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HERBAL MOUTHWASH FOR THE TREATMENT OF DENTAL CARIES

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ABSTRACT In terms of overall health, oral health is crucial. People may experience more oral health issues today, such as plaque, gingivitis, sore throats, and periodontal disease. Various formulations are created to maintain good oral health. For the purpose of preventing plaque buildup, bad breath, toothaches, and bacteria, mouthwash is advised. Herbal mouthwash is favored compared to chemical mouthwash since it has fewer negative effects and is less poisonous, irritating, and contains no alcohol. Due to their antiviral and antibacterial effects on human microorganisms, medicinal plants play a significant role in the treatment and prevention of disease. The herbs that are effective in dentistry are cinnamon, neem, guava, pomegranate, Basil, wintergreen, peppermint, miswak, and clove. Mouth rinses that can be reliably made and administered to homeowners using organic elements may improve the general oral health of the population. One of the most prevalent and significant oral health problems that exists nowadays is dental caries, a debilitating condition that is specific to humans. Prevention is less expensive. This review's main objective is to highlight natural mouthwash as a means of maintaining dental health.

KEYWORDS : Mouthwash, Caries, Herbal, Anti-bacterial

INTRODUCTION

Herbal Mouthwash:

When using a mouthwash, one keeps a medicated solution dentifrice in their mouth and utilizes their perioral muscle to swish it about their mouth to get rid of any oral bacteria (Manipal et al., 2016) Its main purpose is to maintain oral hygiene (Panda, 2000). Three distinct processes are used to make mouthwash (Sharma, n.d.)

1. Antibacterial based mouthwashes;
2. Fluoride-containing mouthwashes;
3. Mineral-based mouthwashes.

Mouthwashes occur in a variety of forms, including cosmetic and therapeutic mouthwashes. Masks foul breath with a flavouring ingredient that gives you fresh breath (Takenaka et al., 2019). Mouthwashes serve a variety of functions, such as removing food particles from the mouth and inhibiting the growth of bacteria (Sharma, n.d.). Both chemical and natural mouthwashes are readily available (Chowdhury et al., 2018). Because of their antibacterial and antioxidant characteristics, herbal mouthwashes are currently quite popular (Farjana et al., 2014). Herbal plants have a broad spectrum of medical uses and are essential in the cure for numerous illnesses (Banu & Gayathri, 2016).

Quality of life may be significantly impacted by oral health and hygiene. Along with the rise in oral cases, there has been a general increase in demand for prevention (*PDFfiller - Salvadora-Persica-Miswak-Mouthwash-a-Promising-Home-Care-Agent.Pdf*, n.d.). Because they contain substances like chlorine dioxide, an instant whitener, and painkillers in addition to having negative side effects and being inexpensive, chemical mouthwashes tend to discolor teeth (*(PDF) Formulation and Evaluation of Herbal Mouthwash against Oral Infections Disease*, n.d.) (*RJPT - Antimicrobial Effect of Mouthwashes: An In Vitro Study.*, n.d.). Children and teenagers who neglect their oral health are more likely to develop cavities (*PDF) Formulation and Evaluation of Herbal Mouthwash against Oral Infections Disease*, n.d.).

Dental pain, also referred to as toothache, is a type of discomfort that affects the tissues that support the teeth. Common causes include pus collection, pulp inflammation & so on (Nuraskin et al., 2021). Dental biofilms are a major contributor to dental cavities, gingivitis, and periodontitis (Takenaka et al., 2019). Poor dental hygiene is the root cause of periodontal disease, a disorder that harms the tissues that support the teeth (Jalaluddin et al., 2017). A person with halitosis releases an offensive odour from their mouth. It is also referred to as poor breath and oral malodor (*RJPT - Halitosis: A Short Review*, n.d.).

Mouthwash can be used in the following cases:(Dr. Preethi, 2020)

1. Gum disease
2. Halitosis
3. Periodontal disease
4. To maintain septic sockets
5. To prevent plaque
6. To relive pain
7. To efficiently supply fluoride to avoid dental caries
8. Lessen inflammation & Breath freshner

Advantages of mouthwash:

1. Fresh breath
2. Helps remove food and dirt caught between the teeth
3. Prevent the accumulation of space
4. Helps to prevent cavities
5. Whitens the teeth

Disadvantages of the mouthwash:

1. For kids under the age of six, mouthwash can be harmful.
2. Mouthwash can discolour and darken teeth.
3. Certain mouth tissues may become damaged.
4. A lot of mouthwashes contain alcohol, which increases tooth sensitivity.

