



FORMULATION, DEVELOPMENT AND EVALUATION OF HERBAL MOUTH FRESHENER – A REVIEW.

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Abstract: Herbs have been used for centuries to prevent and control dental disease. Herbal extracts are effective because they interact with specific chemical receptors within the body. The review gives an introductory of mouth Fresheners in combating halitosis, the traditional herbal ingredients and their efficiency in mouth Fresheners and additional potent benefits such as Antimicrobial, antioxidants, anti-inflammatory, antifungal and wound healing properties were explored. Mouth fresheners are found to show an instant therapeutic efficacy in reducing bad odour, giving a refreshment which lasts for some period of time this study aims at screening the antibacterial and antimicrobial potential of available natural herbs for oral hygiene against various bacteria such as *S. mutans*, etc. A selective number of herbs were subjected to the study. The oral hygiene products containing natural herbs proved to be the most effective followed by those containing fluoride. The need for a better alternative to help control dental caries is on the rise even today.

KEYWORDS: Herbs, herbal extracts, dental disease, mouth freshener, oral hygiene.

1. Introduction:

Oral health enables an individual to speak, eat and socialize without active disease, discomfort or embarrassment. Oral health is fundamental to general health and well-being, significantly impacting on quality of life. It can affect general health conditions. Oral health means more than healthy teeth. The health of the gums, oral soft tissues, chewing muscles, the palate, tongue, lips and salivary glands are also significant. ^[1]

Oral health is multifaceted and includes the ability to speak, smile, smell, taste, touch, chew, swallow, and convey a range of emotions through facial expressions with confidence and without pain, discomfort, and dis-ease of the cranial facial complex. Further attributes of oral health are:

- It is a fundamental component of health and physical and mental well being. It exists along a continuum influenced by the values and attitudes of people and communities.
- It reflects the physiological, social, and psychological attributes that are essential to the quality of life.

- It is influenced by the person's changing experiences, perceptions, expectations, and ability to adapt to circumstances. [2]

The role of oral hygiene products has traditionally been to keep the teeth free of stain and to freshen the breath.

Oral hygiene practices are designed to maintain the crown enamel, dentin (if exposed) and gingiva in healthy states. [3]

