

RESEARCH ARTICLE

NATURAL CHEMISTRY

HERBAL MOUTHWASHES – A GIFT OF NATURE

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ABSTRACT

The importance of mouth and teeth cleanliness has been recognized from the earliest days of civilization to the 21st century. Patients and oral health practitioners are faced with a multitude of mouthwash products containing many different active and inactive ingredients. Making informed decisions as to the suitability of a particular product for a particular patient can be a complex task. Although many popular herbal products have helped to control dental plaque and gingivitis, they have been used for a short time and only as an adjunct to other oral hygiene measures such as brushing and flossing. Various herbal products and their extracts such as Guava, Pomegranate, Neem, Propolis, Tulsi, Green Tea, Cranberry, Grapefruit etc, have shown significant advantages over the chemical ones. Natural mouthwashes may offer significant advantages over the chemical ones. If such mouthwashes can be formulated which can be easily prepared and used safely by people at home using natural products, it may lead to improvement in the general dental health of the population. This review is an attempt to outline such natural substances, which may be used as effective mouthwashes.

KEYWORDS

herbal, mouthwash, plaque, gingiva

INTRODUCTION

Ancient Egyptians are known to be responsible for the first artistic drawings 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 AD) whose writings served as a medical textbook, suggested for treatment of bad breath a mouthwash mixture of the following: a decoct of the leaves of the olive tree, milk, the juice of pickled olives, gum myrrh with wine and oil, pomegranate peelings, nutgalls, and vinegar. The ancient Romans included teeth cleaning as part of their religious ceremonies. The patriarchy required their slaves to clean their teeth. The Romans included a secret ingredient in their mouthwash: human urine. They imported urine from Portuguese people because they thought it had more strength. Until the 18th century, urine continued to be an active ingredient in toothpaste and mouthwash because of the ammonia's cleansing abilities (1).

Mouthrinses are widely used as adjuncts to oral hygiene and in the delivery of active agents to the teeth and gums. The ability of these rinses to influence plaque formation and to alter the course of gingival inflammation has been extensively studied. Natural products have been used for folk medicine purposes throughout the world for thousands of years. Many of them have pharmacological properties, such as antimicrobial, anti-inflammatory and cytostatic effects. They have been recognized as useful for human medicine (2).

Use of guava (*Psidium guajava*) as a mouthwash

In southern Nigeria the twigs are used as chew sticks and the presence of bioactive compounds comprised of saponins, tannins,

flavonoids, alkaloids is responsible for their effectiveness. Chewing sticks when used without toothpaste are very efficient, effective, and reliable for cleaning teeth. The teeth of chewing sticks users are usually strong, clean, fresh, and devoid of dental plaques and caries (3).

In Brazil guava is considered an astringent and diuretic and is used for the same conditions as in Peru. Decoction is also recommended as a gargle for sore throats, laryngitis and swelling of the mouth. Chewing sticks when used without toothpaste are very efficient, effective, and reliable in cleaning the teeth of many people in Southern Nigeria. The teeth of the users of chewing sticks are usually strong, clean, fresh, and devoid of dental plaques and caries. These results indicate the basis for the preventive and protection of the tea against caries and plaques by the samples used. In Ghana and in Nigeria the leaves are chewed to relieve toothache. A decoction of the root-bark is recommended as a mouthwash for swollen gums and decoction of the leaves makes an efficacious gargle for swollen gum and ulceration of the mouth and also for bleeding gums (4).

Use of pomegranate (*Punica granatum*) as mouthwash:

Pomegranate is currently finding important applications in the field of dental health. Clinical studies have shown that this popular antioxidant superstar attacks the causes of tooth decay at the biochemical level, with remarkable vigour (5,6,7,8,9). When used regularly in combination with toothpaste that has been reinforced with bioactive botanical extracts, pomegranate containing mouthwash may fight dental plaque and tartar formation by inhibiting the activities of the microorganisms

that cause plaque. Additionally, pomegranate compounds possess anti-inflammatory properties that may help soothe irritated tissues (10,11).

Fascinating research shows that pomegranate extract suppresses the ability of these microorganisms to adhere to the surface of the tooth (5). The trick is to inhibit a common species of *Streptococcus*, preventing it from producing chemicals that create favorable conditions for fungi and other microorganisms to thrive. Plaque may involve four or more different microorganisms combining forces to colonize the surface of the teeth. Remarkably, nature's own pomegranate fights the organisms' ability to adhere by interfering with production of the very chemicals the bacteria use as "glue" (12).

