



A Comparative Analysis of Herbal Tea and Green Tea: Unravelling Their Origins, Processing, Caffeine Content, Flavor Profile, and Health Benefits

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Received: 29-08-2023, Revised: 10-11-2023, Accepted: 27-11-2023, Published: 09-12-2023

Abstract: This study compares herbal tea and green tea in-depth in order to clarify their origins, production processes, caffeine amounts, flavor characteristics, and associated health benefits. Even while both green tea and herbal tea have become very popular, they each have distinctive features that set them apart from one another. The primary components are what distinguish green tea and herbal tea from one another. The same *Camellia sinensis* plant that yields oolong, black, and white teas is also utilized to produce green tea. They differ from one another because of variations in the withering and oxidation processes. Herbal tea, unlike green tea, employs dried fruits, flowers, spices, and herbs in different proportions instead of the tea plant. While the majority of herbal teas are caffeine-free, green tea is a rich source of caffeine. Additionally, most herbal teas have less antioxidants than green tea. The taste profile of herbal tea actually varies on which herbal teas are being tried out, whereas green tea has a fairly distinct natural flavor. When it comes to herbal teas, there are often two different flavor profiles: one that is scrumptious and the other that is as bitter as green tea. When it comes to herbal teas, there are often two different flavor profiles: one that is scrumptious and the other that is as bitter as green tea. The health advantages of green tea and herbal tea differ since they come from different plants. Green tea is a healthy beverage since it is full of antioxidants, catechins, theanine, and different vitamins. Herbal teas provide a range of health advantages since they are manufactured from a variety of fruits and plants. There are drinks labeled as "herbal tea" even though many herbal teas are used as natural medicines. In addition, this study aims to clarify the distinction between herbal teas and green tea and to provide insightful information to help people better understand, appreciate, and choose wisely when it comes to these beloved beverages.

Keywords: Origin and Processing, Caffeine Content, Flavor Profile, Health Benefits

1. Introduction

The beverage is not innately good or bad. They can each be enjoyed as part of a healthy life when consumed in restraint and as part of an overall balanced diet. Potables are an integral part of our lives and we elect them for lots of different reasons – thirst, fun, taste, energy, hunger, tedium, to cool down and indeed warm up. Particular selection is grounded on your age, stage, life, and occasion. Numerous beverages are also part of our social occasions with family, and colleagues and at special events and vacations.

Healthy drink consumption is when we enjoy potables as part of a balanced and varied diet. All non-alcoholic potables, both sugar-candied and non-sugar, are a stimulating and affable addition to a balanced diet when consumed in restraint. Different people have different intentions and may have different requirements concerning energy consumption and how they choose to consume that energy. After water, tea and coffee are the two most generally consumed potables on the earth. Drunk straight, they're calorie-free potables brimming with antioxidants, flavonoids, and other biologically active substances that may be good for health. Green tea, especially the strong variety served in Japan, has entered attention for its possibility of guarding against heart disorders [1, 2]

Green tea falls under the traditional tea category because it is derived from the *Camellia sinensis* plant. Furthermore. Herbal tea is made with or without the leaves of the *Camellia sinensis* plant, which differs from traditional tea. Traditional tea is obtained from the leaves of the *C. sinensis* plant, while herbal teas can be prepared using a wide range of plant materials other than *C. sinensis* leaves [3].

It should be noted that green tea, which is considered a healthy drink, is not technically classified as herbal tea.

Green tea is popular and widely consumed, especially in Asian countries such as China, Korea, and Japan. By now this has been an integral part of their culture for centuries [4].

Herbal teas are made by combining one or more herbal substances and preparing them through methods like decoction, infusion, or maceration. A demonstrative picture is shown in Figure 1. These preparations are typically made just before consumption. Herbal teas are commonly available in bulk or sachet form, and the herbal ingredients may undergo prior processing such as comminution or crushing. Herbal tea mixtures are carefully prepared blends of herbal substances with specific proportions to promote effective mixing and minimize the possibility of ingredient separation and settling. This results in a uniform distribution of the various components in the mixture [5].

