# Formulation Of an Herbal Mouthwash Containing Mimosa Pudica and Moringa Seed Powder for Tannin Reducing Agent

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***Abstract*—The present study focuses on the formulation and evaluation of herbal mouthwash using Mimosa pudica and Moringa oleifera seed powder as a tannin reducing agent. Herbal mouthwash is considered a natural and safer alternative to synthetic mouthwashes used for maintaining oral hygiene. Mimosa pudica possesses antimicrobial and anti-inflammatory properties which help in reducing microbial growth in the oral cavity. However, the presence of tannins may affect the quality and acceptability of the formulation. Therefore, Moringa oleifera seed powder was used to reduce tannin content naturally.The herbal mouthwash was prepared using suitable ingredients and evaluated for various physicochemical parameters such as colour, odour, pH, viscosity, stability, and foamability. Antimicrobial activity was determined by agar plate method using zone of inhibition measurement. The formulated mouthwash showed satisfactory antimicrobial activity, good stability, and acceptable physicochemical properties. Sample 2 showed the highest antimicrobial activity among all batches.**

**The study concludes that Mimosa pudica-based herbal mouthwash with Moringa oleifera seed powder can be used as an effective and economical herbal oral care formulation with reduced tannin content and good antimicrobial potential.**

***Index Terms*—Herbal Mouthwash, Mimosa pudica, Moringa oleifera, Tannin Reducing Agent, Antimicrobial Activity, Agar Plate Method Zone of Inhibition, Herbal Formulation, Oral Hygiene, Phytochemicals, Natural Oral Care, Herbal Extract, Tannin Reduction, Antibacterial Activity, Mouthwash Evaluation**

## I. INTRODUCTION

Oral hygiene is an important part of maintaining overall health. Poor oral hygiene may lead to dental caries, bad breath, gum infections, plaque formation, and other oral diseases. Mouthwash is commonly used as an adjunct to brushing for reducing microbial growth and maintaining freshness in the oral cavity. Most commercially available mouthwashes contain synthetic chemicals and alcohol, which may produce side effects such as staining of teeth, irritation, burning sensation, and altered taste sensation on prolonged use. Therefore, there is an increasing demand for herbal mouthwash formulations due to their safety, effectiveness, and fewer side effects.

Herbal products have been used traditionally for the treatment and prevention of various diseases. Medicinal plants contain phytoconstituents such as alkaloids, flavonoids, tannins, glycosides, and phenolic compounds which possess antimicrobial, anti-inflammatory, antioxidant, and healing properties. Herbal mouthwash formulations are gaining importance because they are natural, economical, biodegradable, and suitable for long-term use.

Mimosa pudica, commonly known as touch-me-not plant, belongs to the family Fabaceae. The plant possesses various medicinal properties including antimicrobial, anti-inflammatory, antioxidant, and wound-healing activities. Due to these properties, Mimosa pudica can be effectively used in oral care preparations for controlling microbial growth and maintaining oral hygiene.

Tannins are naturally occurring polyphenolic compounds present in many herbal extracts. Excess tannin content may affect the taste, colour, and stability of herbal formulations. Therefore, reduction

of tannin content is important for improving the quality and acceptability of herbal mouthwash. Moringa oleifera seed powder is widely known for its natural coagulating and tannin reducing properties. It acts as an effective natural agent for reducing tannin content and improving the formulation quality.

The present study aims to formulate and evaluate a herbal mouthwash using Mimosa pudica and Moringa oleifera seed powder as a tannin reducing agent. The formulated mouthwash was evaluated for various parameters such as colour, odour, pH, viscosity, stability, foamability, and antimicrobial activity using agar plate method. The study was carried out to develop a safe, effective, and economical herbal mouthwash for maintaining oral hygiene naturally.

