

Formulation and Evaluation of Herbal Mouthwash

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Abstract: Oral health is important as overall health. Now-a-days people may faces more oral problems like periodontal disease, sore throat, gingivitis, plaque and so on. For maintaining good oral health various formulations are formulated. A mouthwash is recommended for controlling plaque, bad breath, toothache and bacteria. Herbal mouthwash are preferred over chemical mouthwash as it shows less sideeffects and is non-irritant, less toxic, and do not contain alcohol. Medicinal plants, because of their antiviral and antibacterial action against human microorganisms, have a major role in healing and preventing illnesses. Herbal mouthwash consists of extracts of crude drugs which has no or less side effects as compared to synthetic mouthwash. Herbal mouthwashes are prepared from various plant extracts. The herbs described in this article are cinnamon, neem, pomegranate, tulsi, peppermint, and clove that are useful in dentistry. Mouthwashes that may be readily produced and used safely by peopleat home using natural materials could enhance the population's overall oral health. The major goal of this review is to preserve dental health by using natural mouthwash.

Keywords: Mouthwash, Herbs, Antibacterial, Antiviral, Plaque, Gingivitis

I. INTRODUCTION

Mouthwash is an antiseptic aqueous solution used to clean the mouth and teeth or freshen up the breath. It is most often used for control of plaque and other dental problems.[1] It is a medicated liquidthat is held in the mouth and swished around by the perioral muscles to get rid of oral pathogens.[2]

Mouthwashes come in two different varieties: Chemical and herbal. Herbal mouthwash contains naturalingredients called phytochemicals that contains desired anti-microbial and anti-inflammatory effects. Herbal mouthwash becomes more popular they work without alcohol, artificial preservatives, flavoursand colors. As it contains natural herbs that have natural cleansing and healing property to teeth and gums. Natural Herbs such as Triphala, Tulsi, Neem, Clove oil, Pudina and many others are used as single or in combination have been Scientifically Proven to be Safe and Effective Medicine against OralHealth Problems such as Bleeding Gums, Mouth Ulcers, and Preventing Tooth Decay without side effects.[3]

Herbal Mouthwashes are in high demand, because they act on oral pathogens and relieve the pain instantly and are also less side-effective. The mouth washes are concentrated aqueous anti-bacterial solution that are used against oral microbes to counter oral infection, cleansing, to get rid of bad breathrefreshing ,anti-septic .The mouthwash plats an prominent role in the oral hygiene of an individual ,it helps to relieve symptoms of inflamed gums gingivitis. And also it reliably used to destruct the pathogenic germs. The mouth washes are used by most of the dental patients to overcome sour mouth (xerostomia), ulcerated throat and sensitive teeth. Dentists always use mouthwash as an antimicrobial agent before oral surgery of the patients, because they help to sterilize the surface of the inflamed gumsand teeth, thereby the contamination of any other microorganisms can be avoided.[4]

Mouthwash, also known as mouth rinse, oral rinse, or mouth bath, is a liquid that can be held in the mouth passively or swirled around by the contraction of perioral muscles and/or movement of the head. It may also be gargled, tilting the head back and bubbling the liquid at the back of the mouth. Typically, mouthwashes are antiseptic solutions designed to reduce the microbial load in the mouth.

However, some mouthwashes serve other purposes such as providing analgesic, anti-inflammatory, or anti-fungal effects. In addition, certain rinses act as saliva substitutes to neutralize acid and maintain moisture in the mouth for individuals with dry mouth (xerostomia). Cosmetic mouth rinses can temporarily control or reduce bad breath, leaving the mouth with a pleasant taste. There is a high demand for herbal mouthwashes, as they act on oral pathogens, provide instant pain relief, and have fewer side effects.

Chemical mouthwashes containing hydrogen peroxide and chlorhexidine serve as immediate whiteners, sterilizers, and pain relievers for teeth, although they may cause tooth discoloration and side effects, despite being cost-effective. One of the most common infectious diseases encountered by many individuals is dental caries and periodontal diseases at various stages of their lifetime. Mouthwashes are concentrated aqueous antibacterial solutions used against oral microbes to combat infection, cleanse, eliminate bad breath, and refresh the mouth. They play a significant role in an individual's oral hygiene, helping to alleviate symptoms of inflamed gums, such as gingivitis, and reliably destroying pathogenic germs.