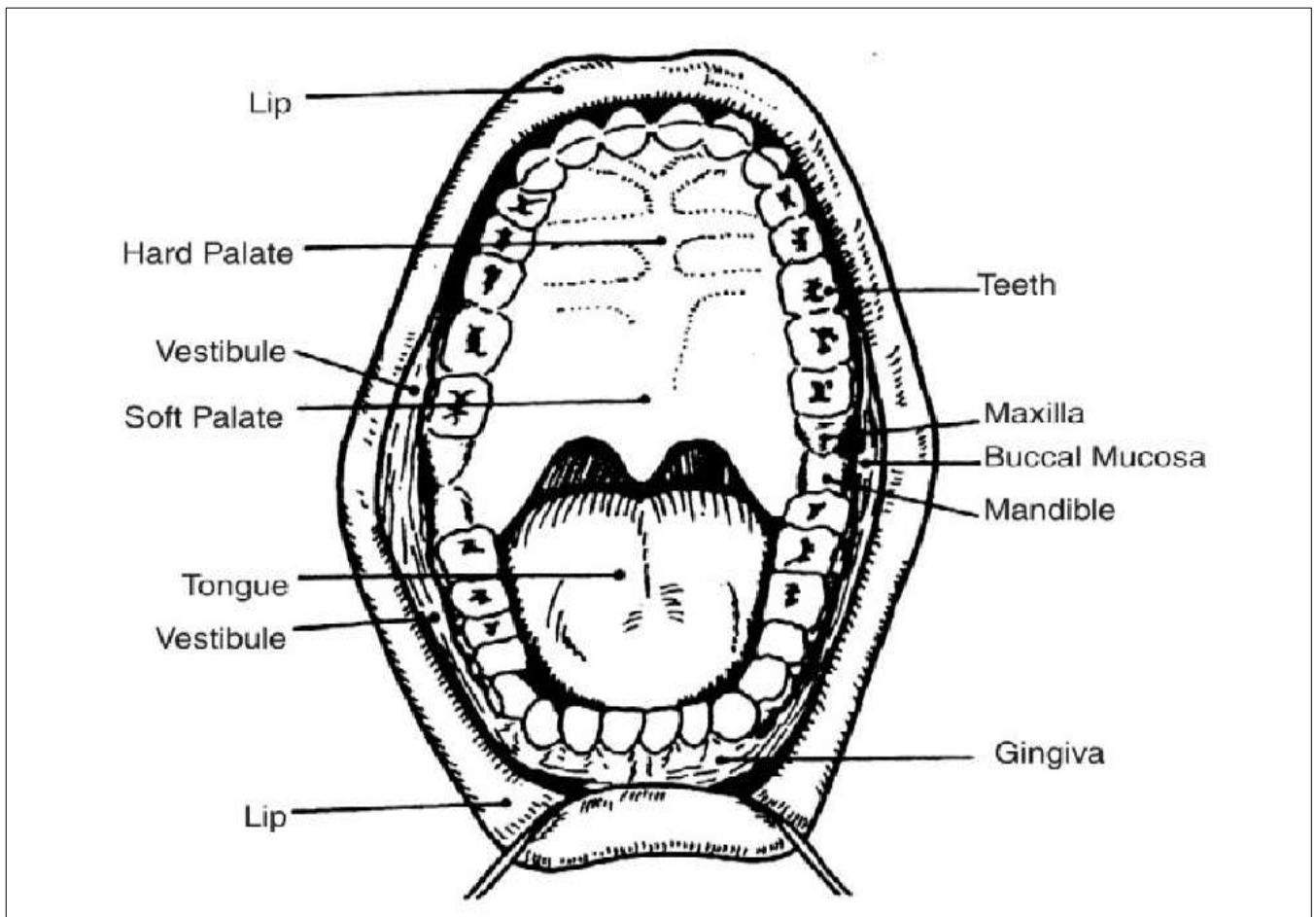


Figure 1. Oral cavity

Streptococcus mutans is the most prominent bacterial group implicated in the formation of dental caries among the various kinds of microorganisms ordinarily present in the oral cavity. As a result, lowering the bacterial burden is an effective preventative measure. [4]

In the oral cavity, the presence of saliva is essential. Its functions is varied but, certainly, the most important is to make the contacts between the different structures of the mouth lubricated. In particular it:

- reduces friction between hard and soft tissues.
- reduces tooth wear .
- reduces friction between the mucous membranes
- lubricates the surfaces of the tongue optimizing the perception of taste; [5]

