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Anti-bacterial activity of various medicinal plants against mixed dental flora.

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ABSTRACT

The incidence of multidrug resistance in bacterial population has increased the importance of conventional ayurvedic and herbal medicines. In this study we have evaluated the effect of Azadirachta indica, Mangifera indica, Hemidesmus indicus, Caryophyllus aromaticus, Cinnamomum zeylanicum, Quercus infectoria, Rubia cordifolia, Embilica officinalis, Terminalia belerica, Terminalia chebula, Acacia arabica on bacteria. Aqueous and ethanolic extracts of different medicinal plants were screened for their anti-microbial activity on Blood Agar Medium against mixed dental flora. Agar well diffusion method was used to check anti-bacterial activity of the extracts against aerobic dental flora. The extracts which demonstrated maximum anti-bacterial activity were used to prepare a poly herbal extract. This poly herbal extract can prevent the growth of dental bacteria and thus can be used for oral hygiene. Chewable tablets were prepared from the poly herbal extract and the tablets also demonstrated good antimicrobial activity.

Key words: poly-herbal extracts, anti-bacterial activity, agar well diffusion method, mixed dental flora.

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INTRODUCTION

The use of plant-derived medicines for treating diseases has been common practice in India since ages. Medicinal plants are part and parcel of humans since the dawn of civilization. In India they form the backbone of several indigenous traditional systems of medicine. The demand of plant based therapeutics is increasing in both developed and developing countries as they are non narcotic, having no side effects, easily available at affordable prices. The presence of nutrients, epithelial debris and secretions makes mouth a favourable habitat for a great variety of bacteria. Oral bacteria include Streptococci, Lactobacilli, Staphylococci, and Corynebacterium, with a great number of anaerobes, especially bacteriodes.

Dental plaque refers to the aggregates of bacterial cell embedded in a polysaccharide and protein matrix which adheres to the teeth by a characteristic bacterium, Streptococcus mutans. [1] Plaque is classified as supragingival or subgingival based on its relationship to the gingival margin. [2] Dental decay is due to the irreversible solubilization of tooth mineral by acid produced by certain bacteria that adhere to the tooth surface in bacterial communities known as dental plaque. [3]

The present study aimed to evaluate effect of many herbs and their mixture to control plaque formation.

MATERIALS AND METHODS

Plant material and extract preparation: Fresh plants or parts thereof were collected from Ayurved Rasashala and Green Pharmacy (authenticated by Botany department), Pune. 1gm powder of plants samples viz., Azadirachta indica(twig)(Neem), Mangifera indica(twig, fruit)(Mango), Hemidesmus indicus(root)(Anantmul), Caryophyllus aromaticus(fruit)(Clove, Lavang), Cinnamomum zeylanicum(bark)(Dalchini), Quercus infectoria(fruit)(Maifal), Rubia cordifolia(plant)(Manjishtha), Embilica officinalis(fruit)(Amla), Terminalia belerica(fruit)(Behda), Terminalia chebula(bark)(Harda), Acacia arabica(bark)(Babhul) were weighed and soaked in 5ml distilled water and ethanol for 48hrs to obtain extracts of 20% concentration.

Culture: Aerobic mixed dental micro flora was isolated and maintained as mentioned previously. [4]

Anti-microbial test: Antimicrobial activity was evaluated by using Agar Well Diffusion Assay method against mixed dental micro flora. 0.1ml culture (OD at 530 nm = 0.1) was spread by Spread Plate Technique on sterile pre solidified blood agar plate aseptically. The assay was performed as mentioned earlier. [4].The zone diameters were measured from six different angles for each well and the average Zone diameter was recorded.

Direct compression method for tablet preparation: Extracts which showed higher zone of inhibition were used for preparation of tablet viz., Mangifera indica(fruit)(Mango), Azadirachta indica(bark)(Neem), Caryophyllus aromaticus (fruit)(Clove), Terminalia chebula(bark)(Harda),

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Emblica officinalis(fruit)(Amla), Terminalia belerica(fruit)(Behda), Cinnamomum zeylanicum (bark)(Dalchini), Quercus infectoria(fruit)(Maifal) 20mg powder of each herb was weighed for 1 tablet and was mixed properly. 5%w/v of PVP (polyvinyl pyrrolidone) in alcohol, used as binder, was added till the mixture become rough and mixed in mortar pestle. 5% starch powder was added as disintegrating agent. The choice and selection of binders is extremely critical for Direct Compression tablets. The mixture was then added in a machine which compresses the powder directly into tablet by applying high pressure.

