and widespread use in both traditional and modern medicine. This study systematically analyzes the bioactive compounds in chamomile tea, focusing particularly on the synergistic effects of flavonoids and essential oils and their therapeutic potential, including comprehensive health benefits related to digestive health, mental well-being, and skincare. The study also explores the historical context of chamomile tea from ancient Egypt and Greece to its modern applications, compares its nutritional and therapeutic properties with other herbal teas, and showcases its clinical efficacy and safety through case studies. The findings indicate that chamomile tea holds significant therapeutic potential, but further research is needed to fully explore its bioactive components and long-term health benefits. This study contributes to a deeper understanding of chamomile tea's role in traditional and modern medicine and provides directions for future research.
Keywords Chamomile tea; Bioactive compounds; Flavonoids; Essential oils; Therapeutic applications

1 Introduction

Chamomile tea, derived from the dried flowers of *Matricaria chamomilla* and *Chamaemelum nobile*, is a widely consumed herbal infusion known for its soothing properties. For centuries, this fragrant tea has been embraced across various cultures, not only as a beverage but also as a remedy for numerous ailments. Chamomile's gentle yet potent effects have rendered it a staple in traditional practices, while recent scientific investigations have begun to explore its diverse bioactive compounds and their therapeutic potential.

Chamomile tea holds a prominent place in the cultural traditions of many civilizations. In ancient Egypt, Greece, and Rome, chamomile was revered for its healing properties, often used to treat fevers and inflammation. Similarly, it has been incorporated into European and Middle Eastern traditions as a natural remedy for insomnia, digestive issues, and skin conditions. Today, chamomile continues to be a popular herbal choice, with its use expanding into holistic health practices around the world (Catani et al., 2021).

Chamomile's role in traditional medicine extends beyond its historical use. Traditional herbalists have long valued its anti-inflammatory, antioxidant, and anxiolytic properties, employing it to alleviate various health conditions, including gastrointestinal disturbances, anxiety, and respiratory disorders. In modern medicine, research has substantiated some of these claims, highlighting chamomile's rich composition of bioactive compounds such as flavonoids, terpenoids, and phenolic acids. These compounds are being actively studied for their role in reducing inflammation, managing anxiety, and improving cardiovascular health, positioning chamomile tea as a valuable complement to conventional treatments (Bayliak et al., 2021).

This study provides an in-depth analysis of chamomile tea, focusing on its bioactive compounds, therapeutic applications, and historical usage. By integrating evidence from both traditional and scientific perspectives, this study aims to bridge the gap between historical remedies and modern medicine, exploring the chemical composition, pharmacological effects, and potential of chamomile as a treatment in various medical fields. Through this study, the goal is to highlight the importance of chamomile tea as a versatile therapeutic agent while identifying areas that require further research to fully understand its capabilities.

2 Bioactive Compounds in Chamomile Tea

2.1 Identification of key bioactive compounds

Chamomile tea is rich in flavonoids, which are a group of polyphenolic compounds known for their health benefits. The primary flavonoids identified in chamomile include apigenin, quercetin, patuletin, and luteolin, along with their glucosides. These compounds exhibit a range of biological activities, such as antioxidant, anti-inflammatory, and antispasmodic effects. Apigenin, in particular, has been noted for its potential to induce apoptosis in cancer cells and its anxiolytic properties. Quercetin and luteolin also contribute to the anti-inflammatory and antioxidant properties of chamomile tea, which can help in managing oxidative stress and inflammation-related conditions (McKay and Blumberg, 2006).

The essential oils extracted from chamomile flowers are another significant group of bioactive compounds. The main components of these oils include terpenoids such as α-bisabolol, its oxides, and azulenes like chamazulene. These essential oils are known for their therapeutic properties, including anti-inflammatory, antimicrobial, and antispasmodic effects. α-Bisabolol, for instance, has been shown to possess anti-irritant and anti-inflammatory properties, making it useful in treating skin conditions and gastrointestinal disturbances. Chamazulene, on the other hand, is recognized for its potent anti-inflammatory and antioxidant activities.