Types of herbal tea in the market can be categorized as Camomile, Peppermint, Mixed Fruit, Rosehip, Fennel, Lime flower and Mint, Elderflower, Lemon, Verbena, Melissa, Flower

Garden, Hibiscus, Matte, and Nettle. Those are the most common herbal teas in market. According to the place, herbal teas are differ. Currently, there are trends for herbal teas in the market because of it various health benefits. Based on the raw material, flavor type, product type, packaging type and region, those herbal teas trends are differ within North America, Europe, Asia Pacific, Latin America, and Middle East & Africa [6]. Also, there are different sources herbal teas around the world such as Asian herbal teas: *Centella asiatica*, Arabian jasmine, Balsam pear, barley grass, guava, hardy rubber tree, Japanese persimmon, Jobs tears, Wolof berry tea, A. marmelos (bael), Tanner's Cassia (*Cassia auriculata*), African herbal teas: African rooibos (*Aspalathus linearis*), borututu (*Cochlospermum angolensis*), and honey bush tisanes, South America herbal teas: Yerba mate (*Ilex paraguariensis*) and Kombucha tea, European herbal teas: *Chamomilla recutita*, *Matricaria chamomilla*, *Chamaemelum nobile*, and Peppermint tea (*Mentha piperita leaves*) [7].



Figure 1. Green Tea Vs Herbal Tea

2. Origin and Processing

The leaves of the *C.sinensis* are used to produce a different range of traditional teas, which can be distributed into three types related to their degree of oxidation: green (unfermented), oolong (incompletely fermented), and black (fermented) tea. Unlike other traditional teas, green tea has gained worldwide recognition as an extensively consumed drink, appreciated for its different health benefits. Also, the Chinese have been well apprehensive of the medicinal components of green tea since ancient times [8]. Green teas are generally drafted

from the young leaves, buds, and internodes of *Camellia sinensis* or *Camellia assamica*, which are kinds of tea plants. As an illustration, herbal teas have been created by incorporating herbal parts to enhance the flavor, aroma, and health-promoting attributes, giving a complementary blend to marketable green tea.

Herbal teas have a rich global legacy, with traditional Chinese Medicine renowned for its utilization of herbal teas in treating various ailments. Additionally, Sri Lanka, Egypt, and Greece also possess a medicinal history associated with herbal tea. Throughout the world, herbal teas have remained a favored drink choice. The origins of herbal tea can be traced back to ancient China, with the previously proven books dating back to 2737 BC. Written records from the third-century announcement further attest to the wide use of herbal tea. Over time, these teas transcended borders, spreading from China to Egypt, Japan, Europe, and other countries of the world [9]. East Asia is considered the home-place of the *Camellia Sinensis* plant, and it's in this region where indigenous tea can be set up in countries similar as Japan, China, Burma, India, and others [10]. To ensure the maximum preservation of bioactive compounds, the standardization of processing methods for both herbal leaves and green tea involves subjecting them to two different processing conditions [11]. The processing methods are shown in Figure 2.

Green tea is traditionally produced using freshly plucked tea leaves. These leaves typically undergo a withering process and are then subjected to heat treatment to deactivate enzymes. Afterward, the leaves are rolled and finally dried to remove moisture, resulting in minimal oxidation compared to the production of other teas like black tea. Two common methods used for enzyme deactivation are pan-firing and hot steam treatments. Pan-fired green teas often exhibit a roasted flavor profile, while steamed teas tend to have a more pronounced green note [12].

The methodology for the preparation of herbal tea powder involved several sequential steps to ensure the production of high-quality and consistent samples, as shown in Figure 3. Fresh herbal leaves were carefully selected and subjected to a meticulous inspection to remove any foreign materials or impurities. Subsequently, the leaves were gently rinsed with tap water to cleanse their surfaces effectively. The first processing method employed was ordinary processing, wherein the cleaned herbal leaves were spread thinly on aluminum trays inside a cabinet drier. The leaves were dried at a controlled temperature of 60 °C for a duration of 6 hours, allowing them to undergo gradual dehydration while retaining their essential properties.

Alternatively, the steam blanching technique was utilized as another processing approach. In this method, the cleaned herbal leaves were exposed to steaming at 90 °C for 3 minutes, followed by the same cabinet drying process at 60 °C for 6 hours. Steam blanching helped to preserve the leaves natural attributes while facilitating the subsequent drying phase. Moreover, the hot water blanching method was employed in the preparation process. In this approach, the cleaned guava leaves were immersed in hot water at a temperature of 85 °C for 2

minutes, prior to undergoing the cabinet drying process at 60 °C for 6 hours. Hot water blanching was utilized to achieve specific desired effects on the leaves' constituents, ensuring optimal results in the final herbal tea powder. After the completion of the designated processing methods, the processed and dried herbal leaves were transformed into a powdered form using a blender. To ensure uniformity in particle size, the powdered leaves were passed through an aluminum sieve with a mesh size of 1mm, resulting in a consistent herbal tea powder ready for further analysis and consumption [11].

