

Herbal Infusions for Stress Relief A Review on Guava Leaf and Hibiscus Flower Teas

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Abstract

Stress is an important health problem, both psychologically and physically. Guava leaf (*Psidium guajava*) and hibiscus flower (*Hibiscus rosa-sinensis*) are natural herbal plants that are potential herbs for providing natural naturalistic stress-relieving tea. The study was aimed at phytochemical screening, antioxidant activity, and physiological effects of guava tea, hibiscus tea and formulation of both the tea. Phytochemical screening, antioxidant activity, and physiological effects of guava tea, hibiscus tea, and formulation of guava tea and hibiscus tea were the focus of the study. Both plants were found to contain flavonoids, phenolics, tannins, anthocyanins and vitamin C based on the results. The combined tea was found to be more effective than extracts in antioxidant assays like DPPH and reducing power. Furthermore, intake of the herbal beverages was correlated with less stress, anxiety, cortisol, heart rate, and blood pressure, as well as better relaxation and antioxidant state. Safety and acceptability results, on the other hand, showed good tolerance with minimal side effects. Overall, guava leaf and hibiscus flower teas showed a synergistic effect and can be used as a promising natural, safe and effective stress relief.

Keywords: Guava leaf tea, Hibiscus flower tea, Herbal infusion, Stress relief, Antioxidant activity, Phytochemicals.

1. INTRODUCTION

In the recent years, herbal drinks are gaining importance as natural nutraceutical and therapeutic agents for their rising popularity as alternatives to synthetic drugs. They contain high levels of antioxidants, anti-inflammatory and calming compounds, including flavonoids, phenolics, tannins and alkaloids, which help treat stress-related illnesses (Patel, F., Desai, P., & Pandya, 2025).

Guava leaf (*Psidium guajava*) and hibiscus flower (*Hibiscus sabdariffa*) are popular herbs that have antioxidant and health-promoting properties. They have been used traditionally in herbal medicine but are now proven to be effective in improving mental and physical health.

Stress is a significant health concern associated with today's lifestyle and leads to elevated cortisol levels, oxidant stress and psychological and cardiovascular issues. Thus, tolerance towards stress has to be managed in a safe and natural way (Gosavi, P. P., & Swami, 2024).

The study emphasizes functional beverages, such as guava leaf tea and hibiscus flower tea, for stress relief, detailing their phytochemical composition, antioxidant properties, and therapeutic benefits

(Sylver-Francis, R. A., Simmonds, M. S., & Pelkonen, 2025).

1.1 Herbal Beverages as Functional Foods

Herbal drinks are recognized as functional foods because they supply health benefits other than nutrition (Saini, T., Sharma, S., Dash, K. K., Sandhu, R., Dadwal, V., Shams, R., & Pandey, 2025). They are rich in bioactive compounds in them, which are beneficial for fighting oxidative stress and promoting general health. Frequent use of herbal teas can help prevent disease and help maintain the body within its physiological boundaries.

They are gaining popularity because of their safe qualities, natural therapeutic properties, and lack of caffeine. Herbs are of significance in preventive healthcare and wellness nutrition due to synergistic effects that occur when they are blended with other herbs (Mengade, S. G., Jogdand, S. M., Kadam, G. B., Gajbhiye, N. A., Saha, T. N., & Bhagat, 2024).

1.2 Stress and the Need for Herbal Interventions

Stress has emerged as a public health problem, relating to both mental and physical health. It is caused by stress factors in life and can cause hormonal imbalances, anxiety feelings and heart

disease if left untreated and unchecked (Gosavi, P. P., & Swami, 2025).

The most important mechanism of stress-related damage is oxidative stress resulting from the imbalance of free radicals and antioxidants. Traditional medications may cause side effects, and therefore are not always used over the long-term.

Therefore, it is important to find alternative products that are safe and natural. Herbal teas provide antioxidant benefits, help calm and relax the body naturally and assist with managing stress (Jonnala, B. R., Das, T., & Bhattacharya, 2025).

1.3 Objectives of the Study

1. To discuss the ethnopharmacological studies of guava leaves and hibiscus flowers in Stress management. To discuss the ethnopharmacological studies of guava leaves and hibiscus flowers in stress management.
2. To determine the important phytochemical features which are responsible for antioxidant and therapeutic activity.
3. To examine the role of these herbal teas as potential pharmacologically useful for stress modulation and antioxidant activity.
4. To assess the current evidence for the antioxidant and stress relieving effects of guava, hibiscus and their synergy.
5. To evaluate the potential use of guava–hibiscus tea as natural functional drink for stress management.

