NEEM TREE (AZADIRACHTA INDICA) - USE IN DENTISTRY

OBJECTIVE: The anti-microbial efficacy of 2.5% sodium hypochlorite (SHC) and 0.2% chlorhexidine gluconate were compared with an experimental irrigant formulated from the Neem tree, Azadirachta indica A. Juss.

MATERIALS AND METHODS: A sample of 36 single rooted anterior teeth with periapical radiolucency and absence of response to vitality tests that required root canal treatment were selected for this study. The test irrigants and their combinations were assigned to five different groups and saline served as the control. Access cavities were prepared using an aseptic technique and samples collected for both anaerobic culture and Gram stained smears, followed by irrigation and sample collection again. The number of organisms were expressed in colony forming units/ml after 72 h of incubation; the smears were analyzed for their microbial loads and tissue clearance and assessed as per defined criteria.

RESULTS: Our results found the maximum reduction in microbial loads, when analyzed by culture method, with a combination of SHC and the experimental neem irrigant. Maximum tissue clearance on the Gram Stained smears was also found with the same combination.

CONCLUSION: Neem irrigant has anti-microbial efficacy and can be considered for endodontic use.

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In vitro evaluation of antimicrobial effect of miswak against common oral pathogens.

METHODS: This was a cross-sectional study involving 100 health care workers. This research was carried out in Microbiology section of Dow Diagnostic Research & Reference Laboratory. A questionnaire was designed to test oral hygiene habits of study subjects. Oral swabs were taken and microorganisms were identified by standard bacteriological methods. Test material included four different types of miswaks i.e. (1) root of the peelu (Salvadora persica) tree (in packing) (2) root of the peelu tree (without packing) (3) stem of the peelu tree & (4) stem of the neem (Azadirachta indica) tree. These miswaks were tested against three different types of microorganisms isolated from oral swabs: Staphylococcus aureus, Streptococcus mutans & Candida albicans by agar diffusion method. Inhibition zone was measured after 24 hrs of incubation at 37(o)C.

RESULTS: Among the miswaks used, root of the peelu tree in both packing and without packing exhibited strong antimicrobial effect against all three tested microorganisms. However miswak taken from the stem of the peelu and neem tree did not show any antimicrobial activity against all three types of the tested microorganisms.

CONCLUSION: Miswak taken from the root of the peelu tree exhibited antimicrobial activity against all the common oral pathogens and could be a good oral hygiene tool in combating dental caries.

INTRODUCTION: Endodontic infections are polymicrobial in nature. Candida albicans is the most common fungus isolated from failed endodontic cases. The constant increase in antibiotic resistant strains and side-effects caused by synthetic drugs has prompted researchers to look for herbal alternatives such as propolis, Morinda citrifolia and Azadirachta indica (Neem) etc., since, the gold standard for irrigation, i.e., sodium hypochlorite has many disadvantages.

MATERIALS AND METHODS: Extracted human mandibular premolars were biomechanically prepared, vertically sectioned, placed in tissue culture wells exposing the root canal surface to C. albicans grown on Sabouraud Dextrose Agar to form a biofilm. At the end of 2 days, all groups were treated with test solutions and control for 10 min and evaluated for Candida growth and number of colony forming units. The readings were subjected to statistical analysis using analysis of variance and post hoc Tukey tests.

RESULTS: Sodium hypochlorite and propolis groups exhibited highest antimicrobial efficacy against C. albicans with no statistically significant difference. It was followed by the A. indica (Neem) group. M. citrifolia had limited antifungal action followed by the negative control group of saline.
CONCLUSION: According to the results of this study, propolis can be used as an effective antifungal agent similar to that of sodium hypochlorite, although long-term in vivo studies are warranted.

MATERIAL AND METHODS: One hundred dentin blocks were allocated into 5 experimental groups (20 samples each): C (control group, without gel); CG (control group, only base gel); F (fluoride gel, 1.23% NaF; pH 4.1, Dentsply; Brazil); N (Neem gel, 10% neem extract; pH 4.1, manipulation); NF (Neem+fluoride gel, 10% Neem extract and 1.23% NaF; pH 4.1, manipulation). The blocks were stored in artificial saliva for 24 hours. After this, they were submitted to six alternating re- and demineralization cycles. The blocks were analyzed for wear (profilometry). The results were submitted to statistical analysis by ANOVA and Tukey tests (P<0.05).

