

Review on Periodontal Disease

Latpate Manisha Bhimrao, Maneri Karishma Yakub, Andhale Shriram Sominath

Dharmaraj Shaikshank Pratishthan's College of Pharmacy, Walki, Ahilyanagar, Maharashtra, India

Abstract: *The purpose of this study is to formulate dental gel containing clove oil, and aloe vera gel to relieve pain and discomfort due to dental pain. It has a wide spectrum of antibacterial activity against a number of periodontal pathogens, hence it is selected for the treatment of periodontitis. Periodontal disease is recognised as a one of the major public health problem throughout the world and occurs in all groups, ethnicities, races, genders and Socio-economic levels. Aloe vera is a succulent plant that has been used for centuries in traditional medicine due to its medicinal properties. It is known to have anti-inflammatory anti-bacterial and wound healing properties, making it a popular ingredient in various health and beauty products. Recently aloe vera has been used as a ingredient in dental gel products due to ability to promote oral health. Clove oil known for its analgesic and anti-inflammatory properties making it an effective ingredient in dental products.*

Keywords: Aloevera, Clove oil, Periodontal disease, Antibacterial activity, Dental gel

I. INTRODUCTION

Periodontal disease is recognized as a major public health problem throughout the world and occurs in all groups, ethnicities, races, genders, and socio-economic levels. It is characterized by inflammation and degeneration of the gums, supporting bone, periodontal ligament and cementum and accumulation of bacterial pathogens, mainly within the periodontal pockets. The periodontal disease commonly refers to inflammatory diseases that are plaque induced i.e. gingivitis and periodontitis. Gingivitis, the moderate stage of disease caused by an accumulation of supragingival plaque and characterized by swelling, light bleeding and redness of the marginal gingiva. Gingivitis is associated with a change in the microflora, shifting from a gram-positive anaerobic flora to a more gram-negative one. Periodontitis, a more severe stage of periodontal disease, results in the resorption of the bone and detachment of periodontal ligament supporting tooth. Recent advances in the field of dentistry have promoted the use of herbal and natural products for the treatment of various oral diseases. The conventional method of treatment of the periodontal disease like oral, topical and systemic dosage forms have major disadvantages like superinfection, low or non-compliance, low gingival crevicular fluid levels of antibiotics, systemic side effects, short duration and high relative cost. Clove oil is one such product exhibiting multiple benefits and has gained considerable importance in clinical research. Since clove oil shows low intrinsic toxicity along with a wide spectrum of biological actions like analgesic, antiseptic, antispasmodic, anti-neuralgic, carminative, anti-infectious, disinfectant, insecticide, stimulant, stomachic and other useful properties, it is very useful in dentistry also. The most known type of aloe vera which is developed overall is aloe barbadensis Miller. Aloe vera gel is obtained from within aloe leaf. It is the adhesive gel created from the center (parenchyma) of the plant leaf. The gel invigorates cell development and upgrades the rebuilding of harmed skin. It saturates the skin since it has a water-holding limit. As utilized, a beverage will safeguard the mucous film of the stomach, particularly when disturbed or harmed. The present study was aimed to formulate dental gel containing clove oil for the treatment of periodontal diseases and then evaluated for their physicochemical properties including drug content, spreadability, extrudability and in-vitro antibacterial activity. Medicinal plants have been used as traditional treatments for numerous human diseases for thousands of years and in many parts of the world. In rural areas of the developing countries, they continue to be used as the primary source of medicine.

II. PERIODONTAL DISEASE

Periodontal diseases including gingivitis and periodontitis are serious infections which can lead to tooth loss when left untreated. The word periodontal literally means "around the tooth". Periodontal diseases are infections of bone and gums that bound and support the teeth. In its early phase called gingivitis, gums can become inflamed and red, and

they may bleed too in severe conditions. In it's more severe form, called periodontitis, the gums can draw away from the tooth, bone can be lost, and the teeth may get loosen or even fall out. It is a local infection with primary bacterial etiology in the gingival crevices, which affects the structural organs surrounding the teeth like periodontal ligament, connective tissue and bone. The warm and moist pocket environment fastens the growth of gram – negative, anaerobic bacteria that proliferate in the subgingival space.

Therapeutic approaches for periodontitis fall into two major categories :

- 1) Anti-infective treatment, which is designed to stop the progression of periodontal attachment loss by removing etiologic factors; and
- 2) Regenerative therapy, which includes anti-infective treatment and is intended to restore structures destroyed by this disease.