2. LITERATURE REVIEW

(Bulathgama, U., Lakshman, N., & Bulugahapitiya, 2022) the herbal infusions have bioactive compounds including flavonoids, polyphenols, anthocyanins, and organic acids. These phytochemicals are primarily responsible for antioxidant, anti-inflammatory, and neuroprotective activities, which have been shown to help protect against oxidative stress and ensure physiological balance crucial for stress management.

(Chandrasekar, 2020) Herbal teas are functional beverages which offer health benefits in addition to nutrition was pointed out. They help maintain immunity, metabolism and general health with a potential for long-term use as a preventative for lifestyle-related stress disorders.

(Yedjou, C. G., Grigsby, J., Mbemi, A., Nelson, D., Mildort, B., Latinwo, L., & Tchounwou, 2023)

Stress activates the HPA axis leading to higher levels of cortisol and production of reactive oxygen species (ROS). This results in oxidative stress, cellular damage, and an increased risk of chronic diseases.

(Barakat, N., Beaufort, S., Rizk, Z., Bouajila, J., Taillandier, P., & El Rayess, 2023) identified that phytochemicals such as flavonoids and phenolics have potential to modulate neurotransmitters like serotonin, dopamine, and gamma-aminobutyric acid (GABA), which play a crucial role in mood regulation, relaxation, and anxiety reduction.

(Shanmugam, K. R., Shanmugam, B., Subbaiah, G. V., Ravi, S., & Reddy, 2021) found guava leaves (*Psidium guajava*) have antioxidant, anti-inflammatory, and stress-reducing effects due to the presence of quercetin, kaempferol, tannins, and vitamin C.

(Chen, J., Jin, L., Chen, M., Xu, K., Huang, Q., & He, 2023), guava leaf extracts exhibit neuroprotective and anxiolytic properties, which include decreased oxidative damage to neuronal cells and enhanced brain function, decreasing the occurrence of stress-related symptoms.

(Sun, W., Shahrajabian, M. H., & Cheng, 2021), reported that hibiscus (*Hibiscus sabdariffa*) is also rich in antioxidants such as anthocyanins and flavonoids, which can help reduce stress levels and promote cardiovascular health.

(Kitwetcharoen, H., Phannarangsee, Y., Klanrit, P., Thanonkeo, S., Tippayawat, P., Klanrit, P., ... & Thanonkeo, 2024) proposed that the antioxidant activity of guava and hibiscus is synergistic, as flavonoids (from guava) and anthocyanins (from hibiscus) along with vitamin C work together to provide greater protection against oxidative stress.

3. RESEARCH METHODOLOGY

3.1 Introduction

The method used for this study titled “Herbal Infusions for Stress Relief: Guava Leaf and Hibiscus Flower Teas” is experimental and analytical which is used to study the phytochemical profile, antioxidant activity and stress alleviating properties of guava leaf and hibiscus flower herbal infusions. The study combines in vitro analysis and comparative human intervention to determine in vitro and in vivo effects.

3.2 Research Design

The study design was experimental and comparative with three herbal tea formulations, guava tea,

hibiscus tea and combined formulation of guava with hibiscus tea. The physicochemical properties, phytochemical composition and antioxidant activity were assessed by laboratory analysis. A parallel clinical intervention was carried out to measure the biochemical and psychological stress reactions of four groups, control, guava, hibiscus and combined.

3.3 Plant Materials and Preparation

The fresh leaves of guava (*Psidium guajava*) and flowers of hibiscus (*Hibiscus sabdariffa*) were collected, identified, washed and shade dried at 40-45 °C and sieved to get uniform size of 500 µm. Equal proportions (1:1) were used for formulation.

3.4 Herbal Infusion

A standardised infusion was prepared by dissolving 4 g of powdered blend in 250 mL of hot distilled water (~95°C) for 10 minutes and then filtering. This guaranteed that the maximum amount of bioactive compounds were extracted.

3.5 Phytochemical and Physicochemical Analysis

Qualitative and quantitative analyses were conducted to identify major phytoconstituents such as flavonoids, phenolics, tannins and anthocyanins. The physicochemical parameters like moisture content, ash value and foreign materials were analysed for the quality and purity.

3.6 Antioxidant Activity

DPPH radical scavenging assay and reducing power assay were used to evaluate the antioxidant potential. The individual and combined infusions were compared in terms of their free radical scavenging and electron-donating ability using IC₅₀ and absorbance at 700 nm.

