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Formulation, Sensory and Physicochemical evaluation of a Polyherbal Dip Tea

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ABSTRACT:
"Drinks called herbal drinks are made with natural ingredients derived from a variety of morphological plant parts, such as leaves, stems, roots, fruits, bud, and flower structures. Herbal drinks have a long history as healers of the older, familial insight. Tisanes, or herbal teas, are another name. These beverages are sans caffeine in nature. The plant has different restorative properties. The point of this study is to figure out a polyherbal tisane with Anti- oxidant, cell reinforcement, hostile to diabetic, hemoglobin-enhancing, calming, anti – inflammatory and defensive properties, as well as wellbeing advancing properties. Moringa is an excellent plant and supplement source with demonstrated benefits for networks in India and Africa. Moringa is referred to as "sigru" in Ayurvedic texts, which means "to move like an arrow," indicating the herb's penetration capabilities. Moringa is normally wealthy in supplements, wealthy in fundamental amino acids, protein building blocks and numerous other medical advantages. Punica granatum strips are typically discarded, however they are rich in polyphenols and have cell reinforcement properties. These rinds have different useful qualities. As a result, herbal tea was made with these components. The tea bags were infused with boiling water, and their physical, sensory, and phytochemical properties were examined. The tea that was produced passed the tests and contained terpenoids, polyphenols, flavonoids, alkaloids, saponins, and tannins, according to the findings.

KEYWORDS : Polyherbal dip tea, herbal tea, tisane, teabag, Antioxidant, nutritional and therapeutic properties, health benefits.

I. INTRODUCTION :

Herbs are mostly aromatic plant leaves, like basil, bay leaves, dill leaves, marjoram, tarragon, and thyme, among others. According to Jiang (2019), herbs add zest, flavor, aroma, and vibrant color to dishes. These regular flavor sources wealthy in cancer prevention agents, antimicrobial properties, and less harmfulness them adaptable for culinary, corrective, and restorative applications.[1]

Natural substances derived from various morphological plant parts, such as leaves, stems, roots, fruits, buds, and flowers, are used to make herbal drinks. Herbal drinks have long been used as remedies by the elderly, according to traditional wisdom. These drinks are ingrained in the culinary traditions of a number of nations, including China, India, Sri Lanka, Indonesia, Malaysia, and others, all of which make extensive use of traditional medicines. The World Health Organization (WHO) states that each traditional medicine is adaptable to its surroundings and places an emphasis on holistic health. Natural beverage qualities can be isolated into two unmistakable properties like physical and substance properties. Color, turbidity, temperature, taste, odor, and solid content are examples of drinks' physical properties, while mineral content is one of their chemical properties. Phytochemicals like flavonoids, phenolic compounds, carotenoids, plant sterols, glucosinolates, alkaloids, polyacetylenes, coumarins, saponins, terpenoids, and other sulphur-containing compounds may be abundant in herbal drinks derived from a single herb or a combination of herbs. According to previous research on herbal tea, the phytochemical properties of the plant parts used, like the leaves, flowers, and roots, vary. Tanning agents, saponins, cardiac glycosides, terpenoids, and flavonoids have

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all been found in green tea. Bioactives like glucosinolates, hydroxycinnamic acids, flavonols, and catechins are found in higher concentrations in green tea infusions enriched with broccoli by-products[1].

The Importance of herbal beverages :

As a result of advancements in herbal medicine, herbal drinks have emerged as one option for maintaining good health. Thusly, the utilization of natural beverages is worldwide and a few beverages have acquired prominence than others relying upon their geological beginning. The World Health Organization (WHO) says that more than 80% of people in Africa and Asia still use herbal remedies as basic health care. A few populaces on the planet polished off home grown drinks as one piece of their eating regimen to keep up with their wellbeing. As a result of the balanced and reasonable approach to treatment, people's interest in herbal beverages as a habit increases. There are many different ways to prepare herbal drinks, such as "jamu," "akar kayu," herbal infusion, herbal decoction, and herbal tea. In a number of nations, including China, India, Brazil, Turkey, and others, herbal tea is a well-liked herbal beverage. Herbal teas made from flowers are frequently utilized in traditional medicine and pharmacy in Greece and the Eastern Mediterranean countries[1].

The Indian system of herbal drinks is based on Ayurveda, which has been around for more than 3,000 years. Vata, pitta, and kapha are the three basic principles of the Ayurveda system. Home grown drinks are basically made by various blends of Ayurvedic spices like turmeric, ginger, tulsi, mint, coriander, Terminalia arjuna, Decalepis hamiltonii root, Flautist longum, Tinospora cordifolia, and others as per their particular purposes. Herbal drinks that are notable in the ayurvedic framework are natural rice drink, halu kashaya, jaljira powder juice, nannari sharbat, and tambuli.[1]

It Is believed that consumer awareness of tea's antioxidant potential and other health benefits is the reason for the industry's expansion. However, due to a lack of information regarding traditional herbal beverages, researchers worldwide are increasingly concentrating on herbal tea. Instead of scientific data, the majority of published information on product safety and efficacy is based on ethnopharmacological experiences from traditional medicines. As a consequence of this, additional research into other traditional beverages is required because they also possess a significant potential for enhancing health.[1]

Preparation of herbal drinks :

The traditions and purpose of the herbal beverage serve as the basis for its preparation. Rashid et al. (2018) state that there are four categories of herbal beverages: herbal tea, herbal infusion, herbal decoction, and herbal fruit juice. Herbal teas, which are also called tisanes, are made from a combination of botanical ingredients like dried leaves, seeds, grasses, nuts, barks, fruits, and flowers. These ingredients give herbal tea its flavor and make it better. Pour boiling water over the herbs and let them steep for 5 to 15 minutes to make an herbal infusion. The herbal decoction is made by grinding or crushing the whole root, bark, and seed into powder and boiling it with water for about 30 minutes, or until half of the water has evaporated. It can be kept for two to three days.[1]

