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## ROLE OF ALOE VERA IN DENTAL PRACTICE- A REVIEW

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### ABSTRACT

Dental caries, plaque. Periodontal diseases and root canal treatment failure are all associated with oral pathogens. Several plant derivatives have been evaluated with respect to their antimicrobial effects against such pathogenic microorganisms. Aloe vera is one such medicinal plant with anti-inflammatory, antimicrobial, antidiabetic and immune-boosting properties. This review has the compiled data of the antibacterial activity of Aloe vera against cariogenic *S. mutans*, periodontopathic *A. actinomycetemcomitans*, *P. gingivalis*, and *B. fragilis*, *Candida albicans* and *E. faecalis*.

**Keywords:** Caries, plaque, Root canal failure, Aloe Vera, Anti-microbial.

### INTRODUCTION

The oral flora comprises a diverse group of microorganisms including bacteria, fungi, mycoplasmas, protozoa and viruses. Bacteria predominate, with an estimate of over 600 different species present in the oral cavity.<sup>1</sup>

periodontal diseases and dental caries are the two most prevalent oral infections affecting mankind worldwide.<sup>2</sup>

Dental plaque is a dense, complex heterogeneous layer of microorganisms and their metabolites.<sup>3</sup> *Streptococcus mutans* is a

predominant microbial species in dental plaque. Because bacteria cause dental caries, it is, by definition, an infectious disease. The source of bacteria responsible for caries arises from the bacterial populations indigenous to the oral cavity or the normal flora.

Two species of *mutans streptococci*, *Streptococcus mutans* and *Streptococcus sobrinus* are associated with human caries.<sup>4</sup>

Any inherited or acquired disorder of the tissues surrounding and supporting the teeth (periodontium) can be defined as a periodontal

disease. Gingivitis is the mildest form of periodontal disease.

The putative pathogens include *Porphyromonas gingivalis*, *Tannerella forsythensis*, and the spirochaete *Treponema denticola*.<sup>5</sup> *Actinobacillus actinomycetemcomitans* is another species commonly associated with disease, especially in young adults.<sup>6</sup> Root canal treatment usually fails when the treatment is carried out inadequately. In most of the cases, the endodontic failure results from persistent or secondary intraradicular infection.

Failure of endodontic treatment is a result of microorganisms persisting in the apical portion of the root canal system, even in well-treated teeth.<sup>7</sup> *Enterococcus faecalis* and yeast-like microorganisms have been found in root canals of obturated teeth in which treatment has failed.<sup>7,8</sup> *E. faecalis* is a normal inhabitant of oral cavity. It is associated with asymptomatic chronic periradicular lesions significantly more often than with acute periradicular periodontitis or acute periradicular abscesses.

Failed root canal treatment cases are nine times more likely to contain *E. faecalis* than primary endodontic infections.<sup>9</sup> Either due to the resistance of these organisms against the drugs or due to some disadvantages of the drugs used, like unpleasant taste, toxicity etc. herbal medicines have come into play. Hence,

this article reviews the potent use of *Aloe vera* in dental practice.

#### MEDICINAL VALUE OF ALOE VERA:

*Aloe vera* is a medicinal plant. The botanical name of *Aloe vera* is *Aloe barbadensis miller*. It belongs to *Asphodelaceae (Liliaceae)* family. The known biological/medicinal properties of aloe vera is as follows.

Moisturizing properties

Anti-inflammatory

Antibacterial

Antifungal

Antiviral

Wound healing

Pain relief

Treatment of minor burns, skin abrasions, and irritations

Treatment of psoriasis and frostbite.<sup>10</sup>

#### ANTIBACTERIAL/ANTIFUNGAL EFFECTS:

*Streptococcus pyogenes* and *Streptococcus faecalis* are two microorganisms that have been inhibited by *Aloe vera* gel.<sup>11</sup> *Aloe vera* gel reportedly was bactericidal against *Pseudomonas aeruginosa* while acemannan prevented it from adhering to human lung epithelial cells in a monolayer culture.<sup>12</sup> A processed *Aloe vera* gel preparation reportedly inhibited the growth of *Candida albicans*.<sup>11</sup>

