

Review on Gumpaint used in periodontal disease

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ABSTRACT

Periodontal disease is characterized by inflammation and destruction of supporting tissues of the teeth. Dental plaque is the primary etiological agent in periodontal diseases. In addition to mechanical plaque removal measures, chemical plaque control measures have also been advocated which can be used as an adjunct to mechanical measures. These together can reduce plaque associated gingivitis.

Chronic periodontitis disease is predominantly affects adults, but aggressive periodontitis may occasionally occur in children. Periodontal disease initiation and propagation is through a dysbiosis of the commensal oral microbiota (dental plaque), which then interacts with the immune defences of the host, leading to inflammation and disease. The severity of the periodontal disease depends on environmental and host risk factors, both modifiable (for example, smoking) and non-modifiable (for example, genetic susceptibility). New treatment modalities that are actively explored include antimicrobial therapy, host modulation therapy, laser condition therapy and tissue engineering for tissue repair and regeneration.

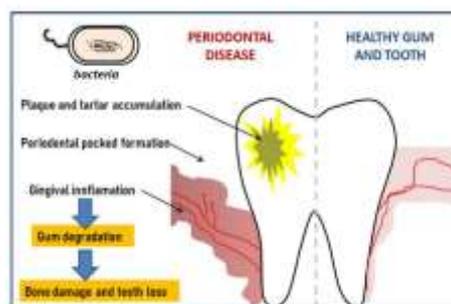
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I. INTRODUCTION

Periodontal disease is a chronic inflammatory disease of periodontium and its advanced form is characterized by periodontal ligament loss and destruction of surrounding alveolar bone.¹ It is the main cause of tooth loss and is considered one of the two biggest threats to the oral health.^{1,2} There are approximately 800 species of bacteria identified in the oral cavity³ and it is hypothesized that complex interaction of bacterial infection and host response, modified by behavioral factors such as smoking, can result in periodontal disease.⁴

Approximately 700 species of microorganisms colonize the human oral cavity.⁵ These bacteria inhabiting the human oral cavity are mainly commensals along with a sparse population of pathogenic bacteria.⁶ Periodontitis is one of the most common ailments affecting the teeth, leading to the destruction of

the supporting and surrounding tooth structure.⁷ The term "periodontitis" is build up of two words, i.e., "periodont-" meaning "structure surrounding the teeth" and "itis" means "inflammation." Periodontitis is originally a disease originating from the gingival tissue which if left untreated results in penetration of inflammation to the deeper tissues, altering the bone homeostasis causing tooth loss.⁷ Periodontal disease has a multifactorial origin.⁸ The main culprit identified in periodontitis is the bacterial biofilm growing on the tooth surfaces.⁹¹⁰ While the host response determines the progression of the disease along with factors like local factors like plaque and calculus, genetics, environmental factors, systemic health of the patient, lifestyle habits and various social determinants also play a role.⁸ The deleterious effects of periodontopathogens are not limited to the periodontium, but they also exude their ill effects on the systemic health of the patients.¹¹



Stages

There are mainly four stages in periodontal diseases which includes different clinical sign&symptoms and radiological screening are given as follows:¹²⁻¹⁴

1)Gingivitis

It is the only stage when periodontitis can be reversible. At this stage the plaque formation around teeth occurs. There are mainly few painless symptoms seen at this stage such as bad breath, swollen reddish gums and bleeding while brushing and flossing. It can be reversed by maintaining good oral hygiene and regular checkups. Generally, 1-2 mm clinical attachment loss, less than 15% of bone loss around root, probing depth 4mm or less occurs.

2) Early stage

It is the second stage of periodontal disease. It is manageable by oral hygiene but not reversible. At this stage, the infection starts spreading to surrounding tissues and starts degrading it. Symptoms at this stage include inflammation of gums, severe bad breath, and bleeding during brushing or flossing, spacing between teeth become evident and will gradually increase. Here, 3-4 mm clinical attachment loss, less than 15-33% of bone loss around root, probing depth 5mm or less occurs.