## II. BACKGROUND OF THE STUDY

Oral diseases such as dental caries, gingivitis, plaque formation, and bad breath are common health problems affecting people of all age groups. Proper oral hygiene is necessary to prevent microbial growth and maintain healthy teeth and gums. Mouthwash is widely used as a supplementary oral hygiene product along with brushing and flossing. Conventional mouthwashes available in the market mainly contain synthetic chemicals and alcohol which may cause side effects such as tooth staining, irritation, dryness of mouth, and unpleasant taste after prolonged use.

Due to these limitations, the use of herbal formulations has increased significantly in recent years. Herbal products are considered safer, economical, eco-friendly, and suitable for long-term use. Medicinal plants contain various bioactive constituents that exhibit antimicrobial, anti-inflammatory, antioxidant, and healing properties. Therefore, herbal mouthwash formulations have become an important area of research in pharmaceutical and oral care fields.

Mimosa pudica is a medicinal plant traditionally used for various therapeutic purposes. It possesses antimicrobial and anti-inflammatory activities which help in reducing oral microorganisms responsible for dental infections and plaque formation. The plant contains tannins, flavonoids, alkaloids, and other phytochemicals contributing to its medicinal value.

However, excess tannin content in herbal preparations may affect the taste, colour, stability, and acceptability of the formulation. Tannins may produce bitterness and reduce the overall quality of mouthwash preparations. Hence, reduction of tannin content becomes necessary during formulation development.

Moringa oleifera seed powder is known for its natural coagulating and tannin reducing properties. It has been widely used in water purification and herbal preparations for reducing impurities and tannin content naturally. The use of Moringa oleifera seed powder as a tannin reducing agent provides a natural, safe, and economical approach in herbal formulation development.

Based on these properties, the present study was carried out to formulate and evaluate a herbal mouthwash using Mimosa pudica and Moringa oleifera seed powder. The study mainly focuses on tannin reduction and antimicrobial activity evaluation to develop an effective herbal oral care formulation.

Plan of work:

Phase1:
Aim and objective Literature review

Phase2:
Selection of ingredient’s

Phase3:
Selection of method Formulation of mouthwash

Phase4:
Evaluation of mouthwash Writing of this

## III. NEED OF STUDY

Oral diseases such as dental caries, plaque, bad breath, and gum infections are common problems.

Synthetic mouthwashes may cause side effects like staining, irritation, dryness, and burning sensation.

Herbal formulations are safer and suitable for long-term use.

Mimosa pudica possesses antimicrobial and anti-inflammatory properties beneficial for oral care.

Excess tannin content may affect taste and quality of herbal preparations.

Moringa oleifera seed powder acts as a natural tannin reducing agent.

There is a need to develop a safe, effective, economical, and herbal mouthwash with reduced tannin content.

Aim:

To formulate and evaluate herbal mouthwash using Mimosa pudica and Moringa oleifera seed powder as a tannin reducing agent.

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## IV. OBJECTIVES

To collect and prepare plant materials.
To prepare extract of Mimosa pudica.
To reduce tannin content using Moringa oleifera seed powder.
To formulate herbal mouthwash using suitable ingredients.
To evaluate physicochemical parameters such as pH, viscosity, colour, odour, and stability.
To study antimicrobial activity using agar plate method.
To measure zone of inhibition for antimicrobial evaluation.
To develop a safe and effective herbal oral care formulation.

## V. SCOPE OF STUDY

Development of natural herbal mouthwash for oral hygiene.
Reduction of tannin content using natural agents.
Evaluation of antimicrobial potential of herbal formulation.
Use of herbal ingredients with fewer side effects compared to synthetic mouthwash.
Future use in herbal oral care and pharmaceutical preparations.
Further studies can be carried out for clinical evaluation and commercial formulation development.