RESULTS: The mean wear (+/- SD, micro m) was shown as follows in groups: C (13.09+/-0.99), CG (10.60+/-1.99), F (10.90+/-1.44), N (12.68+/-1.13) and NF (10.84+/-1.65). All gels showed some preventive action when compared with control group. However, significant differences were found only between Neem+fluoride gel and fluoride gel.

CONCLUSION: A single application of a neem-containing fluoride gel reduced dentin erosion, thus it is a possible alternative in reducing dental wear. Further research should investigate the action mechanism and the synergism between them.

OBJECTIVE: This study analyzed the antimicrobial effect of five irrigants formulated from different parts of the tree Azadirachta indica (Neem) and compared with 2.5% sodium hypochlorite and 0.2% chlorhexidine gluconate through an agar diffusion test.

MATERIALS AND METHODS: A clinical isolate of Candida albicans was inoculated on Sabourad Dextrose Agar and Enterococcus faecalis (ATCC 29212) on Sheep Blood Agar.
aqueous extracts of certain traditionally used plants were examined for their effects on the enzyme, while tannic acid (0.2 mM) and syringic acid (5 mM) inhibited the enzyme activity 80% and 48%, respectively in vitro. The aqueous extracts of chewing sticks produced 35-40% inhibition of dextran sucrase activity at 5 mg phenol concentration. Kinetic analysis revealed mixed-type of enzyme inhibition by polyphenols, where both K(m) and V(max) were altered. The value of K(i) for tannic, gallic and syringic acids were 0.35, 1.6 and 1.94 mM, respectively. The enzyme inhibition by polyphenols was optimum at pH 7-7.5, while by plant extract was maximum at pH 5-6. These results suggest that plant polyphenols may find potential applications in the prevention and control of dental caries by inhibiting dextran sucrase activity in S. mutans.

**CONCLUSIONS:** Two neem irrigants displayed antimicrobial properties. The efficacy of the standard endodontic irrigants varied depending on the organisms tested.

**CLINICAL RELEVANCE:** Neem-based endodontic irrigants may be formulated for clinical application.

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**Mapping of fluoride endemic area and assessment of F(1) content in tree species**

Saini, Poonam; Khan, Suphiya; Baunthiyal, Mamta; Sharma, Vinay.

**Title**
Inhibition of dextran sucrase activity in Streptococcus mutans by plant phenolics.

**Source**

**Abstract**
Streptococcus mutans is responsible for causing dental caries in humans and utilizes sucrose for its growth. The dextran sucrase (EC 2.4.1.5) is responsible for sucrose metabolism, which exhibits both hydrolytic and glucosyltransferase activities. In this study, we examined the effects of the plant phenols, namely gallic, tannic and syringic acids and aqueous extracts of certain traditionally used chewing sticks (Acacia arabica, Azadirachta indica, Pongamia pinnata and Salvadora persica) for prevention of dental caries on hydrolytic activity of dextran sucrase in S. mutans. Gallic acid (4-5 mM) produced 80-90% inhibition of the enzyme, while tannic acid (0.2 mM) and syringic acid (5 mM) inhibited the enzyme activity 80% and 48%, respectively in vitro. The aqueous extracts of chewing sticks produced 35-40% inhibition of dextran sucrase activity at 5 mg phenol concentration. Kinetic analysis revealed mixed-type of enzyme inhibition by polyphenols, where both K(m) and V(max) were altered. The value of K(i) for tannic, gallic and syringic acids were 0.35, 1.6 and 1.94 mM, respectively. The enzyme inhibition by polyphenols was optimum at pH 7-7.5, while by plant extract was maximum at pH 5-6. These results suggest that plant polyphenols may find potential applications in the prevention and control of dental caries by inhibiting dextran sucrase activity in S. mutans.