3) Moderate stage

Like second stage moderate stage cannot be reversed. Same symptoms as moderate stage occurs but space between teeth and recessions of gums are more evident. Treatment like deep cleaning, scaling and flap surgeries can be done at this stage. Around 5mm or more clinical attachment loss, 33% of tooth loss of four teeth or less, with complex issues such as probing depth 6 mm or more, Class II-III furcations, and/or moderate ridge defects.

4) Advanced stage

Last stage of periodontal disease; wherein 50-90% of loss of periodontal tissues occurs. Also other symptoms like swollen gums that ooze of pus, cold sensitivity, loosening of teeth, painful chewing and severe halitosis occurs. If left untreated it causes more spaces or gaps between teeth and gums, gum recession, patient needing dentures, and other health problems that can be worst. Treatment includes regular checkups, cleaning and maintaining good oral hygiene can help halt the progression of Periodontitis. Secondary Occlusal trauma, severe ridge defects, bite collapse, pathologic migration of teeth, less than 20 remaining teeth (10 opposing pairs) seen.

Types of periodontal disease : [15-18]

1. Gingivitis

As described above, gingivitis is inflammation of gums and can be reversed by maintained oral hygiene.

2. Chronic periodontitis

In this type of periodontal disease, symptoms may include chronic inflammation of gums, severe bad breath, and bleedings during brushing or flossing occur. Loss of epithelial tissue, bones and ligaments which is not reversible.

3. Aggressive periodontitis

It can be present in localized or generalized forms, both are early onset form of chronic periodontal inflammatory diseases, typical manifesting between puberty and early third decade of life. The symptoms are same as chronic periodontitis.

4. Necrotizing ulcerative gingivitis

It is mainly occurring in people who are suffering from malnutrition, immune suppressive and HIV. Necrosis means death of cell or living tissue. It mainly occurs due to deficiency of nourishment needed by people to remain healthy.

5. Systemic chronic periodontitis

This type of chronic periodontal disease happens in patient who have systemic syndrome. Inflammation of gums occurs due to systemic diseases such as Diabetes, Heart disease, Respiratory disease, etc.

Symptoms : [19]

The following are warning signs of periodontal disease:

- Bad breath or bad taste that won't go away
- Red or swollen gums
- Tender or bleeding gums
- Painful chewing
- Loose teeth
- Sensitive teeth
- Gums that have pulled away from your teeth
- Any change in the way your teeth fit together when you bite
- Any change in the fit of partial dentures

Risk factors [19]

Certain factors increase the risk for periodontal disease:

- Smoking
- Diabetes
- Poor oral hygiene
- Stress
- Heredity
- Crooked teeth
- Underlying immuno-deficiencies—e.g., AIDS
- Fillings that have become defective
- Taking medications that cause dry mouth
- Bridges that no longer fit properly
- Female hormonal changes, such as with pregnancy or the use of oral contraceptives

Prevention[20]

The best way to prevent periodontitis is to follow a program of good oral hygiene, one that you begin early and practice consistently throughout life.

- **Good oral hygiene.** That means brushing your teeth for two minutes at least twice daily — in the morning and before going to bed — and flossing at least once a day. Flossing before you brush allows you to clean away the loosened food particles and bacteria. Good oral hygiene prevents the development of an environment around your teeth that is favorable to specific bacteria that cause periodontal disease.
- **Regular dental visits.** See your dentist or dental hygienist regularly for cleanings, usually every six to 12 months. If you have risk factors that increase your chance of developing periodontitis — such as having dry mouth, taking certain medications or smoking — you may need professional cleaning more often.
- **Good health practices.** Practices such as healthy eating and managing blood sugar if you have diabetes also are important to maintain gum health

Treatment[21-24]

Treatment may be performed by a periodontist, a dentist or a dental hygienist. The goal of periodontitis treatment is to thoroughly clean the pockets around teeth and prevent damage to surrounding bone. You have the best chance for successful treatment when you also adopt a daily routine of good oral care, manage health conditions that may impact dental health and stop tobacco use.

