ABSTRACT

Objective: To discuss the benefits of herbal mouthwashes with the standard chlorhexidine mouthwash. This review is conducted to explore the benefits of herbal mouthwashes.

Methods: Many herbal extracts are now available as mouthwash for maintaining the good oral hygiene. Plaque accumulation and increase in oral microorganisms are the main factors for poor oral hygiene. Herbal extracts such as German chamomile, Terminalia chebula, Aloe vera, Green tea, peppermint satva, turmeric, neem, triphala, pomegranate extracts, guava extract, propolis, alum, darim leaves, mulethi, etc., are similar to chlorhexidine in plaque control and gingivitis reduction. Many herbal mouthwashes contain herbs with anti-microbial property such as neem, yavani satva, nagavalli, Gandhapura taila, plu, Bibhitaka, Ocimum, Echinacea, Chameli leaves, etc. Many herbs are with anti-inflammatory and anti-oxidant property such as neem, clove, triphala (combination of amalaki, haritaki, and vibhitaki), tubi, grapefruit, celery, licorice, katha, spearmint, and chamomile essential oil. Some herbal mouthwash with chamomile extract kills some skin pathogens such as staphylococcus and Candida species. Mixture of Staphyagria, Chamomilla, Echinacea, Plantago, Ocimum, and Citrus extracts used as mouthwash which was is better than chlorhexidine in reducing salivary mutans streptococci count. Hence usage of herbal mouthwash will enhance the oral hygiene comparatively with chlorhexidine mouthwash without any adverse effects.

Result: Though herbal mouthwashes has the ability to maintain good oral hygiene on daily basis, but still it is less effective than chlorhexidine mouthwash during treatments like gingivitis, periodontitis, trauma, etc.

Conclusion: Besides the disadvantages, chlorhexidine mouthwash plays effective role during dental treatments on short term usage. Herbal mouthwashes are suitable for maintaining good oral prophylaxis. Many programs have to be conducted to make them aware about mouthwashes in their oral hygiene.

Keywords: Chlorhexidine, Herbal, Mouthwash, Oral hygiene, Prophylaxis.
growth. Hence, it is used during the treatments such as gingivitis, periodontitis, trauma, and after wisdom tooth extraction.

Mode of action

Chlorhexidine is a broad-spectrum biocide effective against Gram-positive bacteria, Gram-negative bacteria, and fungi. Depending on its concentration, it has both bacteriostatic (inhibits bacterial growth) and bactericidal (kills bacteria) mechanisms of action. Chlorhexidine kills the microorganism by disrupting the cell membrane [10]. Positively charged chlorhexidine attracted toward negatively charged phospholipids in the cell wall and causes rupture which leads to lysis of cytoplasm and end up in cell death. On application in vitro, chlorhexidine can kill nearly 100% of Gram-positive and Gram-negative bacteria within 30 seconds [11].

It provides immediate bactericidal and prolonged bacteriostatic action due to adsorption onto the pellicle-coated enamel surface [12]. Chlorhexidine is active against Gram-positive, Gram-negative, facultative anaerobes, aerobes, and yeasts [13]. Chlorhexidine is ineffective against poliovirus and adenovirus. Since chlorhexidine formulations can destroy the majority of categories of microbes, there is limited risk for the development of opportunistic infections.

In topical applications, chlorhexidine is shown to have the unique ability to bind with the proteins present in human tissues such as skin and mucous membranes with limited systemic or bodily absorption [14]. Protein-bound chlorhexidine releases slowly leading to prolonged activity. This phenomenon is known as substantivity [15] and allows for a longer duration of antimicrobial action against a broad spectrum of bacteria and fungi. In fact, chlorhexidine antimicrobial activity has been documented to last at least 48 hours on the skin [16].

In oral applications, chlorhexidine binds to the mouth tissue, oral mucosa, and teeth. This helps to reduce the bacterial count and prevents dental plaque. It has become the gold standard in dentistry due to its ability to adhere to soft and hard tissue and maintain a potent sustained release [17]. Chlorhexidine has also been applied to medical devices such as dental implants, vascular catheters, needleless connectors and anti-microbial dressings. Chlorhexidine, when applied to or impregnated in medical devices protects against microbial colonization and subsequently biofilm development.

The overdose of chlorhexidine may cause nausea, vomiting, feel like drunken, etc. It may also leads to some side effects such as white patches in mouth or lips, ulcers, swelling of salivary glands, irritation, dry mouth, unpleasant taste, decreased sensation due to an allergic reaction to some individuals.