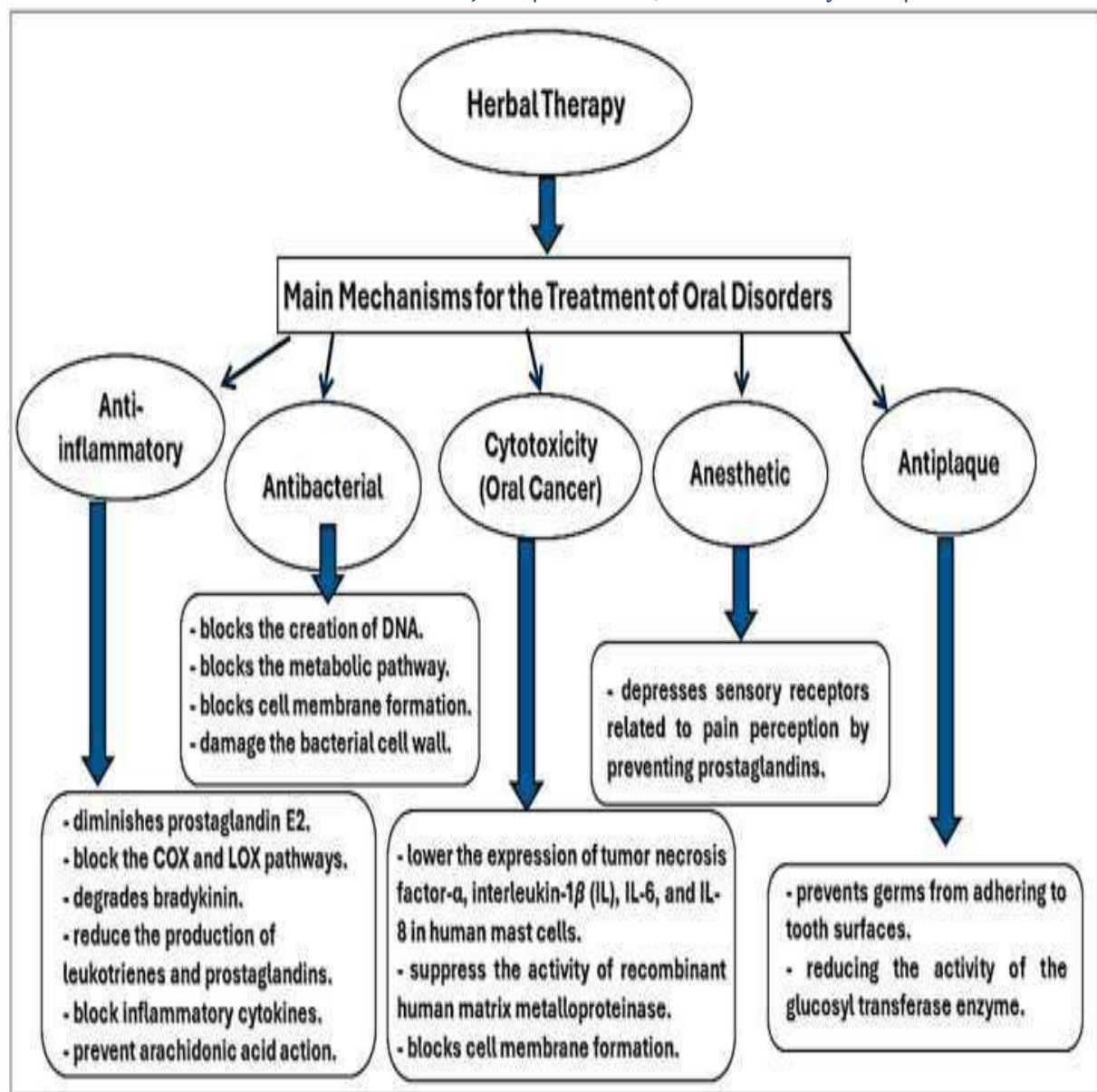


Figure 2. Herbal Therapy

2. Halitosis:

Halitosis is an unpleasant odour in the oral cavity that stimulates to oral health. The bad odour is a taboo that creates hesitation and embarrassment in society.

Halitosis is considered as the social and relational problem. Every person might have experienced the unpleasant odor when speaking in close proximity to the other person. This is also called the 'halitophobia', which is an imaginary breath odour that can even commit to suicide of an individual.^[6]

Halitosis can be a result of both intra-oral and extra-oral causes. Evidence-based treatment of halitosis is always etiology-based. Many advanced diagnostic tests are available to diagnose halitosis. One of the commonly used treatment methods for halitosis is the mouth freshener.

These mouth fresheners are available in the form of sprays, chewing gums, and candy's.^[7]