Herbs could be used as a tea or infusion to prevent or treat urinary tract infections. After water, the most common drink is tea. Many people enjoy its refreshing, slightly bitter and astringent taste. Tea is a drink that is enjoyed every day in all domestic, social and official occasions. The design supports invulnerability, keeps dynamic, revitalizes cells, relieves pressure, exhaustion, sleepiness, restlessness and more. In addition to invigorating, many home-brewed teas are also consumed for their obvious restorative effects. The infusion or boiling of herbs, spices or other plant material is the basis of herbal tea, a beverage without caffeine. Therefore, in some countries, such as Europe, tisanes or herbal teas are also called infusions. Herbal tea is much more than tea for one simple reason: tisane is made from several different plants, while tea is made from one plant. Since herbal teas do not contain tea leaves, the term "herbal tea" is actually a misnomer. Herbal teas or "teas" are naturally caffeine-free beverages made from various flowers, herbs, spices and dried fruits. Tea is currently a hot topic in nutritional and medical research worldwide.[2]

Tea has antifibrotic and neuroprotective properties, increases bone mineral density and helps reduce the risk of cardiovascular disease and cancer. Tea is great for oral health, lowers blood pressure, helps control weight and has antibacterial properties. Herbal tea differs from coffee and real tea in many ways. Herbal tea contains more than 4,000 bioactive compounds, one third of which are polyphenols and the remaining third are tannins and flavonoids. Recently there has been a

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resurgence of interest in tea as consumer awareness of the medicinal benefits of tea consumption has improved. Because herbal teas can be relaxing, they are often consumed for their healing and energizing properties. Herbal tea has the ability to relieve stomach or digestive problems, cleanse the body and strengthen the immune system at the same time. Consumption of low calorie tea should be encouraged. Infusion or boiling are both methods of making herbal tea. Its restorative properties include stimulating, relaxing and permanent strengthening of the body. Black, green, chamomile, ginger, ginseng, peppermint and cinnamon teas are the most popular types of tea.[2]

Table 1: Difference between Herbal Tisane and Regular tea.

Sr.no	Herbal tisane	Regular tea / real tea
1.	Consists of various herbal leaves, flowers, spices, dried fruits, barks, roots, etc.	Regular /real tea is made from the leaves of the Camellia Sinensis plant of the Theaceae family or tea.
2.	Without caffeine.	They contain caffeine.
3.	It is therapeutic and has various pharmacological properties. They can be used to prevent various diseases or provide nutritional benefits.	Energizing, antioxidant properties.
4.	Affordable. Herbs are dried without heat fixation.	Camellia sinensis tea is finished with a complex heat – fixing process.

Novelty of tea bags:

As the socio-economic status of the population and culture rises, there is a demand for tea bags with different credits, including customer/consumer preferences, ingredients used in small bags, advantages of ingredients used in the factory. . tea bag, the versatile use of the tea bag, the ease of use and the profit ratio for both the producer and the customer. Tea bags account for about 3-4% of retail tea and continue to grow the fastest, with India growing at nearly 50-60% per year.[3]

Need for tea bags:

Interestingly, herbal infusions consumption is greatly increased due to natural ingredients and probable health benefits. With benefits in mind, this study aimed to gather evidence on six herbs made into multi-herb infusions and make a sensory and phytochemical evaluation of a tisane with different nutritional and therapeutic effects.[3]

Populations around the world prefer to start their day with the tea and if the tea is in medicinal form, it would be easy and convenient for the patients to take the medicine. Recent studies aim to include the most common herbs with good antioxidant, hemoglobin-increasing, anti-diabetic, anti-inflammatory, hepatoprotective, immune-enhancing and health-promoting effects. The selected herbs have a different active ingredient that does not show the side effects of synthetic drugs.[3]

The benefits of herbal tea are:

• Provides a calmer and more relaxed state of mind.
• Support heart health.
• Helps with stomach and digestive problems.
• Gives the body cleansing properties.
• Nutritional benefits.[4]

Physiological maintenance of the nervous system.
• Strengthen the immune system.
• Provide the body with antioxidants.
• Stress relief.
• Promotes good sleep because it is without caffeine.[4]
• They have various therapeutic and pharmacological properties for the prevention and treatment of diseases.[4]

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Figure 1 : Benefits of herbal tea.

Reference : https://www.shutterstock.com/search/infographic-tea-benefit

II. LITERATURE REVIEW :

Table no. 2 : Literature Review

Sr.no	Title	Author	Biological importance
1.	Formulation, Nutritional Assessment and Sensory Evaluation of Moringa Oleifera Infused Herbal Tea Formulation and its effect on Obesity and Hemoglobin Levels.[5]	Meet C Patel , Neha Shukla, Divya Patel, Ramar Krishnamurthy, Giftson J Senapathy, July 2023.	Moringa tea was prepared. The study concluded that regular consumption of the tea can help reduce anemia by increasing Hb levels and control obesity in both sexes without side effects. Nutritious M-Tea for regular use as an alternative to commercial tea to refresh the body, reduce anemia and control obesity. G
2.	Production and quality Evaluation Of Herbal Tea From Moringa Leaves And Lemon Peel powder.[6]	U. C., Ekeh, J. I., Ndife, J. and 1Iguh, B. N. April 2022.	The prepared tea had nutritional and medicinal properties.

