



Research Article

FORMULATION AND EVALUATION OF HERBAL TEA FROM HIBISCUS ROSA-SINENSIS FOR THE MANAGEMENT OF CHOLESTEROL

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ABSTRACT

High cholesterol is a common health problem caused by poor dietary habits and an inactive lifestyle. In recent years, herbal beverages have gained attention as a natural and safer alternative for improving overall health. The present study is aimed at the preparation and evaluation of herbal tea prepared from Hibiscus rosa-sinensis for the management of cholesterol. In this study, fresh Hibiscus rosa-sinensis flowers were collected, washed properly and shade dried. The dried material was powdered and used for the preparation of herbal tea. The prepared tea was evaluated for sensory characteristics such as colour, flavour, taste and overall acceptability. The study also focused on the potential role of hibiscus in supporting cholesterol management based on its known functional and antioxidant properties. The findings of the study indicated that the developed hibiscus herbal tea was acceptable in terms of taste and aroma and showed good consumer acceptability. Due to the presence of natural bioactive compounds, the tea may help in supporting healthy lipid levels and improving heart health. This study concludes that Hibiscus rosa-sinensis herbal tea can be considered a simple, economical and natural functional beverage for the management of cholesterol.

INTRODUCTION

Cholesterol-related disorders are a growing public health concern due to unhealthy diet, physical inactivity and stressful lifestyle. Elevated blood cholesterol can --increase the risk of cardiovascular diseases and other metabolic complications. In recent years, herbal and plant-based products have gained attention as supportive dietary options because of their natural origin and minimal side effects. Hibiscus rosa-sinensis is known for its antioxidant and bioactive compounds that may help in maintaining healthy lipid levels. Therefore, the present study focuses on the preparation and evaluation of a herbal tea formulation containing Hibiscus rosa-sinensis along with selected supportive herbs for cholesterol management.^[1]

Method of preparation:

Firstly, collect all the selected plant materials and remove dust and foreign particles by washing with clean water. Dry all the ingredients in shade at room temperature for two days. After complete drying, take the following quantities of dried ingredients separately. Take 35 g of Hibiscus petals (Hibiscus rosa-sinensis) in a clean container, 17 g of rose petals (Rosa damascena), 15 g of lemongrass leaves (Cymbopogon citratus), 10 g of fennel seeds (Foeniculum vulgare), 8 g of cinnamon bark (Cinnamomum verum), 7 g of clove buds (Syzygium aromaticum).and 8 g of dried orange peel (Citrus sinensis).Now, lightly dry-roast the fennel seeds, cinnamon bark and clove buds separately on a low flame until a mild aroma is obtained. Allow them to cool. Do not roast the hibiscus petals, rose petals, lemongrass leaves and orange peel. These ingredients are used only in dried form.

EVALUATION

Organoleptic Evaluation:

The developed herbal tea formulation was evaluated for its organoleptic properties including colour, odour, taste, touch and smell. For evaluation, about 2 g of the tea blend was infused in 100 mL of hot water (80–90°C) for 5 minutes and filtered. The prepared infusion and dry powder were examined carefully.

Colour:

The prepared infusion showed a clear reddish-brown colour, mainly due to the presence of Hibiscus rosa-sinensis petals. No turbidity or unwanted particles were observed.

Odour:

The formulation possessed a pleasant and mild herbal odour. The aromatic components of

lemongrass, cinnamon and clove contributed to a refreshing fragrance.

Smell:

On closer sensory perception, the tea exhibited a balanced floral and spicy aroma. The combination of hibiscus and rose petals provided a soothing smell, while fennel and orange peel added freshness.

Taste:

The tea had a slightly tangy and mildly spicy taste. The sour note of hibiscus and orange peel was balanced by the sweet and warm flavor of fennel and cinnamon, resulting in acceptable palatability.

