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TO STUDY ANTIMICROBIAL ACTIVITY OF SYZYGIUM AROMATICUM EXTRACT AGAINIST DENTAL PATHOGENS

Amrutha Sai. Kotu[1], Sharat Babu P R[2*]

[1]Assistant Professor of Dental, Pondicherry Institute of Medical Sciences, Pondicherry
[2]Assistant Professor of Dental, Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry

ABSTRACT

The present study was conducted to assess the antimicrobial potential of Syzygiumaromaticumagainst bacterial strains which causes the dental caries by disc diffusion technique. The organisms reported to cause dental caries such as Streptococcus mutans, Streptococcus salivariousand Fusobacterium nucleatumwere used to evaluate the antimicrobial activity of Syzygiumaromaticumextract, which were isolated from dental caries. Ethanolic extract of Syzygiumaromaticumat various (100 – 500 µg) concentrations were used and the antimicrobial activity was evaluated by disc diffusion method. Doxycycline (100mg) was used as positive control for comparison. Ethanolic extract of Syzygiumaromaticumexhibited dose dependent inhibition against Streptococcus mutansand Streptococcus salivarious. All the concentrations of ethanolic extract of Syzygiumaromaticumshowed strong antibacterial activity against Fusobacterium nucleatum. From the result it was concluded that, ethanolic extract of Syzygiumaromaticumexhibited antimicrobial activity against the organisms which causes dental caries.

Keywords :- Syzygiumaromaticum, Dental caries, Antimicrobial activity, Streptococcus mutans, Streptococcus salivarious.

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INTRODUCTION

Ayurveda is a medical system primarily practiced in India that has been known for nearly 5000 years recommends a combination of lifestyle management, and treatment with specific herbs to cure various diseases. There are approximately 1,250 medicinal plants being used in formulating beneficial measures [1]. Herbal medicines have two special characteristics that distinguish them from chemical drugs, use of crude herbs and prolonged usage. Experience has shown that there are real benefits in the long-term use of whole medicinal plants and their extracts, since the constituents in them work in conjunction with each other. Severalpopularconventional drugs on the market are from various herbs.

Herbal medicines have fewer side effects and are safer to use than conventional medications. It is well documented that medicinal plants confer considerable antibacterial activity against various microorganisms including bacteria's responsible for dental caries. Phytochemicals for the prevention, treatment and maintenance of periodontal diseases are identified. They may be tannins, terpenoids, flavonoids, alkaloids, etc. Antimicrobial activities of these have been found to be particularly useful for periodontal diseases [2]. Cloves (Syzygiumaromaticum) are dried aromatic unopened floral buds of anevergreen tree 10-20 m in height,belonging to the family Myrtaceae, indigenousto India, Indonesia, Zanzibar, Mauritius and Ceylon[3].

Corresponding Author: **Dr P R Sharat Babu** Email: drpebyreddy@gmail.com

They are esteemed as a flavouring agent and also used as a spice for scenting, chewing tobacco and an ingredient of betel chew. Cloves have many therapeutic uses: they control nausea and vomiting, cough, diarrhoea, dyspepsia, flatulence, stomach distension and gastro intestinal spasm, relieve pain, cause uterine contractions and stimulate the nerves [4]. In addition, the cloves are highly antiseptic, antimutagenic, anti-inflammatory, antioxidant, antiulcerogenic, antithrombotic, antifungal, antiviral and antiparasitic [4].

Herbs are staging a comeback and herbal 'renaissance' is happening all over theglobe. The herbal products today symbolize safety in contrast to the synthetics that are regardedas unsafe to human and environment. Over three-quarters of the world population relies mainlyon plants and plant extracts for health care. The demand of plant based therapeutics is increasingin both developed and developing countries due to the growing recognition that they are naturalproducts, being non narcotic, having no side effects, easily available at affordable prices andsometimes the only source of healthcare available to the poor. In dental complications, Cloveswas found to be used in the sites of periodontal surgery, toothpick injuries, gum abscesses, dry socket, and gingival problems associated with AIDS, leukemia, migratory glossitis, geographic tongue and burning mouth syndrome, desquamative [13]. The major challenge and problem is the lack of scientific evidence on clovefor its effect on dental caries, so effort was taken to study the antimicrobial activity of ethanolic extract of *clove* against the bacteria causing dentalcaries.