3.	Synergistic use of Punica granatum peel and Moringa oleifera leaf to develop a functional and sustainable decoction.[7]	Parkash Meghwar a, Aasia Akbar Panhwar b, Isaac Duah Boateng. et al.February 2024.	PPP and ML decoction can be a direct source of bioactive compounds, vitamins and minerals that are easier and more economical to extract in aqueous solution.
4.	Efficacy of Hot Tea Infusion vs. Ethanolic Extract of Moringa oleifera for the Simultaneous Treatment of Non-alcoholic Fatty Liver, Hyperlipidemia, and Hyperglycemia in a Murine Model Fed with a High-Fat Diet.[8]	Salma I. Cortes-Alvarez , Ivan Delgado-Enciso , et al. February 2024.	The Infusion gave a better therapeutic effect. Treatment with MO infusion improved locomotor activity. Fear-like behavior was reduced only by infusion.
5.	A Panoramic View on Pharmacognostic, Pharmacological, Nutritional, Therapeutic And Prophylactic Values of Moringa oleifera Lam.[9]	Ganatra Tejas H*, Joshi Umang H, Bhalodia Payal N, Desai Tusharbindu R, Tirgar Pravin R. May 2012.	Moringa contains four times more vitamin A than carrots and 13 times more than spinach. It contains seven times (7X) the vitamin C of oranges, four times (4X) the calcium of pork and four times (4X) the calcium of milk.
6.	Moringa Leaf Infusion And Tea : How Are Their Antioxidants Activities Different ? [10]	Irma Rahmawati , Sinta Dewi Anggraeni, Andi Ika Julianti. October 2022.	It consists of the preparation method of moringa leaf tea and evaluation of its antioxidant properties.
7.	Phytochemical Analysis, Antimutagenic and Antiviral Activity of Moringa oleifera L. Leaf Infusion: In – Vitro and in – Silico Studies.[11]	Ika Rahayu and Kris Herawan Timotius. June 2022.	The study concluded that M. oleifera leaf infusion offers a promising herbal beverage with good antioxidant, antimutagenic and antiviral properties.
8.	Moringa infusion (Moringa oleifera) rich in phenolic compounds and high antioxidant capacity attenuate nitric oxide pro-inflammatory mediator in -vitro.[12]	X. Coz-Bolañosa, R. Campos-Vegaa, R. Reynoso-Camachoa , M. Ramos-Gómeza et al. 2018.	This paper determines the antioxidant capacity and NO suppressive effects of moringa water infusion.
9.	Comparison of different aqueous extraction methods for optimum extraction of polyphenols and in-vitro anti-oxidant activity from pomegranate peel.[13]	Sarbaswarup Ghosh, Jayanta Kumar Chatterjee, Banti Chalkroborty and Alok Kumar Hazra. 2019.	This study concluded that the hot water infusion method is a simple, cheap and convenient method for extracting polyphenols from pomegranate peel and can be used in the future for in vivo antioxidant testing in animal models. The results showed that the hot water infusion method provides a significant ($P<0.05$) level of antioxidant activity over others.

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10.	The in vitro and ex vivo antioxidant properties, hypolipidaemic and Anti atherosclerotic activities of water extract of Moringa oleifera Lam. Leaves.[14]	Pilaipark Chumark a , Panya Khunawat a, Yupin Sanvarinda et al. December 2007.	The results showed that Moringa has antioxidant, hypolipidemic and anti-atherosclerotic effects and has therapeutic potential for the prevention of cardiovascular diseases.
11.	Natural Antioxidants in Anemia Treatment.[15]	Coralia Cotoraci , Alina Ciceu et al.. 2021	Moringa leaves and beetroot act as natural antioxidants in the treatment of anemia.
12.	Nutraceutical values of hot water infusions of moringa leaf (Moringa oleifera) and liquorice root (Glycyrrhiza glabra) and their effects on liver biomarkers in Wistar rats.[16]	Sule O. Salawu, Emmanuel O. Ibukun, Israel A. Esan. 2019.	The antioxidant effect of a hot water infusion made from moringa leaves, licorice root and their mixtures was investigated.
13.	Why Drinking Herbs in Tea Form is More Effective Than Pills: The Science Behind TEAONIC's Herbal Brews.[17]	By Teaonic Info January 16, 2023.	The advantage of drinking herbs is that the compounds in the herbs are more easily absorbed into the bloodstream.
14.	Formulation Of Antioxidant Tea By Utilising Pomegranate Peel & Spices.[18]	Mishra Malvika and Singh Neetu , October 2017.	This article makes antioxidant herbal tea from pomegranate peels.

Formulation of herbal tea :

The ingredients used in this herbal tea are Moringa oleifera, Punica granatum, Glycirrhiza gabra, Beta vulgaris, Mentha piperita (peppermint) and Elettaria cardamomum.

Moringa oleifera

Moringa oleifera can treat more than 300 diseases and is often considered a miracle cure. Native Americans and Africans have traditionally used moringa in herbal medicine. It works well as a medicine because of the phytochemicals it contains. Due to its high nutritional content and ability to fight disease, Moringa is particularly useful. Moringa oleifera, sometimes called the miracle tree, contains a complex composition of bioactive chemicals that contribute to its broad medicinal potential. Several factors influence the mechanism of this therapeutic benefit. First, moringa's high concentration of antioxidants, including vitamin C, flavonoids and polyphenols, can help the body fight oxidative stress and reduce inflammation. In addition, studies have shown that moringa has anti-inflammatory properties. This prevents the release of pro-inflammatory chemicals and enzymes, which in turn reduce inflammation. Additionally, moringa has been shown to have antibacterial properties, which means it can successfully fight a variety of bacteria, viruses and fungi. By causing cancer cell apoptosis, or programmed cell death, it also exerts an anticancer effect. In addition, the presence of certain chemicals such as glucosinolates and isothiocyanates contribute to the liver and heart protective properties of moringa. Overall, the anti-inflammatory, antibacterial, antioxidant, anti-cancer, hepato- and cardio-protective properties of Moringa oleifera contribute to its therapeutic potential, making it a promising plant for multiple medicinal uses.[19]

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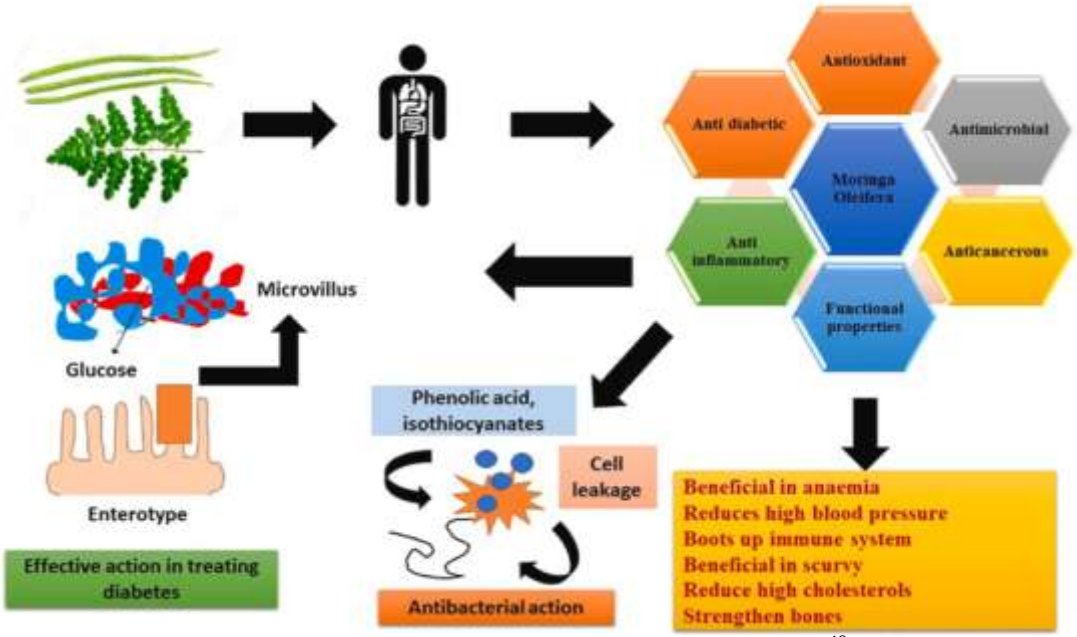