Touch (Texture of dry blend):

The powdered herbal blend was coarse and free-flowing in nature. It was dry, non-sticky and uniform in texture without any lump formation.^[1]

Physiochemical Evaluation

Determination of pH:

The pH of the herbal tea infusion was determined to evaluate its acidic nature, which is important for stability and palatability. About 2 g of the formulated tea blend was infused in 100 mL of distilled water at 80–90°C for 5 minutes and filtered. The filtrate was allowed to cool at room temperature and the pH was measured using a calibrated digital pH meter. The formulation showed a mildly acidic pH, mainly due to the presence of *Hibiscus rosa-sinensis*, which is known to contain organic acids and anthocyanins.

Moisture Content (Loss on Drying):

Moisture content was determined by the loss on drying method to ensure stability during storage. Approximately 2 g of the powdered formulation was accurately weighed and placed in a hot air oven at 105°C until constant weight was achieved.

The percentage loss in weight was calculated. Low moisture content indicates reduced chances of microbial contamination and better shelf life of the herbal tea.

Total Ash Value:

Total ash value was determined to estimate the total inorganic residue present in the formulation. About 2 g of the sample was taken in a silica crucible and incinerated in a muffle furnace at 450–600°C until a carbon-free ash was obtained.^[3]

The ash was cooled in a desiccator and weighed. The total ash value reflects the purity and quality of the crude herbal ingredients used in the formulation.

Bulk Density:

Bulk density was measured by introducing a known weight of the powdered formulation into a graduated measuring cylinder without tapping and noting the volume occupied. Bulk density was calculated as:

$$\text{Bulk Density} = \text{Weight of sample} / \text{Bulk volume}$$

This parameter indicates the packing characteristics of the powder blend.

Tapped Density-Tapped density was determined by mechanically tapping the measuring cylinder containing the sample until a constant volume was obtained.

$$\text{Tapped Density} = \text{Weight of sample} / \text{Tapped volume}$$

This parameter helps in evaluating flow properties and compressibility of the formulation.

Particle Size Analysis:

Particle size analysis was performed by sieve analysis method. The powdered herbal tea blend was passed through standard sieves arranged in decreasing mesh size. Uniform particle size ensures proper extraction of active constituents like anthocyanins and flavonoids from Hibiscus rosa-sinensis, which are responsible for cholesterol-lowering activity.^[4]

Solubility

Solubility of the herbal tea formulation was evaluated by dissolving a measured quantity of the powder in hot distilled water. The mixture was observed for dispersion and clarity. The formulation showed good solubility and formed a clear reddish infusion due to the presence of hibiscus pigments, indicating proper extraction of bioactive compounds.

Phytochemical evaluation

Test for Alkaloids

Dragendorff's Test:

To 2 mL of the aqueous extract, a few drops of Dragendorff's reagent were added. Formation of an orange or reddish-brown precipitate indicates the presence of alkaloids.

Mayer's Test:

To 2 mL of extract, Mayer's reagent was added. Cream or pale-yellow precipitate confirms the presence of alkaloids.

Test for Flavonoids

Shinoda Test:

To 2 mL of extract, a small piece of magnesium ribbon and few drops of concentrated hydrochloric acid were added.

Development of pink or red colour indicates the presence of flavonoids.

Alkaline Reagent Test:

To the extract, a few drops of sodium hydroxide solution were added.

An intense yellow colour that becomes colourless on addition of dilute acid confirms flavonoids.

Flavonoids are important antioxidants that may help in reducing oxidative stress related to high cholesterol.

Test for Tannins: To 2 mL of extract, a few drops of ferric chloride solution were added.

Appearance of dark blue or greenish-black colour indicates the presence of tannins.

Tannins contribute to lipid-lowering and antioxidant properties of the herbal tea.

Test for Glycosides

Keller–Killiani Test (for cardiac glycosides):

To 2 mL of extract, glacial acetic acid containing a trace of ferric chloride was added, followed by careful addition of concentrated sulfuric acid along the side of the test tube.^[6]

Formation of a brown ring at the junction indicates the presence of glycosides.