2.2 Quantification methods for bioactive compounds

Chromatographic techniques, particularly Gas Chromatography-Mass Spectrometry (GC-MS) and Liquid Chromatography coupled with Diode-Array Detection and Mass Spectrometry (LC-DAD-MS/MS), are commonly used to quantify the bioactive compounds in chamomile tea. GC-MS is effective in analyzing the essential oil components, providing detailed profiles of terpenoids and other volatile compounds. LC-DAD-MS/MS, on the other hand, is utilized for the quantification of polyphenols, including flavonoids and phenolic acids, offering high sensitivity and specificity (Viapiana et al., 2016).

Spectroscopic methods, such as UV-Vis spectrophotometry, are also employed to quantify the total polyphenol content in chamomile tea. The Folin-Ciocalteu method is a classical approach used to estimate the total phenolic content by measuring the absorbance of the sample at specific wavelengths. This method provides a general indication of the antioxidant capacity of the tea, which is largely attributed to its polyphenolic compounds.

2.3 Synergistic effects of bioactive compounds

The bioactive compounds in chamomile tea, particularly flavonoids and essential oils, can interact synergistically to enhance their therapeutic effects. For instance, the combination of apigenin (a flavonoid) and α-bisabolol (an essential oil component) can potentiate anti-inflammatory and antispasmodic activities, providing more effective relief from gastrointestinal and inflammatory conditions. Such interactions can also enhance the overall antioxidant capacity of chamomile tea, contributing to its health benefits (Ganzera et al., 2006).

The combined effects of flavonoids and essential oils in chamomile tea can lead to significant health benefits. These compounds work together to provide a broad spectrum of therapeutic effects, including antioxidant, anti-inflammatory, antimicrobial, and anxiolytic properties. The antioxidant activity helps in reducing oxidative stress, which is linked to various chronic diseases, while the anti-inflammatory and antimicrobial properties can aid in managing infections and inflammatory conditions. Additionally, the anxiolytic effects of compounds like apigenin contribute to the calming and sedative properties of chamomile tea, making it a popular remedy for stress and anxiety (El Mihyaoui et al., 2022).

3 Therapeutic Applications of Chamomile Tea

3.1 Use in digestive health

Chamomile tea has been traditionally used to alleviate symptoms of indigestion and bloating. The bioactive compounds in chamomile, such as flavonoids and terpenoids, contribute to its antispasmodic and carminative properties, which help in relaxing the digestive tract muscles and expelling gas. This makes chamomile tea a popular remedy for mild digestive disturbances. Chamomile tea is also effective in managing various gastrointestinal disorders. Its anti-inflammatory and antimicrobial properties help in reducing inflammation and

preventing infections in the gastrointestinal tract. Studies have shown that chamomile can be beneficial in treating conditions such as gastritis, colitis, and irritable bowel syndrome (IBS). The therapeutic effects are attributed to its ability to modulate the immune response and inhibit the growth of harmful bacteria (Maleki et al., 2023).

3.2 Role in mental health and relaxation

Chamomile tea is widely recognized for its calming effects, making it a popular choice for reducing anxiety and stress. The anxiolytic properties of chamomile are primarily due to the presence of apigenin, a flavonoid that binds to benzodiazepine receptors in the brain, producing a sedative effect. A systematic review and meta-analysis have demonstrated that chamomile is effective in reducing symptoms of generalized anxiety disorder (GAD) and improving overall mental well-being (Dai et al., 2022).

Chamomile tea is commonly used as a natural remedy for sleep enhancement and the treatment of insomnia. The sedative effects of chamomile help in promoting relaxation and improving sleep quality. Research has shown that chamomile administration significantly improves sleep quality, although its effect on insomnia severity is less conclusive4. The mild sedative properties of chamomile make it a safe and effective option for individuals seeking to improve their sleep patterns.