Although chlorhexidine mouthwash has some side effects being a gold standard mouthwash it is effective in maintaining good oral hygiene during gingivitis, periodontitis, traumas [18], oral cyst [19] and after wisdom tooth extraction. It lasts longer in the mouth than other mouthwashes. It is required for healing and regeneration of oral tissues. However, continuous use of products containing chlorhexidine for long periods can cause stains on teeth, tongue and gingiva also on silicone and resin restorations, alter taste sensation, sweeping, xerostomia, ulcers, etc. Hence, it cannot be used for daily prophylactic measures.

Other chemical mouthwashes are made of potassium nitrate, hydrogen peroxide, iodide, etc. Some of the harmful chemicals in mouthwashes are thymol, hexetidine, methyl salicylate, eucalyptol, benzoalkonium chloride, cetlypridinium chloride, methyl paraben, alcohol, and hydrogen peroxide which causes harmful effects in our body.

Iodine-based mouth rinse was clearly effective in reducing the amount of harmful bacteria in the mouth when used daily. However, the most interesting part is that it significantly lowers cholesterol levels in the patients. In addition to iodine’s strong antibacterial and antifungal properties, which make it an ideal mouth rinse which is available in markets. In a recent study, the effect of povidone-iodine and chlorhexidine mouthwash is compared on plaque Streptococcus mutans count after restoration. After using mouth rinse, there was a significant reduction in S. mutans count in the population. After 3 months interval, the count started to gradually increase with iodine mouth rinse [20].

Hydrogen peroxide is a liquid substance which is also commonly used as a mouthwash. It works to destroy bacteria via oxidation damage. This oxidation creates free-radicals which can ultimately destabilize the molecular structure and cellular strength of the bacteria cells. Hydrogen peroxide is also used in teeth bleaching agents to whiten your teeth. However, this does not mean that hydrogen peroxide will be effective at whitening your teeth. The amount of hydrogen peroxide you use determines the safety of the mouthwash. The problem with hydrogen peroxide is that it has a cytotoxic effect on the dental pulp cells, which means that it literally kills them.

Alkaline mouthwash is predominantly used as mouthwash. It helps in eliminating bad breath, soothes mouth ulcers, restores pH balance, reduces acidity, low alcohol content, and reduces stinging and burning.

The use of sodium bicarbonate as a mouthwash helps in patients with suffering from xerostomia or erosion due to its ability to increase salivary pH and suppress the growth of acid producing microorganisms such as S. mutans and also helps in treatment for mouth ulcers [21,22].

This medication is used to prevent cavities and to reduce pain from sensitive teeth (dental hypersensitivity). Sodium fluoride works by making the teeth stronger and more resistant to decay caused by acid and bacteria. Potassium nitrate works by calming the nerves in the teeth. Mouth/gum irritation may rarely occur.

HERBAL MOUTHWASH

Herbal mouthwash contains a natural ingredients called phytochemical that contains desired anti-microbial and anti-inflammatory effect. Herbal mouthwash becomes more popular they work without alcohol, artificial preservatives, flavor, or colors [5]. As it contains natural herbs that have natural cleansing and healing property to teeth and gums. Many herbal mouthwashes contain herbs with anti-microbial property such as Neem, Yavani satva, Nagavalli, Gandhapurataila, Pilu, Bibhitaka, Ocimum, Echinacea, Chameli leaves, etc [23]. Some of the herbs that are used in mouthwashes are clove, which is traditionally used for oral health because of their anti-septic, antibacterial, and antiviral property, peppermint which gives cooling effect to the mouth, plantain has ability for speed wound healing and many of the herbs contain anti-microbial, anti-inflammatory, antioxidants, antiseptic properties such as neem, clove, triphala with combination of amalaki, haritaki, vibhitaki, tulsi, celey, licorice, oak tree, bakula, katha, spearmint, turmeric, and Aloe vera [5].

Almost all chemical mouthwashes contain alcohol and fluoride which is toxic to our body in overdose. Hence, most herbal mouthwashes are safe alternative to pregnant women, people with dry mouth, diabetic and to children. Instead of artificial dyes, herbal mouthwash made of vegetable juices such as beetroot, mato, carrot, and annatto to add color.