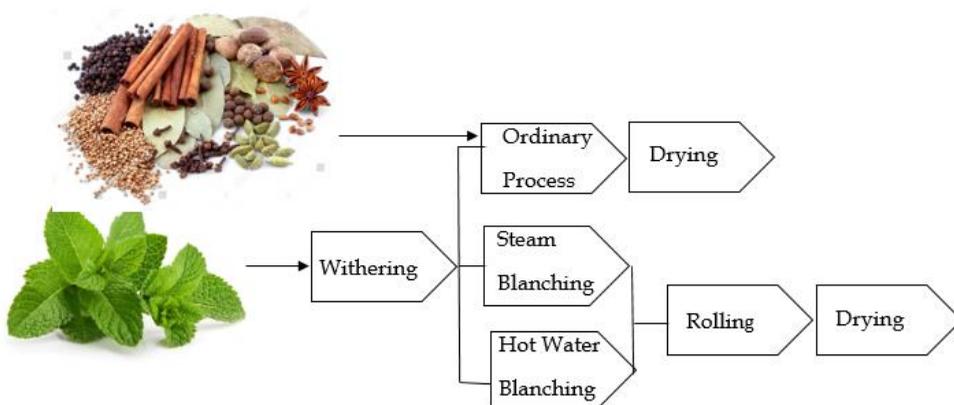


Figure 2. Standardization of processing method for herbal leaves, other herbal parts

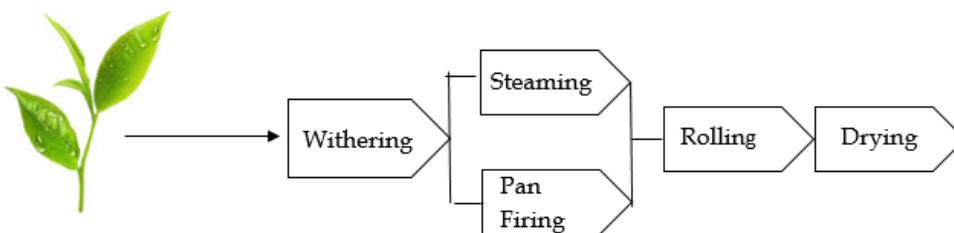


Figure 3. Green Tea Processing Steps

3. Caffeine Content

Caffeine is indeed a highly consumed medicine worldly and is present in different drinks, including tea. While caffeine is frequently consumed to increase alertness and enhance performance, it's important to note that its operation should be avoided by certain individuals. Pregnant women, children, and individuals with cardiovascular disorders and anxiety diseases are advised to refrain from consuming caffeine [13].

Due to growing enterprises regarding the possible negative goods of consuming drinks containing caffeine, health-conscious individuals are highly seeking derivatives. Herbal teas have

highly gained recognition as backups for traditional low-calorie, caffeinated drinks like coffee, cocoa, and tea among those who prioritize their well-being [14]. It's crucial to remember that green tea typically contains more caffeine than herbal tea when comparing the amounts of caffeine in the two types of tea. The *Camellia sinensis* plant, which produces green tea, naturally contains caffeine. While brewed from a variety of plants, herbal teas do not naturally contain caffeine unless it is added separately. Caffeine plays an important part in assessing the quality of green tea as it's the primary methylxanthine emulsion set up in tea alkaloids. It's highly identified for its stimulating aspects and is considered an important factor in determining the overall quality of green tea. Unlike other compounds present in green tea, caffeine noticeably enhances the flavor in the tea infusion [15]. The amount of caffeine in green tea might change based on the type of green tea, the amount of time it is brewed for, and the temperature of the water. An 8-ounce cup of green tea typically has 25–45 mg of caffeine in it. Herbal teas, in contrast, often don't have any caffeine at all or have very little. As a result, herbal tea is a good choice for those who are sensitive to caffeine or want to cut back. Many herbal teas are naturally caffeine-free, there's one beverage exception Yerba Mate. Yerba Mate is an herbal tea originating from South America and it does contain caffeine [16]. One special thing about herbal teas is their prominent labeling indicating their caffeine-free nature, which can be set up on every packet and brand. While caffeine is generally associated with coffee, it's important to note that tea can also contain significant situations of caffeine. Herbal tea often has less caffeine than green tea, which may have a negative effect on sleep and digestion. This finding of caffeine content in tea has led to a clear emphasis on pressing the absence of caffeine in herbal teas [17].