3.3 Applications in skin health

Chamomile exhibits a wide range of biological activities, including anti-inflammatory, antioxidant, antimicrobial, and anticancer properties. Its active components, such as apigenin and bisabolol, play a crucial role in these effects (Figure 1) (Sah et al., 2022). Studies have discovered that topical application of chamomile tea can be used to treat various skin inflammations. The flavonoids and terpenoids in chamomile help reduce redness and irritation associated with skin conditions like eczema and dermatitis. Its soothing effects make it a valuable addition to skincare routines aimed at managing inflammatory skin disorders (Sah et al., 2022).

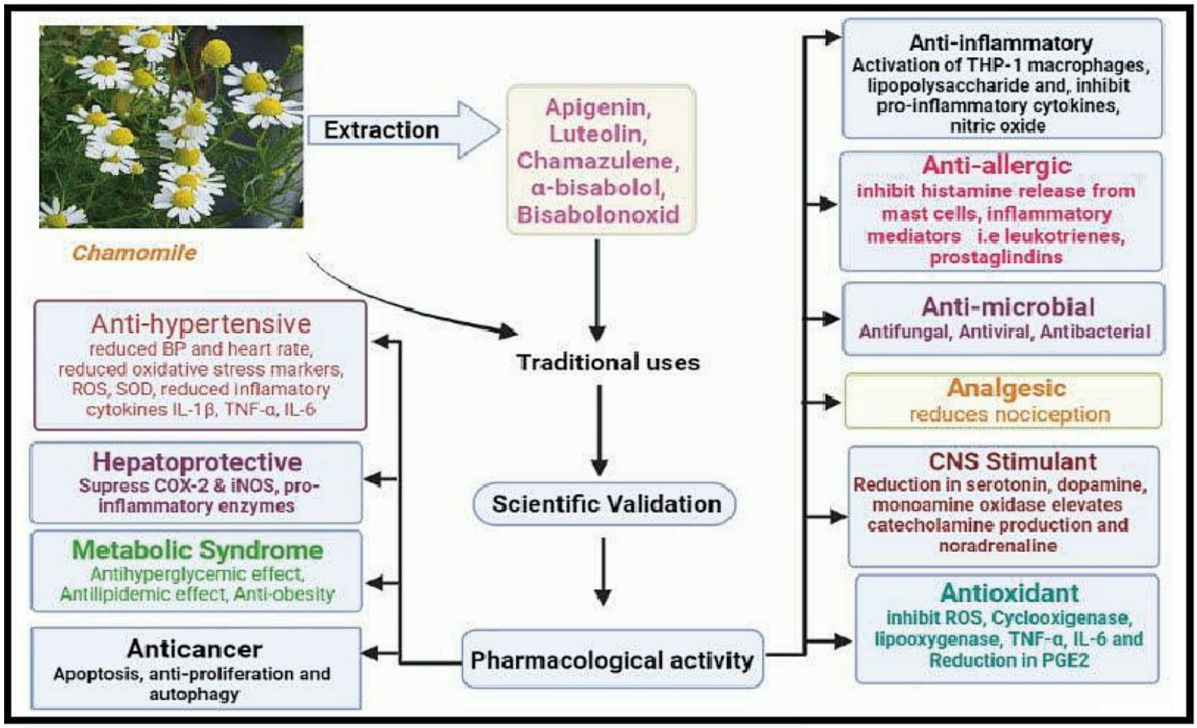

Figure 1 The therapeutic applications of chamomile and the respective mechanism of action (Adopted from Sah et al., 2022)

Image caption: The figure lists the pharmacological effects of chamomile in areas such as anti-inflammatory, antioxidant, antimicrobial, anticancer, analgesic, neurological disorders, and metabolic syndrome, and it identifies the potential mechanisms behind each effect. For example, chamomile exerts anti-inflammatory and antioxidant effects by inhibiting pro-inflammatory cytokines and free radicals. Studies have shown that various chemical components of chamomile, such as apigenin and bisabolol, actively regulate multiple physiological processes, confirming its therapeutic potential as a multifunctional natural remedy (Adapted from Sah et al., 2022)

Chamomile tea also plays a significant role in wound healing. The antimicrobial and anti-inflammatory properties of chamomile accelerate the healing process by preventing infections and reducing inflammation at the wound site. Studies have shown that chamomile extracts can enhance the rate of wound contraction and epithelialization, making it an effective natural remedy for minor cuts, burns, and abrasions. The application of chamomile in wound care highlights its therapeutic potential in promoting skin health and recovery (Poswal et al., 2019).

