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Use Of Herbs In An Periodontal Disease

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Abstract

Millions of people each year suffer from periodontitis, sometimes known as gum disease. The periodontium (the soft tissues and bones that surround and support teeth) is harmed by periodontitis, a serious gum infection. Generally, the gums and bones that support the teeth become infected by bacteria found in dental plaque. If left untreated, periodontal conditions can have a serious negative impact on one's health. The last ten years have seen a global shift in the prominence of herbal and Ayurvedic medicines, with ramifications for both medicine and business. In pharmaceutical formulation, herbal excipients play a significant role because they are non-toxic and compatible. Since ancient times, herbal remedies have been used extensively around the world. Both doctors and patients now realize their superior therapeutic value because they have fewer side effects than modern pharmaceuticals. The purpose of the current essay is to provide a comprehensive overview of the current approaches used in the development and use of conventional herbal treatments. This review article provides an overview of the most recent research on the biological effects of natural products including Aloe Vera, Azadirachata indica, Ocimum sanctum, Punica granatum and other significant herbs on the treatment of different periodontal disorders.

Keywords: Herbal remedies, dental plaque, gingivitis, and periodontitis

INTRODUCTION

Periodontal disease is major public health problem in the world and is most common cause of tooth loss in population. Periodontal disease is a general term used to describe various pathological conditions which affects the supporting tissues of tissue [1]. Scaling root planning and periodontal surgery are aimed at improving clinical conditions by lowering microbiota either by physical removal of plaque or by alteration of the sub gingival microbiota habitat [2]. Antimicrobial agents can be administered systemically or locally to target the subgingival organisms living in the biofilm, thereby altering the subgingival habitat. Also, laser therapies are known to control the periodontal diseases successfully. Many soft tissue lasers are used as a method of altering the gingival inflammatory status [3]. Herbal medicines comprise plant parts or other plant materials thought to have therapeutic properties as active ingredients. This includes herbs, herbal

preparations, and finished herbal products. A wide range of anti-microbial agents have been evolved in recent years. Development of natural substances for use in dentistry is gaining momentum [2,4].

Since the beginning of human civilization, medicinal and ayurvedic herbs have been a part of human existence. The screening of these herbs extracts and plant products for antimicrobial activity has shown that plants represent a new potential source of anti-infective agents [4]. Herbal products are preferred over prescription medications for treating certain illnesses because of their lower cost or because people may believe the herbs to be less toxic, given that they are natural [5].

When the balance of bacteria changes from Gram-positive aerobic to Gram-negative anaerobic microorganisms, gingival and periodontal disease develops [2]. According to epidemiologic studies, nonsurgical treatment and antimicrobial therapy as an adjuvant aid in lowering the overall bacterial load. Individuals seeking periodontal therapy prefer less invasive, more practical, safe, effective, and economical treatments in developing countries. Dental patients and professionals have recently become more familiar with using herbal medications and products to treat gingivitis, periodontitis, and dental caries. Herbs, herbal materials, preparations, and goods with plant parts or other plant materials as active ingredients are all considered herbal medicines. The most current research on the traditional use of medicinal herbs to treat and prevent periodontal and gingival diseases is compiled in this review [6].

Oral Care Cosmetics:

This are intended to cleanse the oral cavity, freshen the breath, and maintain good oral hygiene. Additionally, certain products contain ingredients that prevent cavities from forming.

Products used to take care of the teeth and mouth are referred to as oral care products. Based on their unique clinical indications, a range of products are offered, such as mouthwashes, toothpastes, teeth-whitening products, and denture care supplies. Although these products have gone through standard safety evaluations prior to marketing, and have been approved by the regulatory bodies, local and systemic adverse reactions associated with different materials in each category have been reported

Herbal remedies have a long history of use for gum & tooth problems. Herbal "chewing sticks" are frequently used in place of plastic bristle brushes in many traditional cultures.

Oral care cosmetics can be broadly classified into two categories: mouth fresheners, which are preparations taken internally to prevent nausea and other discomforts, and dentifrices, which are preparations for external use that clean the teeth and the area around them, as well as the inside of the mouth, preventing dental caries and periodontal diseases. By preventing dental and periodontal diseases, it has become essential for maintaining the oral cavity in a healthy condition.

Dentifrices can be further categorized based on their form: toothpaste, fluid-form toothpaste, tooth powder, moist (semi-kneaded) tooth powder, and liquid form dentifrice. Mouthwash resembles liquid dentifrice in that it should be used sparingly; the right amount is rubbed in the mouth to rinse it out and then discarded.

the purposes of mouthwash, which include breath freshening, halitosis prevention, and internal mouth cleaning. Dental cavities and periodontal disorders can be successfully avoided with mouthwashes that contain pharmaceutical ingredients.

E.g.; turmeric, tulsi, neem, guava, etc

Periodontal Disease:

Periodontal diseases are mainly the result of infections and inflammation of the gums and bone that surround and support the teeth During its initial phase, known as gingivitis, the gums may bleed, swell, and turn red. In its more severe form, known as periodontitis, the teeth may become loose or fall out, the gums may separate from the tooth, and bone may be lost. Adults are primarily affected by periodontal disease. The two main risks to dental health are tooth decay and periodontal disease.