## VI. MATERIALS AND METHODS

- Mimosa pudica extract:

Scientific name: Mimosa pudica
Family: Fabaceae
Common name: Touch-me-not plant / Lajwanti
Use: Antibacterial: Helps reduce harmful oral bacteria responsible for plaque, bad breath, and infections.
Anti-inflammatory: Soothes swollen gums, reduces redness, and supports healing in gingivitis.
Astringent: Tightens tissues and reduces excessive bleeding from gums due to natural tannins.
Wound healing: Promotes faster healing of minor cuts, oral sores, or gum injuries. Antioxidant: Protects oral tissues from oxidative stress and helps maintain healthy gums. Analgesic (mild pain relief): Reduces discomfort caused by mouth ulcers or gum irritation.

- Moringa oleifera seed powder

Scientific name: Moringa oleifera

Family: Moringaceae
Common name: Drumstick tree / Moringa
**Use**: Antibacterial, antioxidant, clarifying agent; helps red6uce microbes, improves oral hygiene, and enhances mouthwash stability.

- Neem

Scientific name: Azadirachta indica
Family: Meliaceae
Common name: Neem / Indian Lilac
Use: Strong antibacterial, antifungal, anti-inflammatory; helps control oral infections, reduce

plaque, and improve gum health.

➢ Tulsi

Scientific name: Ocimum sanctum / Ocimum tenuiflorum

Family: Lamiaceae

Common name: Holy Basil

**Use**: Antibacterial, anti-inflammatory, antioxidant; helps reduce oral germs, freshens breath, and improves gum health.

➢ Peppermint

Scientific name: Mentha piperita

Family: Lamiaceae

Common name: Peppermint

**Use:** Antibacterial, cooling, mouth-freshening; reduces oral germs and provides a refreshing flavor.

Clove

Scientific name: Syzygium aromaticum

Family: Myrtaceae

Common name: Clove / Lavang

Use: Strong antibacterial, analgesic (pain relief), anti-inflammatory; helps reduce toothache, oral bacteria, and gum inflammation.

➢ LEMON

Scientific name: Citrus Family: Rutaceae

Common name: Lemon / Nimbu

Use: Antibacterial, antioxidant, refreshing agent; helps reduce oral microbes, removes bad odor, and provides freshness.

➢ Aloe

Scientific name: Aloe vera

Family: Asphodelaceae

Common name: Aloe / Ghritkumari

Use: Anti-inflammatory, antibacterial, soothing; helps heal mouth ulcers, reduce gum inflammation, and maintain oral moisture.

➢ Glycerin

Scientific name: Glycerol

Family: Not applicable (It is a chemical compound, not a plant)

Common name: Glycerin / Glycerol

Use: Acts as a humectant, retains moisture, improves mouthfeel, provides smoothness, and prevents dryness in mouthwash.

➢ Honey

Scientific name: No scientific name (it is a natural product). Produced mainly by Apis mellifera (Honey bee)

Family: Apidae (bee family) Common name: Honey / Madhu

Use: Natural antibacterial, soothing, healing; helps reduce oral microbes, soothes gums, and promotes healing of mouth ulcers.

Chemicals and Reagents

Nutrient agar

Distilled water

Ethanol (if required for extraction)

Peptone

Ferric chloride

Equipment Used

Beaker

Measuring cylinder

Conical flask

Hot plate

pH meter

Viscometer

Petri plates

Incubator

Filter paper

Formulation:

| Ingredients | F1 | F2 | F3 | F4 | F5 |
|---|---|---|---|---|---|
| Mimosa pudica extract | 3 ml | 3.5 ml | 2 ml | 2.5 ml | 4 ml |
| Moringa oleifera seed powder | 2 ml | 2.5 ml | 1.5 ml | 3 ml | 3.5 ml |
| Neem | 2 ml | 1 ml | 2.5 ml | 1.5 ml | 3 ml |
| Tulsi | 0.1 ml | 2.5 ml | 1.5 ml | 1 ml | 3 ml |
| Peppermint | 0.05 ml | 0.09 ml | 0.4 ml | 0.12 ml | 0.8 ml |
| Clove | 1 ml | 0.045 ml | 0.04 ml | 0.051 ml | 0.047 ml |
| Lemon | 2 ml | 1.5 ml | 2 ml | 1.9 ml | 2.5 ml |
| Aloe | 2 ml | 2.5 ml | 1.5 ml | 1 ml | 3 ml |
| Glycerin | 5 ml | 4 ml | 3 ml | 4.5 ml | 5.5 ml |
| Honey | 1 ml | 2 ml | 1.5 ml | 2.5 ml | 3 ml |
| Water | Up to 100 ml | Up to 100 ml | Up to 100 ml | Up to 100 ml | Up to 100 ml |

