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RESEARCH ARTICLE

EVALUATION OF ANTIMICROBIAL ACTIVITY OF ETHANOLIC EXTRACT OF CURCUMIN LONGA AGAINST STREPTOCOCCUS MUTANS AND CANDIDA ALBICANS

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ABSTRACT

Aim: To evaluate antimicrobial activity of ethanolic extract of curcumin against Candida albicans and steptococcus mutans by agar well diffusion method.
Background: Oral pathogens such as streptococcus mutans and Candida albicans are associated with severe human diseases.The alarming incidence of antibiotic resistance amongst the microbes, has led to the search of alternative antimicrobial drugs from medicinal plant to treat these infections. Curcumin, an active product of turmeric (curcuma longa) has broad spectrum of biological actions.
Materials and Methods: Curcumin was diluted with ethanol and with phosphate buffered saline. Test organisms were cultured in the respective culture media.Antimicrobial activity was tested by using agar well diffusion method.
Results: Confluent growth was seen in Candida albicans and no growth was seen in streptococcus mutans which indicates that curcumin was effective against streptococcus mutans and does not have antimicrobial activity against Candida albicans.

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INTRODUCTION

The prevalence of fungal infections has been increasing progressively contributing to mobility and mortality. Candidiasis is a very important fungal infection which affects the oral cavity. Also, *Candida albicans* are considered to be the most resistant species, and responsible for root canal treatment failure (Lakshmi, 2013). Typically, drug based Management of oral candidiasis has resulted in resistance in Candida species due to the use of azoles and subsequent treatment failures.So problems associated with common antifungal drugs have led to new therapeutic methods to be thought (Davis, 1994). Moreover, antibiotics are sometimes associated with adverse effects on host which include hypersensitivity, immunosuppressant and allergic reactions. This has created immense clinical problems in the treatment of infectious diseases (Ahmedullah and Nayar, 1999). Recently much attention has been paid to extracts and biologically active compounds isolated from plant species used in herbal medicine (Dovigo *et al*., 2013). According to World Health Organization (WHO) more than 80% of the world's population relies on traditional medicine for their primary healthcare needs. Turmeric has held an important position both in unani and Ayurvedic medicine due to its broad spectrum of biological actions such as antioxidant, anti-carcino-genic, anti- mutagenic and anti-inflammatory properties (Sharmila Devi Devaraj and Prasanna Neelakantan, 2009). It has also been used in dentistry in treating periodontal disease, maintain good oral hygiene and oral cancers. It can also be used as a component in local drug delivery system in gel form. It has widely used in cookery, cosmetics, fabric dying and medicine for more than 2000 years (Subashree and Karthikeyan Muthukumar, 2010). Curcumin, a major bioactive compound found in turmeric (*Curcuma longa*) has the ability to change properties of the cell membrane and affect membrane-bound proteins indirectly thereby helps in prevention and treatment of fungal infections. Curcumin was also found to counteract the altered functionality of proliferative and apoptotic pathways thereby acting as anti cancer agent (Nida Fathima, 2014). In the present study antimicrobial activity of curcumin was evaluated against *Candida albicans and streptococcus mutans.*

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MATERIALS AND METHODS

Test organisms	Culture media
Candida albicans	Sabouraud's dextrose agar
Streptococcus mutans	Muller and Hilton agar

Preparation of extract

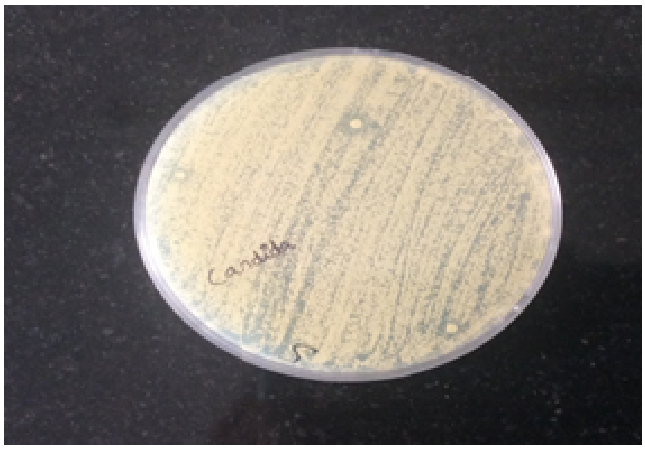
5mg of the extract was diluted with 5ml of ethanol and left till ethanol got vapourized from extract. The extract was diluted with 5ml of phosphate buffered saline.

