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Tea-Infused Foods: Health Benefits and Consumer Appeal

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Abstract Tea-based foods have garnered significant attention due to their potential health benefits and appeal to consumers. The primary aim of this study is to explore the health-promoting properties of tea and its compounds in various foods. Tea, derived from *Camellia*, is rich in bioactive compounds such as polyphenols, catechins, and flavonoids, which exhibit antioxidant, anti-inflammatory, and antimicrobial activities. Studies have shown that tea-infused foods, such as biscuits and beverages, not only possess enhanced nutritional value and antioxidant potential but also exhibit good stability, making them beneficial functional foods for health. Furthermore, the sensory characteristics of these products are improved by the addition of tea, increasing their appeal to consumers. This study synthesizes current research on the health benefits and consumer acceptance of tea-based foods, highlighting their potential role in promoting overall health and preventing chronic diseases, thereby providing a scientific basis for developing tea-based foods with greater health value and market appeal.
Keywords Tea-infused foods; Health benefits; Antioxidant properties; Consumer appeal; Functional foods

1 Introduction

Tea, derived from the leaves of *Camellia sinensis*, is one of the most widely consumed beverages globally, renowned not only for its unique flavors but also for its numerous health benefits. The infusion of tea into various foods has gained popularity, leveraging the bioactive compounds present in tea, such as polyphenols, catechins, and amino acids, to enhance both the nutritional profile and sensory attributes of these foods. Tea-infused foods encompass a broad spectrum, including baked goods, beverages, dairy products, and even savory dishes, each benefiting from the antioxidant, anti-inflammatory, and other health-promoting properties of tea (Pastoriza et al., 2017; Zhao et al., 2019; Shang et al., 2021).

The cultural significance of tea dates back thousands of years, with its origins rooted in ancient China. Over centuries, tea has evolved from a medicinal herb to a daily beverage, deeply embedded in the social and cultural fabric of many societies. In Japan, the tea ceremony, or chanoyu, epitomizes the cultural reverence for tea, emphasizing aesthetics, mindfulness, and hospitality. Similarly, in Morocco, the preparation and consumption of mint tea is a symbol of hospitality and social bonding (Li et al., 2013; Pastoriza et al., 2017). The integration of tea into foods is a natural extension of these traditions, reflecting a blend of historical practices and modern culinary innovation.

This study comprehensively explores the health benefits and consumer appeal of tea-infused foods. It systematically categorizes and introduces the various types and forms of tea-infused foods available in the current market, showcasing their diversity and innovation. Additionally, it delves into the health benefits of tea-infused foods by integrating scientific research and nutritional data to elucidate their positive effects on human health. Through market research and consumer behavior analysis, the study seeks to understand consumers' acceptance and preferences regarding tea-infused foods and to identify the main factors influencing their purchasing decisions. By achieving these objectives, this study aims to provide robust theoretical support and market insights for the future development of tea-infused foods.

2 Types of Tea-Infused Foods

Tea-infused foods have gained popularity due to their unique flavors and potential health benefits. The incorporation of tea into various food products not only enhances their sensory attributes but also imparts the bioactive compounds present in tea, which are known for their health-promoting properties. This section explores the different categories of tea-infused foods, including baked goods and desserts, savory dishes and snacks, and beverages and cocktails.

2.1 Baked goods and desserts

Tea-infused baked goods and desserts are a delightful way to enjoy the flavors and health benefits of tea. Green tea, particularly matcha, is commonly used in a variety of sweet treats such as cakes, cookies, and pastries. The polyphenols and catechins in green tea contribute to its antioxidant properties, which can be beneficial for health (Hayat et al., 2015; Hinojosa-Nogueira et al., 2021; Shang et al., 2021). Additionally, black tea and oolong tea are also used in baking, providing unique flavors and potential health benefits due to their polyphenolic content (Wang et al., 2000; Sang et al., 2011; Khan and Mukhtar, 2018).

2.2 Savory dishes and snacks

Tea is not limited to sweet applications; it is also used in savory dishes and snacks. Tea leaves can be used as a seasoning or marinade, adding a distinct flavor profile to meats, vegetables, and grains. The bioactive compounds in tea, such as flavonoids and alkaloids, contribute to its health benefits, including anti-inflammatory and antimicrobial properties (Wu and Wei, 2002; Zhang et al., 2019; Bag et al., 2021). For instance, tea-smoked meats and tea-infused rice dishes are popular in various cuisines, offering both taste and health advantages (Hayat et al., 2015; Pathaw et al., 2022).

2.3 Beverages and cocktails

Tea-based beverages and cocktails are perhaps the most traditional and widespread form of tea consumption. Beyond the classic hot or iced tea, tea is now being incorporated into a variety of innovative drinks, including smoothies, lattes, and alcoholic cocktails. The health benefits of tea beverages are well-documented, with studies highlighting their antioxidant, anti-cancer, and cardiovascular protective effects (Wang et al., 2000; Hinojosa-Nogueira et al., 2021; Shang et al., 2021). Green tea, black tea, and oolong tea are all used in these beverages, each bringing its unique set of bioactive compounds and health benefits (Sang et al., 2011; Khan and Mukhtar, 2018; Zhang et al., 2019).