A study conducted at the Human Nutrition Center at Ohio State University in 2007 examined the effects of using a mouthwash containing pomegranate extract on the risk of gingivitis. Investigators noted that pomegranate's active components, including polyphenolic flavonoids (e.g., punicalagins and ellagic acid), are believed to prevent gingivitis through a number of mechanisms including reduction of oxidative stress in the oral cavity, (13,14,15) direct antioxidant activity; anti-inflammatory effects;(16,17) antibacterial activity;(18) and direct removal of plaque from the teeth (8). They also noted that a published pilot study has already shown that pomegranate extract can reduce the clinical signs of chronic periodontitis (7).

For the Ohio State study, researchers recruited 32 healthy young men and women, who were randomly assigned to rinse with pomegranate mouthwash, or placebo, three times daily for four weeks. Subjects were instructed to rinse for five minutes per rinse. Saliva samples were evaluated for a variety of indicators related to gingivitis and periodontitis. Subjects rinsing with pomegranate solution experienced a reduction in saliva total protein content which is normally higher among people with gingivitis (19) and may correlate with plaque-forming bacterial content (20).

Pomegranate-treated subjects also experienced significant decreases in the

salivary activity of the enzyme aspartate aminotransferase. This enzyme is considered a reliable indicator of cell injury and is elevated among patients with periodontitis (21). Pomegranate rinsing also lowered saliva activities of alpha-glucosidase, an enzyme that breaks down sucrose (sugar), (22) while it increased activities of ceruloplasmin, an antioxidant enzyme (23).

Use of neem (Azadirachta indica, A.indica) as a mouthwash

The first known use of neem by the Harrappa culture in ancient India dates back 4500 years. The history of the Neem tree is inextricably linked to the history of the Indian way of life. Today, neem extracts are used to treat various skin diseases, as an antiseptic substance, against endo and ectoparasites or simply as a herbal mouthwash (24). Neem extract has also an excellent effect as a non-toxic repellent, insecticide and pesticide (25). Almost every study of neem notes its antibacterial properties, but the more recent studies typically mention it in passing and emphasize newer discoveries or focus on a more specific use. Most of this work has been done in laboratories because treating bacteria (unlike viruses or cancer) is relatively straight-forward. In test tubes, neem has been shown to have significant effects on both gram-positive and gram-negative organisms and other bacteria that cause a wide array of human and animal diseases including *E. coli*, streptococcus and salmonella. Some of the more recent work has focused on oral care, a critical issue in both developing countries where professional dental care is limited and in developed nations where populations are aging. Extracts from neem sticks or bark have been shown to inhibit the growth of streptococcus mutans (26).

Wolinsky et al have examined the inhibitory effects of aqueous extracts of neem, derived from the bark-containing sticks (Neem stick) of *A. indica* upon bacterial aggregation, growth, adhesion to hydroxyapatite, and production of insoluble glucan, which may affect in vitro plaque formation. The Neem stick extract and the gallotannin-enriched extract from *Melaphis chinensis* inhibited insoluble glucan synthesis.

Incubation of oral streptococci with the Neem stick extract resulted in a microscopically observable bacteria aggregation. These data suggest that Neem stick extract can reduce the ability of some streptococci to colonize tooth surfaces (26).

In dentistry, *A. indica* provide abbreviation has also demonstrated a good efficacy in the treatment of periodontal disorders (27). In a small trial from India, it was suggested that a dental gel containing *A. indica* extract has significantly reduced plaque index and bacterial count as compared to positive controls (chlorhexidine 0.2%). *Streptococcus mutans* (*S. mutans*) provide abbreviation in the saliva was found to be reduced significantly (28). The positive effect on dental health has been reported in epidemiological studies such efficacy of the herbal mouthrinses extract and the low dental caries among other natural bioactive products users (29, 30).

Use of propolis as mouthwash

Bee propolis has proved successful against a range of dental disorders - from plaque and cavities to gum disease and mouth ulcers, as well as having other health benefits. Added to toothpaste, it prevents periodontal disease, and is antiplaque/anti-inflammatory (31). It can even be used as a dental adhesive and anaesthetic. In one Russian report, the authors suggest adding a 4-per-cent alcohol solution of bee-propolis 'glue' to the root-canal filler during root-canal treatment. As well as fighting against acute and chronic periodontal infection, the glue relieves pain and helps bone regeneration. In one Brazilian study, patients used a propolis mouthwash for 45 days after oral surgery. The researchers concluded that it not only aided the repair of the surgical wounds, but again had painkilling and anti-inflammatory effects (32).