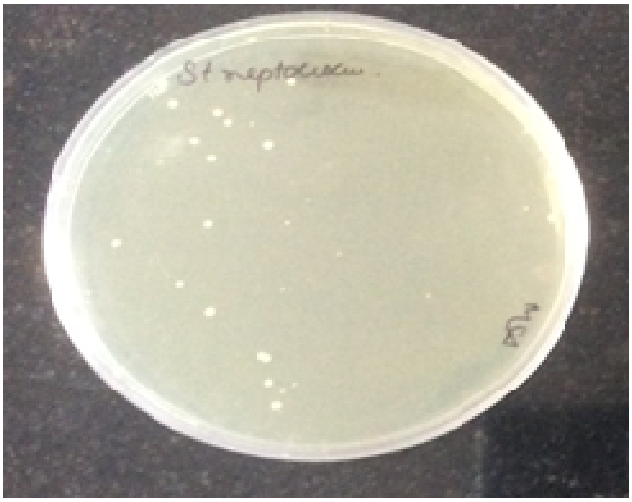
Preparation of inoculum

Suspension of test organisms were prepared and cultured for 24hrs. These Suspensions were made in sterile isotonic solution of sodium chloride and the turbidity was adjusted. Agar well diffusion method was used to conduct the antimicrobial susceptibility test. The agar media plates were inoculated with the respective organisms by even streaking of the swab over the entire surface of the plate three times, rotating the plate approximately 60 degrees after each application to ensure an even distribution of the inoculums. Finally, it was swabbed all around the edge of the agar surface. After incubation for 24hrs at 37C, the plates were observed.

RESULTS

It was observed that confluence growth was seen in *Candida albicans* and no trusty was seen in *streptococcus mutans*, which indicates that 1mg/ml concentration of ethanolic extract was curcumin was effective against streptococcus mutans and does not have any effect on Candida albicans.





DISCUSSION

Jerunka *et al* reported that Curcumin is a strong anti oxidant agent compared to vitamin C and vitamin E with significant preventive and curative effects on number of diseases such as cancer, diabetes and artherosclerosis. Curcumin acts as a potent scavenger of various Reactive Oxygen Species (ROS) including superoxide anion radicals and hydroxyl radicals that play a central role in artherosclerosis and cancer disease. It is also shown to mediate anti-inflammatory effects through the inhibition of different macromolecules involved in inflammatory including phospholipase, cyclooxygenase 2, lipooxygenase, prostaglandins, interleukins 1 and 2, and tumour necrosis factor (Karewicz *et al*., 2011). A study by Gul *et al* found that ethanolic fractions of curcumin was effective against gram positive which are resistant to most of the broad spectrum antibiotics used (Jurenka, 2009) curcumin has also been shown to potentiate the antimicrobial action of cefexime, cephotaxime, vancomycin and tetracycline, suggesting a possible utilization in combination with other medicaments [10]. Prasanna Neelakantan *et al* curcumin may not only exhibit antimicrobial prop erties but also produce photodynamic effects to further potentiate its antimicrobial efficacy (Moghaddam *et al*., 2009). Alsaid *et al* noted that the antimicrobial effect of plant extract varies from one plant to another in different researches carried out in different regions of the world. This may be due to many factors such as, the effect of climate, soil composition, age and vegetation cycle stage, on the quality, quantity and composition of extracted product, different bacterial strains. Moreover, different studies found that the type of solvent has an important role in the process of extracting (Prasanna Neelakantan and Cheng Qing Cheng, 2014). Noted that curcumin is effective only at higher doses due to its poor bioavailability. Major reasons owing to its bioavailability arerapid metabolism and rapid systemic elimination (Alsaid *et al*., 2010). Curcumin nanoparticles, liposomal curcumin, structural analogues of curcumin, curcumin phospholipid complexes or the combination of curcumin with adjuvants (e.g. Piperine) are some of approaches by which researches attempted to improve the bioavailability of this agent (Basnet and Skalko-Basnet, 2011).

Conclusion

From the results obtained in the present study, it can be concluded that 1mg/ml concentration of extract of curcumin had good results on cariogenic bacterium such as streptococcus mutans and does not had any effect on *Candida albicans.* curcumin can be considered a potential candidate in the development of a novel antimicrobial agent due to its antimicrobial activity.

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