RESULTS AND DISCUSSION

The results are summarized in figure no. 1. The results demonstrated that, all the extracts except Anantmul possess potent antimicrobial activities.

Figure no. 1: Effect of aqueous and ethanolic herbal extract on mixed dental flora.

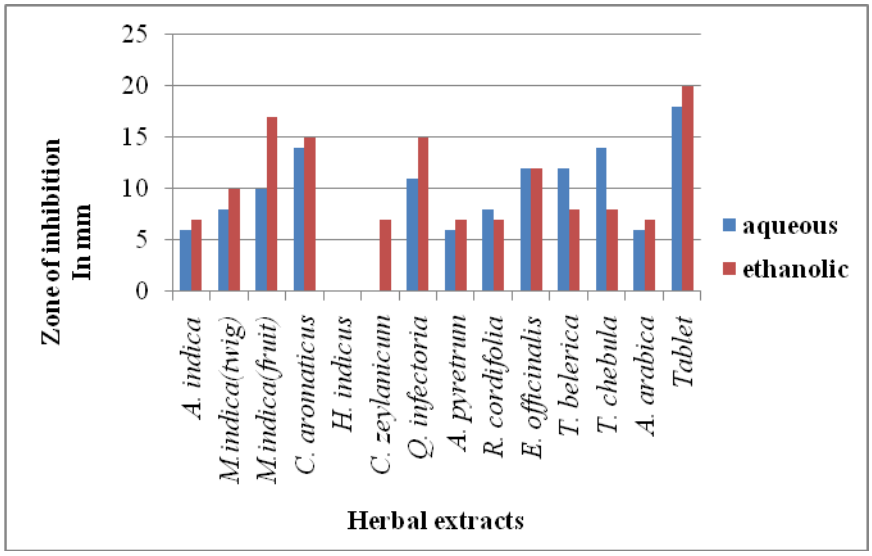

Figure no. 2: Chewable tablets prepared from polyherbal extract

The increasing prevalence of multi drug resistant strains of bacteria and the recent appearance of strains with reduced susceptibility to antibiotics raises the specter of untreatable bacterial infections adds urgency to search for new infection fighting strategies. Several phytoconstituents like flavanoids and polyphenols, tannins, terpenoids, sesquiterpenes have

proven effective antimicrobial substances against a wide range of microorganisms. Mango contains tannins, bittergums and resins. Tannins and resins have an astringent effect on mucous membrane and they form a layer over enamel thus providing protection against dental caries. Neem contains alkaloids, resins, fluoride, silica, flavanoids, etc. due to these constituents neem exerts anticariogenic action, analgesic action, astringent effect and prevention of accumulation of plaque. [5] Amla showed presence of tannins, saponins, flavanoids and phenols. [6] Clove contains eugenol which is used in treatment for smoking. Behda contains gallic acid, ellagic acid and tannic acid.

The unique aspect of the work is to confirm the importance of herbal products for its medicinal properties. From the findings of study it appears that it may be possible to maximize the antimicrobial effect of the extracts by using them in combination. Usually only one type of plant part is used by any one individual but, perhaps, people can be encouraged to use a combination of the extracts for better oral cleanliness and protection against oral & dental bacteria.

CONCLUSION

The formulation i.e. tablet (figure no. 2) proved to be very effective against mixed dental flora when compared to its individual ingredients. The tablet showed the antibacterial activity with zone of 20mm in diameter which is greater than each individual extracts tested. Hence from these studies we can conclude that instead of using individual extract, mixture of extracts is more effective. The polyherbal product in the form of tablet with hardness=2 disintegrate immediately in water and hence is potential for using commercially.

In fact these plants produce a wide range of bioactive molecules. Here, the combination of all these plant materials in equal proportions makes the tablet preparation as one of the rich source of phytoconstituents. The tablet shows the synergistic effect on plaque.

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