4. Flavor Profile

The flavor of tea, including its aroma and taste, is primarily determined by the chemical components present in the tea leaves. These constituents are influenced by both the tea genotype and the manufacturing process. Absolutely, manufacturing techniques play a crucial role in influencing the flavor of tea by impacting the conversion of chemicals during the processing procedure. Different chemical reactions take place, like the Maillard reaction, which is responsible for the product of aroma composites. Also, the manufacturing process also affects the changes in precursors of carotenoids, lipids, and glycosides, further contributing to the overall flavor profile of the tea. In the case of green tea, it tends to have a further bitter and tangy taste and is generally less ambrosial compared to other types of tea [18].

During the preservation of tea, out-flavors can arise due to the oxidation of tea accouterments. This is more likely to be done in teas that suffer lower oxidation during the manufacturing process, similar to green tea. Green tea, with its lower level of oxidation, can have a distinct and sometimes striking off-flavor compared to fermented teas. This is because the amount of aroma compounds in green tea is generally lower compared to fermented teas, contributing to the differences in scent and flavor [19]. The flavor profile of herbal tea varies on

the herbal tea you are sampling, whereas green tea has a distinct natural flavor. Green tea might not be a popular choice for many people because it lacks a fruity or sweet flavor. Some green teas are quite astringent and clearly flavor the leaves. Many people sweeten their green tea with sugar, but this may prevent the antioxidants from giving the health advantages they are supposed to.

When it comes to herbal teas, there are often two different flavor profiles: one that is scrumptious and the other that is as bitter as green tea. Herbal teas are prepared by combining dried leaves, seeds, meadows, flowers, nuts, or other botanical components. These different parts contribute to the characteristic taste and flavor attributes set up in herbal teas. The flavor plays a significant role in determining the acceptability of herbal teas, making it a crucial factor to consider. As a result, high-quality herbal teas are required to retain exceptional flavors that are pleasurable and satisfying to the palate [20].

The world of herbal teas offers a vast array of flavors, with each variety having its own unique flavor profile. Here are three major categories of herbal tea flavors. **Sweet Teas:** Sweet herbal teas are often crafted from fruits or berries, imparting a naturally sweet taste. Some floral teas can also possess a delightful sweetness, accompanied by aromatic undertones. **Aromatic Teas:** Aromatic herbal teas exhibit strong scents that match their robust flavors. These teas are characterized by deep spice profiles, which may include notes of turmeric, cinnamon, ginger, or other aromatic ingredients. **Bitter Teas:** Certain herbal teas have a distinct bitter taste. However, bitter herbs are often known for their powerful healing properties, making these teas worth exploring despite their stronger flavor profiles. It's important to note that these flavor attributes are general orders, and individual herbal teas may have unique combinations and variations of flavors according to their specific materials [16].

5. Health Benefits

Green tea has been consumed for over 5000 years, with a rich history steeped in both medicinal and refreshing purposes. Traditionally, it was prescribed to address various ailments and enjoyed for its ability to prevent future health issues. The surge in popularity of green tea can be attributed to the growing recognition of its numerous health benefits [21]. In fact, traditional Chinese medicine has long advocated for the use of this plant in promoting for:

Table 1. Health Benefits of Green Teas

Green Tea Health Benefits	• Antioxidant Property
	• Lowering LDL cholesterol levels
	• Inhibiting the abnormal formation of blood clots, Reduction of platelet aggregation

	<ul style="list-style-type: none"> • Lipid regulation and inhibition of proliferation and migration of smooth muscle cells
	<ul style="list-style-type: none"> • Reducing cardiovascular diseases
	<ul style="list-style-type: none"> • Boost the immune system
	<ul style="list-style-type: none"> • Parkinson’s disease and a temporary increase in short-term memory
	<ul style="list-style-type: none"> • Relevant for management of iron overload and oxidative stress.
	<ul style="list-style-type: none"> • Reduce inflammation associated with Crohn’s disease and ulcerative colitis
	<ul style="list-style-type: none"> • Weight loss and diet
	<ul style="list-style-type: none"> • Anti-viral effects
	<ul style="list-style-type: none"> • Anti-fungal activity
	<ul style="list-style-type: none"> • Anti-carcinogenic property

Green tea is enjoyed globally in diverse manners. The extensive research conducted on its safety and the multitude of studies highlighting its positive impact on health make it highly advisable to incorporate green tea into one's regular consumption routine. In addition to the aforementioned advantages, green tea has also shown promising applications in areas such as diabetes management, improving exercise performance, alleviating symptoms of inflammatory bowel disease, and treating certain skin disorders [3].