In summary, chamomile tea offers a wide range of therapeutic applications, from digestive health and mental relaxation to skin care. Its bioactive compounds contribute to its effectiveness in treating various conditions, making it a valuable natural remedy in traditional and modern medicine.

4 Historical Usage of Chamomile Tea

4.1 Ancient uses in egypt and greece

Chamomile has a long-standing history in ancient Egyptian medicine, where it was revered for its therapeutic properties. The Egyptians used chamomile primarily for its anti-inflammatory and antispasmodic effects, treating ailments such as stomach problems, cramps, and minor infections. Chamomile was also associated with the sun god Ra and was used in rituals and embalming processes due to its preservative qualities. In ancient Greece, chamomile was widely recognized for its medicinal benefits. Prominent figures such as Hippocrates, Galen, and Asclepius documented its use for treating various conditions, including fevers and digestive issues. Dioscorides, a Greek physician, noted its effectiveness in treating periodic fevers and other ailments, highlighting its broad therapeutic applications.

4.2 Chamomile in european herbal traditions

During the medieval period in Europe, chamomile was a staple in herbal medicine. It was commonly used to treat digestive disorders, skin conditions, and as a general tonic for various ailments. Chamomile's versatility made it a valuable herb in medieval apothecaries, where it was often prescribed for its calming and anti-inflammatory properties. In the Renaissance era, the use of chamomile expanded further as herbal medicine flourished. Herbalists of the time, such as Nicholas Culpeper, praised chamomile for its wide range of applications, including its use as a sedative, antispasmodic, and anti-inflammatory agent. Chamomile tea became a popular remedy for stress and anxiety, reflecting its enduring reputation as a calming herb (Tsiogka et al., 2022).

4.3 Evolution of chamomile use in modern times

Chamomile's transition from a folk remedy to a mainstream medicinal herb is marked by increasing scientific validation of its therapeutic properties. Modern research has confirmed many of the traditional uses of chamomile, such as its anti-inflammatory, antioxidant, and antimicrobial effects. This scientific backing has led to its incorporation into various pharmaceutical and cosmetic products, solidifying its place in contemporary medicine. Today, chamomile tea is consumed worldwide, with more than one million cups enjoyed daily. Its popularity spans across cultures and continents, reflecting its global acceptance as a soothing and health-promoting beverage. Chamomile is not only used for its calming effects but also for its potential benefits in managing conditions such as obesity, metabolic syndrome, and cancer complications. The widespread consumption of chamomile tea underscores its enduring legacy and continued relevance in modern health practices (Akbar and Akbar, 2020).

5 Safety and Toxicology

5.1 General safety profile of chamomile tea

Chamomile tea, derived from the flowers of *Matricaria chamomilla*, is widely consumed for its various health benefits, including its sedative, digestive, and anti-inflammatory properties (Zemestani et al., 2016). Generally, chamomile tea is considered safe for most individuals when consumed in moderate amounts. Studies have shown that short-term intake of chamomile tea can have beneficial effects on glycemic control and antioxidant status in patients with type 2 diabetes mellitus, without reporting significant adverse effects. Additionally, its use in improving sleep quality and alleviating symptoms of depression in postpartum women further supports its safety profile in short-term applications (Tsiogka et al., 2021).

5.2 Allergic reactions and sensitivities

Despite its general safety, chamomile tea can cause allergic reactions in some individuals, particularly those who are sensitive to plants in the Asteraceae family (Chang and Chen, 2016). Cases of anaphylaxis have been reported due to cross-reactivity between chamomile pollen allergens and those of other Asteraceae plants. Allergic contact dermatitis, systemic allergic contact dermatitis, and airborne contact dermatitis have also been documented, with symptoms ranging from mild skin reactions to severe anaphylactic shock. The allergens involved include proteins such as Art v 1 and Mat c 1, which are homologous to Bet v 1, and other proteins sized between 23 and 50 kDa. Additionally, components like matricin, desacetylmatricarin, and herniarin have been identified as potential allergens (Avonto et al., 2017).