Glycosides may support cardiovascular health and cholesterol regulation.

Test for Phenolic Compounds:

To 2 mL of extract, a few drops of 5% ferric chloride solution were added.^[7]

Formation of deep blue or black colour confirms the presence of phenolic compounds.

Phenolic compounds are known for their antioxidant activity, which plays a significant role in preventing lipid oxidation.^[8]

RESULTS

Table 1: Organoleptic Evaluation Results of Hibiscus rosa-sinensis Herbal Tea Formulation

Parameter	Observation	Result
Colour	Reddish to deep pink coloured infusion due to natural anthocyanin pigments	Pass
Odour	Mild and pleasant floral aroma with a slight citrus note	Pass

Taste	Slightly tart with mild sweet and herbal after-taste	Pass
Appearance	Clear infusion without any visible impurities or foreign particles	Pass
Texture (Dry powder)	Coarse, uniform and free-flowing herbal blend	Pass
Mouthfeel	Smooth, non-irritating and refreshing sensation after consumption	Pass

Table 2: Physicochemical Evaluation Results of Hibiscus rosa-sinensis Herbal Tea Formulation

Parameter	Observed Value	Inference
pH (1% aqueous infusion)	3.2 ± 0.1	Mildly acidic and suitable for herbal infusion
Moisture content (% w/w)	6.4 %	Within acceptable limit and indicates good stability
Total ash value (% w/w)	8.1 %	Indicates normal inorganic content of herbal ingredients
Bulk density (g/mL)	0.42 g/mL	Shows good packing property
Tapped density (g/mL)	0.51 g/mL	Indicates acceptable flow characteristics
Carr's index (%)	17.6 %	Suggests fair compressibility and flow property
Particle size	Passed through #40 sieve	Indicates uniform particle size distribution
Solubility	Completely dispersible in hot water	Suitable for herbal tea infusion preparation

Table 3: Preliminary Phytochemical Screening Results of Hibiscus rosa-sinensis Herbal Tea Formulation

Phytochemical constituent	Test performed	Observation	Inference
Alkaloids	Dragendorff's / Mayer's test	Formation of orange-brown precipitate	Alkaloids present
Flavonoids	Shinoda test	Development of pink to reddish colour	Flavonoids present
Tannins	Ferric chloride test	Greenish-black coloration	Tannins present
Glycosides	Keller–Killiani test	Brown ring at the junction of two layers	Glycosides present
Phenolic compounds	Ferric chloride test	Deep blue coloration	Phenolic compounds present
Saponins	Foam test	Stable froth formation	Saponins present

Reducing sugars	Benedict's test	Brick-red precipitate	Reducing sugars present
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CONCLUSION

The present study successfully formulated and evaluated a herbal tea using *Hibiscus rosa-sinensis* for the management of cholesterol. The formulation was prepared by blending dried hibiscus petals with selected supportive herbal ingredients known for their antioxidant and cardioprotective properties.

Organoleptic evaluation indicated that the prepared herbal tea possessed acceptable color, aroma, taste, clarity and overall appearance, suggesting good consumer acceptability. The infusion showed a characteristic reddish color and a mildly tart flavor due to the presence of natural anthocyanins and organic acids.

Physicochemical analysis demonstrated that the formulation had a mildly acidic pH, low moisture content and acceptable ash value, indicating good quality and stability. Bulk density, tapped density and particle size distribution were found to be within suitable limits, ensuring proper flow properties and uniform extraction during preparation of the infusion.

Phytochemical screening confirmed the presence of important bioactive constituents such as flavonoids, phenolic compounds, tannins, glycosides and saponins. These compounds are known for their antioxidant potential and may contribute to lipid-lowering and cardioprotective effects.

Based on the overall evaluation, the developed *Hibiscus rosa-sinensis* herbal tea formulation can be considered safe, stable and potentially beneficial as a supportive dietary approach for cholesterol management. Further in-vivo and clinical studies are recommended to scientifically validate its hypolipidemic efficacy.

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