The incorporation of tea into various food products not only enhances their flavor but also provides numerous health benefits. The bioactive compounds in tea, such as polyphenols and catechins, play a significant role in promoting health and preventing diseases, making tea-infused foods a valuable addition to the diet.

3 Nutritional and Health Benefits

3.1 Antioxidant properties

Tea, particularly green tea, is renowned for its high antioxidant capacity, which is primarily attributed to its rich content of polyphenolic compounds, such as catechins. These antioxidants play a crucial role in neutralizing free radicals, thereby reducing oxidative stress and preventing cellular damage. Studies have shown that the antioxidant activities of various tea infusions, including green, black, oolong, white, yellow, and dark teas, are significant, with green tea often exhibiting the highest levels of antioxidant activity (Tang et al., 2019; Zhao et al., 2019). The presence of compounds like epigallocatechin gallate (EGCG) in green tea is particularly noteworthy for its potent antioxidative properties (Anderson and Polansky, 2002). Additionally, tea-fortified foods, such as cookies, have demonstrated enhanced antioxidant potential, further supporting the health benefits of tea consumption (Gramza-Michałowska et al., 2016).

3.2 Anti-inflammatory effects

Tea also exhibits notable anti-inflammatory properties, which contribute to its health-promoting effects. The bioactive components in tea, such as polyphenols, have been shown to modulate inflammatory pathways,

including the inhibition of nuclear factor-kappa B (NF-κB) signaling, which is a key regulator of inflammation (Shang et al., 2021). These anti-inflammatory effects are beneficial in managing chronic inflammatory conditions and reducing the risk of diseases such as cardiovascular disease and arthritis (Hayat et al., 2015; Hinojosa-Nogueira et al., 2021). Although some studies have reported minimal effects of green tea on certain biomarkers of inflammation in specific populations, such as obese individuals with metabolic syndrome, the overall evidence supports the anti-inflammatory potential of tea (Basu et al., 2011).

3.3 Potential for weight management and metabolic health

Tea, particularly green tea, has been extensively studied for its potential benefits in weight management and metabolic health. The polyphenolic compounds in tea, especially EGCG, have been shown to enhance metabolic rate and fat oxidation, which can aid in weight loss and the management of obesity (Ohishi et al., 2021). Additionally, tea consumption has been associated with improved insulin sensitivity and glucose metabolism, which are critical factors in the prevention and management of type 2 diabetes (Anderson and Polansky, 2002). Despite some inconsistencies in the findings, the majority of research supports the role of tea in promoting metabolic health and aiding in weight management (Alagawany et al., 2019; Shang et al., 2021).

Tea-infused foods offer a range of nutritional and health benefits, including potent antioxidant properties, anti-inflammatory effects, and potential benefits for weight management and metabolic health. These benefits are primarily attributed to the bioactive compounds present in tea, such as polyphenols, which have been extensively studied for their health-promoting properties.

4 Impact on Flavor and Culinary Uses

4.1 Enhancing flavor profiles with tea

Tea, particularly green and white varieties, is known for its unique flavor profiles, which can significantly enhance the taste of various foods. The polyphenolic compounds in tea, such as catechins, contribute to its distinctive aroma, color, and taste (Senanayake, 2013; Pastoriza et al., 2017). L-theanine, a unique amino acid found in tea, also plays a crucial role in imparting a special flavor to tea-infused foods (Figure 1) (Li et al., 2022). The addition of tea extracts to foods can introduce a subtle bitterness and astringency, which can be balanced with other ingredients to create a harmonious flavor profile (Świąder and Florowska, 2022).