## VII. METHODOLOGY

Collection and Authentication of Plant Materials

Fresh Mimosa pudica leaves were collected from a local area. Moringa oleifera seeds were obtained from a reliable herbal supplier.

Both plant materials were authenticated by a qualified botanist before use.

- Preparation of Mimosa pudica Extract

a. Cleaning and Drying

Leaves were washed thoroughly with distilled water to remove dust and impurities. Dried under shade for 5–7 days to prevent loss of active compounds.
Dried leaves were powdered using a grinder.

b. Extraction Procedure
Aqueous extraction method was used.
20 g of powdered material was mixed with 200 mL distilled water. Heated at 60–70°C for 1 hour with continuous stirring.
The extract was cooled and filtered through muslin cloth, followed by Whatman No. 1 filter paper.
The filtrate served as the Mimosa pudica extract.

- Preparation of Moringa oleifera Seed Powder

Moringa pods were opened and seeds were collected. Seed coats were removed and kernels were sun-dried. Dried kernels were ground into fine powder using a mixer. Powder was sieved to obtain a uniform particle size.

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- Tannin Reduction Step

Using Moringa Seed Powder as Natural Coagulant
Measured quantity of mimosa extract was placed in a beaker.
Moringa seed Powder (1 -2%) was added with constant stirring.
The mixture was stirred for 15-20 min to allow the protein-tannin complex to form.
Coagulated tannins settled at the bottom.
The supernatant was carefully filtered to obtain a clarified extract with lower tannin
Content
Formulation of herbal mouthwash:
Ingredients
Clarified Mimosa Pudica extract
Moringa seed- treated filtrate
Sweetener
Flavoring agent
Preservative
Distilled water to make up volume

Procedure
The clarified extract was measured as the base.
Sorbitol (5–10%) was added as a sweetening and tonicity agent.
Peppermint oil (1–2 drops/100 mL) was added for flavor.
If used, sodium benzoate (0.1%) was added as a preservative.
The volume was made up with distilled water.
The solution was mixed using a magnetic stirrer to ensure uniformity.
The final formulation was stored in amber-colored bottles.
Evaluation Parameters of Herbal Mouthwash

1. Organoleptic Evaluation
The prepared herbal mouthwash was evaluated for:
Colour: light greenish
Odour: Minty herbal odor
Taste: sweet minty
Observation
The formulation showed acceptable colour, pleasant odour, and good appearance.
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2. pH Determination
Principle
pH indicates the acidity or alkalinity of the formulation.
Procedure
The pH of mouthwash was measured using a digital pH meter.
Normal mouthwash pH should be Around 5.5-7-0
Observation- 6.2
The formulation showed suitable pH for oral use.
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3. Viscosity Test
Principle
Viscosity determines the flow property of mouthwash.
Procedure
Viscosity was measured using a Ostwald viscometer.
Observation
The formulation showed satisfactory flow property.
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4. Foamability Test
Procedure
The mouthwash was shaken in a measuring cylinder and foam formation was observed.
Observation
Moderate foam formation was observed.
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5. Stability Study

Procedure

The formulation was stored at room temperature for a specific period and observed for changes.

Observation

No significant change in colour, odour, or appearance was observed.


6. Tannin Reduction Test

Principle

The test was performed to determine reduction of tannin content using Moringa oleifera seed powder.