Herbs use in mouthwash preparation:

Cinnamon (Ceylon cinnamon, Chinese cassia, Cortex cinnamoni): It is made from the dried bark of Cinnamomum zeylanicum (family Lauraceae). Volatile oil, calcium oxalate, negligible amounts of ketones and alcohols, and starch are among its constituents. It is commonly grown in India, Brazil. Cinnamon is utilized as an aromatic, carminative, flavouring, analgesic, antibacterial, and antifungal, among other things (Evans, 2009). Cinnamon's essential oil and extract are separated from its leaves, bark, fruits, flowers, and buds (Yanakiev, 2020).

Clove (Clove flowers, Clove buds):
Cloves come from Eugenia caryophyllus Thumb, a plant in the Myrtaceae family, which are dried flower buds. It is an Indonesian

native. Its chemical makeup includes 14 to 21% volatile oils, eugenol, resin, methyl salicylate (painkiller). It has antiseptic, antibacterial properties (Durbar & Geetha, 2015) (Shankar et al., 2022). Clove oil was utilised by dentists as a root canal and an oral anaesthetic. Clove has antimicrobial properties and can be used to treat toothaches ((Seth & Shah, 2009) (Prashar & Jasra, 2021). It has anti-inflammatory properties. It is marketed as a mouthwash & lozenges. ((PDF) Herbs: A Good Alternatives to Current Treatments for Oral Health Problems, n.d.) (Nafea et al., 2020).

Neem (Azadirachta):
Azadirachta is a member of Meliaceae family, are the most significant useful section. Pakistan and India are its native countries. Neem has antioxidant, antiviral, antifungal, antibacterial, and antitumor effects (Seth & Shah, 2009)(*(PDF) Herbs: A Good Alternatives to Current Treatments for Oral Health Problems*, n.d.). Dental research indicates that Neem is effective against periodontal disease (*(PDF) Herbal Mouthwashes - A Gift of Nature*, n.d.). The finest remedy for treating mouth ulcers, tooth pain, and decay. Streptococcus mutans, S. faecalis, and other species are among the bacteria against which has been demonstrated to have antibacterial activity (Lakshmi et al., 2015) (RJPT - The Use of Neem in Oral Health, n.d.). Azadirachtin can break down the bacterial cell walls, and a change in osmotic pressure causes cell death (Jalaluddin et al., 2017). It exhibits sensitivity. Because of its harshness, it is only used in very limited amounts (Banu & Gayathri, 2016).

Guava (Lemon Guava, Apple Guava):
It is a member of the plant family Myrtaceae. The height of Guava tree is approximately three metres, & frequently used in herbal medicine. Moreover, leaf decoction can be used as mouthwash to treat several illnesses, including toothache, sore throats, and inflamed gums (Nuraskin et al., 2021). Guava mouthwash is an antibacterial and astringent that can treat gum swelling, sore throat and others.

Pomegranate (*Punica granetum*):
An ancient fruit from the Punicaceae family. In chronic periodontal disease, pomegranate extract effectively reduces bacteria (Banu & Gayathri, 2016). Pomegranate extract has antimicrobial properties and prevents viral illness. Active substances can prevent microorganisms from clinging to tooth surfaces by having anti-inflammatory qualities that calm sensitive tissues (Evans, 2009). Due to its antibacterial, anti-inflammatory, and antioxidant properties, the seeds and juice have been evaluated as a tonic for the heart and throat (Banu & Gayathri, 2016).

Tulsi (*Ocimum baslicum,* Holy Basil):
It is a member of the Labiatae family. It is widespread in India and revered. Volatile oil, which possesses insecticidal and antibacterial properties, is present in tulsi (Lakshmi et al., 2015). Tulsi's antipyretic and anti-inflammatory properties are demonstrated by its methanolic extract (Hosamane et al., 2014). It exhibits sensitivity to Streptococcus pyogenes and Lactobacillus bulgaricu (Banu & Gayathri, 2016) (Thombre et al., 2020).