Figure 2 : Bioactive properties of Moringa oleifera.[19]

Antioxidant Activity :

The antioxidant properties of Moringa are very useful in reducing inflammation and fighting chronic diseases. Moringa may also have anti-aging effects due to its antioxidant properties. Free radicals can damage cells and accelerate aging, which can lead to wrinkles, fine lines and other signs of aging. The antioxidants of Moringa contribute to the formation of collagen, to the prevention of damage and to the youthful appearance of the skin. In addition, the antioxidant properties of moringa have been found to improve liver health. Oxidative stress can damage the liver, which is important for removing toxins from the body. Moringa improves liver function and detoxification by lowering oxidative stress and increasing liver enzyme levels. In addition, studies have shown the potential of moringa's antioxidant components to treat and prevent several chronic diseases, including diabetes. Because oxidative stress damages pancreatic cells and impairs insulin action, it plays an important role in the development and progression of diabetes. Moringa's antioxidants help control diabetes by reducing oxidative stress, improving insulin sensitivity and regulating blood sugar. In conclusion, the antioxidant properties of Moringa oleifera offer several health benefits. Moringa offers anti-aging benefits, lowers inflammation, improves liver function, neutralizes free radicals and lowers oxidative stress, all of which help maintain a healthy immune system and help manage chronic diseases like diabetes. Moringa can be a useful addition to a balanced diet to promote overall health and well-being.[19]

Anti Anemic Effects and Nutritional Benefits of Moringa :

Moringa oleifera contains iron and zinc. MO was added in large quantities to prepare diets to compete with anemia and bone problems due to the high Fe content in its leaves. It is included in the diet of children, pregnant and lactating women to overcome iron deficiency and malnutrition. Leaf powder has been used as an iron supplement and to increase its bioavailability.[20]

Moringa oleifera and vitamins. B-carotenes, α-tocopherols and L-ascorbic acid as well as vitamins B1, B2 and B3 were detected in many parts of the MO plant, especially in the leaves. The amount of vitamin A in MO is higher than in carrot and L-ascorbic acid is higher than in orange. It is also accepted that the recommended daily amount of vitamin A and C could be covered by daily consumption of Moringa seeds and leaves. The ability of MO to improve vitamin A (retinol) kinetics and retention along with improved malnutrition has also been approved in clinical trials. Status of children, improvement of vitamin A levels in postmenopausal women, and improvement of serum retinol levels in adolescent girls.[20]

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According to studies, tea with Moringa tea compound effectively increases hemoglobin levels, which in turn reduces obesity without side effects when consumed regularly.[21]

A study conducted showed that the effect of Moringa oleifera tea bags increased hemoglobin (Hb) in teenagers. After the 30-day intervention, the mean Hb value was 11.63 g/dL, an increase of 0.6 g/dL from the first intervention (15-day intervention) and 0.92 g/dL higher than before the intervention (0 days). [22]

Hypoglycemic activity:

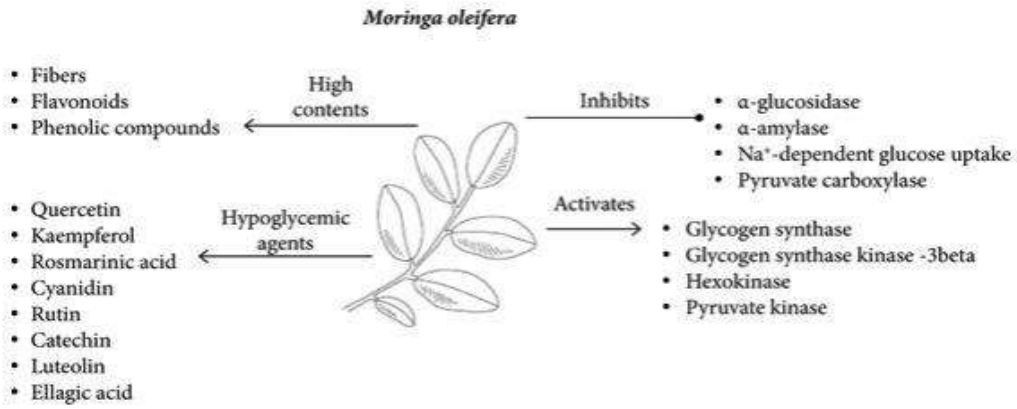

Figure 3 : Hypoglycemic action of Moringa oleifera.[20]

Aqueous leaf extract improved insulin resistance in mice. Fasting blood glucose (FBG) and glycated hemoglobin (HbA1c) were improved by MO in prediabetics, while postprandial blood glucose (PBG) values were decreased in diabetics, the same results were obtained in studies with diabetic rats.[20]

Liver protective effect :

Moringa oleifera leaves are very nutritious. The hepatoprotective effect of quercetin obtained from Moringa oleifera leaf extract has been demonstrated. The protective nature of hepatocytes was demonstrated by the potent effects of quercetin on the expression levels of aspartate alkaline phosphatase (ALP), aminotransferase (AST) and alanine aminotransferase (ALT). In addition, quercetin was found to reduce the lipid profile of rat liver. Leaf extract has been reported to alleviate renal failure and repair damage caused by synthetic drugs and to decrease plasma AST, ALT, ALP and creatinine. It has been shown to have similar effects in rats with induced nephropathy. Treatment with Moringa oleifera leaf extract has been shown to reduce cholesterol and 256 triglycerides accumulated in hepatocytes in non-alcoholic fatty liver disease (NAFLD) in guinea pigs.[19]