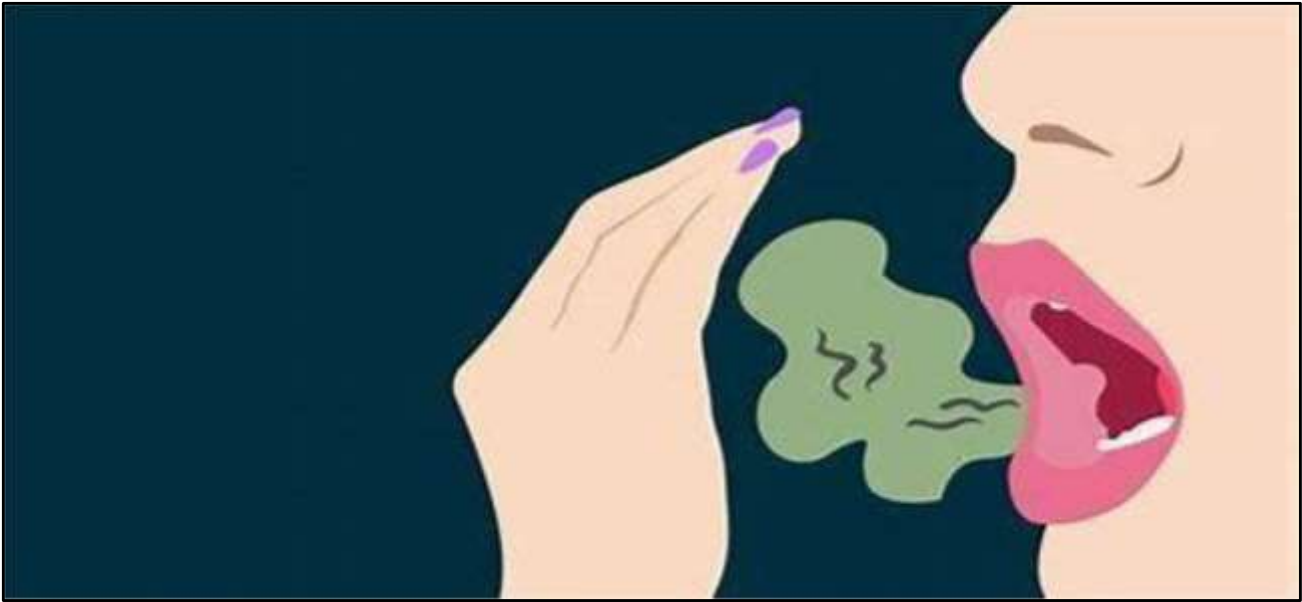


Figure 3. Bad odor

3. Dental Products:

Dental products are mainly used for treating and cleaning the teeth. The products prepared for cleaning surface of the teeth is called dentifrices. The main products used to clean teeth are toothpaste, mouthwash, tooth cleaning powder, chewing gums. These products contain polishing agents, surface active agents, humectant, binding agents. Different methods are used to determine the oral hygiene and its effectiveness. These products do not contain the mono and disaccharides. Natural ingredients are used other than dyes in preparation of dental products.

3.1 Ideal properties of dental products:

Impart no stain in tooth.

Good abrasive effect.

Cheap and easily available.

Keep the mouth fresh and clean

Prolong effect

Non irritant and nontoxic.

[8]

4. ORAL SPRAY:

The first evidence of drug absorption via the buccal mucosa was noted over 100 years ago.¹⁹ Subsequently, in 1879, sublingual administration of nitroglycerine was reported to successfully alleviate the symptoms of classic angina pectoris.²⁰ Since then, oral mucous drug delivery has drawn more and more attention because of its potential advantages over other routes of delivery.

Oral sprays are the fastest, most effective and convenient way to get a daily dose of vitamins, minerals, and other nutritional supplements. The design of oral sprays came out with a purpose to improve patient's compliance. These dosage forms rapidly releases the drug in intra oral cavity, thus obviating the need for water during administration, an attribute that makes them highly attractive for pediatric and geriatric patients who need frequent or immediate medical intervention. Aforementioned problems can be resolved by means of Oral sprays. ^[9]

5. Mouth freshener:

Mouth Fresheners or Halitosis masker is generally consumed to avoid the oral malodour and to get an instant therapeutic benefit. Mouth Fresheners can be formulated in the form of Spray, Granules, powder, strips, etc. Hydrated or dehydrated herbal ingredients are used in the preparation of herbal mouth fresheners which serve as nutritive and taste masking factor.