Throughout history, ingredients of plant and herbal teas have been extensively employed for their medicinal characteristics. According to the World Health Organization (WHO), a stunning number of roughly 4 billion individuals have turned to herbal products as their primary choice for addressing health problems. These products frequently correspond to a single crucial herbal component or a combination of different herbal factors, which contribute to their unique remedial advantages [22]. By harnessing the power of nature, these remedies offer a range of potential benefits, including:

Table 2. General Benefits of Herbal Teas

General Benefits for Herbal Tea	<ul style="list-style-type: none"> • Facilitating a sense of tranquility and serenity
	<ul style="list-style-type: none"> • Supporting cardiovascular well-being
	<ul style="list-style-type: none"> • Assisting with gastrointestinal and digestive issues
	<ul style="list-style-type: none"> • Purifying and detoxifying the body

	• Fostering vitality and overall wellness
	• Nourishing the nervous system
	• Enhancing immune system function through its antioxidant properties
	• Providing a natural energy boost and invigorating effect
	• alleviating stress
	• Aiding in the prevention of common colds
	• Stimulating internal organ functions, promoting restful sleep
	• Offering a delightful caffeine-free taste experience

Herbal tea encompasses a wide array of herbs, each with its own unique properties and intended uses. This diverse range of herbs allows for a variety of purposes and benefits when consumed as tea [4].

Table 3. Helpful Herbal Teas

Health Benefit	Herbal Tea Type
Anti-Inflammatory	Licorice, Red Raspberry Hibiscus, Echinacea Ginger, Linden
Skin Health Support	Chamomile, Lavender Coriander, Rose Hip Marshmallow
PMS System Relief	Fennel, Hibiscus Licorice, Fenugreek
Antioxidant	Orange, Red Raspberry Gingko, Jasmine Linden
Stress Relief	Spearmint, Lavender Peppermint, Passion flower Jasmine, Linden
Digestive System Support	Peppermint, Lemon Balm Ginger, Fennel Coriander, Marshmallow Hibiscus, Licorice
Cardiovascular Support	Orange, Gingko Jasmine, Rose Hip

Immune Boost	Echinacea Rose Hip Chamomile
Sleep Aid	Chamomile, Lavender Lemon Balm, Aniseed
Oral Health	Spearmint Calendula

Apart from the table 3 most common herbal teas benefits can be mentioned as below. Chamomile: Age old herbal tea taken for its calming effect on those suffering from stress. Also good for teething babies. Peppermint: Cleansing digestive tonic which can also improve circulation. Mixed fruit: A tea with refreshing astringent qualities. Rosehip: Rich in vitamin C and can relieve headaches. Fennel: Comforting for sore throats and coughs. Enlivens sluggish appetites. Maté: Potent Brazilian reviver. Nettle: Blood purifier believed to reduce susceptibility to colds. Lemon verbena: Eases nausea and indigestion.

6. Conclusion

Herbal teas boast a fascinating history and continue to delight enthusiasts with their enticing taste, captivating aroma, and potential health advantages. The infusion of diverse ingredients leads to a delightful array of flavor profiles, making them an attractive option for those seeking beverages free from caffeine. With origins that span thousands of years, herbal teas have been deified across different traditions for their medicinal characteristics. Also, green tea, deduced from the *Camellia sinensis* plant, has garnered global acclaim for its various health benefits, making it largely recommended for regular consumption due to its proven positive impact on overall well-being. The exploration conducted on herbal teas has exfoliated light on their possible applications in different areas, including diabetes applications, exercise improvement, sedentary bowel disorders, and skin diseases. As ongoing research unfolds, the understanding and utilization of herbal teas are expected to expand, offering individuals a broader range of choices to promote their well-being and savor flavorful beverage experiences.

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Acknowledgements

This work supported by a project (No. TG/21/222) funded by Treasury of Sri Lanka under the title of “Development of novel juice extraction techniques or high quality extract from underutilized agro-based commodities, extract based fermented, powder product”.

Conflict of interest: The Authors have no conflicts of interest to declare that they are relevant to the content of this article.

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