Advantages of Herbal Mouthwash

- The use of herbal mouthwash has grown advantage over chemical mouthwashes due to their non-irritant and non-staining properties and it does not contain alcohol.
- They have very minimal or no side effect and they are less harmful.
- All herbal mouthwashes do not contain alcohol and/or sugar
- Herbal mouthwashes are gentle for even the most sensitive mouth.
- Herbal mouthwashes have naturally antibacterial property.
- Herbal mouthwash does not cause dry mouth.
- It is highly in demand.
- It keeps your mouth healthy.
- Herbal mouthwash does not contain:
- Herbal product as mouthwash;

1. Neem:

Biological Source - The part of plant used are leaves of the plant *Azadirachta indica* belongs to the family Meliaceae.

Chemical constituent - Nimbin, Nimbidin, Nimbinin

Use - It inhibit the formulation of plaque and the growth of the bacteria. The leaves, twigs and seeds of neem have been used to clean the teeth and fight bacterial infection. Neem extract is appropriate for treating, gingivitis and oral infectious because it inhibits the formation of plaque and growth of bacteria.



Fig. 1. Neem

2. Tulsi

Biological source – The part of plant used are leaves of the plant *Ocimum Sanctum* .

Family - Lamiaceae.

Use – Indian mythology attaches a great significance to Basil by recognizing it as a holy herb. Perhaps, such significance comes from the actual health applications of the herb. Its use is recommended as a first aid in the treatment of respiratory, digestive and skin diseases. Apart from these common ailments, [Ayurveda](#) also recognizes its use for the diseases

ranging up to tumorous growths. Experimental studies identify it to be a highly promising immune modulator, cytoprotective and anticancer agent.



Fig.2. Tulsi

3. Clove

Biological Source - Clove consist of dried flower bud of the plant *Eugenia caryophyllus* belongs to the family Myrtaceae.

Chemical constituents - Eugenol, caryophyllene, methyl amyl ketone.

Use - Clove is dental analgesic also it fights bad breath, effective at fighting cavities, stimulate circulation



Fig.3. Clove

4. Peppermint :

Biological Source - Leaves of the plant *Mentha piperata*, a aromatic herb belongs to family Lamiacea.

Chemical constituents - Menthol, Menthone, cineole.

Use - Peppermint is the mint that is most often used commercially in mouthwash because of its strong, pure, qualities. Mint is good remedy for gingivitis. Peppermint gives fragrance. Peppermint oil is more effective to reduce cavities. It has healing properties as well as anti-viral and anti-bacterial properties, it is an analgesic.



Fig.4. Peppermint

5. Liquorice

Biological Source - It is an extract from the plant *Glycyrrhiza glabra* belongs to the family Fabaceae.

Chemical constituent – Glycyrrhizin.

Use - Use of Liquorice, it is a natural sweetening agent as well as flavouring additive.



Fig. 5. Liquorice

Pomegranate :

Biological source - The part of pomegranate peel *punica granatum*.

Family - Punicaceae .

Use – pomegranate peel have strong Antibacterial properties, they have been shown to prevent plaquebuildup and help treat various tooth and gum diseases, when used in a mouth rinse. It has anti- inflammatory properties that may help soothe irritated tissues



Fig.6. Pomegranat

PROCEDURE

Collection of Plant: leaves of Neem, Tulsi and peel of pomegranate fruit.

Extraction process:

Neem and Tulsi leaves -

The leaves will be washed with sterile water, shadow dried, pulverized and stored in air-tight bottles.

The Aqueous extracts was prepared by soaking the powdered leaves in sterile distilled water and maintained in Incubator at $37\pm 2^{\circ}\text{C}$ for 72 hours and it was filtered using Whatman filter paper.



Fig 7 Neem Leaves

Pomegranate peel -

Preparation of samples Pomegranate peels were separated and washed with tap water and subjected to drying in vacuum oven.

The dried peels were ground with pestle and mortar to coarse powder of approximately 1 mm size and stored in a incubator at 4 °C.

To prepare samples, 10 g of ground pomegranate peel were separately soaked in 100 ml water.

The samples were staying at 24 h. After this, the samples were filtered filter paper and filtrate was stored.