**CONCLUSIONS:** Two neem irrigants displayed antimicrobial properties. The efficacy of the standard endodontic irrigants varied depending on the organisms tested.

**CLINICAL RELEVANCE:** Neem-based endodontic irrigants may be formulated for clinical application.

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**Environmental Monitoring & Assessment. 185(2):2001-8, 2013 Feb.**

**Abstract**
The prevalence of fluorosis is mainly due to the consumption of more fluoride (F(-1)) through drinking water, vegetables, and crops. The objective of the study was mapping of F(-1) endemic area in Newai Tehsil, Tonk district, Rajasthan, India. For the present study, water, soil (0-45 cm), and vegetation samples were collected from 17 villages. Fluoride concentration in water samples ranged from 0.3 to 9.8 mg/l. Out of 17 villages studied, the amounts of F(-1) content of eight villages were found to exceed the permissible limits. Labile F(-1) content and total F(-1) content in soil samples ranges 11.00-70.05 mg/l and 50.3-179.63 mg g(-1), respectively. F(-1) content in tree species was found in this order Azadirachta indica 47.32-55.76 mg g(-1) > Prosopis juliflora 40.16-49.63 mg g(-1) > Acacia tortilis 34.39-43.60 mg g(-1). While in case of leafy vegetables, F(-1) content order was...
Chenopodium album 54.23-98.42 mg g(-1) > Spinacea oleracea 30.41-64.09 mg g(-1) > Mentha arvensis 35.48-51.97 mg g(-1). The order of F(-1) content in crops was found as 41.04 mg g(-1) Pennisetum glaucum > 13.61 mg g(-1) Brassica juncea > 7.98 mg g(-1) Triticum sativum in Krishi Vigyan Kendra (KVK) farms. Among vegetation, the leafy vegetables have more F(-1) content. From the results, it is suggested that the people of KVK farms should avoid the use of highly F(-1) containing water for irrigation and drinking purpose. It has been recommended to the government authority to take serious steps to supply drinking water with low F(-1) concentration for the fluorosis affected villages. Further, grow more F(-1) hyperaccumulator plants in F(-1) endemic areas to lower the F(-1) content of the soils.

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Title
Source
Other ID
Source: NLM. PMC3467930
Abstract
BACKGROUND: Probably microbial plaque is the main etiology for periodontal tissue inflammation. Various chemical agents have been evaluated over the years with respect to their antimicrobial effects in the oral cavity. However, all are associated with side effects that prohibit regular long-term use. Therefore, the effectiveness of Azadirachta indica (neem) against plaque formation is considered to be vital, with lesser side effects. The aim of the present study is to evaluate and prove the antimicrobial activity of neem using plaque samples.

MATERIALS AND METHODS: Culture was prepared using brain heart infusion broth reagent. Dental plaque samples were used for that. Kirby-Bauer antimicrobial susceptibility test procedure was carried away with the sample. Neem oil was kept in the agar plate with culture and the diameter of inhibition zones was calculated.

RESULTS: Results showed inhibition zones on the agar plate around neem oil.

CONCLUSION: Study shows definite antiplaque activity of neem oil.

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Title
To evaluate the antigingivitis and antipalque effect of an Azadirachta indica (neem) mouthrinse on plaque induced gingivitis: A double-blind, randomized, controlled trial.
Source
Other ID
Source: NLM. PMC3283940
Abstract
BACKGROUND: Azadirachta indica (neem), a Meliaceae family tree, has been used in India for several decades for the treatment of several diseases in medicine and dentistry. Neem has been considered to have antiseptic activity, but still its use for the treatment of gingivitis and periodontitis is not very clear. Hence, the purpose of the present study was to assess the efficacy of neem based mouth rinse regarding its antigingivitis effect.

MATERIALS AND METHODS: Forty five subjects with plaque induced gingivitis were selected for the study. They were equally divided into three groups. Group I patients were asked to rinse with 15 ml of neem mouthwash twice daily, group II with 15 ml of chlorhexidine mouthwash twice daily, and group III with 15 ml of saline twice daily. The three groups were asked to perform the routine oral hygiene procedures thought out the study period. Bleeding
on probing and gingivitis were evaluated by Muhlemann and Son's Sulcus bleeding index (1971) and Loe and Silness gingival index (1963), respectively, at base line, after every week till one month.

