



FORMULATION AND EVALUATION OF HERBAL MOUTHWASH

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Abstract: The oral cavity is the home of various bacterial species. All through some of the oral bacteria are harmless and there are certain species that are harmful which may cause oral plaque, bad breath and mouth disease. Thus maintain a good oral hygiene is essential for healthy mouth and body. The importance of herbs are highly considered as effective in contrast chemical products. Medicinal plants play important role in curing diseases due to their antimicrobial and antifungal activity against human pathogen through decades. Herbal products help to control dental plaque, inhibit growth of bacteria, freshen breath, cleanse tooth. Herbal mouthwashes can be used as an adjunct to various oral hygiene practices like tooth brushing, flossing. They have effective anti-inflammatory, anti-plaque properties and hence can be used in supportive periodontal therapy. Various herbal products and their extract such as Neem, Turmeric, clove, peppermint have shown significant advantages over chemical ones. Medicinal plants play a vital role in curing disease due to their anti-bacterial, anti-microbial, anti-fungal activity against human pathogen through decades. Natural mouthwashes may offer significant advantages over chemical ones. If such formulation can be formulated by which can be easily prepared and used safely by people at home using natural product. It may lead to improvement in the general dental health of population. Herbal mouthwashes are in high demand because they act on oral pathogen and relieve the pain instantly and are also less or no side effect. One of the most common infectious diseases encountered by many individuals are dental caries and periodontal disease at different stage of lifetime. This review is an attempt to outline such natural substances can be used as an effective mouthwash. The present study aimed to formulate polyherbal mouthwash that have antibacterial properties.

Key Words – Herbal mouthwash, Herb, Natural extract, Neem, Turmeric, Clove, Liquorice, Peppermint

1. INTRODUCTION

1.1 History

- The importance of mouth and teeth cleanliness has been recognized from the earliest days of civilization to the 21st century.
- As far as we have come in creating dental solutions that are effectively treat and prevent various types of oral diseases, the mouthwash rinses our ancestor used to maintain a healthy smile were just as widely used as some of the around today.
- The first known references to mouth rinsing are in Ayurveda and Chinese medicine around 2700 BC. Mouthwash is a chemotherapeutic agent used as effective home care system by the patient to oral hygiene.
- In the Greek and Roman periods, mouth rinsing following mechanical cleansing became common among the upper classes and Hippocrates recommended a mixture of salt, alum and vinegar.
- Ancient Egyptians are known to be responsible for the first artistic drawing that emphasize the importance of beauty and hygiene. An unclean body was thought to be impure. Pedanius Dioscorides, A Greek physician and surgeon (40-90) whose writings served as a medical textbook, suggested for treatment of bad breath a mouthwash mixture of the following.
- Greek physician Pedanius Dioscorides, formulated a mouthwash mixture of decoction extracted from the olive tree leaves, milk, wine and oil, pomegranate peelings, nutgalls and vinegar, this was how ancient mouth washes were prepared using traditional methods and herbs.
- The Romans included a secret ingredient in their mouthwash: human urine. They imported urine from Portuguese people because they thought it had more strength.

- It is observed that in 18th century urine served as a key active ingredient due to the presence of ammonia that rendered the oral cavity free from oral pathogens especially sulphur producing organisms.
- Before Europeans came to Americas, Native North American and Mesomeric cultures used mouthwashes, often made from plants such as Coptis trifolia.
- In 1892, German Richard Seifert invented mouthwash product Odol, which was produced by company founder Karl August Lingner (1861-1916) in Dresden.

1.2 Define

- **Mouthwash**

Mouthwash is an aqueous solution which is most often used for control of plaque and is a medicated liquid which is held in mouth and swished by the action of perioral musculature to eliminate the oral pathogens.

- **Herbal Mouthwash**

Herbal mouthwashes are mouthwashes which are prepared from natural plant extracts. The natural extract present in the herbal mouthwashes are obtained from various plant leaves, fruits, seeds and various tree oils.

1.3 Why should we prefer Herbal Mouthwash?

Herbal mouthwashes are high in demand, because they act on oral pathogens and relieve the pain instantly and are also less side-effect. Chemical mouthwashes have hydrogen peroxide and chlorhexidine as an immediate whitener, sterilizer and pain reliever of teeth, but they tend to produce discoloration of teeth and may produce side effect, meanwhile they are cost effective.