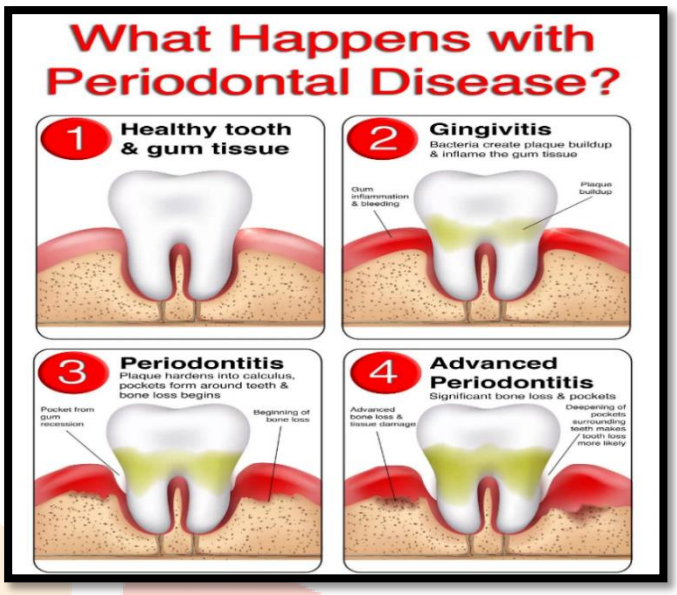

Fig. 1

- The following information on the prevalence of periodontitis in the United States is taken from a recent CDC report1:
- Adults thirty years of age and above who suffer from periodontal disease have a rate of 47.2%.
- The prevalence of periodontal disease rises with age; among adults 65 years of age and above, 70.1% suffer from the condition.

Individuals with less than a high school education (66.9%), men (56.4% vs. 38.4%), those living below the federal poverty line (65.4%), and current smokers (64.2%) are more likely to have this condition. [7]

A) <u>Gingivitis</u>:

A form of gum disease that causes inflamed gums. The cause is poor oral hygiene. Gingivitis left untreated can result in serious conditions like tooth loss. Symptoms include gums that are swollen, puffy, receding, sometimes tender or that bleed easily. Treatment involves a professional cleaning as well as oral rinses [8].

Fig. 2

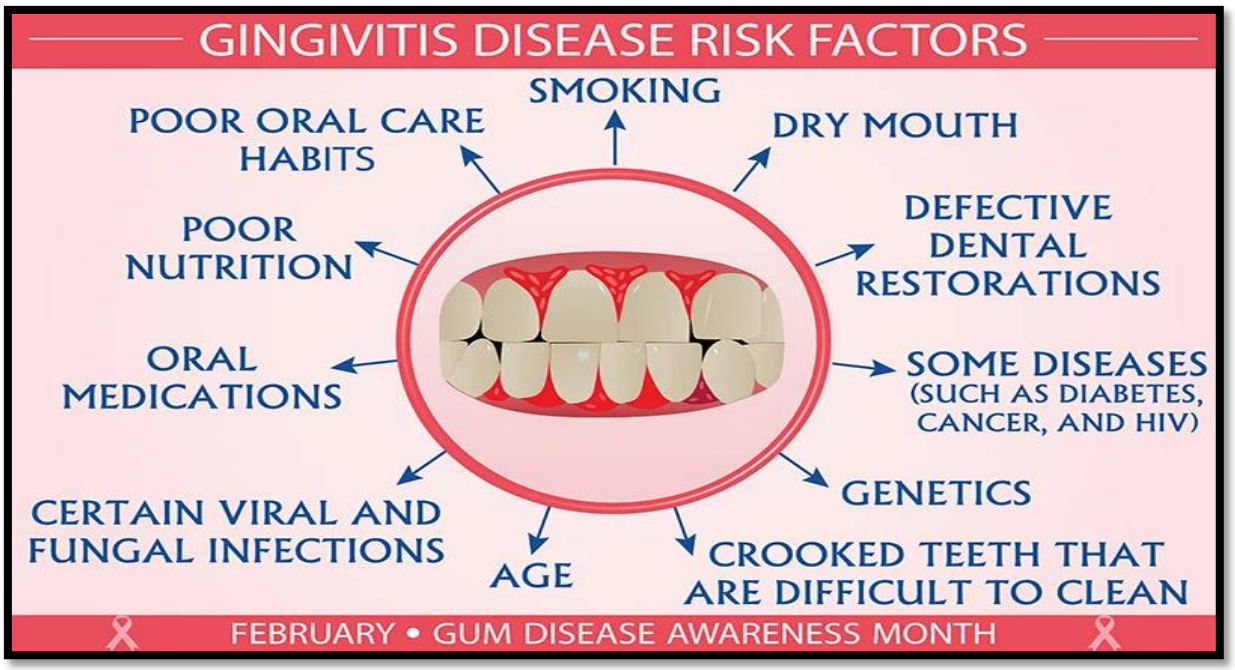

Fig. 3

B) <u>Periodontitis</u>:

A serious gum infection that damages gums and can destroy the jawbone. Although common, periodontitis is largely preventable. Most often, bad dental hygiene is the cause. Dental loss can result from periodontitis. It increases the risk of lung and heart conditions. Tender, red, and swollen gums are among the symptoms. To protect the surrounding bone, treatment involves having the pockets around teeth professionally cleaned. Advanced cases might need to be operated on [7].