Moringa for Bone Health :

Moringa oleifera is concentrated in all the essential and optional essential amino acids and trace elements, including beta-carotene, vitamin C, calcium and potassium, which are important for the maintenance of bone. In addition, it contains minerals such as B and Mg, which help the body absorb calcium. Dried moringa leaves contain 2185 mg of calcium and 448 mg of magnesium per kilogram of dried leaves. The study showed that Moringa is a good source of calcium because 73% of the calcium was absorbed and 59% was retained. It can be useful for osteoporosis.[19]

Hypolipidemic Effects :

Administration of crude leaf extract of Moringa oleifera to high-fat fed rats reduced serum cholesterol up to 14%, which may be due to the bioactive phytoconstituent, so called. -sitosterol. Since the systems involved in the removal of lipids from the body are under your control, Moringa oleifera leaf has a powerful hypolipidemic effect. Moringa oleifera consumption has been linked in several studies to lowering triglyceride and cholesterol levels, two critical indicators of cardiovascular health. This is because Moringa oleifera contains various bioactive substances that can affect fat metabolism, including polyphenols, flavonoids and saponins.[19]

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Anticancer activity

Moringa oleifera is natural, reliable and safe in known amounts, so it can be used as an anticancer medicine. According to research, the use of moringa as a neoproliferative drug can stop the growth of cancer cells. Moringa oleifera has been found to have chemotherapeutic properties and to regulate the growth of certain tumor cells . Moringa leaves have the ability to reverse oxidative DNA damage in organisms and cells, especially when it occurs in cancer and degenerative diseases. Several bioactive compounds found in Moringa oleifera, including niacimycin, 3-o-D-glucopyranoside, and 4-(L-rhamnosylosy)benzyl isothiocyanate, may be the source of the plant's anticancer activity. The leaf extract has shown its effectiveness in pancreatic cancer cells by altering and improving the effectiveness of chemotherapy and NF-κB signalling. The effectiveness of Moringa oleifera leaves as an anticancer agent in rats has been demonstrated in many studies.[19]

For blindness and eye infections / eye health

Although there are many causes of blindness, vitamin A deficiency causes poor adaptation to darkness and night blindness. Eating moringa leaves, pods and leaf powder, rich in vitamin A, can help prevent night blindness and eye problems in children. Taking birch leaves (beta-carotene and leutin) with oil improves vitamin A nutrition and can delay cataracts. The juice can also stick to the eye in conjunctivitis.[23]

Punica granatum :

Many researchers have confirmed that pomegranate peel (PoP) is a rich source of bioactive compounds including ellagitannins, catechins, rutin and epicatechins. The skin is rich in polyphenols, and since polyphenols are cancer-preventing agents, they may indicate the pharmacological power of pomegranate. Literature has shown that the peel contains more bioactive compounds than other parts of the fruit.[24]

They are usually discarded after eating the juicy seeds inside. However, pomegranate peels have gained attention in recent years due to their many beneficial properties and potential applications. Pomegranate peels contain many bioactive compounds such as polyphenols, flavonoids, tannins and antioxidants.[25]

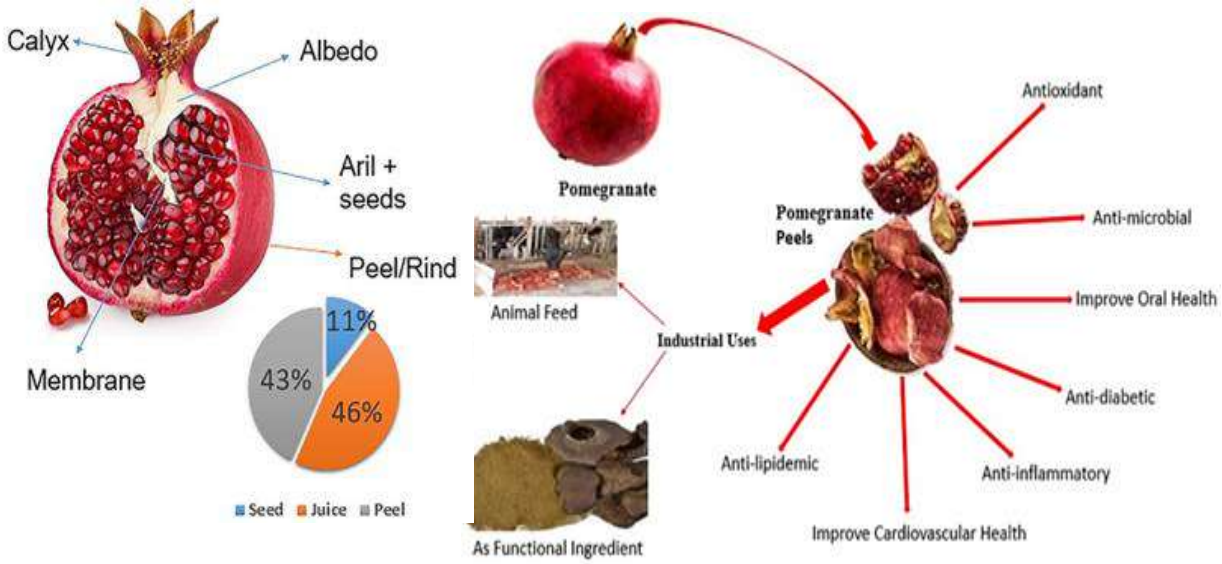

Figure 4 : Parts of pomegranate fruit and nutritional and functional properties of pomegranate peels. [24]

Antioxidant activity

Pomegranate has become one of the richest foods in polyphenols. It has a high antioxidant capacity and health benefits that make it very popular, which is why it is often called a "superfruit".[24]

The phenolic profile of pomegranate peels contains significant amounts of punicalagin, a type of ellagitannin that is abundant in pomegranate peels. Pomegranate peels contain ellagic acid, a polyphenol with antioxidant and anti-inflammatory properties. Aqueous extracts of red and white pomegranate peels with TPC (209.5 mg bile acid/g

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for red and 180.5 mg bile acid/g for white) were evaluated for antioxidant activity using DPPH, TPTZ, and reducing power tests. Both red and white peel extracts showed scavenging activity in the DPPH assay with 54.4 and 75% inhibition, respectively.[25]