1. Nonsurgical treatments

Scaling If periodontitis isn't advanced, treatment may involve less invasive procedures, including:

- **Scaling** removes tartar and bacteria from your tooth surfaces and beneath your gums. It may be performed using instruments, a laser or an ultrasonic device.
- **Root planing.** Root planingsmooths the root surfaces, discouraging further buildup of tartar and bacteria, and removes bacterial byproducts that contribute to inflammation and delay healing or reattachment of the gum to the tooth surfaces.
- **Antibiotics.** Topical or oral antibiotics can help control bacterial infection. Topical antibiotics can include antibiotic mouth rinses

or insertion of gels containing antibiotics in the space between your teeth and gums or into pockets after deep cleaning. However, oral antibiotics may be necessary to completely eliminate infection-causing bacteria.

2. Surgical treatments

If you have advanced periodontitis, treatment may require dental surgery, such as:

- **Flap surgery (pocket reduction surgery).** Your periodontist makes tiny incisions in your gum so that a section of gum tissue can be lifted back, exposing the roots for more effective scaling and root planing. Because periodontitis often causes bone loss, the underlying bone may be recontoured before the gum tissue is sutured back in place. After you heal, it's easier to clean these areas and maintain healthy gum tissue.
- **Soft tissue grafts.** When you lose gum tissue, your gumline recedes. You may need to have some of the damaged soft tissue reinforced. This is usually done by removing a small amount of tissue from the roof of your mouth (palate) or using tissue from another donor source and attaching it to the affected site. This can help reduce further gum recession, cover exposed roots and give your teeth a more pleasing appearance.
- **Bone grafting.** This procedure is performed when periodontitis has destroyed the bone surrounding your tooth root. The graft may be composed of small fragments of your own bone, or the bone may be synthetic or donated. The bone graft helps prevent tooth loss by holding your tooth in place. It also serves as a platform for the regrowth of natural bone.
- **Guided tissue regeneration.** This allows the regrowth of bone that was destroyed by bacteria. In one approach, your dentist places a special piece of biocompatible fabric between existing bone and your tooth. The material prevents unwanted tissue from entering the healing area, allowing bone to grow back instead.
- **Tissue-stimulating proteins.** Another technique involves applying a special gel to a diseased tooth root. This gel contains the same proteins found in developing tooth enamel and stimulates the growth of healthy bone and tissue.

GUMPAINT

Gum Paint is used in the treatment of inflammation of gums. It kills the harmful microorganisms in the oral cavity that cause swollen gums, and tartar, bad odor from the mouth. This way it cleans the affected area and speeds up healing.

Gum Paint should be used exactly as prescribed by your doctor. Follow the doctor's instructions or use it in the dose and duration suggested by the doctor. Do not stop using it until you have finished the complete course, even when you feel better. You must have to avoid eating, drinking, or smoking for at least 30 minutes after using it.[28] It is a safe medicine with little or no side effects. However, it may cause staining of teeth, hard dental plaque, and taste change in some people.[28]



Formulation and method

Gum Paints can be used to provide relief from inflamed and bleeding gums, cold sores, and mouth ulcers. ICPA offers a variety of gum paints for you to recommend to your patients. They are easy to use, help solve gum issues and prevent plaque buildup.

- 1.weight the required quantity of drug into glass mortar.
- 2.take _ml of drug solution in dish and boil it on a hot plate up to a temperature of 140-160 c
- 3.add small quantity of drug to mortar and mix the contents.
- 4.now add rest of solution in to a mortarto make the preparation
- 5.mixed the contents thoroughly using pestle and allow it for cooling.
- 6.transfer the formed paints to a dispensing bottle and cover with cap.

Gum paints are the combination of antiseptics and tanninggents which precipitate

proteins but do not penetrate cells thereby affecting only the superficial layer making it mechanically stronger and decreases exudation. They have germicidal, fungicidal, anesthetic and healing properties. When applied, they provide a soothing, cooling and an astringent effect. All these preparations contain Choline salicylate, Tannic acid, Cetrimide, Thymol, Camphor, Cinnamon oil, Iodine and Alum (hydrated potassium aluminium sulfate). They are applied on flabby edentulous ridges for gum massage to improve the edentulous foundation.