5.3 Long-term consumption and chronic effects

The long-term consumption of chamomile tea has not been extensively studied, and thus, its chronic effects remain largely unknown (Raal et al., 2012). While short-term studies indicate beneficial effects without significant adverse outcomes, the potential for cumulative exposure to allergens and other bioactive compounds warrants caution. For instance, the anti-allergic activity of chamomile, demonstrated through its inhibitory effects on mast cell degranulation and histamine release, suggests that it may have complex interactions with the immune system. Therefore, while chamomile tea is generally safe for short-term use, individuals with known sensitivities or allergies should exercise caution, and further research is needed to fully understand the implications of long-term consumption (Bravo et al., 2021).

6 Comparative Analysis with Other Herbal Teas

6.1 Nutritional comparison with other popular herbal teas

Chamomile tea, known for its high content of flavonoids and phenolic compounds, stands out among herbal teas for its significant antioxidant properties. Studies have shown that chamomile contains high levels of apigenin, luteolin, and their glycones, which contribute to its potent antioxidant effects. In comparison, other popular herbal teas such as green tea and lemon balm also exhibit high levels of phenolic compounds and flavonoids, with lemon balm showing the highest contents among the studied herbal infusions. These compounds are associated with various health benefits, including the inhibition of digestive enzymes and antioxidant capacity, which are crucial for promoting overall health (Poswal et al., 2019).

6.2 Therapeutic efficacy comparison

Chamomile tea is renowned for its wide range of therapeutic applications, including anti-inflammatory, analgesic, antimicrobial, and sedative effects (Duan et al., 2022). It has been shown to have significant effects on the central nervous system, providing antinociceptive, sedative, and anxiolytic-like effects. Additionally, chamomile has demonstrated potential in managing obesity and metabolic syndrome by modulating signaling pathways involving AMP-activated protein kinase, NF-κB, Nrf2, and PPARγ transcription factors (Figure 2) (Bayliak et al., 2021). In comparison, other herbal teas such as lavender, spearmint, and hibiscus have been studied for their effects on female health, diabetes, heart disease, and weight loss, but the number of studies exploring their clinical efficacy and safety remains limited. Chamomile's broad spectrum of therapeutic effects, particularly in reducing cancer complications and improving quality of life among cancer patients, further highlights its superior therapeutic efficacy (Maleki et al., 2023).

Bayliak et al. (2021) highlighted the intricate relationship between excessive energy intake, low physical activity, and the onset of metabolic syndrome. They found that hypertrophied adipocytes, resulting from over-nutrition, play a key role in triggering oxidative stress and chronic inflammation. These conditions arise from elevated levels of reactive oxygen species (ROS) and inflammatory cytokines, such as TNF-α and IL-6, leading to impaired insulin signaling and increased free fatty acid release. The accumulation of these free fatty acids in the liver and muscle reduces insulin sensitivity, further contributing to hyperglycemia. Additionally, Bayliak et al. emphasized the role of NF-κB in exacerbating inflammation by inhibiting PPARγ, which typically mediates anti-inflammatory processes. This cascade of events fosters the development of metabolic syndrome, characterized by dyslipidemia, fatty liver, and heightened glucose levels. These findings underscore the detrimental cycle between obesity, inflammation, and metabolic dysfunction.