MATERIAL AND METHODS

Collection of Clinical Sample, Isolation and Identification of Dental Pathogen

Dental plaque samples were collected from the adult patients in Sri Lakshmi Narayana Institute of Medical Sciences and Pondicherry Institute of Medical Sciences,Pondicherry. The dental plaque sample was inoculated on blood agar plates and incubated for 18-24 hours at 37^{o}C streak plate technique and the pathogens were isolated and identified by Bergey's manual[14].

Cloves Collection & Authentication

*Syzygiumaromaticum*was collected from the medicinal garden of Sri Lakshmi Narayana Institute of MedicalSciences, Pondicherry and the plant was authenticated Plant Anatomy Research Centre, Chennai. The voucher specimen was deposited in the herbarium for future reference.

Extraction

The samples were carefully washed under running tap water followed by steriledistilled water. These were air dried at room temperature (30OC) for two days and pulverized to afine powder using a sterilized mixer grinder and stored in air-tight bottles. Ethanol was used as solvent for extraction. 10 grams of this powder was soaked in 100ml ethanol as solvent, for 24 h. The contents were then filtered through Whatman filter paper no. 1 and the filtrate was evaporated to dryness. the filtered extract was concentrated undervacuum below 40^{o}C using Heidolph. The dried extract thus obtained was exposed to UV rays for 24h and checked for sterilityon nutrient agar plates and stored in labeled sterile bottles in a freezer at 4^{o}C until further useThis dried extract was further powdered and stored in refrigerator.

Preparation of Disc

The discs were prepared by sterile filter paper dried in an oven to remove moisture. The extracts were applied on the dried filter paper disc by micropipette to obtain disc containing 100µg, 200µg, 300µg, 400µg and 500µg of extract concentration in eachdisc.

Antibacterial Assays

Antibacterial activities of ethanolic extracts of *Syzygiumaromaticum*were evaluated by disc diffusion method. A 100 µL of diluted bacterial suspension (5 x 106 cfu mL-1) of test bacterial strains was spread on the surface of Muller Hinton agar. Then sterile disc containing 100 µg, 200 µg, 300 µg, 400 µg and 500 µg of *Aloe vera* gel extracts was placed onto the surface of agar plate. For negative control, discs were impregnated with solvent. Plates were incubated at 37^{o}C for 24 h and diameters of inhibition zones (mm) weredetermined.

RESULTS AND DISCUSSION

Antimicrobial activity of ethanolic leaf extract of *Syzygiumaromaticum*(100 µg – 500 µg) was studied against *Streptococcus mutans, Streptococcus salivarious*and *Fusobacterium nucleatum*by disc diffusion method and the result were given in table 1. Doxycycline was used as reference control. *Syzygiumaromaticum*extract [14] exhibited dose dependent antimicrobial activity against *Streptococcus mutans* and *Streptococcussalivarious*.

The zone of inhibition *Syzygiumaromaticum*extract at 100 µg against *Streptococcus mutans*and *Streptococcus salivarious*was 9.35±0.78 and 5.77±0.29 respectively. The zone of inhibition of *Syzygiumaromaticum* extractat 500µga gainst *Streptococcusmutans*and *Streptococcus salivarious*was increased to 17.42±0.99and 16.78±0.84 respectively. There was dose dependent increase in antimicrobial activity of *Syzygiumaromaticum*extract

against *Streptococcus mutans*and *Streptococcus salivarious.* The zone ofinhibition [13]of *Syzygiumaromaticum*extract at 100 µg and 500 µg against *Fusobacterium nucleatum*was 15.37±0.74 and 16.81±0.77 respectively. The antimicrobial activity of *Aloe vera* gel extract was comparable to the effect of Doxycycline.