1) Zingisol

Zingisol containing 2% Zinc Sulfate is used to control bleeding gums. The patient is advised to apply 3-4 drops on finger and massage 3-4 times a day.

2) Sensoform

Sensoform gum paint (Warren) contains tannic acid, glycerine and potassium iodide and is applied on affected area several times with the cotton applicator for the treatment of stomatitis, inflammation and bleeding gums. Gum astringent It also decreases sensitivity and increases gingival resistance against infections.

3) Stolin

Stolin gum paint 15ml contains cetrimide 0.1 % w/v, tannic acid 2 % w/v, zinc chloride 1 % w/v. Sensorok gum astringent with zinc sulfate is used for gum massage 2-3 times daily.

4) S.G. PAINT

S. G. Paint contains Tannic acid- 27% , Potassium Iodide - 0.05% , Iodine - 0.03% , Thymol-0.033% , Menthol- 0.05%, Glycerine - 72%. Tannic acid in S. G. Paint has been used as an astringent for the mucus membranes of the mouth and throat. Ingredient rationale of S. G. PAINT gum paint, provides cooling, soothing, astringent effect. Similarly, ingredients like iodine, potassium iodide have germicidal, fungicidal, anaesthetic and healing properties. Menthol provides the cooling effect and also it possesses local anesthetic action. Glycerine helps the healing of the ulcer as well as it has anti- inflammatory property. Gum paint is indicated for treatment of Stomatitis, Glossitis and Aphthous Ulcers.

5) Arofil

Arofil gum paint contains Iodine 1.0%, Potassium Iodide 2.0%, Thymol 0.25%, Menthol 0.25%, Camphor 0.2%, Tannic Acid 1.55%.

6) Astradent
Astradent contains Tannic Acid 5% w/v, Choline Salicylate 8% w/v, Cetrимide 0.01% w/v, Lignocaine 2%, Glycerine base.

List of Gumpaint use in Dentistry

| Sr. no. | Brand Name | Constituents | Uses |
|---------|--|--|--|
| 1 | Gel cord/ gel cord clear (pascal) | 25% Aluminium sulfate gel | Gingival retraction |
| 2 | Stat gel FS (pascal) | 15.5% Ferric sulfate | Gingival retraction |
| 3 | Hemostatic gel | 20% ferric sulfate | Gingivalretraction |
| 4 | Traxodent/Hemodent (Premier dental products) | 15% Aluminium chloride | Gingival retraction |
| 5 | Viscostat clear (ultradent) | Aluminium chloride gel | Gingival retraction |
| 6 | Racestptine (septodent) | 25% aluminum chloride, oxyquinolhydroalcoholic excipients | Gingival retraction |
| 7 | Quickstat FS (Vista) | 15.5% ferric sulfate gel | Gingival retraction |
| 8 | Zingisol | 2% zinc sulfate | Gum astringent(to apply 3-4 times a day on bleeding gums) |
| 9 | Sensoform gum paint (warren) | Tannic acid, glycerin and potassium iodide | Stomatic, gingivitis (to apply several times) |
| 10 | Stolin gum paint (dr. reddys) | Cetrимide 0.1%, tannic acid2%, zinc chloride 1% | Gingivitis |
| 11 | Astradent | Tannic acid 5%, choline salicylate 8%, cetrимide 0.01%, lignocaine 2%, glycerine base | Gum astringent |
| 12 | S.G. Paint | Tannic acid 27%, potassium iodide 0.5%, iodine 0.3%, thymol, menthol, glycerine. | Stomatic, glossitis, apthous ulcer (applied after every 3-4 hrs) |
| 13 | pyosan | Tannic Acid glycerin 27%, Potassium iodide I.P. 0.05%, Iodine I.P. 0.03%, Thymol I.P. 0.033%, Menthol I.P. | Bleeding gums & pus discharge are a sign of poor oral hygiene |

| | | | |
|--|--|-------------------------------|--|
| | | 0.05%, Glycerine I.P. q.s. | |
|--|--|-------------------------------|--|