TYPES OF PERIODONTITIS:

1. Mild periodontitis (gingivitis)
2. Moderate periodontitis
3. Advanced periodontitis
4. Refractory periodontitis

COMMON PATHOGENS OF PERIODONTITIS:

- T. forsythia
- P. intermedia
- F. nucleatum
- A. actinomycetemcomitans

Signs and Symptoms

- 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
- Pus around gums and teeth
- Metallic taste
- Any change in the way your teeth fit together when you bite
- Any change in the way your fit together when you bite
- Any change in the fit of partial dentures

Risk factors-

- Smoking
- Diabetes
- Poor oral hygiene
- Stress
- Crooked teeth
- Underlying immune-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

Clove-



Synonyms :- Clove bud,Laung,Lavang,Caryophyllum

Biological Source :- It consists of dried flower buds of *Eugenia caryophyllus* (sprengel) Bullak & Harrison.

Family :- Myrtaceae

Geographical Source :- It is native to the Mollucca Island & traditionally cultivated in Tanzania (zingiber), Madagascar,Indonesia,Sri Lanka & India(mainly in Nilgiri hills,Kanyakumari,Kottayam & Quilon hills of Kerala

Cultivation and Collection :-

Soil :-Loamy soil & also Sandy loamy & laterite soil

Climate :-Warm humid

Rainfall :- Range of 150 to 250 cm

Altitude :- 900 m from sea level

Cultivation :- August – October

Collection :- Buds change the colors from green to light pink

Chemical constituents :- 15-20% of volatile oil,10-13% of tannin (gallotannic acid),chromone and eugenin.The volatile oil contains Eugenol (about 70-90%),Eugenol acetate,methylamylketone.Caryophyllene and small quantities of ester and alcohols.Some important components are; flavonoids,hydroxybenzoic acid ,hydroxycinnamic acid, hydroxyphenyl propens,eugenol,phenolic acids,gallic acid,kaempferol,quercetin,caffeic acid,ferulic acid,ellagic acid, salicylic acids.

Macroscopic characters:-

Colors :- Crimson red to brown

Odours :- Characteristic or aromatic

Taste :- Aromatic and pungent

Size :- Length -10-18 mm, Width-3-4 mm, Thickness -2 mm.

Shape :- Flower bud is nail shaped.

Uses:-It is used as a carminative.

It is used as a dental analgesic.

It is used as a stimulant.

Aloe vera



Synonyms :- Aloe barbadensis Miller, Aloe officinalis Forskal.

Biological Source :- Aloe is the dried juice collected by incision from the bases of the leaves of various species of Aloe like Aloe vera Linn. or Aloe barbadensis Mil.

Family :-Liliaceae

Geographical Source :-Aloe are indigenous to East & South Africa, but have been introduced into tropical countries, & will even flourish in the countries bordering on the Mediterranean.

Cultivation and Collection :-

Soil :- Sandy and loamy soil, require well – drained soil & can grow in nutritionally poor soil.

Climate :- Hot, dry and humid .

Rainfall :- 1000-1300 mm

Cultivation:- June-July & September – October

Chemical constituents :-Aloins, Barbaloin & Iso Barbaloin are important constituents. Amorphous aloin, resin, emodin & Aloe emodin.

Macroscopic characters :-

Colour :- Green to grey green

Odour :- Pungent oniony smell

Taste :-Neutral to extremely bitter

Size :-60-100 cm tall, spreading by offsets

Shape :-Candelabra shaped

Uses :-It is used to reduce dental plaque.

It is used to accelerates wound healing.

It is used to control bacteria which causes cavities.

III. MATERIAL AND METHOD

Chemicals :- Carbopol-940, Sodium CMC, Sodium benzoate, PEG-400, Sodium saccharin, Sodium Lauryl sulfate all these chemicals were taken from our college laboratory i.e. DSP college of pharmacy. Clove oil is purchased from a local shop in Ahmednagar.

Collection :-

Aloe vera :- The leaves of Aloe vera were collected from the plant present in the herbal garden of our college i.e. DSP college of pharmacy, walki.

Clove oil :- Clove oil is purchased from the local shops in Ahmednagar.

Extraction :- The fresh aloe vera leaves were collected from the plant, washed in the running tap water and then rinsed with sterile distilled water and mild chlorine solution, then cut and the aloe vera gel was scraped out by using sterile knife, thick epidermis was selectively removed and gel like pulp separated with spoon and homogenized on mixer.