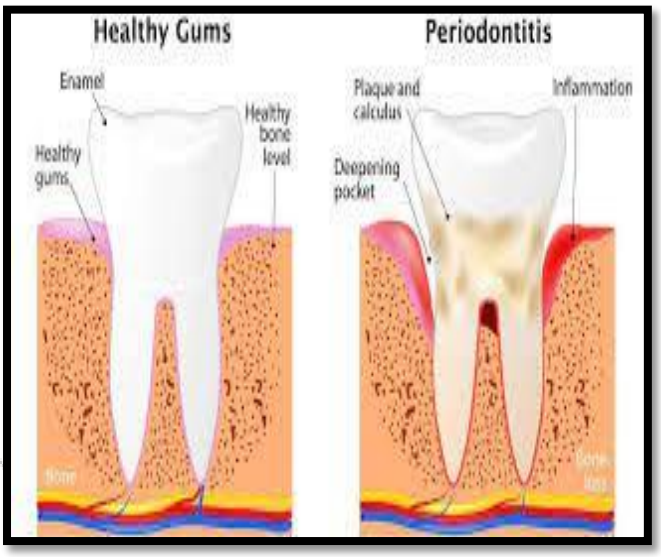

Fig.4

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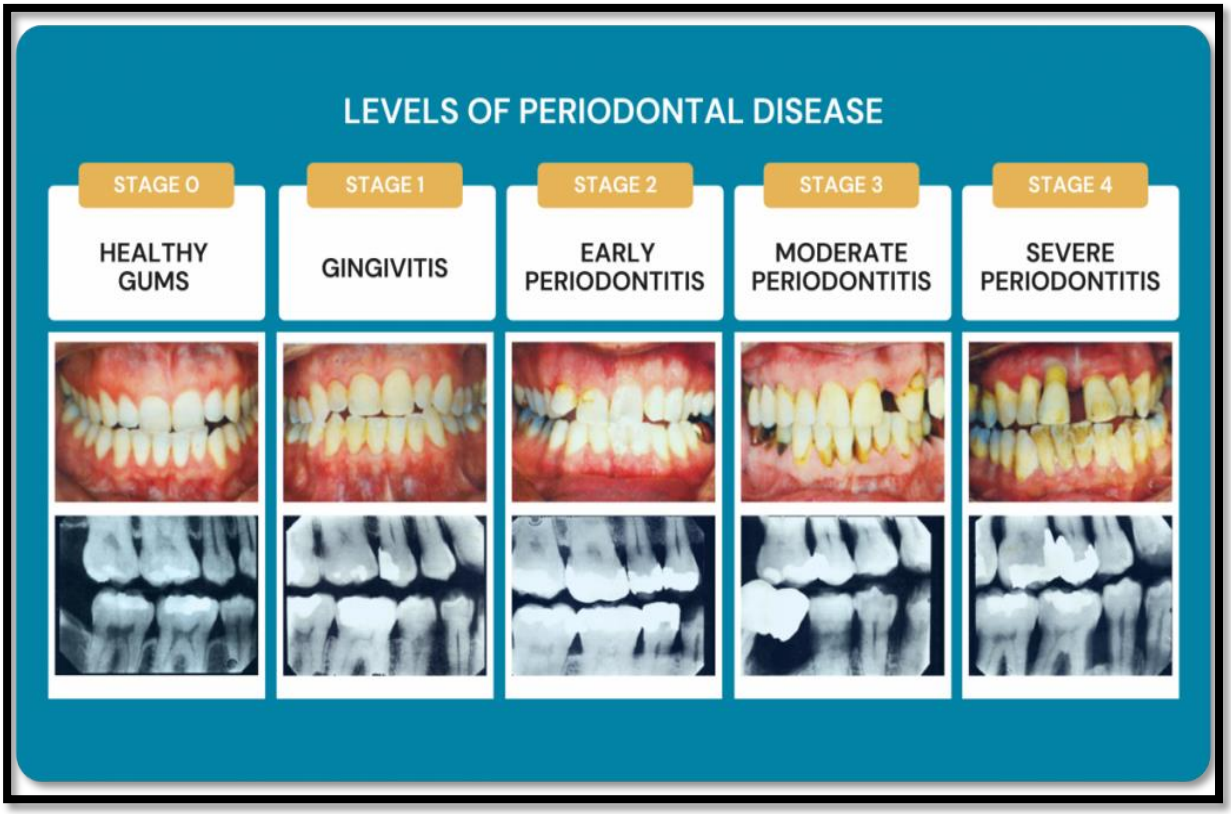

Fig. 5

Prevention and Treatment: Regular professional cleanings and good oral hygiene can help control and treat gingivitis. Even though they might need more intensive care, more severe cases of periodontal disease can be successfully treated. Medications administered orally or inserted beneath the gum line, thorough cleaning of the tooth root surfaces beneath the gum line, and occasionally corrective surgery are some of the treatments that may be included. In order to mitigate the risk of or manage periodontal diseases, it is critical to:

1. To get rid of the bacteria that cause gum disease, brush and floss daily.

2. Get regular check-up's from a dentist at least once a year, or more often if you have any of the risk factors or warning signs listed above [7, 8].