In this study, the antioxidant activity of pomegranate peel powder was found to be 2.4 µg/ml and 1.5 µg/ml for commercial tea powder. The results show that pomegranate peel powder had the highest inhibition percentage compared to commercial tea powder. The results showed that pomegranate peel powder had a higher polyphenol content compared to commercial tea powder.[26]

According to a recent study, two extracts of P. granatum – alcohol and infusion – showed high efficiency in inhibition of DPPH radical and significant reducing power of Fe3+/ferricyanide complex. The antioxidant activity of fruit peel extracts is demonstrated by UPLC-PDA-MS analysis of phenolic compounds such as ellagic acid and its derivatives . In addition, fifteen P-variable juices and cream soups were prepared in the study. Granatum and showed that TPC and total flavonoid content (TFC) in aril juice were about 20 and 300 times higher than boiling. Regardless of the variety, each mixture had better antioxidant and chelating effects than the juices. The antioxidant activity of P. granatum bark was evaluated using three water extraction techniques; constant shaking, extraction, soaking and hot water infusion. The infusion method was found to have significant ($p < 0.05$) antioxidant activity compared to other extraction methods.[27]

Anti - Diabetic effect:

The antidiabetic effect of the active ingredient PoP is closely related to inhibition of α-glucosidase and improvement of aldohexose absorption. J The antidiabetic effect of water and ethanol extracts of pomegranate peels (471.7 and 509.16 µg/ml) on α-glucosidase enzyme was evaluated. Water and ethanol extracts of pomegranate fruit peel have antidiabetic effects.[25]

Antidepressant Activity :

Aqueous extract of whole fruits of peeled pomegranate (50 µg/rat) was evaluated for its antidepressant activity in ovariectomized young female Wistar rats using the forced swim test and open field tests. The extract showed significantly reduced immobility compared to saline and increased swimming behavior without significant changes in climbing behavior. Furthermore, the extract alone showed antidepressant-like effects (decreased immobility) and increased swimming behavior compared to vehicle groups.[25]

Oral health:

PoP extract is a promising strategy in the treatment of oral cavity. Due to its tannin-causing antimicrobial properties, pomegranate can suppress Streptococcus mutants, making it a potential enemy for caries specialists. It can prevent the infection of various microorganisms in old age.[24]

Anticancer property:

Punicalagin and ellagic acid in PoP have chemopreventive effects against prostate cancer, breast cancer and colon cancer, and are partially related to urolithin, a metabolite of ellagic acid.[24]

Anti-inflammatory effect :

The anti-inflammatory property of pyruvic acid has also effectively combated skin care problems such as eczema and psoriasis. Punicic acid reduces oxidative damage and inflammation by increasing the expression of peroxisome proliferator-activated receptors. Punicic acid is an important nutritional component in the prevention and treatment of neurodegenerative diseases such as Alzheimer's, Parkinson's and Huntington's.[24]

Health benefits of pomegranate peel powder [25]:

1) Helps fight acne, pimples and rashes: Pomegranate peel is said to have antibacterial, antiviral and anti-inflammatory properties. It can effectively fight skin problems such as acne, pimples and rashes. The peel is rich in antioxidants and helps keep bacteria and other infections at bay.

2) May Fight Skin Cancer An amazing new study has shown that pomegranate extracts contain a preventive agent that fights skin cancer. The anti-inflammatory and anti-cancer properties of pomegranate peel are said to be effective in preventing and treating skin cancer. Pomegranate peel prevents the reproduction process of cancer cells, which reduces the risk of skin cancer.

3) Can protect against heart disease: Pomegranate peel is rich in antioxidants, which are very capable of protecting against oxidation of LDL cholesterol. It is also said to have anti-vascular effects that prevent heart problems. It is useful because LDL. Oxidation of cholesterol in your body can cause oxidative stress, which is a leading cause of heart disease and other diseases.

4) May improve bone health Pomegranate peels are effective in reducing bone loss. Research shows

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that consuming pomegranate peel blends can help improve bone health and prevent postmenopausal osteoporosis. According to one study, pomegranate peel is rich in tannins, polyphenols and flavonoids, and consuming this extract as a dietary supplement has beneficial effects on bone health.[25]

5) Treats Sore Throat and Cough: According to traditional medicine, pomegranate peel helps relieve cough and is used as a powder with water to relieve sore throat. Several studies show that hydroalcoholic extract of pomegranate peel has antibacterial properties that can help treat sore throats and coughs.

6) Young skin: Pomegranate makes skin smooth and firm by increasing collagen content. And elastin production and skin softness.[25]

Glycirrhiza glabra (Licorice)

Health benefits of licorice:

1. Licorice is traditionally used as a sweetener for its taste.

2. Bahmani et al. (2014), licorice can reduce symptoms of diabetes such as polydipsia and frequent urination.

3. Immunomodulatory effect of aqueous extract of G. root. Glabra, the presence of the related phenolic compound licorice has been demonstrated in vitro.[28]

4. Neuroprotective effects: The effects of G. glabra on learning and memory have been studied in mice (Dhingra and Sharma, 2006; Parle et al., 2004). In 2004, Parle et al. (2004) administered G. glabra extract orally to mice for 7 days at various concentrations (75–300 mg/kg). Chakravarthi and Avadhani (2013) and Dhingra and Sharma (2006) investigated the effects of aqueous root extract of G. glabra on learning and memory in 1-month-old male Wistar albino mice at oral doses of 75–300 mg/kg. six consecutive weeks. Both studies showed a significant improvement in learning and memory in mice, but the exact mechanism of this action remains unknown (Chakravarthi and Avadhani, 2013; Dhingra and Sharma, 2006). These findings suggest a possible neuroprotective role of licorice in the prevention of diseases such as Alzheimer's disease. Alzheimer's disease is caused by chronic inflammation of certain areas of the brain. Thus, the anti-inflammatory effects of licorice may contribute to the observed memory-enhancing effects (Yokota, Nishio, Kubota, & Mizoguchi, 1998). Oxygen free radicals are also involved in the aging process and can cause Alzheimer's disease in the elderly. The protective role of licorice extract can be attributed to its antioxidant properties, which reduce brain damage and improve neuronal function and memory. The combination of anti-inflammatory and antioxidant activity with a neuroprotective role can lead to memory-enhancing effects.[28]

5. Expectorant and antitussive effects: Various authors have reported the antitussive and expectorant effects of licorice, especially its beneficial effects in the treatment of sore throat, cough and bronchial catarrh (Damle, 2014; Fiore et al., 2005)). These effects are attributed to licorice, which helps clear upper airway congestion and boosts tracheal mucus secretion (V. Sharma et al., 2016).