List Of Ingredients And Their Uses

| Sr.no. | Ingredients | Uses |
|--------|--------------------|--|
| 1 | Tannic acid | Astringent(prevent bleeding of soft tissue making of the firm) |
| 2 | Glycerin | Demulcent agent, sweetning agent |
| 3 | Aluminium chloride | Astringent |
| 4 | Potassium iodide | Antiseptic and anti-infective (kill bacteria) |
| 5 | Aluminiumsulfate | Good hemostasis |
| 6 | Ferric sulfat | Gingival displacement |
| 7 | Cetrimide | Antiseptic |
| 8 | Zinc choride | Hemostatic agent and astringent |
| 9 | Thymol | Antiseptic and antibacterial property (Reduce oral infaction) |
| 10 | Menthol | Local analgesic, relives pain, give sensation of coolness |
| 11 | Comphor | Mild analgesic, relief pain |
| 12 | Iodine | Dental antiseptics |

Herbal drugs

| | | |
|----|----------------------------|---|
| 13 | Tulsi | Antimicrobial, immunomodulatory, anti-inflammatory, chemoprotective and analgesic |
| 14 | Neem | Anti-inflammatory, antiarthritic, antipyretics, hypoglycemic antifungal |
| 15 | clove | Antioxident, antifungal and antiviral |
| 16 | Vitamin c extract (orange) | To promote healing, reduce oxidative stress, supportive periodontal tissue. |
| 17 | Almond | Help strengthening the tissue around the tooth |
| 18 | Myrrh | Antibacterial (kill harmful oral bacteria) increase blood flow to the soft tissue in mouth(gums will heal faster) |
| 19 | Yarrow | Anti-inflammatoryastringent, styptic hearb (promotes healing of mouth sores) |
| 20 | Blood root | Bloodroot contains sanguinarine which is an alkaloid that helps prevent plaque from sticking to teeth |
| 21 | calendula | anti-inflammatory (reduces oral swelling) |

| | | |
|----|---------------------------|---|
| 22 | Chamomile | anti-inflammatory (it can take care of swollen and bleeding gums) |
| 23 | Echinacea | anti-inflammatory, antiseptic, and antibacterial (immune-boosting properties) |
| 24 | Goldenseal | anti-inflammatory and antibacterial (reduces gum recession) |
| 25 | Oregon Grape Root | antimicrobial so it also fights gum disease. Astringent properties. |
| 26 | Peppermint | anti-inflammatory agents that also help with gum inflammation. |
| 27 | Plantain (Cooking Banana) | antibacterial and anti-inflammatory so it's great for healing wounds |
| 28 | Prickly Ash Bark | It improves blood circulation like myrrh which increases gingival healing |
| 29 | Propolis | antimicrobial |
| 30 | Sage | bleeding gums, gingivitis, gum recession, and mouth sores. |
| 31 | White Oak Bark | This herb is anti-inflammatory so it strengthens and tonifies gingival tissue while relieving swollen, bleeding gums. |
| 32 | Yerba Mansa | antiseptic, antifungal, and astringent. |
| 33 | Green tea | Anti-inflammatory |
| 34 | Triphala | Anti-microbial, anti- oxidant. |

Inclusion criteria

1. Patients agreeing to comply with study protocol and instructions
2. Patients in good health in age range of 18 – 65 yrs.
3. Subject should have at least 20 natural permanent teeth

4. No periodontal pockets greater than 4mm.
5. All subjects who are deemed medically fit.
6. Subjects having Gingival index more than 1.
7. At baseline, all the subjects had to have a plaque index of greater than 2.