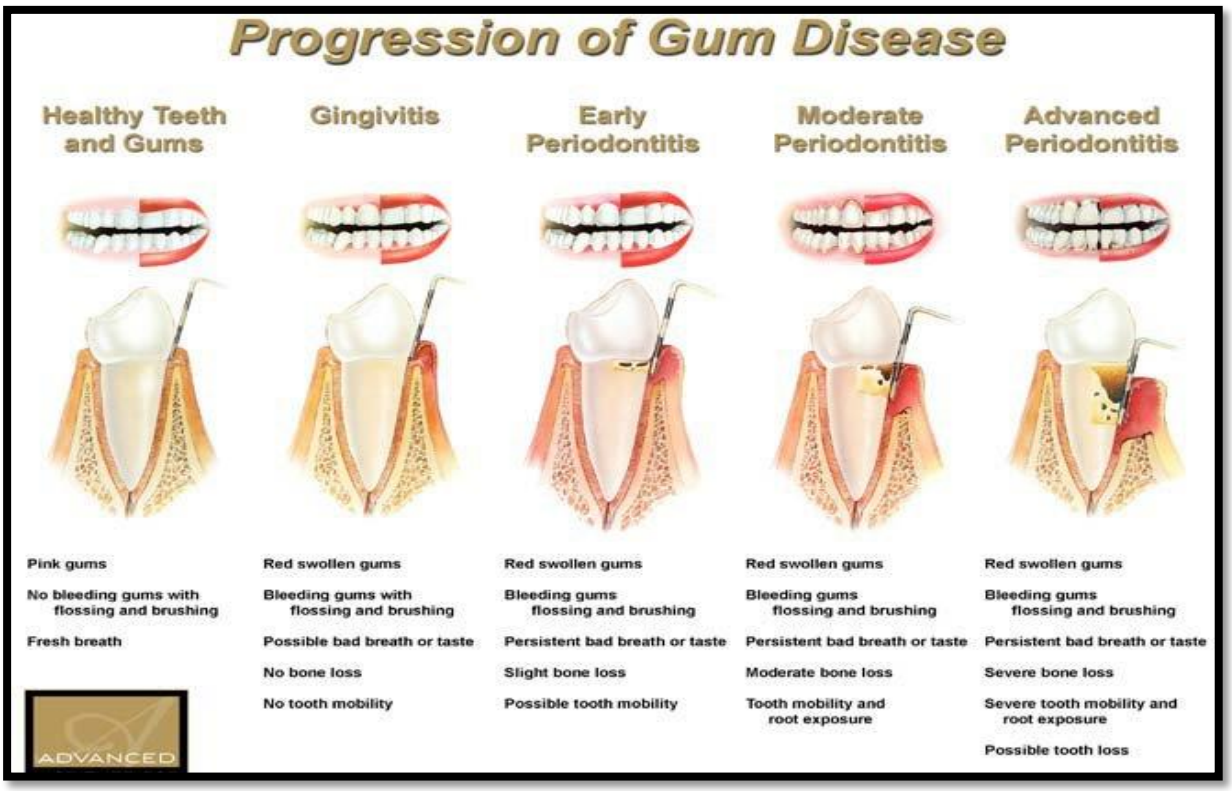

Fig. 6

Historical Aspects:

Due to their therapeutic qualities, a variety of herbal plants have been used for centuries to both treat and prevent specific diseases. Medicinal plants such as barks, seeds, fruits, stems, roots, and others have been used to extract plant-based medications. Since 200 B.C., phytotherapy, also known as phytomedicine, has been used in medical traditions to treat a variety of illnesses. The earliest written record of the use of medicinal plants was discovered on a Sumerian clay board. Since 800 A.C., medicinal plants have been used in India to treat patients' illnesses through the holistic Ayurvedic medical system, which dates back about 5000 years. The father of Greek medicine, Hippocrates, relied solely on "natural" remedies to cure all ailments. There are roughly 500,000 plant species in the world, but only more than 2,000 of those were long believed to have therapeutic benefits. Discovering novel phytochemicals with potential medical and dental applications from the vast array of plant species accessible globally is highly possible with the aid of cutting-edge technology and innovative thinking [9].

Benefits of Herbal Drugs:

Herbal drugs have long era of use and good patient tolerance as well as better public acceptance. Oral diseases that are most common are periodontal disease and dental caries. For this common but straightforward oral disease, rural residents would rather use alternative medicine because dental care is very expensive and does not rank among their top health concerns. Medicinal plant preparation techniques differ based on the type of plant, parts (stems, leaves, and roots), administration route (local, topical, and rinse), and consumption timing. In certain regions, people with dental pain make plant-based fillings or chew the bark of several trees to reduce inflammation. They also make mouthwashes and teas with plant extracts [9].

Advantages of Herbal Therapy:

Herbal therapy can offer many possible advantages. Due to the synergy of their active ingredients' ability to have preventive effects, stimulate the regulation action of the body's defensive functions, and prepare for potential activity against external agents, certain plants have been shown to be more effective than drugs at repairing the entire body. Better tolerance and versatility result in longer-lasting therapeutic effects with fewer side effects. Herbal therapy can work on multiple targets at once or as a co-treatment with conventional medications, unlike prescription drugs that are meant to treat a specific condition. [2,10]

Advantage of Herbal Cosmetics:

- They have no adverse side effects and do not cause an allergic reaction.
- They blend in with skin and hair with ease.
- Compared to synthetic cosmetics, they are highly effective when used in small quantities.
- accessible and plentiful in a wide range of forms and amounts.