In another study (double-blind and crossover) of propolis mouthwash, six volunteers who used no other oral hygiene save the mouthwash - twice a day for three days - had significantly less dental plaque than those who used a placebo (33). A laboratory study using saliva samples from 25 healthy individuals and 25 patients with chronic peridontitis showed

significant inhibition of microbial growth by propolis in both groups (34).

Use of Tulsi (*Ocimum sanctum*) as a mouthwash

Tulsi is a small plant, sub-shrub which has multiple uses. Ayurveda mentions the importance of medicinal uses of it. The leaves are quite effective for the ulcer and infections in the mouth. A few leaves chewed will cure these conditions. The herb is useful in teeth disorders. Its leaves, dried in the sun and powdered, can be used for brushing teeth. It can also be mixed with mustered oil to make a paste and used as toothpaste. This is very good for maintaining dental health counteracting bad breath and for massaging the gums. It is also useful in pyorrhea and other gum disorders. The anti-inflammatory and anti-infectious properties of tulsi make it a powerful treatment for gum disease (35).

Use of green tea (*Camellia sinensis*) as a mouthwash

It can be used as a gargle or mouthwash to treat dental decay, halitosis, laryngitis, mouth sores, plaque formation, sore throat, thrush, and tonsillitis. As a compress thyme treats bronchitis, bruises, colds, congestion (in the lungs), flu, insect bites, and wounds. It can be prepared as a soak to treat fungal infections such as athlete's foot, ringworm, and parasites such as crabs, lice, and scabies or as a douche to deter *Candida*. In a study, the formulation and evaluation of green tea mouthwash as a new, safe and nontoxic product for children and pregnant women was evaluated. Green tea mouthwash has been shown to effectively reduce plaque accumulation, and is free from side effects as of chemical mouthwashes (36).

Use of cranberry (*Vaccinium macrocarpon*) juice as mouthwash

Native Americans were the first who took advantage of cranberries. They mixed deer meat and mashed cranberries to make pemmican-survival food.

A study published in the *Journal of the American Dental Association* reported that a

unique cranberry juice component, a high-molecular-weight nondialysable material (NDM), has the ability to reverse and inhibit the co-aggregation of certain oral bacteria responsible for dental plaque and periodontal disease *in vitro* (37). In addition to cranberry, NDM was isolated from blueberries, mangos, peaches, plums and raspberries. Only weak activity was found in blueberry and the other fruits tested showed no inhibition activity. *Critical Reviews in Food Science and Nutrition* reported on a preliminary clinical trial using a mouthwash containing cranberry NDM (38).

Use of Sodium bicarbonate as a mouthwash

A mouthwash can be prepared by dissolving one teaspoon of sodium bicarbonate in a glass of water. It is recommended in patients suffering from xerostomia or erosion due to its ability to increase salivary pH and suppress the growth of aciduric micro-organisms such as *S. mutans*. Sodium bicarbonate can improve taste and it neutralises acids and thus prevents erosion. It is bland and will not irritate the oral mucosa in patients with xerostomia or oral ulcerative disease (39, 40).

Use of Alum as a mouthwash

Alum containing mouthwashes have also been used over a period of time and have been shown to be effective in plaque reduction. A study has evaluated the effectiveness of daily supervised rinsing with specially formulated alum containing mouth rinse on plaque and gingivitis inhibition. The results of this 2 week

study demonstrate that a mouth rinse containing 0.02 M (molar solution conc) aluminium has significant effect on plaque inhibition (41).

Oil pulling therapy

Oil pulling or oil swishing, is a traditional Indian folk remedy that involves swishing oil in the mouth for claimed oral and systemic health benefits. The practitioner rinses their mouth with approximately one tablespoon of oil (sesame, sunflower and coconut oils are the most recommended) for 15–20 minutes on an empty stomach, for example first thing in the morning, before eating/drinking, then spits the oil out. Saline or salt water gargling is also an age old proven and effective mouthwash, which is still widely used by almost all people (42).

Use of grapefruit (*Citrus paradisi*) extract as mouthwash

The grapefruit (*Citrus paradisi*) extract contains antioxidants (43). Hence its application as a mouthwash can be explored.

CONCLUSION

An attempt has been made to outline some of the commonly available herbs and plants, and certain fruits, 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

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