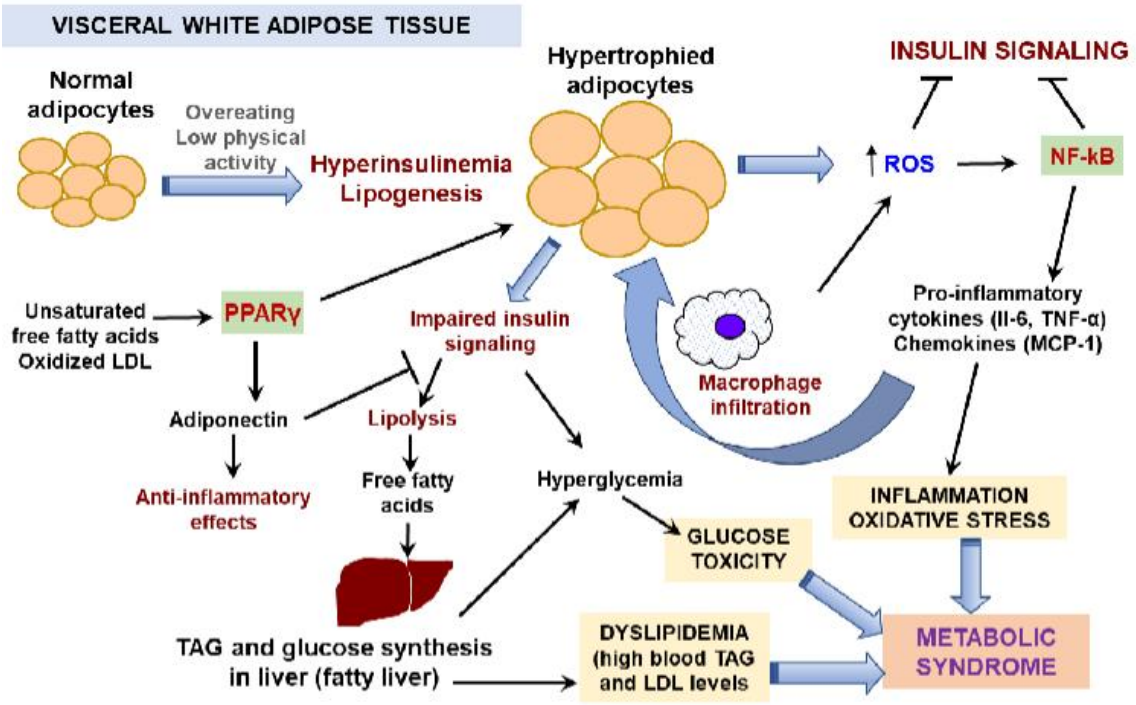

Figure 2 Mechanisms of development of obesity and metabolic syndrome (Adopted from Bayliak et al., 2021)

Image capton: Chronic excessive energy intake especially in combination with low physical activity results in a positive energy balance that may increase insulin production with stimulation of lipogenesis in visceral white adipose tissue. Adipose tissue primarily responds to the higher demand for energy storage by increasing the size of adipocytes leading to adipocyte hypertrophy. As a first step, adipocytes produce higher ROS levels due to stimulation of glucose oxidation via mitochondrial respiration. Increased ROS levels induce activation of adipose AP-1 transcription factor, a regulator of adipose cell proliferation and differentiation, and NFκB transcription factor, which trigger an acute inflammation response followed by releasing proinflammatory mediators, including interleukins (IL-6, IL-1β), TNF-α and MCP1. The latter mediates mac-rophage infiltration in adipose tissue. Recruited macrophages produce high levels of ROS as a part of their protective function resulting in intensification of oxidative stress which further stimulates inflammation processes, forming a vicious cycle. Both chronic oxidative stress and inflammation lead to metabolic complications. NF-κB acts as a negative regulator of peroxisome proliferator activated receptor gamma PPARγ, which regulates expression of anti-inflammatory mediators and adiponectin. Adiponectin sensitizes adipocytes to insulin and stimulates lipogenesis. In the hypertrophied adipocytes, synthesis of adiponectin is decreased and that impairs the insulin signaling and stimulates lipolysis with the release of free fatty acids (FFAs) into the bloodstream. FFAs are adsorbed by liver and muscle causing a decrease in insulin sensitivity of these tissues. As a result, blood glucose level increases. Activated gluconeogenesis in insulin-insensitive liver also contributes to hyperglycemia. Liver increases synthesis and accumulation of triacylglycerols (TAG) that impairs its function and provokes atherogenic blood dyslipidemia. Together these processes characterize metabolic syndrome development (Adopted from Bayliak et al., 2021)