Disadvantage of Herbal Cosmetics:

- Medications that are herbal take longer to take effect than those that are allopathic.
- It requires long term therapy
- They are difficult to hide taste & odour
- Manufacturing process are time consuming & complicated
- No pharmacopeia defines any specific procedure or ingredients to be used in any herbal cosmetics

Table 1: Difference between synthetic drugs & herbal drugs:

SYNTHETIC DRUG	HERBAL DGUG
This are the drug which are prepared using man made chemicals rather than natural ingredients	This are the drug which are prepared by natural ingredients
This drug has many sides effect & adverse reaction	This are mostly safe & having less side effect
Resistance can be observed	Resistance not observed
For short period of time synthetic drug are most preferred	Longer period of treatment may be required while using herbal drugs
This act on symptoms caused by specific disease	This drug has patient compliance

In emergency & chronic condition synthetic drug are most preferred medicine	This are medication that directly act on towards aiding the body's own healing process

- **Plants/Herbs used in the treatment of the oral disease according to experimental evidence.**

1. **TURMERIC**

Role of turmeric (Curcuma longa) in the management of periodontal disease:

Fig.7

Massaging the teeth with roasted ground turmeric eliminates pain and swelling. According to a study, mouthwash containing turmeric and chlorhexidine gluconate can be used as a useful supplement to mechanical plaque control techniques to help prevent gingivitis and plaque build up. The observed effect of turmeric can be attributed to its anti-inflammatory characteristics. Each group showed a decrease in the total number of microorganisms. It is reported that the local drug delivery system containing 2% whole turmeric gel can be used as an adjunct to scale and root planning. The "red complex" species' trypsin-like enzyme activity was significantly reduced. In one of the studies, it was seen that+ 1% curcumin solution can cause better resolution of inflammatory signs than chlorhexidine and saline irrigation as a subgingival irrigant. Mean Probing pocket depth reduction was significantly greater for the curcumin group than all other groups on all post-treatment days [11,12,13].

2. NEEM

Role of Neem (Azadirachta indica) in management of periodontal disease:

Fig. 8

The ancient Ayurvedic practice of using Neem plant parts to heal and rejuvenate gum tissue and to prevent dental caries and gum disease is verified in modern clinical studies. The fibrous nature of neem chewing sticks, which facilitates mechanical plaque removal, is partly responsible for the plant's reported anti-plaque activity; however, Neem also contains chemotherapeutic antiplaque agents. Gallo tannins have the potential to physically remove more pathogenic microbes from the oral cavity through aggregate formation, thereby reducing the number of microbes that bind to the tooth surface during the early stages of plaque formation. Additionally, the effective inhibition of glucosyl transferase activity and the reduced bacterial adhesion as seen with the presence of Gallo tannin extracts suggest some potential anti-plaque activity. The microorganisms found in inflamed gums are resistant to penicillin and tetracycline but are not resistant to antibacterial plant extracts like neem. Unlike antibiotics antibacterial plant extracts produced no allergy in the gingiva that could inhibit their effectiveness [14,15,16,17,18].

3. TULSI

Role of Tulsi (Ocimum sanctum) in the management of periodontal disease:

Fig. 9

Tulsi leaves are quite effective in treating common oral infections. Also, few leaves when chewed raw help in maintaining oral hygiene. Carracrol and Terpene are the antibacterial agents present in this plant. Sesquiterpene b caryophyllene also serves as the antibacterial agents. This constituent is FDA approved food additive which is naturally present in Tulsi. Tulsi leaves which are dried in sun and powdered can be used for brushing teeth. It can also be mixed with mustard oil to make a paste and used as toothpaste. Tulsi has also proven to be effective in counteracting halitosis. Its anti-inflammatory property makes it a suitable remedy for gingivitis and periodontitis, and it can be used for massaging the gingiva in these periodontal conditions. Tulsi contains vitamin A and vitamin C, calcium, zinc and other metals. Chlorophyll and numerous other phytonutrients are also present. Deficiency of these nutrient has been associated with variety of oral disease [5,13,19,20].

4. POMEGRANATE

Role of Pomegranate (Punica granatum) in the management of periodontal disease:

Fig.10

Research showed that pomegranate extract was more effective against the adherence of biofilm species than a pharmaceutical antifungal when three or four microorganisms were involved. Investigators noted that pomegranate 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, direct antioxidant activity, anti-inflammatory effects, antibacterial activity, and direct removal of plaque from the teeth. In a study evaluating the effects of pomegranate on gingivitis results showed a significant reduction in gingival bleeding after using a dentifrice containing the pomegranate extract. Rinsing with Pomegranate extract also lowered saliva activities of alpha glucosidase, an enzyme that breaks down sucrose (sugar), while it increased activities of ceruloplasmin, an antioxidant enzyme13. “The pomegranate extract induced increase in ceruloplasmin activity can be expected to strengthen antioxidant defences,” was noted by some investigators [1,21,22].

5. **Miswak**

Miswak (Salvadora persica) in the management of periodontal disease:

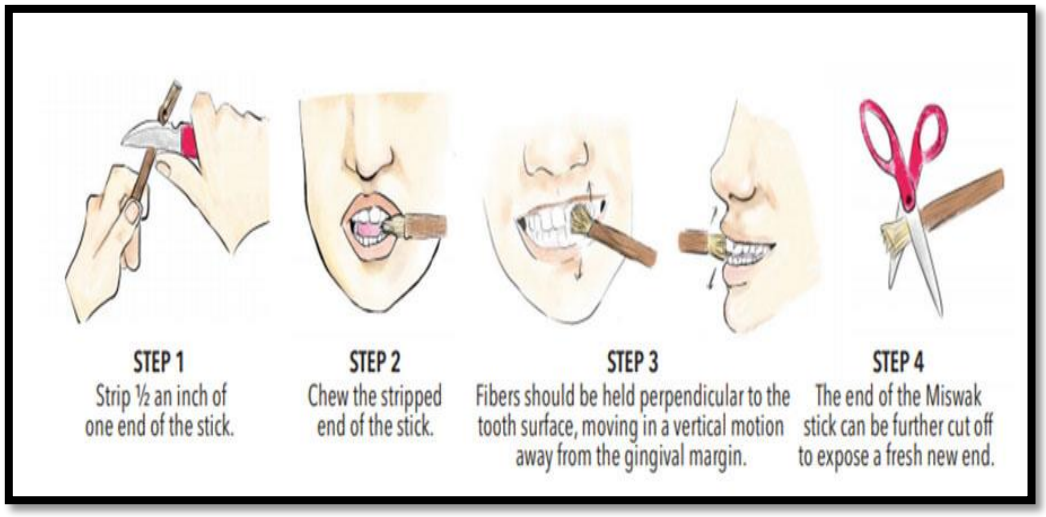

Fig. 11

Miswak belongs to the Salvadoraceae family & also known as a chewing stick. Miswak has been used for dental hygiene since ancient times. 8 Researchers have suggested that miswak has over ten naturally occurring elements that are important for good dental, oral, and overall health like Fluoride, Silica, Benzyl isothiocyanate, Essential oils, salvadorine, Salvadoraside, 1,8-Cineole, linalool, Piperidine, Isoterpinolene, Myrcenol, and sabiene. In medicinal component Benzyl isothiocyanate shown is a major volatile oils component of Salvadora persica which show bactericidal effect against many bacteria. The actions of miswak's key chemical component are displayed. Another antimicrobial constituents & prophylactic component include alkaloids, fluoride, Sulphur compounds & glucosinolates, Methyl chavicol, etc. Miswak is a useful oral hygiene tool that has been scientifically proven to be effective against tooth decay, according to the World Health Organization. It is an affordable option for the average person and a truly amazing dental stick. Report from miswak users is that there is less gingival bleeding, better periodontal health, and interproximal bone loss when especially in comparison with common toothbrush users [2,23,40].

6. GUAVA

Guava (Psidium guajava) in the management of periodontal disease:

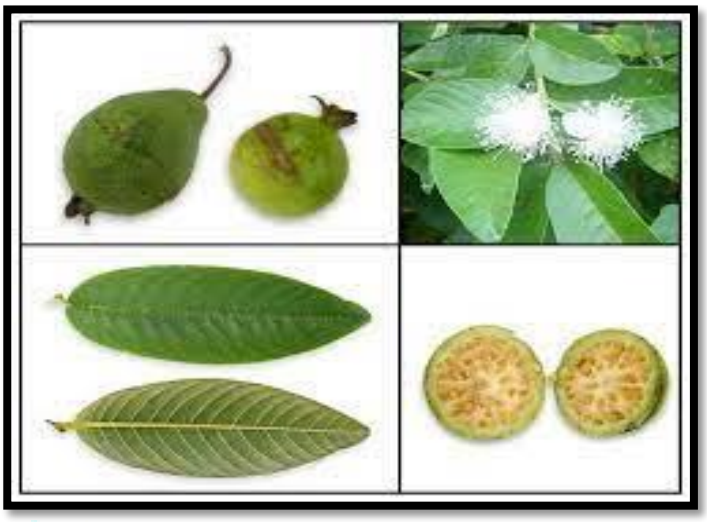

Fig. 12

Guava primarily rich in Vitamin C (Ascorbic acid) shows an excellent antioxidant property. This ascorbic acid, after collagen formation, acts on the extracellular matrix to modify procollagen gene expression and change fibroblast differentiation. The decoction of leaves can be used as a gargle for bleeding gums, while the decoction of roots and bark can be used as a mouthwash [25,26,27,]

Table 2: Commonly used medicinal plants for gingival and periodontal diseases

Family and taxon	Part Used	Periodontal use
Ginger, *Curcuma Longa*	Rhizome	To treat pyorrhoea and gum infections
Leguminosae, *Acacia arabica*	Tender leaves, bark	Decoction of tender leaves is used as a mouthwash and to treat spongy gums. Burnt bark used as tooth powder
Legumes, *Glycyrrhiza glabra*	Root	Effectively reduces plaque formation by its antibacterial effect
Mahogany, *Azadirachta indica*	bark	To treat pyorrhoea and gum infections
Salvadoraceae, *Salvadora persica*	Stem	Used as a chewing stick for oral care
Cashews, *Mangifera indica*	Twigs, leaves	Used for regular cleaning of teeth
Piperaceae, *Piper nigrum*	Fruit	Treatment of oral infection
Spurges , *Ricinus communis*	Roots & leaves	Roots are used as a toothbrush. Leaf juice is used as a mouth wash
Sapindaceae, *Sapindus mucorosai*	Seed	Used in the treatment of gingival inflammation

Table 3: Pharmacological actions of various medicinal plants used in periodontal therapy