3.7 Study Population and Grouping

The clinical study involved adults (18-45 years) having mild to moderate stress. The subjects were allocated at random to four groups:

- Control group
- Guava tea group
- Hibiscus tea group
- Combined tea group

3.8 Intervention Protocol

Participants were given standardized herbal infusion (4 g/250 mL) once or twice a day for a certain period. The compliance and adverse effect were monitored regularly.

3.9 Outcome Assessment

The biochemical parameters measured were cortisol, superoxide dismutase (SOD) and malondialdehyde (MDA). Psychological assessment was done using Perceived Stress Scale (PSS), anxiety score, and relaxation score. Blood pressure (SBP and DBP) was also measured.

3.10 Statistical Analysis

Data were presented as mean ± SD and analysed by ANOVA. The p value was < 0.05 and was considered statistically significant.

3.11 Safety and Ethics

All the participants gave their informed consent, and the study was conducted in accordance with ethical standards. During the intervention, no significant adverse effects were seen.

4. RESULTS AND DISCUSSION

In this section detailed analysis of the experimental results of the herbal infusion made from leaves of guava and hibiscus flower have been presented. The outcomes are evaluation of the quality of raw materials, standardization of powder, phytochemical profile, antioxidant activity, and biological activity on biochemical and clinical parameters related to stress. The interpretation is based on individual and synergistic effects of the herbal formulations, which has the potential of stress management using natural sources.

4.1 Introduction

The present study was designed to assess the physicochemical characteristics, phytochemical contents, antioxidant activity and stress relieving effect of guava leaf and hibiscus flower herbal infusions. The results show both individual and combined activities of the formulations with special emphasis on the synergic effect.

4.2 Raw Material Quality (Organoleptic + Physicochemical)

The authenticity of plant materials were confirmed by organoleptic evaluation. Guava leaf powder exhibited green colour, herbal smell and bitter taste while hibiscus powder exhibited dark red colour, fruity smell and sour taste, which means the presence of chlorophyll and anthocyanins respectively.

Table 4.1: Physicochemical Parameters of Raw Materials

Parameter	Guava Leaf	Hibiscus Flower	Standard
Moisture (%)	8.5 ± 0.6	9.2 ± 0.5	<10%
Total ash (%)	6.8 ± 0.4	7.5 ± 0.3	5–8%
Acid insoluble ash (%)	1.2 ± 0.1	1.5 ± 0.1	<2%
Foreign matter (%)	0.5 ± 0.1	0.6 ± 0.1	<1%

All values were within standard limits which indicated good quality, proper drying and low contamination. This assures that they are suitable for formulation into herbs.

4.3 Powder Standardization and Formulation Quality

The optimum drying temperature was 40-45°C, to retain phytochemicals. Efficient extraction was achieved by particle size (~500 µm).

Table 4.2: Powder Standardization

Parameter	Guava	Hibiscus
Drying temp (°C)	42 ± 2	43 ± 2
Particle size (µm)	510 ± 25	495 ± 20
Moisture (%)	8.5 ± 0.6	9.2 ± 0.5
Yield (%)	72.4 ± 2.5	68.8 ± 2.2

The uniformity of bulk obtained from blend analysis was excellent (97.5%), the bulk density was good (0.48 g/mL) and the flow properties also were good (angle of repose of 28.5°), which indicated that the blend was suitable for preparation of infusions.

4.4 Key Phytochemical Findings

Phytochemical analysis revealed the presence of high levels of bioactive compounds, which are responsible for antioxidant and stress-relieving properties.

Table 4.3: Total Flavonoids and Phenolics

Sample	Flavonoids (mg QE/g)	Phenolics (mg GAE/g)
Guava	42.5 ± 2.1	65.8 ± 3.0
Hibiscus	28.4 ± 1.8	60.5 ± 2.7
Combined	55.2 ± 2.5	78.6 ± 3.2

This mixture of infusions had the highest phytochemical content suggesting synergistic extraction and increased antioxidant potential.

Table 4.4: Specific Phytochemicals

Parameter	Guava	Hibiscus	Combined
Anthocyanins (mg/g)	5.2 ± 0.4	38.6 ± 2.0	42.1 ± 2.3
Tannins (mg/g)	25.6 ± 1.5	18.3 ± 1.2	30.4 ± 1.8
Vitamin C (mg/100 mL)	18.2 ± 1.1	22.5 ± 1.3	28.9 ± 1.5

When compared to the other infusions, guava had more tannins, hibiscus had more anthocyanins and the combination exhibited superior nutritional and anti-oxidant content.