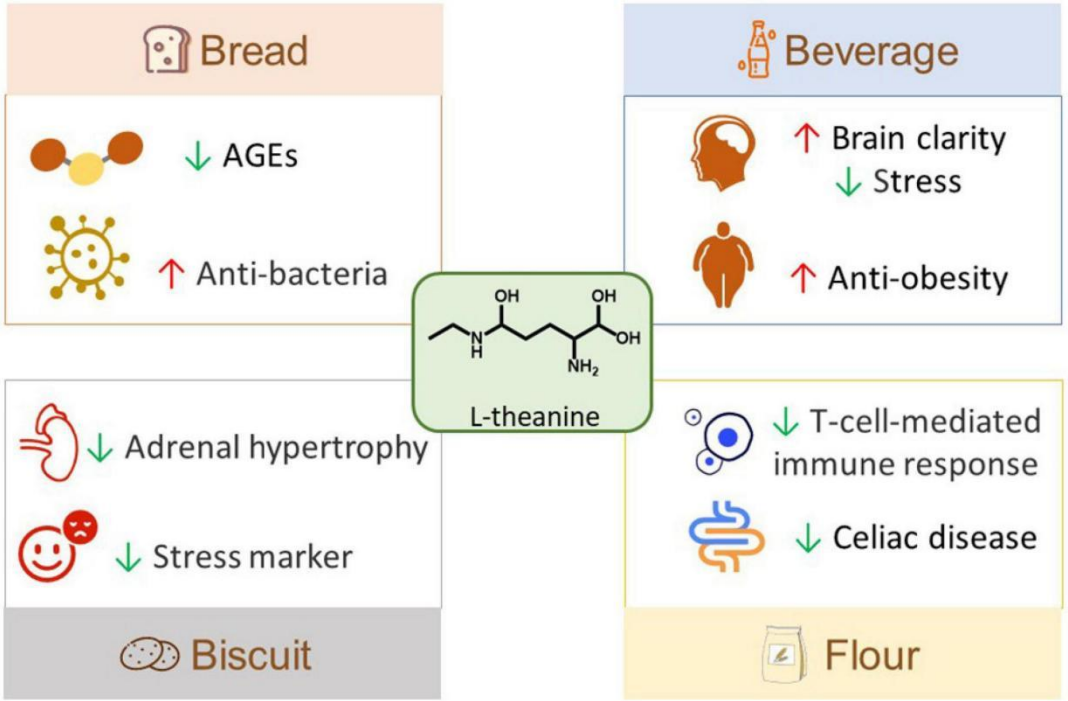

Figure 1 Food applications of L-theanine. AGEs, advanced glycation end products (Adopted from Li et al., 2022)

4.2 Culinary techniques for tea infusion

Several culinary techniques can be employed to infuse tea into foods. One common method is steeping tea leaves in hot water to create a concentrated infusion, which can then be incorporated into recipes. This technique is often used in the preparation of tea-infused yogurts, where green tea is combined with milk and other ingredients to create a unique product (Świąder and Florowska, 2022). Another approach involves using tea extracts, such as green tea extract, which can be added directly to foods to enhance their antioxidant properties and extend shelf life (Perumalla and Hettiarachchy, 2011; Senanayake, 2013). Additionally, tea can be used in marinades, sauces, and baked goods to impart its flavor and health benefits (Yang et al., 2023).

4.3 Pairing tea-infused foods with other ingredients

Pairing tea-infused foods with complementary ingredients can enhance the overall sensory experience. For instance, the bitterness and astringency of green tea can be balanced with the sweetness of fruits or the creaminess of dairy products (Świąder and Florowska, 2022). Inulin, a prebiotic fiber, has been shown to improve the sensory quality of green tea-infused yogurt by increasing sweetness and reducing sourness (Świąder and Florowska, 2022). Spices can also be used to complement the flavor of tea, adding complexity and enhancing its functional value (Sunarharum et al., 2022). For example, spiced teas not only offer a rich flavor but also provide additional health benefits due to the bioactive components in the spices (Sunarharum et al., 2022).

By understanding and utilizing these techniques, chefs and food manufacturers can create innovative tea-infused products that appeal to consumers seeking both flavor and health benefits.

5 Consumer Appeal and Market Trends

5.1 Current market trends in tea-infused foods

The market for tea-infused foods has seen significant growth in recent years, driven by increasing consumer awareness of the health benefits associated with tea consumption. Green tea, in particular, has been extensively studied for its potential health benefits, including antioxidant, anti-inflammatory, and anticancer properties (Boehm et al., 2009; Pinto, 2013; Pastoriza et al., 2017). This has led to a surge in the popularity of green tea-infused products, such as cookies, beverages, and dietary supplements (Gramza-Michałowska et al., 2016). Additionally, the unique flavors and health benefits of other types of tea, such as black, oolong, and dark tea, have also contributed to the diversification of tea-infused food products available in the market (Figure 2) (Hayat et al., 2015; Hinojosa-Nogueira et al., 2021; Lin et al., 2021).