Fig. 8 Pomegranate peels

Liquorice Root –

The root will be washed with sterile water, shadow dried, pulverized and stored in air-tight bottles.

The Aqueous extracts was prepared by soaking the powdered leaves in sterile distilled water and maintained in Incubator at 37±2°C for 72 hours and it was filtered using Whatman filter paper.



Fig. 9 . Liquorice Root

FORMULATION TABLE:-

Sr.No.	Ingredients	Functions	F1 (ml)	F2 (ml)	F3 (ml)
1.	Neem (10g/100ml)	Anti-microbial	5	7.5	10
2.	Tulsi (10g/100ml)	Anti-inflammatory	5	7.5	10
3.	Pomegranate (10g/100ml)	Fight Dental Plaque	5	7.5	10
4.	Clove Oil	Analgesic	0.1	0.15	0.20
5.	Liquorice (10g/100ml)	Sweetener	-	5	-
6.	Honey	Sweetener	1.2	-	1.2
7.	PEG 40	Surfactant	3.6	3.6	3.6
8.	Methyl Paraben	Preservative	1.2g	1.2g	1.2g
9.	Peppermint Oil	Flavors	1.2	1.2	1.2
10.	Distilled Water	Solvent	Up to 60ml	Up to 60ml	Up to 60ml

Table 3. Formulation Table

Formulation of Herbal Mouthwash:

Each ingredient were taken in a weighted quantity.

The neem, tulsi and pomegranate extract was thoroughly combined with a small amount of water in a mortar and pestle.

Mint oil was added drop by drop and thoroughly combined, taking care to prevent lump formation.

Then, drop by drop, PEG 40 and glycerol were added and thoroughly mixed.

Finally, water added to make up the volume, as well as a preservative, and the products were packaged in an attractive, well-closed container.

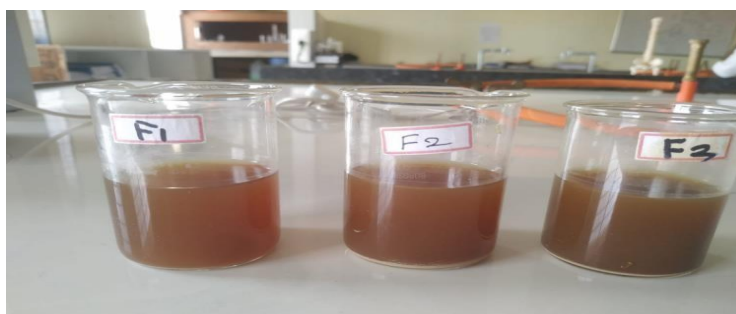


Fig. No.11. Formulations of herbal mouthwash

II. RESULT AND DISCUSSION

Physical and color stability analysis

Three different formulations were prepared.

- The visual appearance phase separation and homogeneity of each formulation were monitored by ocular examination.
- Expectantly, the color of the mouthwash should be maintained throughout the experimental phase to ensure that the mouthwash formulations were acceptable. Mouthwash formulations that were stored in refrigerator (12OC) rendered a light brown color throughout the experiment, whereas those kept at room temperature (25oC) maintained at dark brown Color.
- The original color of the mouthwash was brown following the preparations and prior to storage. The brown color is due to the influence of clove extract within the formulations.
- When compared, the different evaluation parameter of The formulation F1 was better than F2 and F3 .
- The formulations stored at 25oC did not experience changes in color, unlike the formulations stored at 12oC where there is color shift from dark brown to light brown. The change in color might be attributed to the oxidation of the mouthwash ingredients.

- Although the herbs that were used in mouthwash ingredients have natural anti-oxidants, the low storage temperature might have disabled their antioxidant machinery leading to a change in coloration thus lower temperature storage might affect the color stability of the mouth wash formulation. phase separation in the mouthwash was not observed

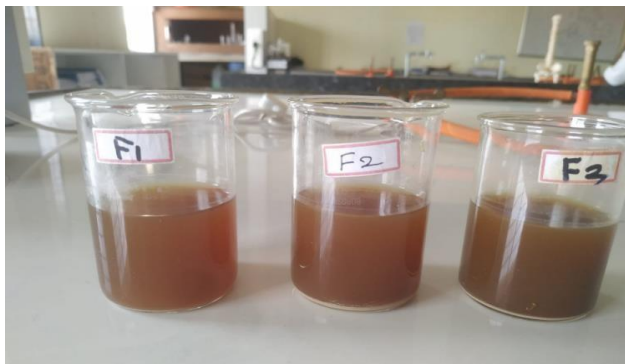


Fig. 11. Formulations of herbal mouthwash

Table 4. The physical characteristics of different mouthwash :