Herbal leaves comprise various biologically active components, which are accountable for antioxidant, antifungal, antibacterial, anti-inflammatory and chemo preventative activities, which are famous to mankind. Oral cavity gives birth to disagreeable odour called Halitosis or Oral malodour. The crucial manifestation embraces psychosocial awkwardness and anxiety, Halitosis may seem simple and be ignored but it's very awful and causes long term effects. Yet 50% of the public worldwide endures some or the other type of oral Halitosis.

Mouth fresheners and are the majorly credited delivery means of Anti-microbial agents after toothpastes. Herbs are readily available and cost effective which improves the immunity and assist in healing of dental infections. Therefore, the traditional use of herbal mouth freshener removes the infectious agent in mouth due to its antibacterial property. Devoid of chemical ingredients in herbal mouth fresheners gives best results compared to chemical mouth spray.

Mouth freshener is generally used to avoid the oral malodor as a halitosis masker to get an instant therapeutic effect. It keeps the tooth clean, prevents cancer, enhances oral health, fights against cavities, freshens breath, relieves from cold and cough, helps in reducing body weight and so on. Herbal medicine has significantly impacted the growth of dental treatment in dental fraternity. Some of the commonly used herbs in dental therapy are clove, tea tree oil, coconut water, German chamomile, cranberry, licorice, neem, *morindacitrifolia*, *arctiumlappa*, evening primrose oil, grape- seed extract, papaine, etc.^[10]

5.1 How does a mouth spray address dry mouth and bad breath?

When the product is sprayed inside a mouth, it leaves a protective film of moisture on the oral tissues. The film provides temporary relief from dry mouth. Even though it acts as a saliva substitute, the spray is devoid of nutritional compounds the natural saliva contains.

In general, the lack of salivary flow allows harmful bacteria to thrive inside our mouths. As the mouth sprays provide a quick fix to this condition, bacteria proliferation is prevented hence that the nasty smell emitted by them is also addressed.

Meanwhile, imbalance in the acidic pH levels of saliva after taking foods also causes mouth dryness and bad breath for a few minutes. The sugarless sweeteners in mouth freshener sprays help neutralize those acidic compounds so that you can address dryness and mask bad breath instantly.^[11]



Figure 4. Mouth freshener

5.2 Advantages:

- **Natural ingredients:**

Mint, Several Mouth Fresheners are formulated by using natural ingredients like cardamom, clove, fennel, etc. which are easily available and provide breath refreshment.

- **No Artificial Chemicals:**

Since Mouth fresheners are used for oral hygiene, herbal drugs are the choice because they are free from artificial colour, flavors, and preservatives.

- **Digestive Benefit:**

The majority of herbal ingredients aid in the Digestion process and soothe the stomach after meals.

- **Alleviates Bad Breath:**

Without the use of chemicals, the herbal ingredients neutralize the odor-causing bacteria and provide long-lasting freshness.

- **Pleasant Taste:**

Herbal drugs provide pleasant taste so that one can enjoy the freshness throughout the day. ^[12]

5.3 Disadvantages:

- **Oral Health Implications:**

One significant side effect of using mouth fresheners is their impact on your oral health. Many mouth fresheners contain high sugar content, which can contribute to tooth decay and cavities. Additionally, the acidity in some fresheners can erode tooth enamel, leading to long-term dental issues.

- **Addictive Ingredients:**

Some mouth fresheners contain ingredients like nicotine or caffeine, which can be addictive. Continuous use of such fresheners can lead to dependency and withdrawal symptoms when you try to quit. It's essential to be cautious of the ingredients in the mouth fresheners you choose.

- **Digestive Issues:**

Certain mouth fresheners contain artificial sweeteners that can disrupt your digestive system. These sweeteners can cause bloating, gas, and diarrhea in some individuals, Especially when consumed in excessive amounts. It's crucial to monitor your intake of such fresheners.