Observation

Reduction in tannin content was observed after treatment.

- Ferric Chloride Test

Principle

Ferric chloride test is used for the detection of phenols and tannins present in herbal extracts. Ferric chloride reacts with phenolic compounds and tannins to produce coloured complexes such as blue, green, or dark coloration.

Procedure

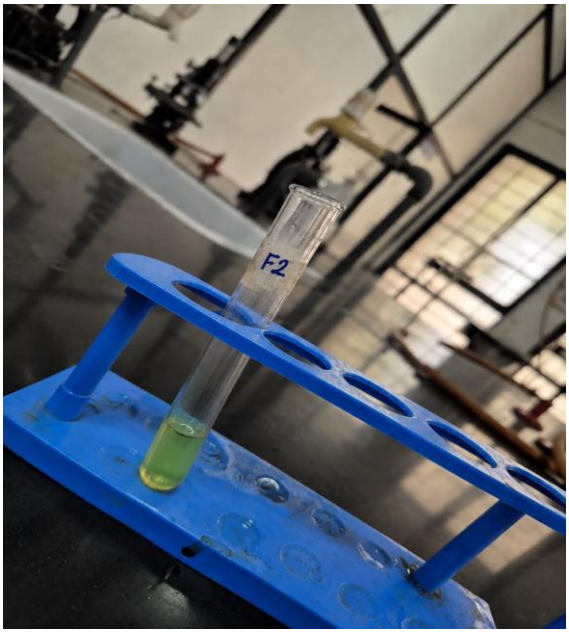
1. Take small quantity of herbal extract in a test tube.
2. Add few drops of ferric chloride solution.
3. Observe the colour change.

Observation

Formation of greenish-black or blue-black colour indicates the presence of tannins and phenolic compounds in the extract.

Result

The test showed positive result for tannins reducing due to formation of light green coloration after addition of ferric chloride solution.




- Antimicrobial Activity


**Principle:**Antimicrobial activity was evaluated by agar plate method.

Procedure

Nutrient agar plates were prepared.

Microorganisms were inoculated on agar surface.

Mouthwash samples were added into wells.

Plates were incubated for 24 hours.
Zone of inhibition was measured in mm.
Observation
Sample 2 showed maximum antimicrobial activity with largest zone of inhibition.
Sample 1 – 16 mm
Sample 2 – 24 mm
Sample 3 – 15 mm
Sample 4 – 18 mm
Sample 5 – 17 mm

Observation:
Sample drug number 2 showed the highest antimicrobial activity with the largest zone of inhibition (24 mm).
The formulation of a herbal mouthwash containing Mimosa pudica and Moringa oleifera seed powder as a tannin-reducing agent can have several pharmaceutical, dental, and commercial applications.

Applications of the Herbal Mouthwash:
1. Maintains Oral Hygiene
Helps in cleaning the oral cavity and maintaining healthy teeth and gums.
2. Prevents Bad Breath
Reduces unpleasant mouth odor caused by bacterial growth.
3. Antimicrobial Action
Inhibits growth of harmful oral microorganisms responsible for dental infections.
4. Reduces Plaque Formation
Helps in minimizing plaque accumulation on teeth surfaces.
5. Prevents Gingivitis
Reduces gum inflammation, redness, and bleeding.
6. Mouth Ulcer Relief
The anti-inflammatory property of Mimosa pudica helps in soothing minor mouth ulcers and irritation.
7. Antioxidant Effect
Protects oral tissues from oxidative damage due to free radicals.
8. Natural Alternative to Chemical Mouthwash
Can be used as a safer herbal substitute for alcohol-based mouthwashes.
9. Improves Taste and Acceptability
Moringa oleifera seed powder reduces tannin content, bitterness, and astringency.
10. Useful for Daily Oral Care
Suitable for routine use to maintain fresh breath and healthy oral cavity.