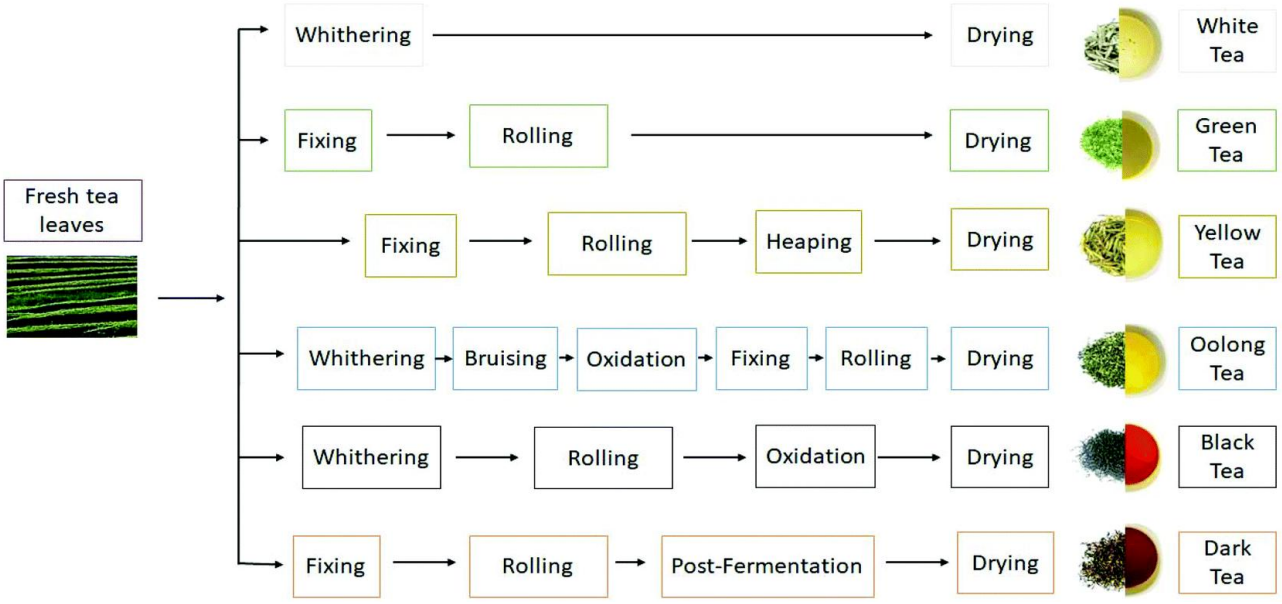

Figure 2 Tea varieties and processing steps (Adopted from Hinojosa-Nogueira et al., 2021)

5.2 Consumer preferences and demographics

Consumer preferences for tea-infused foods are influenced by several factors, including health consciousness, taste preferences, and cultural influences. Studies have shown that consumers are increasingly seeking functional foods that offer health benefits beyond basic nutrition (Khan and Mukhtar, 2007; Hayat et al., 2015). Tea-infused foods appeal to health-conscious consumers due to their high content of bioactive compounds, such as catechins and polyphenols, which are known for their antioxidant and anti-inflammatory properties (Pinto, 2013; Zhao et al., 2019). Demographically, tea-infused foods are popular among a wide range of age groups, with a notable preference among younger consumers who are more inclined towards innovative and health-promoting food products (Wu and Wei, 2002; Pastoriza et al., 2017).

5.3 Marketing strategies for tea-infused products

Effective marketing strategies for tea-infused products often emphasize their health benefits and natural ingredients. Highlighting the antioxidant properties and potential disease-preventive effects of tea can attract health-conscious consumers (Khan and Mukhtar, 2007; Boehm et al., 2009; Hayat et al., 2015). Additionally, leveraging the cultural heritage and traditional uses of tea can enhance the appeal of these products. For instance, promoting the long history of tea consumption in Asian cultures can add an element of authenticity and tradition to the marketing narrative (Boehm et al., 2009; Pastoriza et al., 2017). Collaborations with health influencers and endorsements from nutrition experts can also boost consumer trust and interest in tea-infused foods (Pinto, 2013; Hinojosa-Nogueira et al., 2021). Furthermore, innovative product formulations and attractive packaging can play a crucial role in capturing consumer attention and differentiating tea-infused products in a competitive market (Gramza-Michałowska et al., 2016; Lin et al., 2021).

6 Case Studies

6.1 Successful tea-infused food products

Tea-infused food products have gained popularity due to their health benefits and unique flavors. Several successful products have emerged in the market, showcasing the versatility of tea as an ingredient. For instance, green tea has been incorporated into various food items such as pastries, chocolates, and beverages, leveraging its high antioxidant content and health-promoting properties (Atoui et al., 2005; Almajano et al., 2008; Zhao et al., 2019). White tea, known for its milder flavor and potent antimicrobial properties, has also found its way into food products, particularly in Europe where its flavor is more accepted (Almajano et al., 2008). Additionally, herbal infusions like peppermint and chamomile have been used in functional foods aimed at improving sleep quality and reducing oxidative stress (Etheridge and Derbyshire, 2019).

6.2 Innovations in tea infusion techniques

Innovations in tea infusion techniques have significantly enhanced the quality and appeal of tea-infused foods. Advanced methods such as ultra-performance liquid chromatography (UPLC) and electrospray ionization (ESI) have been employed to identify and quantify phenolic compounds in tea, ensuring the optimal extraction of bioactive components (Atoui et al., 2005; Liu et al., 2016). These techniques have allowed for the precise control of infusion parameters, resulting in products with consistent flavor and health benefits. Moreover, the development of synergistic combinations, such as the addition of bovine serum albumin (BSA) to tea infusions, has improved the oxidative stability of food products, making them more appealing to health-conscious consumers (Almajano et al., 2008).