Peppermint (Brandy Mint):
It is the oil produced by distilling Mentha Piperita, a member of the Labiatae family. Most of its distribution is in Europe, and a few locations in England. Menthol is one of the main components of peppermint oil, along with menthyl acetate isovalerate, menthone (Seth & Shah, 2009). Commercially, mint is used in mouthwash and toothpaste. It has been utilised to treat indigestion, headaches & others (Dr. Preethi, 2020). The odour is intense and energising, and it is caused by menthol and menthyl acetate. Antiviral and antibacterial activities can be found in peppermint essential oil (Sandhya, 2017). Not recommended for people who have liver disease, gallbladder inflammation. Burning, headaches, heartburn, etc. are mentioned as adverse effects (*(PDF) Herbs: A Good Alternatives to Current Treatments for Oral Health Problems*, n.d.).

Wintergreen (Deer Berry, Box Berry, Checker Berry)
It is produced by distilling the dried leaves of Gaultheria procumbens Linn. Consisting primarily of plants from Georgia to Newfoundland that are members of the Ericaceae family. In addition to other substances including Gaultherilene, ketone, ester, and secondary alcohol, its volatile oil includes 99% methylsalicylate (Seth & Shah, 2009). Analgesic, antispasmodic, anti-inflammatory is some of its uses. Gum & tooth discomfort are effectively treated (Menon, 2015).

Curcumin (Curcuma longa):
The main component of this composition was Curcumin (diferuloylmethane). Obtained from the Curcuma longa plant that contains 0.3-5.4% raw turmeric. Curcumin, a flavonoid, and volatile oils such as turmerone, atlantone, and zingiberone are some of the active components found in turmeric. Moreover, it has resins, proteins, and carbohydrates (Chatterjee et al., 2017)

Myrrh (Commiphora Molm):
The term "mur," which in Arabic means "bitter," was used to produce the name "myrrh." It is a resin derived from a tree called oleo gum. Volatile oil (myrrhol), resin (myrhin), gum, and other impurities make up the compound known as "commiphora molmol." (*(PDF) the-Effects-of-Commiphora-Myrrh-Mouthwash-Verses-Chlorhexidine-on-Dental-Plaque-and-Gingivitis-a-Comparative-Study*, n.d.).

General procedure for formulation of mouthwash: The plant parts were separated, preserved in airtight jars, washed in sterile water, shadow dried, and crushed. By incubating powdered plant components in sterile distilled water for 72 hours (about 3 days) at 37°C, it was possible to create aqueous extracts of each plant material. With Whatmann filter paper, the herbal extracts were separated, and 10 mL of sterile distilled water was used to wash and press the marc (Ahmad et al., 2018).

Dental Caries
When dental caries was believed to be caused by a "tooth worm" about 5000 BC, dentistry was thought to have only recently developed. The name "dental caries" originates from the Latin word "caries," that denotes decline (decay), and was first used in writing somewhere about 1634. One of the most prevalent and ancient human diseases is dental caries, according to reports (Rathee & Sapra, 2023).

Table 1- Types of dental caries

Type of caries	Description
Primary caries	Decay at a site where there hasn't been prior day activity
Secondary caries	It shows up in areas where caries has already occurred, and it is frequently observed on the edges of fillings and other dental restoration.
Caries arrested	A cavity-causing lesion on a previously demineralized tooth that has previously undergone remineralization.

Early childhood tooth decay
The term "early childhood tooth decay" (ECTD) refers to a pattern of deterioration in young children's deciduous teeth. The maxillary anterior teeth are the teeth that will likely be affected the most, while any tooth might be (Urquhart et al., 2019). This kind of caries results from feeding kids sweetened liquids several times throughout the day or letting them go to bed with them in their bottles (Urquhart et al., 2019). Hypoplastic enamel developmental abnormalities that already exist may also influence the risk for ECTD (Caries Risk Assessment and Management | American Dental Association, n.d.).

The emerging order of the teeth and the posture of the tongue during feeding show a distinctive pattern in ECTD. Because the tongue covers the lower teeth during feeding and because saliva pools there, these teeth are typically not harmed by ingested liquids (Wagner, 2006).

Rampant caries
Rampant caries is severe deterioration that affects numerous tooth surfaces (Dental Caries | Radiology Reference Article | Radiopaedia.Org, n.d.). Those with xerostomia, poor oral hygiene, those who use stimulants because of drug-induced dry mouth, and/or those who consume a lot of sugar may exhibit it (Caries Risk Assessment and Management | American Dental Association, n.d.). Radiation-induced caries is the term used to describe cavities that are out of control as a result of prior radiotherapy to the head and neck. When new teeth erupt, self-destructive root resorption and whole-tooth resorption can also be problematic (Scheinfeld et al., 2012).