Formulation	Evaluation parameter	Observation
F1	Visual Appearance Phase Separation Homogeneity	brown Nil Good
F2	Visual Appearance Phase Separation Homogeneity	brown Nil Good
F3	Visual Appearance Phase Separation Homogeneity	brown Nil Good

Table 5. pH of herbal mouthwash formulation :

Here I used pH paper for measuring pH value. In 60ml of mouthwash a pH paper dipped into it. It showed a color which detected the pH range by comparing it with standard pH color range.

Formulation	pH
F1	5
F2	6
F3	6

Table 6. The physical characteristics of different mouthwash following different storage Temperature:

Formulation	Parameters	Temperature 12 °C	Temperature 25 °C
F1	Visual appearance Phase separation Homogeneity	Brown Nil Good	Brown Nil Good
F2	Visual appearance Phase separation Homogeneity	Dark brown Nil Good	Dark brown Nil Good
F3	Visual appearance Phase separation Homogeneity	Dark brown Nil Good	Dark brown Nil Good

Table 7. The physical characteristics of different mouthwash following different Days :

Formulation	Parameters	Day 5	Day 10	Day 20
F1	Color Phase Separation pH	Brown Nil 5	Brown Nil 5	Brown Nil 5
F2	Color Phase Separation pH	Brown Nil 6	Light brown Nil 6	Dark brown Nil 7
F3	Color Phase Separation pH	Brown Nil 6	Dark brown Nil 6	Dark brown Nil 7

Viscosity :

Table .8. Viscosity of different mouthwash formulation

Sample	Time of flow(sec)			Average Time(sec)	Density(g/mm)	Viscosity(poise)
Water	29	29.10	29.15	29.08	1.16	0.897
F1	30.10	30	31	30.36	1.2	0.96
F2	32	32.10	31.20	31.76	1.2	1.01
F3	32.15	32.20	32.10	32.15	1.2	1.02

Antibacterial assay :

Table.9. Antibacterial activity of the test sample (mouthwash)

Sr.no.	Name of the microorganism	Diameter of zone inhibition (mm)	
		Gentamicin 10mg	Sample (mouthwash)
1	Escherichia coli	30	20
2	Staphylococcus aureus	25	18



III. CONCLUSION

An attempt has been made to outline some of the commonly available herbs and plants, which are readily available and can be used as effective mouthwashes by all. If people can use and promote such cost effective measures of maintaining the oral health which are also devoid of any untoward side effects, it may help in overcoming some common dental problems.

Herbs which are powerful healing agents, must be used appropriately. The use of herb in dentistry should be based on evidence of effectiveness and safety. They will improve the immunity and help in healing of oral infections.

Furthermore, the best mouthwash formulation was observed to be more stable when maintained at 25 °C. Given its stability and antibacterial properties, the polyherbal mouthwash formulated in this study has the potential to be optimized and commercialized for maintaining oral health.

The current liquid herbal mouthwash offers a lasting solution for combating bad breath and various oral disorders. It provides assurance that no harmful ingredients are included in its formulation. Physicochemical evaluations have confirmed the mouthwash's acceptable color and odor, with a pleasant scent and favorable aftereffects. Zone of inhibition tests have demonstrated its effectiveness as a potent plaque inhibitor, preferred by patients for its taste, ease of use, and lingering freshness post-rinsing.

Consequently, it can complement mechanical therapy in treating plaque-induced gingivitis. This research holds significance in developing an effective and affordable herbal oral health solution, particularly beneficial for socioeconomically disadvantaged communities. Nonetheless, given the short duration of this study, longer-term investigations involving larger cohorts are warranted. The natural herbs incorporated in this formulation have a

longstanding medicinal reputation for promoting oral hygiene and combating bad breath, supported by numerous research findings over the years. With this herbal mouthwash, individuals can effortlessly maintain oral health and mitigate a range of oral issues.

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