1.4 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 is gentle for even the most sensitive mouth.
- Herbal mouthwashes has naturally antibacterial property.
- It contain no harsh additives.
- Herbal mouthwash doesn't cause dry mouth.
- It is highly in demand.
- It keeps your mouth healthy.
- Herbal mouthwash do not contain:
 1. Alcohol
 2. Sugar
 3. Artificial colors
 4. Stannous fluoride
 5. Artificial sweeteners
 6. Cetylpyridinium chloride (CPC)
 7. Sodium Lauryl Sulphate (SLS)
 8. Harsh chemical preservative
 9. Dyes

1.5 Use of Herbal mouthwash

- Many conditions within the oral cavity require the use of a mouthwash.
- This can vary from breath freshener to treatment of life threatening secondary infectious such as oral mucositis in patient undergoing bone marrow transplant therapy.
- The use of mouthwashes requires a correct diagnosis of the oral condition and through knowledge of the product to achieve an effective treatment.
- Use of herbal mouthwash is to improve oral hygiene.
- It help to control dental plaque.
- It can be use in gum diseases.
- Used for killing germs in oral cavity.
- It freshen breath and covers bad breath.
- Using a mouthwash for gum disease prevention is very important.
- It is use to clean septic sockets.
- It relieve pain and inflammation.
- In treatment of Mucositis and Halitosis.
- Used in Periodontal diseases.

1.6 Herbal product as mouthwash

- Neem-

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

Chemical constituent- Nimbin, Nimbdin, Nimbinin.

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.

The leaves, twigs and seeds of neem have been used in India and South Asia for thousands of years to clean the teeth and fight bacterial and fungal infection.

Neem extract is appropriate for treating gingivitis and oral infections because it inhibit the formation of plaque and the growth of bacteria.

Neem has been shown to have significant effects on both gram-positive and gram-negative bacteria and other bacteria that cause a wide array of human and animal diseases including *E.coli*, *streptococcus*.



Fig. 1.1 Neem

- **Turmeric-**

Biological Source- It is dried rhizome of the plant *Curcuma longa* belongs to the family Zingiberaceae.

Chemical constituents- Curcumin, curcuminoids, turmerone.

It is anti-microbial and acts as bacteriostatic and bactericidal. Turmeric causes reduction in ulceration, burning sensation, reduce inflammation and also used as coloring agent.



Fig. 1.2 Turmeric

- **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.

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



Fig. 1.3 Clove

- **Peppermint-**

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

Chemical constituents- Menthol, Menthone, cineole.

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. 1.4 Peppermint

- **Liquorice-**

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

Chemical constituent- Glycyrrhizin.

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



Fig. 1.5 Liquorice

1.7 Ingredient table

Table 1.1: List of ingredients

Sr. no.	Ingredients	Scientific name	Chemical constituents	Use
1	Neem	<i>Azadirachta indica</i>	Nimbin, Nimdin	Antiseptic, inhibit plaque formation
2	Turmeric	<i>Curcuma longa</i>	Curcumin	Anti-microbial, bacteriostatic, bactericidal
3	Clove	<i>Eugenia caryophyllus</i>	Eugenol	Dental Analgesic, Fight bad breath, stimulate circulation
4	Peppermint	<i>Mentha pepperata</i>	Menthol	It gives fragrance, Anti-viral
5	Liquorice	<i>Glycyrrhiza glabra</i>	Glycyrrhizin	Sweetening agent
6	Salt	-	-	Preservative
7	Coco glucoside	-	-	Surfactant
8	Distilled water	-	-	-

2. MATERIALS AND METHODS

2.1 Materials-

Table 2.1: List of materials

Sr. No.	Materials
1	Neem
2	Turmeric
3	Clove
4	Peppermint
5	Liquorice
6	Salt
7	Coco glucoside
8	Distilled water

Table 2.2: List of Equipment

Sr. No.	Equipment
1	Measuring cylinder
2	Beaker
3	Mortar pestle
4	Conical flask
5	Funnel
6	Water bath
7	Burner
8	Petri dish
9	pH meter
10	Incubator

2.2 Method-

Preparation of herbal mouthwash

- Four different extracts of polyherbal mouthwash were developed.
- The mouthwash formula made use of four main herbal ingredients: Neem, Turmeric, Clove, Peppermint.
- Three minor ingredients added which are; Liquorice, salt, coco glucoside. The minor components were used for the preservation and for improving the taste.
- In order to test the anti-bacterial activity of the mouthwash herbs, different percentage of the herbal extract were prepared.
- For the formulation, the mouthwash herbal ingredients were ground to obtain their powder form.
- 10 gram of each Neem, turmeric, clove, peppermint were separately soaked into 100 mL of distilled water and incubated at 37°C for 48 hours.
- After incubation, the herbal extract were filtered.
- The extract were then boiled separately and left to cool.
- Ten gram of each solid minor ingredients (sweetener, salt, coco glucoside) were added separately into 100 mL of distilled water.
- After the ingredients extracts cool down, the major and minor ingredients were mixed following the formulation in Table 2.3