Generic name	Useful Part	Properties
[Ginger family] *Curcuma longa*	Dried root	Analgesic, anti-inflammatory
[Heaths] *Vaccinium macrocarpon*	Fruit	Antioxidant
Legumes] *Acacia arabica*	Bark	Astringent
Legumes] *Glycyrrhiza glabra*	Roots	Anti-inflammatory, antioxidant
[Mahogany] *Azadirachta indica*	Leaves	Antioxidant, antibacterial, anti-inflammatory
Mints] *Mentha piperita*	Leaves	Analgesic, counterirritant
Mints] *Ocimum sanctum*	Leaves	Anti-inflammatory
Rose family] *Rosa canina*	Leaves, Flower ,Hip	Astringent, antibacterial
Rose family] *Rubus idaeus*	Leaves	Anti-inflammatory, astringent
Salvadoraceae] Salvadora persica	Bark	Anti-inflammatory

There are quite a few numbers of herbs that have been proved as an antioxidant which eliminates/minimises dental and periodontal diseases:

1. **Aloe vera (Aloe Barbadensis)-** Aloe vera is a cactus plant that belongs to the Liliaceae family. Aloe Vera minimizes gingivitis and bleeding. It has antiseptic properties and its antifungal property helps in curing denture stomatitis, apthous ulcers, cracked and split corners of the mouth [28,29,30].
2. **Oak (Quercus Brantii)-**Oak is a species from Fagacea family used for the treatment of gastric ulcers, superficial injuries and local inflammation with haemostatic, anti-bacterial, anti- inflammatory, antinociceptive and anti-oxidant effects [31].
3. **Coriander (Coriandrum sativum)** - coriander from the Umbelliferae family was used in Iranian folk medicine as a carminative and spasmolytic agent. It has anti- inflammatory, analgesic, anti-bacterial and anti-oxidant activities [31;32].
4. **Green Tea (Camellia sinensis)-**It has antioxidant, anti-collagenase, anti-inflammatory, anticaries, antifungal, antiviral and antibacterial effects [33,34].
5. **Turmeric (Curcuma longa)-**Turmeric is a rhizome of Curcuma longa is used as an antiplaque mouthwash [11,13] .
6. **Bakul(Minusopselengi)-** Bakul has cryogenic glycosides in addition to several enzymes such as oxidases, peroxidases and pectinases that have shown to inhibit antimicrobial properties [35].
7. **Pomegranate (Punica granatum)-**Pomegranate has active compounds containing polyphenolic flavonoids (e.g., Punicalagins and ellagic acid), are believed to prevent gingivitis [1,21,22].
8. **Neem (Azadirachta Indica):-**It belongs to Meliacae family and widely distributed in Asia and Africa. Almost every part of the plant was used in indigenous systems, particularly against disease of bacterial and fungal origin [14,15,17].

9. **Peppermint (Mentha piperita**)-It grows in moist areas with dark green, lance-shaped leaves and purple flowers. Peppermint oil is used for curing toothache-Soaked cotton ball in the peppermint oil and placing in cavity helps to relieve pain [36].
10. **Lemongrass (Cymbopogon citratus)-**It is a popular medicinal plant. This plant is commonly used in teas, cosmetics, and folk medicine for its antiseptic, antiemetic, antirheumatic, analgesic, antispasmodic, and antipyretic properties [37].
11. **Tulsi (Ocimum Sanctum)-**It is widely used grown, sacred plant of India and belongs to Labiatae family. It has been used for a very long time to treat a variety of illnesses in the Ayurvedic medical system. It is studied that 2% Tulsi was effective in the treatment of experimental periodontitis [11,12,13].
12. **Miswak (Salvadorapersica)-**The most common type of chewing stick, Miswak, is derived from Arak tree. Used as dentifrices in the recent 19 years as antiplaque and antigingivitis agent [2,24].
13. **Myrrh (Commiphora myrrha)-**It is obtained in the form from the trees and shrubs. Myrrh is documented to promote healing in cases of pyorrhoea [38]
14. **Tea tree oil (Melaleuca alternifolia)-**The local delivery of tea tree oil (TTO) gel can be used in case of chronic periodontitis which have proved some beneficial effects to augment the results of the conventional periodontal therapy [33].
15. **Triphala-**It has a free radical scavenging property and the antimicrobial activity [40].
16. **Clove (Syzgiumaromaticum)-**The germicidal and anaesthetizing properties of the oil make it very effective for relieving toothache, sore gums and mouth ulcers [40]. .
17. **Cinnamon (Cinnamomum verum)-**Streptococcus mutans, the etiological agents of dental caries, are highly sensitive to Cinnamon therefore ensuring it as antiseptic toothpaste, mouthwash or chewing gum for prevention of dental caries and other oral infections [41]
18. **Garlic (Allium sativum)-**Garlic concentrate is has been used as antibacterial agent for root canal lavage [42].
19. **Eucalyptus (Globuluslabill)-**Eucalyptus oil exhibits antibacterial activity against cariogenic (tooth decay-causing) and periodontopathic bacteria, is beneficial against some microorganisms such as Vibrio 20 cholerae, Aspergillus flavus and S.aureus [25,40].
20. **Liquorice Root (Glycyrrhiza glabra**):-liquorice root is used as digestive stimulant and also soothing expectorant for lung disease. It is used in 31 various allergies or as an anti-inflammatory agent [43].
21. **Chamomile (Matricariarecutita)** :- chamomile (Matricariarecutita) belongs to family Asteraceae . It has anti-inflammatory activities [40].

