

PATHOGENIC E COLI IN FRESH PRODUCE: A MICROBIOLOGICAL ANALYSIS

Hemant Kumar Joshi¹, Prof. (Dr.) Purnima Shrivastava²

¹Research Scholar, Deptt. Microbiology, Bhagwant University, Ajmer, Rajasthan

²Prof, Deptt. Microbiology, Bhagwant University, Ajmer, Rajasthan

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Abstract

Matrix metalloproteinases (MMPs) belong to the family of metzincin proteases with central roles in extracellular matrix (ECM) degradation and remodeling, as well as interactions with many growth factors and cytokines. Over expression of specific MMPs is responsible in many diseases such as cancer, neurodegenerative diseases and cardiovascular disease. MMPs have recently been the focus of attention as there are goals to develop therapeutics that can treat diseases related to MMP over expression. Upon activation and desalting, the pro domain is cleaved with an N-terminal His-tag, providing activated MMP-3cd for immediate use in countless in vitro applications. This method does not require expensive equipment or complex fusion proteins and describes the rapid production of recombinant human MMPs in bacteria. Antibacterial and anti-fungal activities of extracts of leaves of four different plants namely Madhumalati (*Quisqualis indica*), Aak (*Calotropis procera*), Latjira (*Achyranthes aspera*) and Tulsi (*Ocimum sanctum*) five bacteria (*Bacillus subtilis*, *Enterobacter aerogenes*) included in ten microorganisms. Codon Biotech Pvt Ltd, Noida for testing by well diffusion method against *E. coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*) and five fungi (*Alternaria pori*, *Aspergillus flavus*, *Aspergillus niger*, *Aspergillus aurizee*, *Penicillium chrysogenum*) A study was conducted in the laboratory of Intravenous studies showed that methanol extract was more effective than aqueous extract. The extract of leaves of Madhumalati and Latjira was found to be more effective against fungal species. In contrast, extracts from leaves of Aak and Tulsi were found to be more effective against bacterial species.

Keywords: R2DP, MMPs, DE3,3cd, MMP, *E. coli* etc.

Introduction

What is E-coli?

E-coli is the short form of *Escherichia coli*. It is a type of bacteria that always lives in the stomach of humans and animals, most forms of this bacteria are harmless, but there are some that cause symptoms

such as abdominal cramps and diarrhea, sometimes they cause people to lose kidney function stops and the infected person dies.

What is the information about the current infection?

This time people's kidneys and nervous system are being badly affected in the infection which started from Germany. This condition is called hemolytic uremic syndrome.

Symptoms such as bloody diarrhea, kidney failure and epileptic seizures are seen in this infection.

The form of E-coli bacteria found in most people is named E-coli 0104, which is not common.

Till now the real cause of most cases of E-coli was 0157, the symptoms of people infected with that form of bacteria are also similar.

How did the infection reach people?

This infection usually reaches people through meat, but this time its medium is vegetables. German officials say that E-coli bacteria have been found in cucumbers imported from Spain.

Well-cooked food eliminates the possibility of survival of E-coli bacteria, fruits and many vegetables are often eaten raw, hence the infection is spreading.

The E-coli bacteria somehow got into cucumbers through animal feces, from where it is going to people's stomachs, it is speculated that this may have happened because of the use of cow dung as manure.

What should be done to avoid infection?

German authorities have instructed people not to eat raw things like cucumbers, tomatoes and carrots.

The news of this infection spreading outside Germany has not yet come.

Experts say that if fruits and vegetables are eaten thoroughly washed or peeled, then there is no danger, doctors say that E-coli bacteria are on the fruits and vegetables, not inside them.

It belongs to the Asclepiadiaceae family and is widely distributed in tropical regions. The plant is erect, tall, large, branched and evergreen with a milky latex (shonot). In India, the secretion of its bark and root is used in the treatment of skin diseases and stomach worms.

Latjira belongs to the family Amaranthaceae. It is an annual straight-stemmed medicinal plant commonly found in India as a weed and used as a traditional medicine for the treatment of fever, dysentery and sugar.