#### DENTAL APPLICATIONS:

##### ANTICARIOGENIC ACTIVITY:

Mohammadmehdi Fani found that, *Aloe vera* gel exerted strong bactericidal activity against both cariogenic and periodontopathic

bacteria.<sup>13</sup> The antibacterial activity of *Aloe vera* gel was initially evaluated by the disk diffusion method using 20 isolates of *S.mutans* as the main causative agent of dental caries. Undiluted *Aloe vera* gel produced significant growth inhibition zones against all of the oral bacteria tested. The mean MIC values for *Aloe vera* gel measured by the micro dilution method against clinical isolates of *S.mutans*, was 12.5µg/ml.<sup>13</sup>

S.Subramanian, represented a systematic study on the antimicrobial properties of *Aloe vera* leaf gel against multiple drug resistant common pathogenic bacteria and fungi to support the view that *Aloe vera* is a potent antimicrobial agent. Greater and remarkable antimicrobial activities were recorded with ethanolic extract even at low concentration (25µg).<sup>14</sup>

#### **ANTIPLAQUE ACTIVITY:**

Bathini Chandras, carried out a study to find the antiplaque and anti-gingivitis effect of *Aloe vera* and compared it with that of chlorhexidine mouth wash. They concluded that *Aloe vera* when used at full strength reduced accumulated plaque significantly. Within the limits of the clinical study, it may be concluded that the mouth wash containing *Aloe vera* showed significant reduction of plaque and gingivitis.<sup>15</sup>

#### **ANTIPERIODONTOPATHIC ACTIVITY:**

*Aloe vera* gel exerted strong bactericidal activity against both cariogenic and

periodontopathic bacteria, producing growth inhibition zones ranging in width from 32 to 54 mm.<sup>13</sup> The antibacterial activity of *Aloe vera* gel was initially evaluated by the disk diffusion method using 20 isolates of each of the periodontopathic bacteria, i.e. *A. actinomycetemcomitans* and *P. gingivalis*, and the opportunistic periodontopathogen, *B.fragilis*. Undiluted *Aloe vera* gel produced significant growth inhibition zones against all of the oral bacteria tested. At a dilution of 1:8 (12.5%), *Aloe vera* gel inhibited only *S.mutans*, with an inhibition zone of 10 mm, while all isolates of *A. actinomycetemcomitans*, *P. gingivalis* and *B. fragilis* were resistant to this dilution.<sup>13</sup>

#### **MANAGEMENT OF ROOT CANAL FAILURE:**

In most of the cases, the endodontic failure results from persistent or secondary intraradicular infection. Extraradicular infections may also be implicated in the failure of some cases.<sup>7</sup> *Enterococcus faecalis* has been associated with failure of root canal therapy. It has been shown that *Enterococcus faecalis* may tolerate antibacterial effect of Calcium Hydroxide treatment.<sup>16</sup>

Suresh Chandra conducted a study on *in vitro* antibacterial efficacy of *Aloe vera* extract on resistant antimicrobial strains in endodontics. The antimicrobial effect of water, alcohol, chloroform extracts of *Aloe vera* gel was investigated on different strains of bacteria and yeasts. Their study concluded that chloroform extract of *Aloe vera*



showed significant zone of inhibition against *E. faecalis*.<sup>16</sup>

Hence, *Aloe vera* has shown antimicrobial effect against resistant microorganisms found in the root canal.

#### CONCLUSION:

Oro dental pathogens play a significant role in causing Caries, plaque and periodontal diseases. A wide range of plant derivatives have been evaluated with respect to their antimicrobial effects against such pathogenic microorganisms. *Aloe vera* is a traditional medicinal plant which exhibits anti plaque, anti caries activity. Many literatures prove its efficacy against periodontal pathogens. It is also used to eradicate the *E. faecalis* that commonly causes root canal failure in endodontic procedure.

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