RESULTS: Our result showed that an A. indica mouthrinse is equally efficacious in reducing periodontal indices as Chlorhexidine. The results demonstrated a significant reduction of gingival, bleeding, and plaque indices in both groups over a period of 21 days as compared to placebo.

CONCLUSION: A. indica-based mouth rinse is equally efficacious with fewer side effects as compared to chlorhexidine and may be used as an adjunct therapy in treating plaque induced gingivitis.

Plaque and gingival indices scores, and IL-2 and IFN-gamma levels in the gingival tissues were measured at baseline and after two weeks of mouthwash use. Results showed the reduction of plaque and gingival indices, IL-2 and IFN-gamma level with Chlorhexidine, Essential oil, and Povidone iodine, which were found to be statistically significant. Although Neem reduced the level of plaque and gingival indices, and IL-2 and IFN-gamma to a certain level, it was not statistically significant. Therefore, Chlorhexidine, Essential oil, and Povidone iodine mouthwashes can be used as an adjunct to oral prophylaxis in reducing pro-inflammatory cytokines, IL-2 and IFN-gamma in patients with chronic gingivitis.

Effect of various mouthwashes on the levels of interleukin-2 and interferon-gamma in chronic gingivitis.

The aim of this double blind study was to evaluate the effect of various mouthwashes: Chlorhexidine, Essential oil, Azadirachta indica (Neem) extract, and Povidone iodine on gingival tissue interleukin-2 (IL-2) and interferon-gamma (IFN-gamma) levels in patients with chronic gingivitis. A total of 80 patients (42 boys, 38 girls; mean age 16.0 +/- 1.8 years) were included in this study. Patients were randomly assigned into four groups of 20 each: Group I--Azadirachta indica (Neem) extract, Group II--Essential oil, Group III--Povidone iodine, and Group IV--Chlorhexidine. They were instructed to use these mouthwashes for two weeks.
OBJECTIVE: Azadirachta indica, a Meliaceae family tree, has been used in India for many years in the treatment of several diseases in medicine and dentistry. Current research analyses the effects of the leaf aqueous extract from Azadirachta indica (Neem) on the adhesion, cell surface hydrophobicity and biofilm formation, which may affect the colonisation by Candida albicans.

METHODS: Azadirachta indica extract was tested in vitro on strains of Candida albicans 12A and 156B. Changes in hydrophobicity were reported in assays of yeast adhesion to hydrocarbons, in biofilm formation with glucose and in the adhesion of the microorganisms on light cured composite resin. Assays involved enumeration of candidal colony-forming units together with scintillation counting of radiolabelled Candida and compared to a solution of chlorhexidine digluconate 0.125% widely used in dentistry.

RESULTS: Yeast growth in Neem extract was not inhibited in concentrations ranging from 0.1mg/mL. A statistically significant increase (p<0.05) in cell surface hydrophobicity was evident for the two strain tested and there was also an associated increase in biofilm formation after contact with Neem extract in concentration 0.01 g/mL. Decrease in adhesion capacity of cells to composite resin was also recorded.

CONCLUSION: An anti-adhesive mechanism of action by Azadirachta indica is proposed based on the results observed.
NEEM TREE (AZadirachta Indica) - USE IN DENTISTRY

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immunomodulatory, anti-inflammatory, antihyperglycaemic, antilulcer, antimalarial, antibacterial, antiviral, antioxidant, antitumorgenic and antitumorigenic properties. This review summarises the wide range of pharmacological activities of neem leaf. [References: 100]

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Journal Article.  Research Support, Non-U.S. Gov't.  Review.

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Title
Traditional oral health practices among Kanuri women of Borno State, Nigeria.