Ethanol extract shows high larvicide activity, with leaves and stem extracts of plants reported to inhibit the growth of some microorganisms.

Ocimum sanctum commonly known as basil and belonging to the Lamiaceae family, is a major medicinal herb. It is a plant of Indian origin and apart from its religious value, it has been used in Ayurvedic medicine since ancient times. This herb is used for many diseases ranging from diabetes, arthritis, bronchitis, throat infections, skin diseases etc. Its antimicrobial properties have been tested against various microorganisms.

Material and method

Fresh saplings of Madhumalati (*Quisqualis indica*), Aak (*Calotropis procera*), Latjira (*Akyranthis aspera*), Tulsi (*Ocimum sanctum*) were collected randomly from different parts of Noida and Greater Noida. Considering the medicinal properties of these plants The antibacterial properties of the extract of their leaves have been attributed to ten microorganisms including five bacteria (*Bacillus subtilis*, *Enterobacter aerogenes*, *E. coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*) and five fungi (*Alternaria porii*, *Aspergillus flavus*, *Aspergillus niger*, *Aspergillus*, and *Chrysogonylum*) of five fungi (*Alternaria porii*, *Aspergillus flavus*, *Aspergillus niger*, *Aspergillus*) and *Chrysogonylum*. Contrast comparative study was done.

Extraction Procedures: (a) To extract 20 percent aqueous extract, 2 grams of air-dried plant was mixed with a pestle and mortar and ten ml. Grinded in water. Extracts were filtered out using Whatman filter paper No. (b) To extract 20 percent alcohol extract, take 2 grams of air-dried plant in a pestle and 20 ml in a mortar. Brewed in methyl alcohol and oven dried for 2-3 days for complete evaporation of methyl alcohol. 10 ml of dry mix. Methyl alcohol was added and filtered with Whatman filter paper No. The filtrate was collected and filtered at 40C in sterile tubes.

Preparation of Test Organisms: Five bacteria (*Bacillus subtilis*, *Enterobacter aerogenes*, *E. coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*) and five fungi (*Alternaria porii*, *Aspergillus flavus*, *Aspergillus niger*) were included in the ten microorganisms used in this study. *Aspergillus aurisei* (*Penicillium chrysogenum*) was studied. Obtained from the Department of Microbiology, Indian Agricultural Research Institute, New Delhi. Type cultures of bacteria and fungi were subcultured on nutrient agar (nutrient agar media) and potato dextrose agar (potato dextrose), respectively. Stored at 40C for as long as were necessary for the study.

Antimicrobial activity test: 0.6 ml of standardized bacterial stock suspension was mixed with 60 ml of sterile nutrient agar to assess antibacterial activity. 20 ml. Inoculated nutrient agar was delivered in sterile Petri dishes. The dish was dried for at least a minute. 10 mm in each plate. Diameter follicles were formed by a sterile borer (cork borer No. 4). The surface of the follicle was closed with a drop of nutrient agar to prevent the diffusion of the extract from the agar surface. Three of the four wells were injected with 0.1

ml sterile water/alcohol and marked as controlled. Then the plates were inoculated overnight at 37°C. The presence of an inhibition zone surrounding the follicle was evidence of this activity. Each test was repeated three times and antibacterial activity was expressed as the mean diameter of the inhibition zones produced by the plant extract, compared to the control. Similar to bacteria, this method was also adopted for fungal species. Potato dextrose agar was used in place of nutritional agar.

Observation

E. coli commonly abbreviated *E. coli* is a Gram-negative, rod-shaped bacterium commonly found in the lower intestine of warm-blooded organisms (endotherms). Most *E. coli* strains are harmless, but some serotypes are pathogenic and can cause severe food poisoning in humans, and are sometimes responsible for the product. *E. coli* are also responsible for most cases of urinary tract infections. Harmless strains are part of the normal flora of the gut, and can benefit their hosts by producing vitamin K₂ and preventing the establishment of pathogenic bacteria within the gut.