Table 4: Herbs used for tooth preparation with their images

Generic Name	Name Of Herbal Drug	Part Used	Uses
Acacia arabica	Babul	Bark	Teeth disorders
Azadirachta indica	Neem	Leaf	Toothache, Antibacterial, Dental carries
Barleria prionitis	Vajradanti	Entire herb	Strengthens teeth, tooth ache
Syzygium aromaticum	Clove	Bud	Toothache, Antiseptics
Glycyrrhiza glabra	Yastimadhu	Roots	Natural sweetener, flavour
Salvadora persica	Pilu / Miswak	Twigs	Anti-microbial

Fig. 13

HERBAL PREPERATION AVAILABLE FOR PERIODONTAL DISEASE:

- **Perio gel**

Fig. 14

- **Perio Brite / Cleanse**

Fig. 15

Fig. 16

- **Perio Spot**

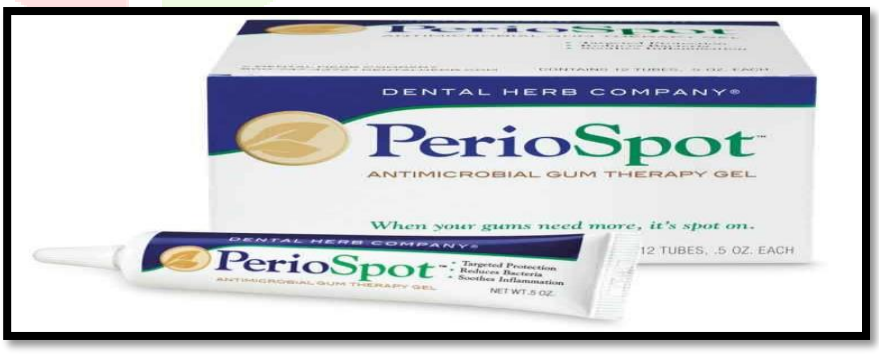

Fig. 17

- **Herbal Oil**

Fig. 18

- **Gum Tone**

Fig. 19

- **Denta Smile Powder**

Fig. 20

- **Home care herbal product**

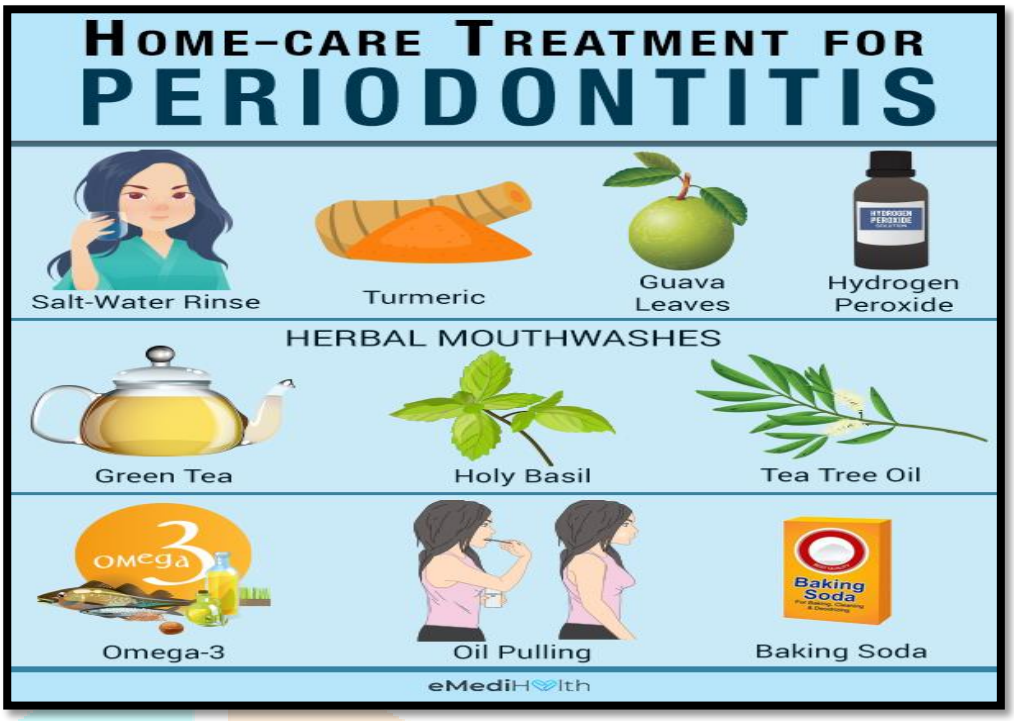

Fig. 21

- **Other herbal product**

Fig. 22

CONCLUSION:

Herbal and ayurvedic drugs have been widely acclaimed worldwide since several years in terms of both medicinal and economic implications. Herbal extracts in the form of dentifrice, medicated gel, ointment, solution etc. have been proved effective in preventing and treating periodontal disease. Thus, this review on herbal approaches in periodontics is useful for dentists, healthcare professionals and general public in terms of prevention, treatment and maintenance of various periodontal and dental diseases. Dentistry is looking for new and efficient alternative forms of treatment. Analyzing historical data and assessing the methods used by earlier generations to treat oral disease is one potential strategy. Through such review and analysis, new horizons in dentistry and other fields of medicine may be reached.

The delivery of safe and efficient Herbal and Ayurvedic medicine into periodontal pockets through local delivery system has reduced the side effects of allopathic medicine system through limited use of antibiotics. With the introduction of Herbal and Ayurvedic medicine system, avenues for research have opened for their use in treatment of periodontal diseases. Development of novel drug delivery systems for treatment of dental and periodontal diseases is likely to be one of the thrust areas of research in future. Thus, it can be concluded that various Ayurvedic and herbal by products as an ad t to scaling and root planning has beneficial effect on periodontal diseases.

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