Source

Local Messages
THIS JOURNAL IS AVAILABLE IN THE BDA LIBRARY

Abstract
A structured questionnaire was administered on 495 women (urban 339, rural 156) from two LGAs of Borno State, Nigeria, using the interviewer method. The age range of the subjects was 12 to 80 years with a mean age (+/- SD) of 35.7 +/- 13.44 years. Majority (83.5%) did not have any formal education. Oral hygiene tools used by the respondents included toothbrush/paste 36 (7.9%), chewing stick 250 (54.9%), charcoal 159 (34.9%) and ordinary water 10 (2.2%). Of those using chewing sticks; 168 (67.2%) use Salvia persica, 36 (14.4%) use Azadirachta indica and 46 (18.4%) use Eucalyptus camaldulensis. Forty (8.1%) of the respondents do not clean their teeth at all. Strong association was found between choice of teeth cleaning material and educational level (P=0.000). Three hundred and one (60.8%) of the respondents stain their teeth with flowers of Solanum incanum or Nicotiana tabacum while, 218 (44.0%) perform tattooing of lip or gingivae and of this number 213 (97.7%) performed tattooing before marriage. Tattooing is usually performed without local anaesthesia with thorns of Balanites aegyptiaca and a mixture of charcoal & seeds of Acacia nilotica var. tomentosa as pigments. It is concluded that traditional oral health practices still constitute important part of the lifestyle in the study population.

Publication Type
Journal Article.  Research Support, Non-U.S. Gov't.
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**NEEM TREE (AZADIRACHTA INDICA) - USE IN DENTISTRY**

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**Status**
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**Title**
Post-harvest fungal quality of selected chewing sticks.

**Source**

**Abstract**
OBJECTIVE: To study post-harvest fungal overgrowth on chewing sticks used for oral hygiene measures and role of disinfection.

METHODS: The post-harvest fungal spoilage of chewing sticks (Garcinia kola, Glyphea brevis and Azadirachta indica) was investigated by subjecting the chewing sticks to different preparatory methods (some disinfected in 0.7% sodium hypochlorite before storage), storage conditions (unsealed or sealed in clear polythene) and different storage periods (2, 3 and 4 weeks).

RESULTS: Significant differences (P = 0.05) in mean percentage fungal colonization were dependent on plant type and storage period, but not on preparative methods and storage conditions. There were, however, significant interactions between chewing sticks and preparative methods, storage conditions and storage periods, respectively. Azadirachta indica was observed to be more susceptible to post-harvest spoilage organisms than other test plants. Generally, percentage fungal colonization increased with increase in storage period. Four genera, Penicillium spp., Aspergillus spp., Mucor spp. and Botryodiplodia spp., were implicated with post-harvest colonization of chewing sticks after 4 weeks of storage.

CONCLUSION: The use of harvested chewing sticks after prolonged storage period is therefore not advisable for oral hygiene measures.

**Publication Type**
Journal Article.

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**Status**
MEDLINE

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**Title**

**Source**

**Abstract**
Neem is one of the most widely researched tropical tree, with almost all it’s parts being put for a variety of uses. In the present study, the antibacterial effect of Neem mouthwash against salivary levels of streptococcus mutans and lactobacillus has been tested over a period of 2 months. Also its effect in reversing incipient carious lesions was assessed. While streptococcus mutans was inhibited by Neem mouthwashes, with or without alcohol as well as chlorhexidine, lactobacillus growth was inhibited by chlorhexidine alone. The initial data appears to prove its effect in inhibiting S. mutans and reversing incipient carious lesions, longer term clinical trials are essential.

**Publication Type**
Clinical Trial. Comparative Study. Journal Article. Randomized Controlled Trial.

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**Status**
MEDLINE

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**Title**
The antimicrobial effects of extracts of Azadirachta indica (Neem) and Salvadora persica (Arak) chewing sticks.
To request copies of any of these articles please use one of our request forms. Articles can be emailed or posted for a charge of £2.50 each.

