



INVITRO ANTIMICROBIAL ACTIVITY OF PHYTOCHEMICAL EXTRACT OF *MYRISTICA FRAGRANS* ON *STREPTOCOCCUS MUTANS*

Nidhi Jaiswal*, and Dr. Shobha Shrivastava

Barkatullah University, Bhopal-462026, Madhya Pradesh, India.

*Corresponding Author: Nidhi Jaiswal

Barkatullah University, Bhopal-462026, Madhya Pradesh, India.

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ABSTRACT

The mouth is full of bacterial micro flora, it provides perfect atmosphere for microbial growth. *Streptococcus mutans* is considered as a potent caries causing bacteria and most common caries causing pathogen isolated from dental plaque. The aim of the study is to determine the invitro inhibitory potential of phytochemical extract of *Myristica fragrans* (its nuts) on *S. mutans*. *Myristica fragrans* is a spice plant that yields Nutmeg or Jaiphal, is common spice used by people. The method used for extraction of phytochemicals from nutmeg was soxlet extraction. Ethanolic and aqueous extracts were obtained and used for testing its antimicrobial activity against *S. mutans*. The percentage yield so obtained was 64% and 34% respectively. The antimicrobial activity was performed by using well diffusion method. *S. mutans* was seeded on NAM (Nutrient agar media). Both aqueous and ethanolic extract of *M. fragrans* was filled in wells of 6mm diameter on NAM plate and incubated at 37 degree C for 24 hrs. The recorded zone of inhibition was found out to be 20mm and 29mm respectively. Thus this showed that *Myristica fragrans* is a potent antimicrobial against *S. mutans* which can be used in many formulations of mouthwashes, dental tubes etc as a potent constituent.

EKEYWORDS: *Streptococcus*, *Myristica fragrans*, mouthwashes.

INTRODUCTION

The mouth has a very mixed bacterial flora; the abundant moisture and the constant presence of small food particles provide an ideal environment for bacterial growth (Stewart and Beswick 1977). The composition and consistency of diet, oral hygiene, clinical health and the use of antimicrobial agents all play a part in determining the quantitative nature of the oral flora. Tooth decay is caused by specific types of acid-producing bacteria that cause damage in the presence of fermentable carbohydrates such as sucrose, fructose, and glucose (Hardie 1982; Holloway and Moore 1983; Rogers 2008). Dental caries is a localized and transmissible pathological infectious process that ends up in the destruction of the hard dental tissue (Rathod et al., 2012). Although 200 to 300 bacterial species have been found in saliva, *Streptococcus mutans* has been considered as a potent caries causing bacteria (Kuramitsu, 2001). The cariogenicity of this bacterium is associated with various factors including dextran production, production of high concentration of acid in the plaque and glycosyl transferase activity. As glycan is the main component of dental biofilm and is directly proportional to the production of glycosyl transferase by *S. mutans*. Therefore *S. mutans* is a most common pathogen isolated from human dental plaque and its

prevalence has been reported (Straetemans et al., 1998; Okada et al., 2005).

As a science of life and the world's oldest medical system, Ayurveda has a holistic approach to health and disease that focuses on preserving and promoting good health and preventing disease through healthy lifestyle practices Cohen (2014). Kukreja et al., (2012) stated that Various herbal products and their extracts such as Guava, Pomegranate, Neem, Propolis, Tulsi, Green Tea, Cranberry, Grapefruit etc, have shown significant advantages over the chemical ones. Shafie et al., (2012) worked on *Myristica fragrans* and proved that both ethyl acetate and ethanol crude extracts from flesh, seed, and mace of *Myristica fragrans* exhibited good potential against oral pathogens. The aim of the present study is to determine in vitro effective inhibitory action of phytochemical extract of nutmeg against *S. mutans*.

MATERIALS AND METHOD

Collection of Samples: Nutmeg was obtained from market and *Streptococcus mutans* (MTCC) for study were procured from IMTECH Chandigarh.

Phytochemical Extraction: The parts of plants *Myristica fragrans* (nuts) were cleaned washed, dried into

fine powder. The powdered crud drug is defatted with petroleum ether at ambient temperature for 12 hours then dried again for phytochemical extraction non-sequentially. 20 to 100 gm of defatted crud drug was used to extract by distilled water and ethanol separately by Soxhletion Method. After various cycles till exhaustion, the menstrum so obtained containing extracted drug was concentrated on water bath so that as extracted drug be obtained free from any traces of extraction solvent. The extracted phytochemical/drug which is a complex mixture of chemical groups is then subjected to its antimicrobial activity.

Antimicrobial Activity

The antimicrobial activity was performed using well diffusion method for which *S.mutans* was seeded on NAM (Nutrient agar media). Both aqueous and ethanolic extract of *M.fragrans* was filled in wells of 6mm diameter on NAM plate and incubated at 37 degree C for 24 hrs and results was noted.

RESULT AND DISCUSSION

When the aqueous and ethanolic extracts of *Myristica fragrans* (nuts) was tested for its antimicrobial activity against *Streptococcus mutans*, the recorded zone of inhibition was found out to be 20mm and 29mm respectively. The results of this study is in conjunction with that of **Shafieiet al., (2012)** who worked on *Myristicafragrans* and proved that both ethyl acetate and ethanol crude extracts from flesh, seed, and mace of *Myristicafragrans* exhibited good potential against oral pathogens. Ethyl acetate extract of flesh has strong antibacterial activity compared to the other extracts. While, ethanol extracts of seed and mace of *Myristicafragrans* gave higher inhibitory and bactericidal activities than their ethyl acetate extracts. The antibacterial activities of the extracts against both Gram-positive cariogenic and Gram-negative periodontopathic bacteria have confirmed its broad-spectrum antibacterial activity. Thus, *Myristicafragrans* should be considered having beneficially potential in dentistry field as oral care products such as toothpaste and mouthwash. In addition, further studies are needed to be carried out to isolate and identify the active compounds of each part of *Myristicafragrans* and their influence in disruption of planktonic or biofilm formation for prevention and control of caries and periodontal diseases.

CONCLUSION

The continuous use of antiseptics and antibiotics not only associated with adverse effects on host including hypersensitivity, depletion of beneficial gut and mucosal microorganism, immune suppression and allergic reactions, but also the pathogens develops the resistance against the antibiotics (Lopez, *et al.*, 2000). This imposes the need to search and development of more promising and reliable new and efficient alternative oral health protection products of natural origin with curative properties but being safe. Plants are the important source

of potentially useful structures for the development of new chemotherapeutic agents. Thus from the present study it can be concluded that *Myristica fragrans* has good antimicrobial effect over *S.mutans* which could be utilized in many ways after further advance studies and proper datageneration for the development of new chemotherapeutic agents.

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