6.3 Consumer preferences and cultural significance

Chamomile tea has a long history of traditional medicinal use and is one of the most popular medicinal plants worldwide. Its calming effects and pleasant taste make it a preferred choice among consumers seeking natural remedies for stress and anxiety (Chaves et al., 2020). In various cultures, chamomile is valued not only for its medicinal properties but also for its role in traditional rituals and daily life. For instance, in traditional Uygur medicine, chamomile is used to treat hepatitis and cholecystitis, showcasing its cultural significance. In comparison, other herbal teas like yerba maté and echinacea are also popular in different regions, each with its unique cultural and therapeutic significance. However, chamomile's widespread acceptance and extensive use in both traditional and modern medicine underscore its prominent position among herbal teas. In summary, chamomile tea's rich nutritional profile, extensive therapeutic applications, and deep-rooted cultural significance make it a standout among herbal teas. Its high content of bioactive compounds and proven health benefits position it as a valuable natural remedy in both traditional and contemporary contexts (Herrera et al., 2018).

7 Case Study

7.1 Clinical trials on the efficacy of chamomile tea

Chamomile tea has been extensively studied for its potential therapeutic effects, particularly in the context of anxiety, generalized anxiety disorder (GAD), and sleep quality. A systematic review and meta-analysis of randomized controlled trials (RCTs) found that chamomile significantly improved sleep quality and GAD symptoms, although its effects on general anxiety and insomnia were less conclusive. Another study highlighted chamomile's anxiolytic and potential antidepressant effects in subjects with GAD, showing a greater reduction in depression symptoms in those with comorbid depression. Additionally, chamomile was identified as one of several phytomedicines with preclinical and clinical evidence supporting its GABA-modulating activity, which is crucial for its anxiolytic effects (Yeung et al., 2018).

7.2 Safety studies in diverse populations

Safety profiles of chamomile tea have been generally favorable across various studies. Mild adverse events were reported in only a few RCTs, indicating that chamomile is well-tolerated (Hieu et al., 2019). A systematic review focusing on herbal medicines for anxiety and depression, including chamomile, found that these treatments often have fewer adverse effects compared to conventional medications, making them a safer alternative for many patients (Savage et al., 2018). Furthermore, chamomile's safety and efficacy were also supported in a review of medicinal plants used for insomnia related to anxiety, which emphasized the need for more standardized clinical trials to confirm these findings (Chaves et al., 2019).

7.3 Long-term health benefits observed in chamomile tea consumers

Long-term consumption of chamomile tea has been associated with various health benefits beyond its immediate therapeutic effects. Chamomile contains bioactive compounds such as glucuronoxylan, which have been shown to possess antinociceptive, sedative, and anxiolytic-like effects, contributing to its calming properties (Chaves et al., 2020). Additionally, chamomile's polysaccharides, including inulin and fructooligosaccharides, have prebiotic properties that can support gastrointestinal health and potentially enhance immune function. The historical use of chamomile as a mild tranquilizer and its multi-target, multi-pathway mechanisms in treating anxiety disorders further underscore its long-term benefits (Jia et al., 2020). Collectively, these studies suggest that regular consumption of chamomile tea can offer sustained health advantages, particularly in managing anxiety and improving sleep quality (Borràs et al., 2021).

8 Challenges and Future Research Directions

8.1 Current limitations in chamomile tea research

Despite the extensive historical use and numerous studies on chamomile tea, several limitations persist in current research. One significant challenge is the variability in the chemical composition of chamomile extracts, which can lead to inconsistent results across studies. For instance, a comparative analysis of six commercially available chamomile extracts revealed substantial differences in yield extraction, chemical composition, and antioxidant effects, highlighting the need for standardized extraction and characterization methods. Additionally, while chamomile has been traditionally used for its calming effects, there is a paucity of studies exploring its impact on the central nervous system (CNS) (Bhukta et al., 2021). Furthermore, the therapeutic potential of chamomile in treating metabolic syndromes and CNS disorders remains underexplored, necessitating more focused research in these areas.