Exclusion criteria

1. Smokers and tobacco chewer.

2. Patients with systemic diseases or compromising medical condition.
3. Patients on antibiotics one month prior to treatment.
4. Patients using orthodontic appliances either fixed or removable
5. Patients who have used mouth rinse containing chemical agents in previous two months.
6. Patients allergic or sensitive to any medication or toothpaste.
7. History of any surgical procedure in the selected area in the past two months

Benefits

In Treatment of Mouth infection

Whenever there is an overgrowth of microorganisms in our mouth, that are otherwise ordinarily present, it can lead to unpleasant symptoms suggestive of mouth infection. These symptoms include unhealthy breath, swollen gums, unpleasant taste changes, sensitivity of teeth to hot or cold food/liquid etc. Gum Paint kills and prevents the growth of these bacteria, thereby relieving these symptoms. This helps in maintaining good oral hygiene.

Poor oral hygiene can be extraordinarily embarrassing and can affect your social life. This medicine helps restore your self-confidence and makes it easier for you to go about your daily activities. Continue using it as suggested by the doctor to get maximum benefit.[29]

Side effect

Most side effects do not require any medical attention and disappear as your body adjusts to the medicine. Consult your doctor if they persist or if you're worried about them[29]

Common side effects of gumpaint

- Taste change
- Staining of teeth
- Hard Dental Plaque

Evaluation parameter

The following parameters are recorded:

1. **Drug Content Evaluation** : Drug content was determined by dissolving 2.5 gms. Of mouth paint in methanol. After suitable dilution absorbance was recorded by using UV-Spectrophotometer at λ_{max} 261nm.
2. **Determination of pH** : 2.5 gm of prepared mouth paint was accurately weighed & dispersed in 25.0ml of purified water (diluted to 10 times), the pH of the dispersion was measured using Digital pH meter

3. **Spreadability** : the determination of spreadability, 3 gm. of sample was applied in between two glass slides and was compressed to uniform thickness by placing 1000 gm. Weight for 5 mins. Weight (50gm) was added to the pan. The time required to displace upper plate over the lower plate for a distance of 10 cms.
4. **Rheological Studies** : The viscosity of various formulated Fluconazole Mouth paints were measured by Brook field Viscometer (LVDV-III ultra-programmable Rheometer) using spindle CP-52 at varying speed & shear rates from 10, 15, 20, 25 & 30 rpm between 20-60 Sec-1 at room temperature to examine the hysteresis of the rheogram.
5. **Strength determination** : A sample of 50gms of mouth paint was placed in a 100ml-graduated cylinder for measuring mucoadhesive strength was allowed to penetrate in the sample. The time (sec) the apparatus took to sink 5cms down through the sample.
6. **Infraredspectralanalysis** : The studies were carried out using IR method with the help of Perkin-Elmer model 983 spectrometer to determine drug excipient interaction.
7. **Anti-microbial studies** : prepared mouth paints were evaluated for In vitro antifungal activity using standard Agar cup-plate method. The test organism *Candida albicans* was a clinical isolate obtain from The a diseased patient suffering from oral candidiasis from our M.R. Medical College & General Hospital. Gulbarga under the guidance of department staff. The microorganism was collected by sweeping cotton-swab on the tongue of patient and stored this swab in peptone water. Nutrient Agar medium was used for the culture and maintenance of isolated microorganism.
8. **Plaque Index (PI)**: The index teeth were stained for plaque using an erythrosine disclosing solution and cotton swab. The plaque score was determined using the Turesky-Gilmore-Glickman modification of the Quigley Hein plaque index (1970)[44]
9. **Gingival Index (GI)**: was recorded using the Gingival Index(GI) by Loe and Silness (1963)
10. **Papillary Bleeding Index (PBI)**: Muhlemann 1977
11. **Periodontal probing depth (PPD)**

II. CONCLUSION

The widespread occurrence of gingivitis provides the rationale for supplementing toothpastes with anti-gingivitis agents such as gum astringents. The current herbal formulation used in the clinical study showed significant clinical improvement in gingival bleeding and plaque index scores

Thus, study suggests that this herbal gum astringent formulation may be useful for plaque control in subjects with gingivitis.

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