- **Masking Underlying Problems:**

While mouth fresheners can temporarily mask bad breath, they do not address the root cause. Chronic bad breath may be indicative of an underlying dental or health issue, such as gum disease or an infection. ^[13]

- **Dry Mouth:**

Many mouth fresheners contain alcohol, which can cause your mouth to feel dry. This can make it more difficult to produce saliva, which is essential for neutralizing acids and maintaining a healthy oral environment.^[14]

6. Plant profile:

Herbs have been in use for centuries to prevent and control disease. Herbal extract are effective because they interact with specific chemical receptors within the body and are in a pharmacodynamic sense, drugs themselves
[15]

6.1 Mango:

Common name	: Mango, Mangga
Biological name	: <i>Mangifera indica</i>
Synonym	: Ambrah, Marvo, Aam.
Family	: Anacardiaceae
Part used	: Mango leaves
Action	: Anti-microbial, Anti-inflammatory, Anti-oxidant.
Chemical compositions	: polyphenolics, flavonoids, triterpenoids. Mangiferin a xanthone glycoside major bio-active constituent, isomangiferin, tannins & gallic acid derivatives.



Figure 5. Mango Leaves

➤ Advantages:

- Antibacterial property against certain strains of bacteria.
- Analgesic
- Regulates sugar level.

- Treats restlessness.^[16]

6.2 Clove:

Biological name	: <i>Syzygium aromaticum</i>
Synonym	: <i>Eugenia caryophyllata</i> ,Clove buds, Clove flowers
Family	: Myrtaceae
Part used	: Dried flower buds
Action	: Anti-inflammatory, Antimicrobial, Anaesthetic, Antioxidant Chemical composition : <u>Flavonoids</u> , hidroxi benzoic acids, hydroxycinnamic acids and hydroxyphenyl propens, phenolic acids, gallic acid, kaempferol, quercetin, caffeic, ferulic, elagic and salicylic acids, 89% of the clove essential oil is eugenol and 5% to 15% is eugenol acetate and β -cariofileno, Other <u>volatile compounds</u> present in lower concentrations in clove essential oil are β -pinene, <u>limonene</u> , <u>farnesol</u> , <u>benzaldehyde</u> , 2- heptanone and ethyl <u>hexanoate</u> .



Figure 6. Clove

➤ Advantage:

- Clove oil can stop toothache.
- Eugenol is also used as local anesthetic in small doses.
- Dentists use clove oil as an oral anesthetic and to disinfect the root canals. Antimicrobial properties against fungi and bacteria.
- Antiseptic, Stimulant, Carminative, Aromatic, Flavoring agent. ^[17]

6.3 Fennel:

Biological name	: <i>Foeniculum vulgare</i>
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Synonym : Saunf, Badi, Badishep
 Family : Umbelliferae
 Part used : Dried fruit
 Action : Antibacterial, Antiallergic, Anti-inflammatory, Antistress
 Chemical composition : The main compounds identified were trans-anethole (31.49%), 2-pentanone (25.01%), fenchone (11.68%) and benzaldehyde-4-methoxy (8.01%). Several other compounds were also identified in higher amounts and some compounds were identified in trace amounts. Many compounds have been reported for the first time in the methanolic extract of *F. vulgare*.



Figure 7. Fennel

➤ **Advantage:**

- Chewing of fennels seeds increases the pH of saliva, thus making it a suitable anti-cariogenic agent.
- Fennel seeds are used for digestion.
- It apical shoots is used as stress removal.
- Chewing of fennel seeds is beneficial for oral health and can be used dentifrices.
- It is used for mouth ulcer, gum disorder, constipation. ^[18]

6.4 Peppermint:

Biological name : *Mentha piperita*
 Synonym : Mint, brandy mint, menta, lamb mint.
 Family : Labiatae
 Part used : Leaves
 Action : Anti-inflammatory, anti-bacterial, anti-headache, anti-oxidant. Chemical composition : Peppermint oil contains chiefly-menthol to the extent of 70%

in free, as well as, in the form of esters, depending upon variety (like American, Japanese, Indian). American peppermint oil contains 80% menthol while Japanese oil contains 70-90%. Other important constituents of the peppermint oil are menthone, menth furan, jasmone, menthyl isovalerate, menthyl acetate and several other terpene derivatives. The other terpenes include α -limonene, isopulegone, cineole, p-camphene, etc.