The biochemical properties and scientific name are *Escherichia coli*, but the bacterial species causes food poisoning. Intestinal invading *E. coli*, enterotoxigenic *Escherichia coli*, pathogenic serotype *E. coli*, intestinal hemorrhagic *E. coli*. Although the mechanism of onset and symptoms vary somewhat, both are mediated by food and drink, usually with diarrhea, fever, sometimes bloody stools.

Treatment of *E. coli*

There is no specific treatment for *E. coli* O157 infection. Infected people can usually be cared for at home and most people get better without medical attention. Due to diarrhea, there is a lack of water in the body, so it is very important to take enough fluids. If you or your child starts to have blood in your stools, see your doctor as soon as possible. It is not advisable to take antibiotics as they increase the chances of complications. Anti-diarrhoea drugs such as loperamide (Imodium) are also not recommended because they can increase your exposure to toxins.

Result & Discussion

The antibacterial and antifungal properties of extracts from the leaves of four different plants were tested on microorganisms. The trial studied the inhibition of growth against microbes with varying degrees of microenvironment. Successful prediction of plant-derived compounds is dependent on the type of solvent used in the extraction process. Traditional healers used water as a solvent. But the first observation that methanol is a better solvent than water for extracting antimicrobial substances from these plants. This may be due to the better solubility of the active compounds than in organic solvents.

The alcoholic extract of the leaves of Madhumalati was more effective in anti-fungal activity than in antimicrobial activity. The highest activity (21 mM) was found against *Alternaria pori* and *Penicillium*

chrysogenum and the lowest activity (11 mM) against *Enterobacter aerogenes*. Whereas, in contrast, the alcoholic extract of aak leaf was found to be more effective against bacterial species with maximum (15 mm) against *Klebsiella pneumoniae* and minimal (06 mm) against *Aspergillus* species. Similar results were obtained when other extracts were used in place of leaf extracts against various microorganisms.

The aquatic and alcoholic extract of Latjira was highly effective against microorganisms. The methanolic extract was highly effective against fungal species. The maximum activity (20 mM) was found against *Alternaria pori* and *Penicillium chrysogenum* and the minimum (12 mM) against the bacterium *E. coli*. The obtained results were supported by the first reported observation on fungal growth. The aqueous and alcoholic extracts of basil were found to have the lowest antibacterial and antifungal activity of all leaf extracts. The antibacterial effect of the leaf extract was tested at a specific concentration.

The antibacterial activity of basil at various concentration levels was found to be relatively higher than that of anti-fungal activity to some extent.

The gram positive bacteria *subtilis* were found to be more sensitive than the gram negative bacterial species according to the antibacterial test conducted for the purpose of testing. This may be due to the difference in cell wall structures between Gram positive and Gram negative bacteria. The outer membrane of Gram-negative bacteria acts as a barrier for many environmental substances, including antibiotics.

The overall comparative study shows that the leaf methanol extract possesses maximum antibacterial activity for *Bacillus subtilis* and maximum anti-fungal activity properties for *Alternaria pori*, *Aspergillus oryzae* and *Penicillium chrysogenum* compared to other fungal species.

Contrast comparative analysis of the antibacterial and antifungal activities of the leaves of different plants of these microbes revealed the potential for the discovery of alternative antibiotic substances for further pharmacological evaluation to develop and carry out new antimicrobial agents in these plants.

Photocatalysis is the activity that occurs when a light interacts with a source and the surface of substances, which are called photocatalysts.

Graphitic carbon nitride has attracted attention as a metalless photocatalyst for the filtration of germs from water. It has the ability to completely remove microbes using photocatalysis. Fusitic carbon nitride has to be mixed with PEI to promote the photocatalytic properties of this material and to be tested on water-related bacteria. We explored the functionalization process (functionalization) of PEI, which actually combines photochemical reactions on graphitic carbon nitride. We found that PEI can enhance the interaction between the photocatalyst and bacterial cells via electrostatically charged graphitic carbon nitride, which is capable of killing bacterial cells in water.

Through this process, under sunlight, the research team removed 99.99 percent of *E. coli* from the water in 45 minutes. This PEI process is simple. Professor Zhang said that after more research is done on the development of photocatalysis devices, it can be sent around the world so that people forced to drink dirty water can use this technology.

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