6.3 Consumer feedback and product adaptation

Consumer feedback plays a crucial role in the adaptation and success of tea-infused food products. Studies have shown that consumers' perceptions and behaviors regarding tea consumption are influenced by factors such as culture, health benefits, and sensory properties (Rocha et al., 2020). For example, frequent consumers of herbal infusions tend to associate these products with sensory, emotional, and health benefits, while less frequent consumers focus more on the composition of the infusions (Rocha et al., 2020). This feedback has led to the development of communication strategies aimed at educating consumers on the proper preparation of tea infusions

to enhance their sensory experience. Additionally, consumer preferences for certain types of tea, such as green and white tea, have driven the market towards products that highlight these varieties' unique health benefits and flavors (Almajano et al., 2008; Klepacka et al., 2021). By understanding and incorporating consumer feedback, manufacturers can adapt their products to meet the evolving demands of the market, ensuring the continued success and appeal of tea-infused foods.

7 Challenges and Limitations

7.1 Stability and shelf life of tea-infused foods

The stability and shelf life of tea-infused foods are critical factors that influence their commercial viability. Tea polyphenols, which are responsible for many of the health benefits of tea, are sensitive to environmental conditions such as temperature, pH, and oxygen. For instance, green tea extracts have been shown to degrade under high temperatures and varying pH levels, which can significantly reduce their antioxidant properties and overall effectiveness in food products (Zokti et al., 2016). Additionally, the incorporation of tea extracts into food matrices can affect the oxidative stability of the product. Studies have demonstrated that green and white tea extracts can enhance the oxidative stability of oil-in-water emulsions, but this effect can vary depending on the presence of other components such as proteins (Almajano et al., 2008). Encapsulation techniques, such as spray-drying, have been explored to improve the stability of tea polyphenols, showing promising results in maintaining their antioxidant activity during storage (Zokti et al., 2016).

7.2 Balancing health benefits with taste and texture

One of the main challenges in developing tea-infused foods is balancing the health benefits with the sensory attributes such as taste and texture. The addition of tea extracts can alter the flavor profile and color of food products, which may not always be desirable. For example, the incorporation of black tea into Chinese steamed bread increased its antioxidant activity but also darkened the bread and had minimal impact on its textural properties (Zhu et al., 2016). Similarly, the addition of green tea, stinging nettle, and olive leaves extracts to Frankfurter type sausages improved their shelf life and microbial stability but also affected their color and sensory attributes (Alirezalu et al., 2017). Consumer acceptance is crucial, and while some studies have shown good overall acceptance of tea-fortified products, achieving the right balance between health benefits and sensory qualities remains a significant challenge (Zhu et al., 2016; Alirezalu et al., 2017).

7.3 Regulatory issues and food safety

Regulatory issues and food safety are paramount when introducing new food products into the market. The use of tea extracts in food products must comply with food safety regulations, which can vary significantly between regions. For instance, the safety and efficacy of green tea extracts as food additives have been extensively reviewed, but concerns about their potential toxicological effects still exist (Hayat et al., 2015). The regulatory status of tea extracts, including their permissible levels in different food products, needs to be clearly defined to ensure consumer safety. Additionally, the antimicrobial properties of tea polyphenols can influence the microbial ecology of food products, which must be carefully monitored to prevent any adverse effects (Almajano et al., 2008). Ensuring that tea-infused foods meet all regulatory requirements while maintaining their health benefits and sensory qualities is a complex and ongoing challenge (Senanayake, 2013; Hayat et al., 2015).

8 Future Research Directions

8.1 Emerging trends in tea-infused food research

The field of tea-infused foods is rapidly evolving, with a growing body of research highlighting the diverse health benefits and bioactive properties of tea. Recent studies have focused on the antioxidant activities of various tea types, such as green, black, oolong, white, yellow, and dark teas, which are attributed to their high phenolic content and catechins (Almajano et al., 2008; Zhao et al., 2019). Additionally, the mineral content of tea infusions has been explored, revealing that while they are not significant sources of essential minerals in a single serving, they can contribute to dietary intake when consumed in larger quantities (Gallaher et al., 2006). The potential health benefits of herbal infusions, including improved sleep quality, glycemic control, and reduced oxidative

stress, have also been documented (Etheridge and Derbyshire, 2019). Future research should continue to explore these health benefits, particularly in human trials, to validate and expand upon these findings.