Figure 10. Pepper mint

➤ **Advantages:**

- The oil of *Mentha* is used tropically to treat oral mucosal inflammation.
- It possesses potent anti-bacterial activity against some gram positive and gram-negative bacteria strains and its ability to retard the retention of bacteria in dental bio film.
- It is used for sore throat.
- It is used for headache therapy in combination for relieving patient's headache pain.^[19]

7. Evaluation Parameters of Mouth Refreshing Spray:

1. Visual Inspection:

Visual examination was performed by testing the physical parameters like colour and odour. The appearance of the formulation is evaluated for colour, odour, taste, clarity, presence of oil particles, separation of phase etc. The overall performance is rated as positive & negative and then reported.

2. Viscosity:

By using Brookfield's viscometer, the viscosity of the formulation is measured, to determine the flow property, product performance, stability in administration. Viscosity was calculated by measuring the viscosity value on the specified spindle scale of the viscometer.

3. Spray Angle:

The formulation is sprayed from the height of 5cm above white plain paper. The spray angle is measured between the outer border and central rod tip at 4 different points. This average is then concluded as spray angle. The contact angle is a measurable angle of drop of liquid that forms on the surface of the solid.

4. Spray Pattern:

On a plain white paper, the formulation is sprayed and evaluated the spray pattern as good spray pattern, slightly uneven and uneven spray pattern. The herbal mouth freshener was also evaluated for its spraying pattern by taking a photo with a highspeed camera and the spray angle formed was also measured.

5. PH:

The pH of the herbal mouth freshener is determined by using a pH meter and a beaker containing herbal mouth freshener formulation. Digital pH meter is used to measure the pH of herbal mouth Freshener. About 1ml of prepared mouth Freshener and standard buffer solution is weighed and 50 ml of distilled water is used to dissolve and the pH is measured.

Test for Microbial Growth:

The formulated Mouth freshener was tested for microbial growth by using streak plate agar method. The preparation is inoculated by using streak plate method in the agar plate and also, the control sample is also prepared. These inoculated agar plates are incubated at 37°C for 24 hours in an incubator. The microbial growth is checked after taking the plates out and Comparison is done with the control.

6. Microbiological analysis:

Microbiological analysis was carried out by 1ml sample was taken and suspended in 99 ml of sterilized distilled water as dilution blank. Serial dilutions were prepared. Approximate dilution of samples was transferred aseptically to sterile Petri plates containing 10-15 ml of nutrient broth. After

solidification Petri plate were incubated at 37°C for 24-48 hours. Average count multiplied by the dilution factor was expressed as CFU/ml. ^[20]

7. Determination of Foaming Power:

The product was evaluated for foam ability by taking a small amount of preparation with water in a measuring cylinder initial volume was noted and then shake for 10 times. The final volume of foam was noted. ^[21]

8. Thin layer chromatography:

Thin Layer Chromatography is a technique used to isolate non-volatile mixtures. The experiment is conducted on a sheet of aluminium foil, plastic, or glass which is coated with a thin layer of adsorbent material. The material usually used is aluminium oxide, cellulose, or silica gel. ^[22]

8. Conclusion:

Bad-breath remains a major concern affecting individuals worldwide, leading to social discomfort and anxiety. The use of mouth fresheners, including herbal formulations, serves as an important tool in managing this condition, offering immediate relief and therapeutic benefits.

Herbal mouth fresheners offer distinct advantages over synthetic alternatives, including natural ingredients devoid of harmful chemicals, digestive benefits, and long-lasting freshness. Utilizing scientific methods to evaluate parameters like visual inspection, viscosity, pH levels, and antibacterial activity of the preparation is essential for ensuring the quality and effectiveness of herbal mouth fresheners. These techniques offer valuable insights into their ability to combat bad-breath and to enhance the complete oral hygiene.

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