2.3 Formulation Table

Table 2.3: Six different formulations of polyherbal mouthwash

Sr. No.	Ingredients	F1 ml	F2 ml	F3 ml	F4 ml	F5 ml	F6 ml
1	Neem (10g/100)	5	10	15	8	8	5
2	Turmeric (10g/100mL)	10	5	15	7	8	10
3	Clove (10g/100mL)	10	5	5	8	10	10
4	Peppermint (10g/100mL)	5	10	5	5	7	6
5	Liquorice (10g/100mL)	10	15	5	10	8	8
6	Salt solution (10g/100mL)	5	2	5	5	7	8
7	Coco glucoside (10g/100mL)	5	3	5	10	7	7
8	Distilled water	10	10	5	7	5	6
9	Total volume	60	60	60	60	60	60

3. EVALUATION

3.1 Stability Test-

Stability test aims to ensure that the mouthwash formulations are usable and can maintain the same characteristics in the long term, before undergoing antibacterial assay. Different mouthwash formulations were subjected to stability test prior to antibacterial testing.

- **Physical stability-** This test included recording the visual appearance, physical separation and homogeneity of the formulated mouthwash. The different mouthwashes then kept in different temperature; 12oC and 25 oC and the appearance is then checked in different temperature and the result was recorded.
- **pH stability-** This test also monitored using a well calibrated pH meter. To investigate the changes and variability in the pH readings, the mean and the standard deviation for the pH readings can be calculated. Different mouthwash formulations then keep on the shelf (25oC) and in the refrigerator (12OC). Then record the result and compared over the course of six weeks.

3.2 Antibacterial assay

- Inoculate all the six formulated mouthwash in the different plates of agar media by streak plate method and prepare a control.
- Place the plates in incubator and incubate at 37oC for 24 hrs.
- After the incubation period take out the plates and check microbial growth in all the plates.

4. RESULT AND DISCUSSION

4.1 Physical and color stability analysis

- Six different formulation were prepared. Each formulation was then split in half and incubated at two different temperatures: in the refrigerator at 12oC and at room temperature at around 25oC.
- Two different temperature were chosen to determine the optimum storage conditions for the mouthwash formulation in which they were able to maintain their activity for the longest time possible. 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.
- As indicated in the Table 7.1, the original color of the mouthwash was dark brown following the preparations and prior to storage. The dark brown color is due to the influence of clove extract within the formulations.
- 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 disable 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 mouth wash was not observed.



Fig. 4.1 Formulated herbal of Mouthwash

Table 4.1: The physical characteristics of different mouthwash prior to incubation to different storage temperatures

Mouthwash formulation	Evaluation parameter	Observation
F1	Visual Appearance Phase separation Homogeneity	Dark brown Nil Good
F2	Visual appearance Phase separation Homogeneity	Dark brown Nil Good
F3	Visual appearance Phase separation Homogeneity	Dark brown Nil Good
F4	Visual Appearance Phase separation Homogeneity	Dark brown Nil Good
F5	Visual appearance Phase separation Homogeneity	Dark brown Nil Good
F6	Visual appearance Phase separation Homogeneity	Dark brown Nil Good

Table 4.2: The physical characteristics of different mouthwash formulations following exposure to different storage temperature.

Storage temperature	Evaluation parameter	Observation of six different mouthwashes
25°C	Visual appearance Phase separation Homogeneity	Dark brown Nil Good
12°C	Visual appearance Phase separation Homogeneity	Light brown Nil Good

4.2 pH Stability analysis

Here I used pH paper for measuring pH value. In 5ml of mouthwash a pH paper dipped into it. It showed a color which detected the pH range between 6-7 by comparing it with standard pH color range. Thus, pH value found is between 6-7.



Fig. 4.2 Measuring of pH value

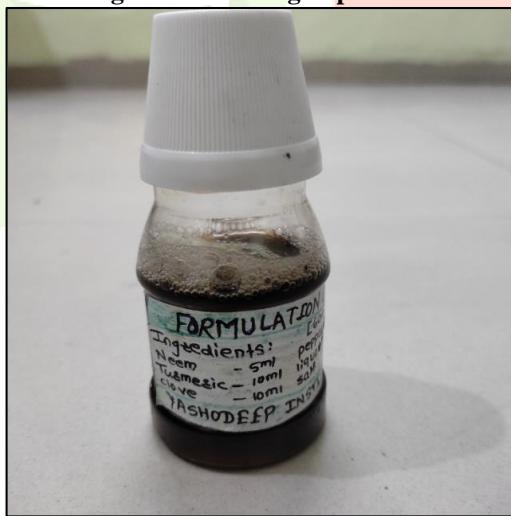


Fig. 4.3 Herbal Mouthwash

5. SUMMARY AND 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.

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