8.2 Technological advancements in infusion techniques

Technological advancements in infusion techniques are crucial for maximizing the health benefits and consumer appeal of tea-infused foods. Innovative methods such as ultra-performance liquid chromatography-electrospray ionization-quadrupole time-of-flight mass spectrometry (UPLC-ESI-Q-TOFMS) have been employed to comprehensively analyze the phenolic profiles of tea infusions (Liu et al., 2016). These techniques allow for the precise identification and quantification of bioactive compounds, which can be used to optimize infusion processes. Additionally, the incorporation of tea extracts into food systems, such as oil-in-water emulsions, has shown promise in enhancing the oxidative stability of these products (Almajano et al., 2008). Future research should focus on refining these techniques and exploring their applications in various food matrices to enhance the functional properties and consumer appeal of tea-infused foods.

8.3 Potential for personalized nutrition with tea-infused foods

The concept of personalized nutrition, which tailors dietary recommendations to individual genetic, phenotypic, and lifestyle factors, holds significant potential for tea-infused foods. The diverse phenolic profiles and bioactive compounds found in different types of tea can be leveraged to address specific health needs. For instance, green tea has been identified as a rich source of phenolic compounds and antioxidants, which can contribute to the daily intake of these beneficial components (Klepacka et al., 2021). Moreover, the modulatory effects of tea on gut microbiota, as demonstrated in high-fat-induced obese mice, suggest that tea consumption can influence metabolic health and obesity-related outcomes (Liu et al., 2016). Future research should investigate the potential for personalized nutrition with tea-infused foods, considering individual variability in response to tea consumption and the development of tailored dietary interventions.

9 Concluding Remarks

Tea-infused foods have garnered significant attention due to their potential health benefits and consumer appeal. The bioactive components in tea, such as polyphenols, polysaccharides, polypeptides, pigments, and alkaloids, contribute to various health benefits, including antioxidant, anti-inflammatory, anti-cancer, anti-obesity, cardiovascular protective, liver protective, and hypoglycemic activities. Specifically, polyphenols like epigallocatechin gallate (EGCG) have been shown to enhance insulin activity and provide protection against oxidative damage, bacterial infections, and cardiovascular diseases. Additionally, tea consumption has been linked to the prevention of chronic diseases such as cancer, diabetes, and neurological disorders. The incorporation of tea extracts into foods, such as Chinese steamed bread, has demonstrated increased antioxidant activity and consumer acceptance without significantly altering textural properties.

To maximize the health benefits and consumer appeal of tea-infused foods, the food industry should implement the following measures. Using high-quality tea extracts is crucial; extracts rich in bioactive compounds, particularly polyphenols like EGCG, should be selected to enhance the health benefits of the final product. Optimizing the formulation is also important, requiring careful adjustment of tea extract concentration to maximize health benefits while maintaining desired sensory characteristics. For instance, adding black tea to Chinese steamed buns can boost antioxidant activity without negatively affecting the texture. Innovation in product development should be prioritized, exploring a range of tea-infused foods, including baked goods, beverages, and snacks, to meet diverse consumer preferences and dietary needs. Consumer education is essential as well, through marketing and labeling that highlight the health benefits of tea foods, especially the presence of beneficial compounds like polyphenols and their related health benefits. Finally, investing in research and development is fundamental for the continuous improvement of tea-infused products, focusing on ongoing studies to better understand the mechanisms of tea compounds and their interactions with other food ingredients.

The future of tea-infused foods looks promising, with growing consumer interest in functional foods that offer health benefits beyond basic nutrition. As scientific research continues to uncover the diverse health-promoting

properties of tea compounds, there is significant potential for innovation in the food industry. By leveraging the unique bioactive components of tea, manufacturers can develop a wide range of appealing and health-enhancing products. Furthermore, as consumer awareness of the health benefits of tea-infused foods increases, these products are likely to gain a stronger foothold in the market, contributing to improved public health outcomes and offering new opportunities for growth in the food industry.

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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.

Reference

Alagawany M., El-Hack M., Saeed M., Naveed M., Arain M., Arif M., Tiwari R., Khandia R., Khurana S., Karthik K., Yatoo M., Munjal A., Bhatt P., Sharun K., Iqbal H., Sun C., and Dhama K., 2019, Nutritional applications and beneficial health applications of green tea and l-theanine in some animal species: A review, Journal of Animal Physiology and Animal Nutrition, 104(1): 245-256.
https://doi.org/10.1111/jpn.13219
PMid:31595607

Alirezalu K., Hesari J., Eskandari M., Valizadeh H., and Sirousazar M., 2017, Effect of green tea, stinging nettle and olive leaves extracts on the quality and shelf life stability of frankfurter type sausage, Journal of Food Processing and Preservation, 41(5): e13100.
https://doi.org/10.1111/JFPP.13100
PMid:31595607

Almajano M., Carbó R., Jiménez J., and Gordon M., 2008, Antioxidant and antimicrobial activities of tea infusions, Food Chemistry, 108(1): 55-63.
https://doi.org/10.1016/J.FOODCHEM.2007.10.040

Anderson R., and Polansky M., 2002, Tea enhances insulin activity, Journal of agricultural and food chemistry, 50(24): 7182-7186.
https://doi.org/10.1021/JF020514C
PMid:12428980