8.2 Potential for discovering new bioactive compounds

Chamomile tea is rich in various bioactive compounds, including flavonoids, terpenoids, and polysaccharides, which contribute to its therapeutic properties (Sah et al., 2022). Recent studies have identified novel compounds such as a highly substituted 4-O-methyl-glucuronoxylan with sedative and anxiolytic-like effects, suggesting that there are still many undiscovered bioactive components in chamomile (Chaves et al., 2020). The chemical characterization of fructooligosaccharides, inulin, and structurally diverse polysaccharides from chamomile tea further supports the potential for discovering new compounds with prebiotic, gastrointestinal, and immunological

functions (Catani et al., 2021). Future research should focus on the isolation and structural elucidation of these compounds to fully understand their bioactivity and therapeutic potential.

8.3 Future directions in therapeutic application research

The therapeutic applications of chamomile are vast, ranging from anti-inflammatory and antioxidant effects to potential benefits in managing obesity and metabolic syndrome. However, more rigorous clinical trials are needed to validate these effects and establish standardized dosages and formulations. For example, while chamomile has shown promise in reducing cancer complications such as oral mucositis and skin issues, further research is required to integrate these findings into routine clinical practice. Additionally, optimizing extraction methods, such as ultrasound-assisted extraction, can enhance the yield and bioactivity of chamomile extracts, paving the way for more effective therapeutic applications. Future research should also explore the synergistic effects of chamomile with other herbal medicines and its long-term safety and efficacy in diverse populations (Bayliak et al., 2021).

9 Concluding Remarks

Chamomile tea, derived primarily from *Matricaria chamomilla* L., has been extensively studied for its diverse bioactive compounds and therapeutic applications. The plant contains over 120 constituents, including terpenoids, flavonoids, and coumarins, which contribute to its wide range of pharmacological activities. Chamomile tea has demonstrated significant antioxidant, anti-inflammatory, antimicrobial, and sedative properties, making it a valuable remedy for various health conditions such as gastrointestinal disorders, anxiety, and metabolic syndromes. Additionally, chamomile has shown potential in managing obesity and related metabolic disorders through the modulation of key signaling pathways. Its efficacy in reducing cancer complications and improving the quality of life for cancer patients has also been highlighted.

Despite the extensive research on chamomile tea, several areas warrant further investigation. The role of chamomile in treating central nervous system disorders and metabolic syndromes remains underexplored and requires more rigorous clinical trials. Additionally, while chamomile's safety profile is generally favorable, more comprehensive toxicity studies are necessary to confirm its long-term safety. Future research should also focus on the molecular mechanisms underlying chamomile's therapeutic effects, particularly its anti-obesity and anti-cancer properties. Clinical applications could benefit from standardized formulations and dosages to ensure consistent therapeutic outcomes. Moreover, the potential of chamomile in integrative medicine, particularly in combination with conventional treatments, should be explored to enhance patient care.

Chamomile tea has a rich history of use in traditional medicine across various cultures, from ancient Egypt and Greece to modern-day practices. Its widespread acceptance and use as a calming and therapeutic beverage underscore its cultural significance. The medicinal properties of chamomile, validated by contemporary scientific research, highlight its enduring relevance in both traditional and modern healthcare systems. As a natural remedy with a broad spectrum of health benefits, chamomile tea continues to be a valuable asset in promoting health and well-being. Its integration into daily life not only offers therapeutic benefits but also connects us to a long-standing tradition of natural healing.

Acknowledgments

I would like to thank Natasha Liu for critically reading the manuscript and providing valuable feedback that improved the clarity of the text. I also thanks the two anonymous peer reviewers for their thorough review of this study and for their valuable suggestions for improvement.

Conflict of Interest Disclosure

The authors affirm that this research was conducted without any commercial or financial relationships that could be construed as a potential conflict of interest.

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