Vegetable glycerine, stevia, and xylitol are used as a sweetener in which foster bacteria does not grow. Vegetable glycerine is derived from soy, and it is clear, colorless, and odorless liquid with an incredibly sweet taste used as an agent in toothpaste, cosmetics, shampoos, soaps, herbal remedies, pharmaceuticals, and other household items. Because it is soluble in water and alcohol which also that aids herbalists in extracting botanical properties from plant materials without the use of alcohol. Stevia is a natural sweet herb used by diabetic patient and it also inhibits the growth and reproduction of some bacteria and other infectious organisms, including the bacteria that cause tooth decay and gum disease. Xylitol is a natural sweetener which helps to improve the dental health, to prevent bacteria from sticking to teeth and also freshens the breath and cleans the mouth. Essential oils used to freshen
Psidium guajava, or pipe betle, is a mouthwash that contains the medicinal properties of cloves and licorice. Clove has anti-cancer, anti-inflammatory, anti-bacterial, and antiseptic properties, while licorice has anti-inflammatory and anti-microbial properties. Pomegranate extract can reduce the signs of chronic periodontitis [29].

Neem as mouthwash has been shown to have significant effects on both Gram-positive and Gram-negative organisms which include Escherichia coli, streptococcus, and salmonella. Extracts from neem inhibit the growth of S. mutans and used in the treatment of periodontitis [30]. It contains anti-microbial, anti-inflammatory, and anti-oxidant property.

Tulsi (Ocimum sanctum) as a mouthwash is quite effective for the ulcer and infections in the mouth. It also helps in eliminating bad breath; also prevent gum disorder [31] as it has anti-oxidant and anti-inflammatory property.

Green tea (Camellia sinensis) can be used as a gargle or mouthwash to treat dental decay, halitosis, laryngitis, mouth sores, plaque formation, sore throat, thrush, tonsillitis and helps in controlling dental plaque accumulation and free from side effects [32].

Bee propolis has proved successful against dental disorders such as plaque accumulation, cavities, gum disease and mouth ulcers, as well as acute and chronic periodontitis [30]. It contains anti-microbial, anti-inflammatory, and anti-oxidant activity. Besides all herbs, clove and licorice containing mouthwash has more benefits than other herbal mouthwashes.

Herbal mouthwashes are gentle enough for daily use and provide less abrasive alternative to more potent prescription formulations meant for short term use. Herbal mouthwashes do not contain any alcohol and other preservatives that cause dry mouth. Herbal mouthwashes are suitable for oral prophylaxis. As it contains herbs and its extracts, that can maintain good oral hygiene without causing any toxic effect to our body. For daily use, herbal mouthwashes are more preferable than chlorhexidine mouthwash considering its side effects on long term usage.

A. vera mouthwash, mixture of Terminalia chebula and cinnamon, mixture of Staphysagria, Chamomilla, Echinacea, Plantago, Ocimum, and cistus extracts, mouthwashes with turmeric, neem and triphala, mixture of Acacia Arabica, Punica granatum, Chameli leaves, Glycyrrhiza glabra and neem shows significant reduction of plaque indices and gingival scores comparatively to chlorhexidine mouthwash and can be a better alternative to chlorhexidine mouthwash [1,33,34].

Comparative study on chlorhexidine versus herbal

Some salivary micro floras like S. mutans play an important role in initiation and progression of dental caries [35,36]. Although chlorhexidine has anti-microbial activity and good choice for effective plaque control by dentist in clinics, it cannot be used for long duration because it has various side effects such as taste alteration, supragingival calculus formation and desquamation of oral mucosa and also restricted usage in pediatric patients [37,38]. It also causes extrinsic staining while using beverages like tea and coffee [33]. Numerous studies have been conducted in comparison of chlorhexidine with herbal mouthwash. Although the herbal mouthwashes is less effective than chlorhexidine mouthwash, it can be used as a good oral prophylaxis as it does not have any adverse effects. Some herbal mouthwashes contains herbal extracts from T. chebula, A. vera, Azadirachta indica, pipe betle, O. sanctum, cinnamon and T. chebula extract in combination, green tea, peppermint satva, triphala, neem, pomegranate extracts, guava extracts, propolis, alum, darim leaves, mulethi, etc., are similar to chlorhexidine mouthwash in plaque control. Many herbal mouthwashes do not contain any alcohol and other preservatives that cause dry mouth. Herbal mouthwashes are gentle enough for daily use and provide less abrasive alternative to more potent prescription formulations meant for short term use.