Table 1: Antimicrobial activities of ethanolic leaf extract of Ethanolic Leaf Extract ofSyzygiumaromaticumagainstStreptococcus mutans, Streptococcus mutansand Fusobacterium nucleatumby disc diffusion method

Extract	Concentrations	Zone of Inhibition (mm)		
		Streptococcus mutans	***Streptococcus salivarious***	***usobacterium nucleatum***
Doxycycline	100mg	18.35±0.95	17.66±0.42	16.88±0.74
Ethanolic Leaf Extract of *Syzygiumaromaticum*	100 µg	9.35±0.78	5.77±0.29	15.37±0.74
	200 µg	11.40±0.99	9.84±0.47	15.72±0.34
	300 µg	12.82±0.89	12.24±0.89	16.23±0.97
	400 µg	16.31±0.71	14.48±0.57	16.41±0.89
	500 µg	17.42±0.99	16.78±0.84	16.81±0.77

CONCLUSION

The antimicrobial activity of ethanolic leaf extract of Syzygiumaromaticumextract was studied on dental caries causing dental pathogens. From the result it was concluded that, ethanolic extract of Syzygiumaromaticumexhibited dose dependent inhibition against Streptococcusmutans and Streptococcus salivarious. All the concentrations of ethanolic extract of Syzygiumaromaticum showed strong antibacterial activity against Fusobacterium nucleatum. From the study it was found that, natural products may be the easy way in controlling the various dental disorders with a least side effect.

REFERENCES

1. Taheri JB, Azimi S, Rafieian N, Zanjani HA. (2011). Herbs in Dentistry. *Int Dent J*, 61,287-96.
2. Kumar P, Ansari SH, Ali J. (2009). Herbal Remedies for the Treatment of Periodontal Disease – A Patent Review. *Recent Pat Drug DelivFormul*, 3(3), 221-228.
3. Dabai YU, Muhammad S, Aliyu BS. (2007). Antibacterial Activity of Anthraquinone Fraction of *Vitexdoniana*. *Pakistan J BiolSci*, 1–3.
4. Ferro VA, Bradbury F, Cameron P, Shakir E, Rahman SR, Stimson WH. (2003). *In vitro* susceptibilities of *Shigellaflexneri*and *Streptococcus phygenes*to Inner Gel of *Aloe barbadensis*Miller. *AntimicroChemother*, 47(3), 1137–1139.
5. Hamman JH. (2008). Composition and Applications of *Syzygiumaromaticum*. *Molecules*, 13, 1599–1616.
6. Rice-Evans C. (2004). Flavonoids and Isoflavones: Absorption, Metabolism, and Bioactivity. *Free Radical Biol Med*, 36,827–828.
7. Scalbert A, Williamson D. (2000). Dietary intake and Bioavailability of Polyphenols. *J Nutr*, 130,2073S–2085S.
8. Anushri M, YashodaR, Puranik MP. (2014).Herbs: A Good Alternatives to Current Treatments for Oral Health Problems. *Int J Adv Health Sci*, 1 (12), 26-32.
9. Imran K, Surya Rao S, Surekha D, Srujana DG, Hemasundara A. (2010). *Arch App SciResear*, 2(2), 246.
10. Chaieb, K., Zmantar, T., Ksouri, R., Hajlaoui, H., Mahdouani, K., Abdelly, C. and Bakhrouf, A
11. 2007.Antioxidant properties of essential oil of Eugenia caryophyllata and its antifungal activity against a large number of clinicalCandida species, *Mycoses* 50, 403-406.
12. Hartnoll, G., Moore, D. and Douek, D (1993). Near fatal ingestion of oil of cloves, *Archives of Disease in Childhood* 69(3), 392-393.
13. Moynihan, P. and Petersen, P.E (2004). Diet, nutrition and the prevention of dental diseases, *Public Health and Nutrition* 7, 201-226.
14. Aneja, K.R. and Joshi, R (2009a). Antimicrobial activity of Amomum subulatum and Elettaria cardamomum against dental caries causing microorganisms, *Ethnobotanical Leaflets* 13: 840-849.
15. Park, M.J., Gwak, K.S., Yang, I., Choi, W.S., Jo, H.J., Chang, W.J., Jeung, E.B. and Choi, I.G 2007. Antifungal activities of the essential oils in Syzygiumaromaticum (L.) Merr. Et Perry and Leptospermum betersonni Bailey and their constituents against various dermatophytes, *J. Microbiology* 45: 460-465.

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