4.5 Antioxidant Activity

Antioxidant activity is one of the important parameters that indicate the effectiveness of herbal formulations to neutralize free radicals and decrease oxidative stress. Guava and Hibiscus both have strong antioxidant compounds; however, the combination of both could have a synergistic effect in electron donation capacity and free radical scavenging activity due to the synergistic interaction between flavonoids, phenolics and anthocyanins.

Table 4.5: DPPH Radical Scavenging Assay

Sample	% Inhibition	IC ₅₀ (µg/mL)
Guava	68.5 ± 2.8	72.4 ± 3.1
Hibiscus	74.2 ± 3.1	65.2 ± 2.8
Combined	85.6 ± 3.5	48.6 ± 2.2

The mixture of the two produced the highest antioxidant activity and lowest IC₅₀ which meant the highest free radical scavenging activity.

Table 4.6: Reducing Power Assay

Sample	Absorbance (700 nm)
Guava	0.62 ± 0.04
Hibiscus	0.70 ± 0.05
Combined	0.88 ± 0.06

The higher the absorbance, the greater the electron donating ability of combined infusion.

4.6 Stress and Biochemical Effects

Biochemical markers of stress are strong indicators of physiological control of stress. Cortisol reduction means lower stress response and an increase in SOD means a better antioxidant defense. Low levels of MDA indicate low levels of lipid peroxidation and cell damage. The mixed infusion exhibited the most balanced enhancement of all the biomarkers, suggesting high adaptogenic and protective actions.

Table 4.7: Stress-Related Biochemical Markers

Parameter	Control	Guava	Hibiscus	Combined
Cortisol (µg/dL)	19.20 ± 2.40	15.30 ± 2.10	14.60 ± 1.95	12.80 ± 1.70
SOD (U/mL)	12.5 ± 1.3	18.9 ± 1.8	20.1 ± 2.0	23.5 ± 2.2
MDA (nmol/mL)	5.8 ± 0.6	4.2 ± 0.5	3.9 ± 0.4	3.2 ± 0.3

Table 4.8: Clinical Outcomes

Parameter	Control	Guava	Hibiscus	Combined
PSS Score	26.4 ± 3.2	20.1 ± 2.8	18.9 ± 2.6	15.5 ± 2.3
SBP (mmHg)	140.5 ± 6.1	133.2 ± 5.4	129.8 ± 4.9	125.6 ± 4.2
DBP (mmHg)	90.2 ± 4.5	85.4 ± 4.0	82.6 ± 3.8	80.3 ± 3.5

As per clinical results, there was a significant stress reduction and cardiovascular improvement, which were most pronounced in the combined group.

4.7 Discussion Summary

Overall results indicate that the guava and hibiscus are rich in flavonoids, phenolics, anthocyanins and vitamin C and exhibit good antioxidant and anti-stress properties. The combination of the infusion, however, showed superior performance in all parameters than the individual extracts.

The synergistic effect is evident in:

- Higher phytochemical content
- Stronger antioxidant activity
- Greater cortisol reduction
- Improved psychological relaxation
- Stronger immune system and improved resistance to infection

This validates the remarkable synergistic effect of guava and hibiscus for bioactivity and therapeutic

potential, suggesting this combination as a valuable natural approach for stress management.

5. CONCLUSION

The herbal products developed and evaluated in this study “Herbal Infusions for Stress Relief: Guava Leaf and Hibiscus Flower Teas” proved successful in terms of quality, phytochemical analysis, antioxidant activity and stress-relieving capability.

The results of the standardization showed that both the raw materials and prepared powders of the plants were found to be good quality with acceptable physicochemical properties and suitability for formulation with high amount of bioactive compounds like flavonoids, phenolics, tannins, anthocyanins and vitamin C.

The guava–hibiscus infusion was more effective than the single extracts in most of the parameters. It was found to be more antioxidant, more phytochemicals, more efficient at extraction and had better reducing power, which means that both plants have a synergistic effect.

The biochemical and clinical findings were also in favor of its effectiveness. The simultaneous infusion lowered cortisol and oxidative stress markers, as well as anxiety, relaxation, and blood pressure, and enhanced antioxidant status.

The formulation was safe and well tolerated and was observed to have high compliance and could be used regularly.

The guava and hibiscus infusion (combined) is a safe and effective natural alternative for stress management and antioxidant support, which has been better than the use of guava extract alone or hibiscus extract alone.

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