6. The use of G. glabra extract as an anti-ulcer agent is widely known. For the digestive tract, it is used for stomach and duodenal ulcers.[28]

Mentha piperita (Peppermint) :

Peppermint tea, made from the leaves of the Mentha piperita plant, has been used for centuries and is known for its refreshing taste and potential health benefits.

Peppermint tea has long been used as a traditional remedy for digestive problems. The trial found that peppermint oil, the main active ingredient in peppermint tea, significantly reduced abdominal pain and improved overall digestive health. Peppermint tea has anti-inflammatory and antimicrobial properties, making it a promising herbal drink for a variety of health problems. Peppermint extracts have anti-inflammatory effects by inhibiting cytokines and pro-inflammatory enzymes. Peppermint tea has also shown antimicrobial activity against many bacteria and fungi, including antibiotic-resistant strains. These properties suggest that peppermint tea may have therapeutic potential in inflammatory and infectious diseases. Peppermint tea has been studied for its analgesic effects and its ability to relieve pain and headaches. Peppermint tea is traditionally used to support respiratory health due to its anti-swelling and anti-cough properties.[29]

Beta vulgaris:

Beetroot (Beta vulgaris) contains iron, nitrates, sodium, potassium and betalain. Benefits of beet juice include treating anemia by improving the ability of red blood cells to transport oxygen, lowering blood pressure by dilating blood vessels and relaxing smooth muscles, preventing birth defects, increasing folate levels, etc. Consuming 8g of beetroot for 20 days caused an increase. Sevenfold decrease in Hb, ferritin and serum iron,

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and transferrin and total iron-binding capacity in a 22- to 24-year-old woman.[30]

III. MATERIALS AND METHODS:

Preparation of PPP, MOP, BV, GG,MP, EC powder:

Preparation of Pomegranate Peel Powder (PPP): Pomegranate fruits were taken from the market. Pomegranate peels and seeds were then separated, and the skin was then washed by hand. After washing, the rinds were cut into pieces. The rind was dried in the sun for 14-16 hours. The dried pomegranate peels were ground in a mill to reduce the particle size. The ground material is then passed through a 30-mesh screen; the larger part of the sieve was taken for grinding again and passed through the sieve. The cream powder was then packed separately in an airtight polyethylene bag and stored.

M. preparation. oleifera leaf powder: The leaves were dried and ground Into powder. This powder was then put through a sieve and then packed separately in an airtight polyethylene bag and stored.

Powder preparation of B. vulgaris, Glycirrhiza, M. piperita and cardamom powder: All four ingredients were ground separately to reduce their particle size. All the three powders were then packed separately in an airtight polythene bag and stored.[31]

Formulation table :

Table no.3 : Formulation table

Sr.no.	Ingredients	F1. (gm)	F2 (gm)
1.	Moringa oleifera (MOP)	1.4	1.3
2.	Punica granatum (PPP)	0.7	0.8
3.	Glycirrhiza glabra	0.5	0.5
4.	Beta vulgaris	0.2	0.2
5.	Mentha piperita	0.1	0.1
6.	Elettaria cardamomum	0.1	0.1
7.	Total weight	3.0	3.0

Herbal tea/beverage formula developed by hot water infusion technique:

Hot water infusion method is a simple, cheap and convenient extraction method. To make tea, a tea bag containing 3 g of the compound mixture was infused in 150 ml of boiling water for 5 minutes.[32,33] All powders were placed in an empty infusion bag (paper bag) according to the amount specified in the composition table. Each infusion bag was kept in a cup after it was closed properly by pulling the string properly. 150 ml of boiling water was poured into the cup. After 5 minutes, the infusion bags were removed from the cup and subjected to sensory evaluation.[34]

EVALUATION :

Evaluation parameters for polyherbal tisane :

Evaluation of physical parameters[35]

1)Angle of repose:

Height of pile in cm = 2cm

Average radius of circle in cm = 2.8 cm.

Angle of repose (ɵ) = $\tan^{-1}(h/r) = 35^0$

2)Bulk density (gm/ml):

Bulk volume in ml = 9 ml

Mass of Granule in gram = 3

Bulk density = Mass / Bulk Volume

= 0.33 g/ml

3) Tapped density (gm/ml)

Tapped volume in ml = 7.5 ml

Mass of granule in gram = 3

Tapped density = Mass / Tapped Volume

= 0.4 g/ml

4) Loss on drying: Take a clean dry Petri dish and weigh it. 2 g of sample powder is weighed and transferred to a Petri dish and weighed. Place the Petri dish in the tray desiccator and weigh it every 5 minutes. Let it dry until it is of constant weight and record the constant dry weight. Calculate the drying loss and moisture content of the sample.[4]

L.O.D = (weight of sample before drying – weight of sample after drying) × 100

5) Dust leakage test: Take a 3g bag of herbal tea and record its original weight. Put it in a blender for 4 minutes at 25 rpm. After 4 minutes, record its final weight. Loss of powder must not exceed 1%. Repeat this experiment with two more bags and take the average.[4]

(Initial wt.−Final wt./Initial wt.) × 100

6) pH test: a tea bag containing herbal tea was boiled with 150 ml of boiling water. The drink was allowed to cool at room temperature. The pH of the

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beer solution was determined using a digital pH meter.[4]

Sensory evaluation :

In the sensory test, the color, smell, taste and texture of the product were visually evaluated. Sensory testing is a basic test to identify and evaluate product quality. In the case of prepared herbal tea, the following parameters are known: color, taste, smell, texture of tea powder, brightness and appearance of the prepared herbal tea.[4]

Tea samples were presented to 15 semi-trained panellists using the method described in Mathew et al., 2015. Panellists were asked to report their perceptions on a 9-point hedonic scale for attributes such as colour, texture, aroma and mouthfeel , taste, flavor and overall acceptability. The average scores of sensory evaluation were expressed as follows: 9- like extremely, 8- like very much, 7- like, 6- like a little, 5- neither like nor dislike, 4- dislike a little, 3- moderately dislike, 2- dislike and 1- dislike very much respectively.[32]

Phytochemical screening:

The prepared herbal tea preparation was tested for phytochemical constituents such as tannin, saponins, flavonoids, alkaloids, carbohydrates and terpenoids.[4]

1) Benedict's test:

1 ml of sample + 2 ml of Benedict's reagent. Heat in a water bath with boiling water for 3-5 minutes. A brick-red precipitate of copper oxide is obtained. It is test for reducing sugars.