Atoui A., Mansouri A., Boskou G., and Kefalas P., 2005, Tea and herbal infusions: Their antioxidant activity and phenolic profile, Food Chemistry, 89(1): 27-36.
https://doi.org/10.1016/J.FOODCHEM.2004.01.075
PMid:12428980

Bag S., Mondal A., Majumder A., and Banik A., 2021, Tea and its phytochemicals: Hidden health benefits & modulation of signaling cascade by phytochemicals, Food chemistry, 371: 131098.
https://doi.org/10.1016/j.foodchem.2021.131098
PMid:34634647

Basu A., Du M., Sanchez K., Leyva M., Betts N., Blevins S., Wu M., Aston C., and Lyons T., 2011, Green tea minimally affects biomarkers of inflammation in obese subjects with metabolic syndrome, Nutrition, 27(2): 206-213.
https://doi.org/10.1016/j.nut.2010.01.015
PMid:20605696 PMCid:PMC2952043

Boehm K., Borrelli F., Ernst E., Habacher G., Hung S., Milazzo S., and Horneber M., 2009, Green tea (*Camellia sinensis*) for the prevention of cancer, The Cochrane database of systematic reviews, 3: CD005004.
https://doi.org/10.1002/14651858.CD005004.pub2
PMid:19588362 PMCid:PMC6457677

Etheridge C., and Derbyshire E., 2019, Herbal infusions and health, Nutrition & Food Science, 50: 969-985.
https://doi.org/10.1108/nfs-08-2019-0263

Gallaher R., Gallaher K., Marshall A., and Marshall A., 2006, Mineral analysis of ten types of commercially available tea, Journal of Food Composition and Analysis, 19: S53-S57.
https://doi.org/10.1016/J.JFCA.2006.02.006

Gramza-Michałowska A., Kobus-Cisowska J., Kmiecik D., Korczak J., Helak B., Dziedzic K., and Górecka D., 2016, Antioxidative potential, nutritional value and sensory profiles of confectionery fortified with green and yellow tea leaves (*Camellia sinensis*), Food chemistry, 211: 448-454.
https://doi.org/10.1016/j.foodchem.2016.05.048
PMid:27283654

Hayat K., Iqbal H., Malik U., Bilal U., and Mushtaq S., 2015, Tea and its consumption: benefits and risks, Critical Reviews in Food Science and Nutrition, 55: 939-954.
https://doi.org/10.1080/10408398.2012.678949
PMid:24915350

Hinojosa-Nogueira D., Pérez-Burillo S., Cueva S., and Rufián-Henares J., 2021, Green and white teas as health-promoting foods, Food & function, 12(9): 3799-3819.
https://doi.org/10.1039/D1FO00261A
PMid:33977999

Khan N., and Mukhtar H., 2007, Tea polyphenols for health promotion, Life sciences, 81(7): 519-533.
https://doi.org/10.1016/J.LFS.2007.06.011
PMid:17655876 PMCid:PMC3220617

Khan N., and Mukhtar H., 2018, Tea polyphenols in promotion of human health, Nutrients, 11(1): 39.
https://doi.org/10.3390/NU11010039
PMid:30585192 PMCid:PMC6356332

Klepacka J., Tońska E., Rafałowski R., Czarnowska-Kujawska M., and Opara B., 2021, Tea as a source of biologically active compounds in the human diet, Molecules, 26(5): 1487.
https://doi.org/10.3390/molecules26051487
PMid:33803306 PMCid:PMC7967157

Li M., Liu H., Wu D., Kenaan A., Geng F., Li H., Gunaratne A., Li H., and Gan R., 2022, L-Theanine: a unique functional amino acid in tea (*Camellia sinensis* L.) with multiple health benefits and food applications, Frontiers in Nutrition, 9: 853846.
https://doi.org/10.3389/fnut.2022.853846
PMid:35445053 PMCid:PMC9014247

Li S., Lo C., Pan M., Lai C., and Ho C., 2013, Black tea: chemical analysis and stability, Food & function, 4(1): 10-18.
https://doi.org/10.1039/c2fo30093a
PMid:23037977

Lin F., Wei X., Liu H., Li H., Xia Y., Wu D., Zhang P., Gandhi G., Li H., and Gan R., 2021, State-of-the-art review of dark tea: From chemistry to health benefits, Trends in Food Science and Technology, 109: 126-138.
https://doi.org/10.1016/J.TIFS.2021.01.030

Liu Z., Chen Z., Guo H., He D., Zhao H., Wang Z., Zhang W., Liao L., Zhang C., and Ni L., 2016, The modulatory effect of infusions of green tea, oolong tea, and black tea on gut microbiota in high-fat-induced obese mice, Food & function, 7(12):, 4869-4879.
https://doi.org/10.1039/C6FO01439A