Formulation :- Carbopol-940 and sodium CMC were dispersed in 40 ml of distilled water with continuous agitation. In another beaker, sodium benzoate was dissolved in 10 ml of water and heat it to dissolve properly. After cooling of solution polyethylene glycol-400 was added and mixed with the first solution. After this required quantity of Aloe vera gel and clove oil was mixed and the remaining chemicals were also mixed in the above solution properly with continuous stirring and tri-ethanolamine was added dropwise to the formulation to obtain gel in required consistency and pH adjustment.

Composition of chemicals

Sr No	Ingredients	Quantity taken		
		F1	F2	F3
1	Aloe vera	7g	8g	7.5g
2	Clove oil	2ml	1ml	1.5ml
3	Carbapol-940	3.5g	3.5g	3.5g
4	Honey	0.6g	0.6g	0.6g
5	Sodium CMC	1.5g	1.5g	1.5g
6	Sodium benzoate	0.5g	0.5g	0.5g
7	Sodium saccharin	0.7g	0.7g	0.7g
8	Peppermint oil	0.3ml	0.3ml	0.3ml
9	PEG-400	2g	2g	2g
10	Sodium lauryl sulphate	2g	2g	2g
11	Tri-ethanolamine	qs.	qs.	qs.
12	Distilled water	qs.	qs.	qs.

IV. EVALUATION PARAMETERS

1) Physical appearance :-

Color :- The color of the formulation was checked out against a white background.

Consistency :- The consistency was checked by applying on skin.

Greasiness :- The greasiness was checked by the application on to the skin.

Odour :- The odor of the gel was checked by mixing the gel in water and taking the smell.

2) Determination of pH :- The pH of gel was determined using a digital pH meter by dipping the glass electrode completely into the gel system. The physicochemical properties, especially pH value of dental medicines, have significant influence on the health of oral cavity tissues.

3) Clarity of gel :- The clarity of gel was determined by visual inspection.

4) Smoothness :- By rubbing the gel formulation between the fingers, the smoothness of the formulation was determined and it was determined whether the gel was smooth, clumped, homogeneous, or rough.

5) Grittiness :- All the formulations were evaluated microscopically for the presence of particles if any appreciable particulate matter was seen under light microscope. Hence obviously the gel preparation fulfills the requirement of freedom from particulate matter and from Grittiness as desired for any topical preparation.

6) Determination of viscosity :- The viscosities of the formed gels were determined using a Brooke field viscometer with spindle no. 7 and spindle speed of 100 rpm at 25°C, with the matching dial reading on the viscometer documented.

7) Relative density :- Weight in gram taken in 10 ml formulation and 10 ml distilled water using RD bottle was used to determine the relative density of the formulation.

8) Determination of spreadability :- A modified wooden block and glass slide apparatus were used to test spreadability. A wooden block with a fixed glass slide and a pulley up the equipment. A thread was used to connect a pan to another glass slide. For the spreadability test, a measured amount of gel was placed in the fixed glass slide and the movable glass slide with a pan attached was placed on top of the fixed glass slide for 5 minutes, sandwiching the gel between the two slides. The pan was now filled with around 30 grams of weight. The length of time it took for the slides to separate was recorded. The spreadability was calculated using the formula below.

$$S = M \times L / T$$

Where,

M = weight tied to a upper slide

L = length of glass slides

T = time taken to separate the slides.

9) Extrudability :- In this method, the formulated gel were filled in standard capped collapsible aluminium tube and sealed by crimping to the end. The weights of the tubes were recorded. The tubes were placed between two glass slides and were clamped. 500 g was placed over the slides and then cap was removed. The amount of the extruded gel was collected and weighed. The percent of the extruded gel was calculated.

10) Microbial growth :- In this method nutrient agar media was used. The blank and sample petriplates were used and formulated gel samples were aseptically transferred on the sample plate on cross pattern. The growth of microbial was checked continuously upto 15 days.

11) Homogeneity :- A developed gel formulation was tested for Homogeneity by visual inspection.

Result :- As a result, the growth of micro organisms inside the mouth cavity is prevented. The combination of clove oil and aloe vera gel formulation against Staphylococcus aureus was found.

V. CONCLUSION

Natural medicines are more acceptable and have minimum side effects than synthetic preparations, according to the study. The combination formulation of clove oil and aloe vera gel is completely capable of protecting teeth, maintaining oral hygiene and demonstrating good antibacterial activity against pathogens.

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