Classification of dental caries
According to the rate of development, the hard tissues affected, and the location, caries can be categorised. These categories can be used to describe a specific instance of dental erosion to better accurately describe the disease to others and to convey the seriousness of tooth loss [23]

Table 2- Classification of dental caries

S.NO.	On the basis of	Classification	Description
1	Speed up the progression	Acute	Signifies a situation that is progressing rapidly.
		Chronic	Indicates a prolonged duration for ailment development.
2	Affected hard tissue	Enamel	Early stages of development may impact enamel.
		Dentinal	The deeper dentin layer is affected by the level of deterioration.
		Cementum	The tooth roots deteriorate.
3	Locati on	Group 1	Caries involving pits and fissures (posterior or anterior teeth).
		Group 2	surfaces close to the roots of the back teeth.
		Group 3	Anterior teeth's approximate surfaces without incisal edge involvement.
		Group 4	The teeth's anterior incisal edges are involved on the approximate surfaces.
		Group 5	The anterior or posterior lingual or facial gingival/cervical surfaces.
		Group 6	Incisal edges of the front teeth or cusp heights of the back teeth.

Dental Caries: Etiology

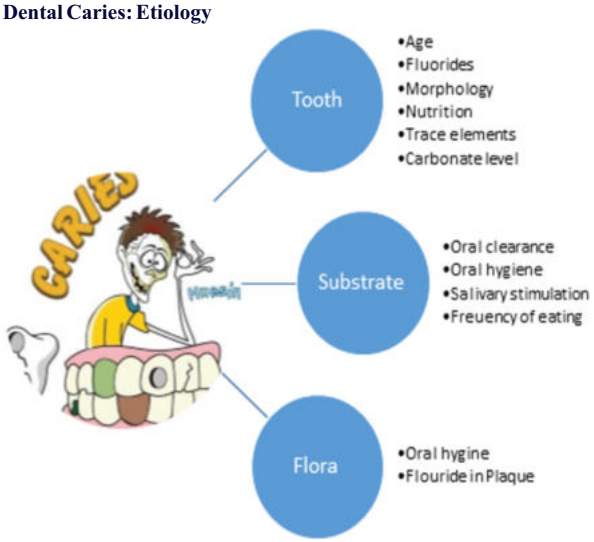

Fig.- Caries etiology

Caries aetiology

The development of caries has historically been explained by biological and nutritional factors on dental health in children. Dental health in children's outcomes have recently been studied utilising a larger framework, which includes biological, nutritional, and environmental factors along with psychosocial predictors (Fisher-Owens et al., 2007). These frameworks frequently divide diseases and their associated conditions into five main categories: genetics and biology, social and physical environment, environment and behaviour affecting health, and medical treatment (Fisher-Owens et al., 2007).

Child-level

Early colonisation of teeth by dental plaque microbes, the existence of dermatophytes streptococci, frequent use of sweetened beverages, infrequent brushing of teeth, sickness, and the consumption of antibiotics have all been linked to the development of caries in preschoolers (Declerck et al., 2008).

Family-level

The family's demographics, the parents' oral health behaviours as well as attitudes, dental anxiety and dentist visits, the mothers' well-being and way of life throughout gestation and early childcare, and maternal health are all factors at the family level that are linked to children's dental caries risk (Pine et al., 2016).

Community-level

Children's dental health is most likely better in a culture that appreciates it (Watt et al., 2016). Neighborhood and cultural factors may have an impact on the growth of caries (Fisher-Owens et al., 2007). Dental health & the onset of caries in preschoolers may be impacted by the teeth, the manner of cleaning and scope of the dental services provided (Pine et al., 2016).

Pathogenesis of dental caries

The three elements of host, bacteria, and nutrition are the traditional explanations for the origins of dental caries. When cariogenic bacteria colonise a vulnerable tooth surface and there is a nutritional source of sucrose or processed sugar, dental caries develop. Lactic acid is created by bacterial pathogens from the fermentation of carbohydrates, and this acid destroys the tooth's hydroxyapatite crystal structure, leading to caries (Caufield & Griffen, 2000).

CONCLUSION:

Herbal mouthwashes are thought to have antibacterial characteristics that could aid in the treatment and prevention of dental caries. According to certain research, herbal mouthwashes like those made with tea tree, clove, or neem may be useful in lowering oral bacteria levels that cause tooth decay.

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