Future Scope of Herbal Mouthwash Containing Mimosa pudica and Moringa oleifera Seed Powder

1. Development of Commercial Herbal Mouthwash
The formulation can be developed into a marketable herbal oral care product.

2. Advanced Clinical Studies
Further clinical trials can be carried out to evaluate long-term safety and effectiveness in humans.

3. Improvement in Formulation
Flavor, color, stability, and shelf life can be improved using advanced pharmaceutical techniques.

4. Use in Dental Care Products
The herbal extract can also be incorporated into toothpaste, gels, sprays, and gargles.

5. Research on Antimicrobial Activity
More studies can be performed against different oral pathogens causing plaque, gingivitis, and dental caries.

6. Standardization of Herbal Ingredients
Future studies can focus on standardization and quality control of plant materials for consistent results.

7. Natural Tannin Reduction Techniques
Further research may identify more effective natural tannin reducing agents along with Moringa seed powder.

8. Large Scale Manufacturing
The formulation process can be optimized for industrial production and commercialization.

9. Eco-Friendly and Cost-Effective Product
Herbal mouthwash may become an economical and environmentally friendly alternative to synthetic mouthwashes.

10. Global Acceptance of Herbal Oral Care
Increasing awareness about herbal medicines may increase the demand and acceptance of this formulation worldwide.

MARKETED HERBAL MOUTHWASH:



Result

The formulated herbal mouthwash containing Mimosa pudica extract and Moringa oleifera seed powder was successfully prepared and evaluated for its physicochemical and antimicrobial properties. The formulation showed acceptable appearance, pH, odor, and stability suitable for oral use.

| Sr. No | Evaluation Test | Observation | Result |
|---|---|---|---|
| 1 | Organoleptic Evaluation | Light greenish colour, minty herbal odour, sweet minty taste | Acceptable appearance, pleasant odour, and good taste |
| 2 | pH Determination | pH observed = 6.2 | Suitable for oral use |
| 3 | Viscosity Test | Good flow property observed | Satisfactory viscosity |
| 4 | Foamability Test | Moderate foam formation observed | Acceptable foamability |
| 5 | Stability Study | No change in colour, odour, or appearance during storage | Stable formulation |
| 6 | Tannin Reduction Test | Reduction in tannin content observed after moringa treatment | Successful tannin reduction |
| 7 | Ferric Chloride Test | Greenish-black / blue-black colour formed | Positive test for tannins and phenolic compounds |
| 8 | Antimicrobial Activity Test | Clear zone of inhibition observed | Good antimicrobial activity |

Final Result Table

| Parameter | Final Result |
|---|---|
| Best Sample | Sample 2 |
| Maximum Zone of Inhibition | 24 mm |
| Overall Evaluation | Formulation showed good stability, acceptable physicochemical properties, tannin reduction, and effective antimicrobial activity |

The mouthwash demonstrated:
Good tannin-reducing activity
Antibacterial activity against common oral microorganisms
Reduction in plaque-forming bacteria
Mild anti-inflammatory effects on oral tissues
Acceptable cleansing and refreshing properties
The presence of phytochemicals such as flavonoids, tannins, alkaloids, and phenolic compounds contributed to its therapeutic activity. The formulation was found to be comparatively safe, economical, and eco-friendly when compared with synthetic mouthwashes.

## VIII. CONCLUSION

The study concludes that the herbal mouthwash formulated using Mimosa pudica and Moringa oleifera seed powder possesses promising oral healthcare properties. The formulation exhibited effective tannin-reducing, antimicrobial, antioxidant, and anti-inflammatory activities, which may help in maintaining oral hygiene and preventing dental problems such as plaque formation, bad breath, and gingivitis.

The herbal mouthwash can serve as a natural alternative to commercially available chemical mouthwashes due to its potential safety, affordability, and reduced side effects. However, further clinical studies and formulation standardization are required to establish its long-term efficacy, stability, and commercial applicability.

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