WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 5.990
Volume 4, Issue 8, 1965-1969. Research Article ISSN 2277– 7105

ANTIMICROBIAL ACTIVITY OF LYCOPENE AGAINST ORAL PATHOGENS

Veena Kalbande,*Rohinee Patle and Dr. Anita Chandak

Department of Microbiology, Kamla Nehru College Nagpur, Sakkardhara Square Nagpur, India.

Article Received on
03 June 2015,

Revised on 26 June 2015,
Accepted on 19 July 2015

***Correspondence for Author**
Rohinee Patle
Department of microbiology, Kamla Nehru College Nagpur, Sakkardhara Square Nagpur, India.

ABSTRACT

Fruits and Vegetables present in our diet have several health benefits. Tomatos are the part of diet, consumed in large level in all over world. Tomatos contain numbers of phytochemical, such as lycopene, carotenoid etc. These phytochemical have health benefits but also have antimicrobial properties. The present work investigated that lycopene extract from tomato have antimicrobial activity against some oral pathogen and comparison its activity with commercial antibiotics and mouthwash. The research work shows that lycopene was effective against oral pathogens *Staphylococcus aureus* and Candida albicans and lycopene have better activity than commercial antibiotics and mouthwashes.

KEYWORDS: Antimicrobial activity, Antibiotics, Lycopene, Carotenoid, phytochemical.

INTRODUCTION

Vegetables and fruit are rich sources of a variety of nutrients, including vitamins ,trace elements minerals, and dietary fiber, and many other classes of biologically active phytochemical compounds.[4] Among the vegetables tomato is largely consumed and most important part of our diet. Tomato contain large number of health beneficiary component such as phytochemical like lycopene, catotenoid etc. the phytochemical have health benefits but also have antimicrobial activity.[1]

The commercially available drugs and antibiotics are effective but they are associated with more side effect. Lycopene is natural compound posses antimicrobial activity get advantages over commercially available drugs and antibiotics because it has no side effect,[3] easily

available and consumable. The main objective of this work is to search antimicrobial activity of lycopene against oral pathogens and comparing it activity with commercial antibiotics and mouthwashes. Lycopene is considered as one of the phytochemical, synthesized by plants and some microorganisms but not by animals. Human can not produce lycopene, so, they must take it in their food.

Lycopene is carotenoid, a natural pigment made by plants, which helps to protect plants from stress, and it also transfers light energy during photosynthesis. Lycopene is found in a number of fruits and vegetables, including apricots, guava, and watermelon, etc.

MATERIAL AND METHODS

A) Extraction of lycopene from tomato

Extraction of lycophene is carried out by dissolving tomato paste into equale volume of mixture of methanol and corbon tetrachloride and corbon tetrachloride phase is used for further purification of lycopene.

B) Crystallization

After phase separation, the carbon tetrachloride phase was evaporated and the residue was diluted with benzene and 1 ml of boiling methanol was added in portion, then crystals of crude lycopene were appeared immediately and the crystallization was completed by keeping the liquid at room temperature and ice bath, respectively. The crystals were washed 10 times using benzene and boiling methanol. Long, red lycopene prisms were observed under the microscope.

C) Identification

Identification test were performed using colour chemical reactions. In order to identify the lycopene, a few crystal of extracted Lycopene was dissolved in concentrated sulfuric acid, imparting an indigo blue colour to the solution.

In another test, by adding a solution of antimony trichloride in chloroform to a solution of lycopene in chloroform, an intense unstable blue colour appeared. These tests proved the presence of lycopene in the extract.

D) Antimicrobial Activity

For antibacterial activity and antifungal activity, Prepare Muller Hinton Agar and Potato Dextrose Agar respectively and Then dispense the media into each of the petridish and allow

it to solidify. Transfer 1ml of 24 hrs bacterial broth culture onto solidified plate and spread it with the help of sterile glass rod. After seeding with bacterial and fungal culture respectively, make the well at the centre of the media with the help of cork and borer. Then transfer lycopene to each of the well. Incubate the plates at 37^{o}C for 24 hrs for antibacterial activity and at room temperature for 2 to 4 days for antifungal activity observed plates for zone of inhibition, compare with the control and measure their diameter.

OBSERVATION AND RESULTS

- Antimicrobial activity of lycopene against *Staphylococcus aureus, and Candida albicans* and compaired with antibiotics chloramphenicol and flucanazole respectively.

Table 1: Antimicrobial activity of lycopene by well diffusion method

Organisms	Zone of inhibition of lycopene	Zone of inhibition of antibiotic
1.*staphylococcus aureus*	22mm	16mm (chloramphenico)
2. *candida albicans*	28mm	25mm(flucanozole)

- Antimicrobial activity of lycopene against *staphylococcus aureus and candida albicans* and compaired with commersial mouth wash.

Table 2: Antimicrobial activity of lycopene by well diffusion method

Organisms	Zone of inhibition of lycopene	Zone of inhibition of mouth wash
1.staphylococcus aureus	22mm	18mm
2. candida albicans	28mm	No zone of inhibition

In this study we found that lycopene were effective against *staphylococcus aureus* and *candida albicans* compaired to tested antibiotics(chloramphenicol, flucanazole) because zone of inhibition of antibiotic chloramphenicol and flucanazole were less as compared to zone of inhibition of lycopene.

DISCUSSION

The major component of tomato is lycopene which show antimicrobial and antifungal activity. Lycopene was extracted from tomato paste by simple liquid-liquid extraction using as minimum organic solvent as possible. Crystals obtained by this method was first observed under microscope. Presence of colourless substances indicated the extent of impurity. crystalization method gave completely pure lycopene crystals as no colourless substances was seen.

The amount of pure lycopene was also good (2.313 mg per 100 g tomato paste) compare to those obtained from other studies.

This study show that lycopene showed antimicrobial effect against *staphylococcus aureus* and *candida albicans* it may used as an antimicrobial agents against infections of these pathogens.

Lycopene interfere with the cell wall biosynthesis of *staphylococuus aureus* hence destruction of cell wall occurs which ultimately leads to the cell death. Hence when lycopene is applied to the bacterial lawn of *staphylococcus aureus* it show clear zone. Lycopene exerted potent antifungal activity on *Candida albicans* by causing significant damage to the cell membranes of the yeast hence clear zone was observed.

CONCLUSION

From the present investigation it was concluded that the lycopene which was extracted from tomato was effective against oral pathogens like *Staphylococcus aureus* and *Candida albicans*. We compare lycopene activity with commercially available mouth washes and found that the antimicrobial activity of lycopene was better than commercially available mouth washes.

Further experiments could be done to understand the effect of lycopene on human being, to find out how much concentration of the lycopene was used as antimicrobial agent.

From this study it can be concluded that lycopene shows antimicrobial actions against oral pathogens so we can used lycopene in the preparation of natural mouth wash as an ideal mouth wash and they were found to be harmless and economic.

ACKNOWLEDGEMENT

I am deeply grateful to Dr. Suhasini Wanjari, President, Amar Seva Mandal for giving me to opportunity to doing research work in their Institution. I place to my Sincere thanks to Dr. Arvind Shende, Princiapl, Kamla Nehru College, Nagpur for his encouragement and providence of all facilities.

I would like to express my gratitude to Dr. Anita Chandak, Head of Deptt. Microbiology and Rohinee Patle, Assistant Professor Deptt. Microbiology Kamla Nenru College Nagpur for providing unavoidable help throughout the course of the research work.

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