Source

Abstract
Chewing sticks (Miswak) is most commonly used in the Middle East and Indian Subcontinent Salvadora persica (Arak) and Azadirachta indica (Neem) are commonly used as oral hygiene tools in different parts of the world. Several studies have demonstrated the anti-plaque anticus and antibacterial effect of these sticks. The aim of this study was to compare the effectiveness of antimicrobial activity of Neem and Arak chewing stick's aqueous extracts at various concentrations. The microbial inhibition was measured using blood agar and ditch plate method up to 48 hours. The pH of Neem extract was 6.1 and of Arak was 4.9 Data suggested that both chewing stick extracts are effective at 50% concentration on strept mutans and Strept faecalis. Arak extract was more effective at lower concentrations for Strept faecalis. The effect may be due to the difference of their chemical composition and variability in their pH. Further research is needed to extrapolate other plants used for oral hygiene. Chewing sticks are recommended as oral hygiene tools for health promotion in developing countries.

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Journal Article.

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Authors
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Title
The inhibiting effect of aqueous Azadirachta indica (Neem) extract upon bacterial properties influencing in vitro plaque formation.

Source

Local Messages
THIS JOURNAL IS AVAILABLE IN THE BDA LIBRARY

Abstract
The purpose of this investigation was to examine the inhibitory effects of aqueous extracts derived from the bark-containing sticks (Neem stick) of Azadirachta indica upon bacterial aggregation, growth, adhesion to hydroxyapatite, and production of insoluble glucan, which may affect in vitro plaque formation. Neem stick extracts were screened for minimal bacterial growth inhibition (MIC) against a panel of streptococci by means of a broth dilution assay. Initial bacterial attachment was quantified by the measurement of the adhesion of 3H-labeled Streptococcus sanguis to saliva-conditioned synthetic hydroxyapatite. The effect of the Neem stick extract upon insoluble glucan synthesis was measured by the uptake of radiolabeled glucose from 14C-sucrose. Aggregating activity of the Neem stick extracts upon a panel of streptococci was also examined. No inhibition of bacterial growth was observed among the streptococcal strains tested in the presence of < or = 320 micrograms/mL of the Neem stick extract. The pre-treatment of S. sanguis with the Neem stick extract or the gallotannin-enriched extract from Melaphis chinensis at 250 micrograms/mL resulted in a significant inhibition of the bacterial adhesion to saliva-conditioned hydroxyapatite. Pre-treatment of saliva-conditioned hydroxyapatite with the Neem stick or gallotannin-rich extract prior to exposure to bacteria yielded significant reductions in bacterial adhesion. The Neem stick extract and the gallotannin-enriched extract from Melaphis chinensis inhibited insoluble glucan synthesis. Incubation of oral streptococci with the Neem stick extract resulted in a microscopically observable bacteria aggregation. These data suggest that Neem stick extract can reduce the ability of some streptococci to colonize tooth surfaces.

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Title
Folklore therapeutic indigenous plants in periodontal disorders in India (review, experimental and clinical approach). [Review] [44 refs]

Source

Abstract
Though a number of plants and their parts are used for dental ailments among population in rural and urban areas of developing countries, in India however, the most common house-
hold, road-side plants are mango (Mangifera indica), neem (Azadirachta indica; Melia azadirachta), ocimum (Ocimum basilicum), tea-dust (Camellia sinensis) and uncommonly murayya, i.e., currey leaf (Murayya koenigi) [Chopra et al. 1958, Kirtikar and Basu 1935, Nadakarni 1954, Satyavali 1984]. The leaves of these plants are folded and brushed (massage with teadust) against the teeth. Therefore, the present study is restricted only to the fleshy leaf extracts [Jindal et al. 1975] (except tea) of these plants inspite of certain limitations in the methodology and arbitrations in the microbial identification and isolation in the light of recent advances in folk dentistry. The investigation was carried out in two parts: 1) Experimental study: The efficacy of various dentifrices (commonly available in the market) and the potentiating effect of the leaf extract (LE) of the aforesaid indigenous plants when amalgamated with the tooth-paste against pathogens, were investigated. Further, the protection afforded by the said plant extracts (PE) over the conventional allopathic medicines on the human plaque cultures and gram negative bacteria from patients were studied. 2) Clinical study: The therapeutic effects of the said PE (individually) on clinical application among severely infected patients were examined. [References: 44]