Ohishi T., Fukutomi R., Shoji Y., Goto S., and Isemura M., 2021, The beneficial effects of principal polyphenols from green tea, coffee, wine, and curry on obesity, Molecules, 26(2): 453.
https://doi.org/10.3390/molecules26020453

Pastoriza S., Mesías M., Cabrera C., and Rufián-Henares J., 2017, Healthy properties of green and white teas: an update, Food & function, 8(8): 2650-2662.
https://doi.org/10.1039/c7fo00611j

Pathaw N., Devi K., Sapam R., Sanasam J., Monteshori S., Phurailatpam S., Devi H., Chanu W., Wangkhem B., and Mangang N., 2022, A comparative review on the anti-nutritional factors of herbal tea concoctions and their reduction strategies, Frontiers in Nutrition, 9: 988964.
https://doi.org/10.3389/fnut.2022.988964

Perumalla A., and Hettiarachchy N., 2011, Green tea and grape seed extracts — Potential applications in food safety and quality, Food Research International, 44(4): 827-839.
https://doi.org/10.1016/J.FOODRES.2011.01.022

Pinto M., 2013, Tea: A new perspective on health benefits, Food Research International, 53: 558-567.
https://doi.org/10.1016/J.FOODRES.2013.01.038

Rocha C., Moura A., and Cunha L., 2020, Consumers' associations with herbal infusions and home preparation practices, Food Quality and Preference, 86: 104006.
https://doi.org/10.1016/j.foodqual.2020.104006

Sang S., Lambert J., Ho C., and Yang C., 2011, The chemistry and biotransformation of tea constituents, Pharmacological Research, 64(2): 87-99.
https://doi.org/10.1016/j.phrs.2011.02.007

Senanayake S., 2013, Green tea extract: Chemistry, antioxidant properties and food applications – A review, Journal of Functional Foods, 5: 1529-1541.
https://doi.org/10.1016/J.JFF.2013.08.011

Shang A., Li J., Zhou D., Gan R., and Li H., 2021, Molecular mechanisms underlying health benefits of tea compounds, Free Radical Biology & Medicine, 172: 181-200.
https://doi.org/10.1016/j.freeradbiomed.2021.06.006

Sunarharum W., Ali D., Hasna T., Pradichaputri A., Sabatudung A., Nurizza N., Farras M., and Kartika A., 2022, The potential of spiced tea for health. Advances in Food Science, Sustainable Agriculture and Agroindustrial Engineering, 5(2): 193-200.
https://doi.org/10.21776/ub.afssaae.2022.005.02.8

Świąder K., and Florowska A., 2022, The sensory quality and the physical properties of functional green tea-infused yoghurt with inulin, Foods, 11(4): 566.
https://doi.org/10.3390/foods11040566

Tang G., Zhao C., Xu X., Gan R., Cao S., Liu Q., Shang A., Mao Q., and Li H., 2019, Phytochemical composition and antioxidant capacity of 30 Chinese teas, Antioxidants, 8(6): 180.
https://doi.org/10.3390/antiox8060180

Wang H., Provan G., and Helliwell K., 2000, Tea flavonoids: their functions, utilisation and analysis, Trends in Food Science and Technology, 11: 152-160.
https://doi.org/10.1016/S0924-2244(00)00061-3

Wu C., and Wei G., 2002, Tea as a functional food for oral health, Nutrition, 18(5): 443-444.
https://doi.org/10.1016/S0899-9007(02)00763-3
PMid:11985958

Yang G., Meng Q., Shi J., Zhou M., Zhu Y., You Q., Xu P., Wu W., Lin Z., and Lv H., 2023, Special tea products featuring functional components: Health benefits and processing strategies, Comprehensive Reviews in Food Science and Food Safety, 22(3): 1686-1721.
https://doi.org/10.1111/1541-4337.13127
PMid:36856036

Zhang H., Qi R., and Mine Y., 2019, The impact of oolong and black tea polyphenols on human health, Food Bioscience, 29: 55-61.
https://doi.org/10.1016/J.FBIO.2019.03.009

Zhao C., Tang G., Cao S., Xu X., Gan R., Liu Q., Mao Q., Shang A., and Li H., 2019, Phenolic profiles and antioxidant activities of 30 tea infusions from green, black, oolong, white, yellow and dark teas, Antioxidants, 8(7): 215.
https://doi.org/10.3390/antiox8070215

Zhu F., Sakulnak R., and Wang S., 2016, Effect of black tea on antioxidant, textural, and sensory properties of Chinese steamed bread, Food chemistry, 194: 1217-1223.
https://doi.org/10.1016/j.foodchem.2015.08.110
PMid:26471674

Zokti J., Baharin B., Mohammed A., and Abas F., 2016, Green tea leaves extract: microencapsulation, physicochemical and storage stability study, Molecules, 21(8): 940.
https://doi.org/10.3390/molecules21080940
PMid:27472310 PMCid:PMC6274239