Table 1 shows that comparison of herbs based on their anti-inflammatory, antibacterial, anti-oxidant, antiseptic, anti-cancer, immunostimulator, and anti-microbial activity. Besides all herbs, clove and licorice containing mouthwash has more benefits than other herbal mouthwashes.

| S. No. | Herbs | Anti-inflammatory | Anti-bacterial | Anti-oxidant | Antiseptic | Anti-cancer | Immunostimulant | Anti-microbial |
|--------|-------|------------------|---------------|-------------|-----------|------------|----------------|---------------|
| 1      | Clove | +                | +             | -           | -         | -          | -              | -             |
| 2      | Triphala (a mixture of amalaki, haritaki, vibhitaki) | +    | -             | +           | -         | -          | -              | -             |
| 3      | Tulsi | +                | -             | +           | -         | -          | -              | -             |
| 4      | Celery (teeth whitening potential) | +    | -             | -           | -         | +          | -              | -             |
| 5      | Licorice | +              | +             | +           | -         | -          | -              | -             |
| 6      | Oak tree | -              | +             | +           | -         | -          | -              | -             |
| 7      | Bakula (astringent) | -   | +             | -           | -         | -          | -              | -             |
| 8      | Katha (astringent) | +   | +             | -           | -         | +          | -              | -             |
| 9      | Spear mint | +          | -             | +           | -         | -          | -              | -             |
| 10     | Charmomile | +            | -             | +           | -         | -          | -              | -             |
| 11     | Ocimum | -               | -             | -           | -         | -          | -              | +             |
| 12     | Echinacea | +            | -             | -           | -         | +          | -              | -             |
| 13     | Terminalia chebula and Cinmanon | -      | +             | -           | -         | -          | -              | -             |
| 14     | Neem, yavani satva, nagavalli, gandhapura taila, pilu, bibhitaka, peppermint satva, ela | +   | -             | -           | -         | +          | -              | -             |
Some herbal mouthwash with chamomile extract kills pathogens such as staphylococcus candida species. A study provides a comparison between chlorhexidine and herbal mouthwash. Nearly 0.2% of CHXG causes brown staining of teeth, desquamation of oral mucosa and irritation in mouth which was not observed with herbal mouthwash containing 20% of babool oil, 1% of darum leaves, 10% of chameli leaves as anti-microbial agent, 5% mulethi as astrigent, 2% neem and other contents such as alam, suhaga, kapoor, laung, and methanol. This mouthwash was a better alternative to 0.2% CHXG. Anti-gingivitis and plaque inhibiting properties of chlorhexidine and herbal mouthwash are similar [34]. Another study compared chlorhexidine with German chamomile and its extract produces 0.31 reduction in gingival index scores [37]. Nearly 50% of T. chebula which is anti-plaque agent and 50% cinnamon extract which has antibacterial and anti-fungal properties was compared with chlorhexidine. Reduction in plaque was noted. T. chebula extract is effective against Helicobacter pylori, Xanthomonas campestris pr.citr and Salmonella typhoid, herpes simplex virus Type-1, HIV-1. It has similar effect on plaque control and alters the oral flora [1]. Mixture of herbal extract from myrrh, Echinacea and chamomile inhibit the growth of S. mutans and Actinomyces viscosus. A. vera mouthwash contains vitamin C, hyaluronic acid, and dermatan sulfate which are involved in collagen synthesis and hence relief swelling and bleeding gums. It has a similar anti-plaque action to chlorhexidine [39]. Recent study on mixture of Stephysagria, Chamomilla, Echinacea, Plantago, Oeicnum, and cat's ears extracts used as mouth wash which was better than chlorhexidine in reducing salivary mutants streptococci count [33]. Herbal extracts such as chamomile retard biofilm formation and prevent gingival inflammation, Ocimum have anti-microbial effect on S. mutans, Echinacea which is an immunestimulator, anti-microbial, and anti-inflammatory agent. Green tea mouthwash could reduce the aerobic mouth bacterial load and prevents plaque accumulation. It comes over halitosis due to infection of the bacteria and it is safe and non-toxic [40]. Many comparative studies have been conducted in benefits of herbal mouthwash with chlorhexidine mouthwash.

SUMMARY

Many studies have been conducted to compare chlorhexidine with many herbal extracts. Although herbal mouthwashes have the ability to maintain good oral hygiene on daily basis, still it is less effective than chlorhexidine mouthwash during treatments such as gingivitis, periodontitis, and trauma. Many herbal extracts contain similar anti-plaque, anti-bacterial property with chlorhexidine mouthwash. Hence, it is most preferable than chlorhexidine for post-treatment prophylaxis because chlorhexidine has some adverse effects on long term use. Besides all herbal mouthwashes fruit extract containing mouthwash will be more effective against the microorganism present in the oral cavity without any side effect on over usage.

CONCLUSION

The aim of this review is to give an overview of mouthwashes and to compare the Chlorhexidine mouthwash with herbal mouthwash to aware people about the uses of herbal mouthwashes. Besides the disadvantages, chlorhexidine mouthwash plays effective role during dental treatments on short term usage. Herbal mouthwashes are suitable for maintaining good oral prophylaxis. Many programs have to be conducted to make them aware about mouthwashes in their oral hygiene.

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