2) Tannin testing: 1 ml of 5% ferric chloride was added to the solvent-free extract in a test tube to check for the presence of tannins. The presence of tannin indicates the formation of a blue-black or greenish-black precipitate.[36]

3) Terpenoids: To check the presence of terpenoids, 5 ml of each extract was mixed with 2 ml of chloroform in a test tube. Then 3 mL of concentrated sulfuric acid (H2SO4) was added to form a layer. The red-brown precipitate formed indicated the presence of terpenoids.[36]

4) Wagner's test:

2 drops of Wagner's reagent + 2 ml of sample Mix well. Reddish color. Indicates the presence of an alkaloid.[35]

5) Saponin test: To check the presence of saponin in the extract, the extract was diluted with 20 ml of distilled water and mixed in a measuring cylinder for 15 minutes. The formation of a 1 cm foam layer indicates the presence of saponin.[36]

6) Fehling's test: take 2 ml of sample + 1 ml of Fehling solution A + 1 ml of Fehling solution B in a test tube. Boil for 5-6 minutes and heat in a water bath. A brick-red precipitate is observed.[4]

7) Protein: Protein Quality Biuret method – the test protein solution was placed in a test tube, no more than 2 ml each, and 5 ml of Biuret reagent was added. 5 drops of CuSO4 solution were added to the protein solution. 2 ml of NaOH solution was also added to the protein solution. Shake the solution slowly and observe the color change. The sample gave a positive reaction, forming a purple color.[37]

IV. RESULTS AND DISCUSSION :

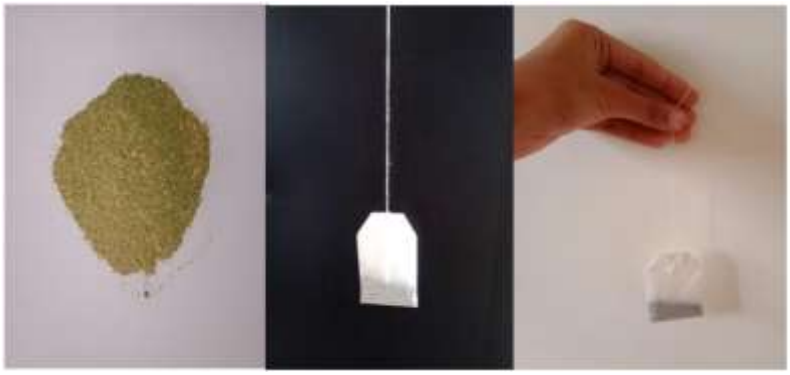

Figure 5: Formulated herbal tea powder

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Evaluation of Physical parameters :

Table no. 4 : Evaluation of physical parameters.

Sr.no.	Test parameter	Observation
1.	Angle of Repose (ɵ)	35^0
2.	Bulk density	0.33 g/ml
3.	Tapped density	0.4 g/ml
4.	Loss on drying (L.O.D)	0.5 %
5.	Dust leak	0.67 %
6.	Chemical test	
	pH	6.9

Organoleptic evaluation:

Table no.5: Organoleptic evaluation.

Sr.no	Sensory test	Observation	Sensory attribute(Hedonic scale) grading
1.	Colour	Reddish colour	8.6
2.	Taste	Characteristic, aromatic, sweet .	7.5
3.	Smell	Herbal, aromatic	7.2
4.	Appearance	Pleasant	8.9

Phytochemical screening:

Table no. 6 : Phytochemical tests

Sr. no.	Phytochemical	Test	Observation Present/Absent (+)/ (-)
1.	Test for reducing sugars	Benedict's test	+
2.	Tannin	Ferric chloride test	+
3.	Terpenoids	Salkowski test	+
4.	Alkaloids	Wagner's test	+
5.	Saponins	Saponin test	+
6.	Carbohydrates	Fehling's test	+
7.	Protein	Protein	+

Figure 6 : Formulated Herbal Tea and it's Phytochemical tests

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Herbal teas, also known as tisanes, are made from a combination of botanical ingredients such as dried leaves, seeds, herbs, nuts, barks, fruits, flowers that give them the flavor and benefits of herbal tea. To prepare vegetable acid, pour boiling water over the herbs and let them soak for 5-15 minutes.

Herbs have various nutritional and medicinal properties. The preparation and evaluation of herbal tea was carried out in this study. Prepared tea powder was filled in infusion tea bags and the hot water infusion method was used to make the tisane. Organoleptic evaluation, phytochemical screening and evaluation of physical parameters were performed. In the evaluation, a 9-point hedonic scale was used to evaluate the tea, which is one of the sensory evaluation methods. The road conforms to the tests carried out. A literature review of the ingredients used in this formula indicates that they have antioxidant, antidiabetic, neuroprotective and hepatoprotective properties, nutritional and functional properties, hemoglobin-enhancing properties and anti-inflammatory properties. More in vivo and in vitro studies could be done to confirm this. Herbal teas/tisanes are more affordable as they have no or minimal side effects. A cup of tea in the morning is a healthy and energizing drink.

V. CONCLUSION :

Herbal tea contains polyphenols, flavonoids, vitamins, alkaloids and various nutrients that can be beneficial to the body. It promotes good health and helps prevent certain diseases. Herbs in tea form are easily absorbed. Bioactive compounds reach the body more efficiently. The hot water infusion method is a simple, cost-effective and convenient method. Plant extracts provide nutritional value and have natural antioxidant and pharmacological properties. Herbal tea can be considered a cup of good health.

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