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ORIGINAL ARTICLE

Antimicrobial Activity of Resin of Asafoetida (Hing) against Certain Human Pathogenic Bacteria

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ABSTRACT
The present investigation was carried out with the major objective of studying antimicrobial activity of resin of asafoetida against some human pathogenic bacteria. Screening of antimicrobial property of several organic and aqueous extracts of Asafoetida against Gram positive bacteria (Staphylococcus aureus MTCC 3160 and Bacillus subtilis MTCC 441) and Gram negative bacteria (E.coli MTCC 443 and Pseudomonas aruginosa 4673) was carried out. The acetone, petroleum ether, ethanol, mixture of carbon tetrachloride and methanol of resin of asafoetida crude sample and powder were subjected to a preliminary screening for antimicrobial activity against S.aureus and E.coli.It was clear from the present findings that acetone extract of asafoetida crude sample is very effective against E.coli. and S. aureus in comparison to the pseudomonas aeruginosa and B.subtilis. In case of powder form ethanol extract of asafoetida is has maximum zone of inhibition against E.coli. and S. aureus. There was very less activity of asafoetida against pseudomonas aeruginosa and B.subtilis. Above results show that Asafoetida crude sample is more effective against micro organisms in comparison to Asafoetida powder sample but both sample have antimicrobial activity against E.coli followed by S. aureus. Pseudomonas aeruginosa is susceptible to both the samples. Therefore the present investigation has generated a good platform for further detail investigation about the scientific basis and antimicrobial activity of asafoetida. This may also provide a good support to the traditional medicinal system.
Keywords: *Asafoetida, Extracts, Antimicrobial, Phytochemicals*

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INTRODUCTION

In ancient times, plants have been utilized as an important source of medicines as they are the reservoir of chemical agents with antimicrobial properties. Herbal medicines are being increasingly used as dietary supplements for the treatment of different human disorders [11]**.** Spices have been used for thousands of years to enhance the flavor, colour and aroma of food. Herbs have been used as therapeutic agent against many pathological conditions [8]**.** In addition to boosting flavour spices are also known for their preservative and medicinal value. The spices have a unique aroma and flavour which are derived from compounds known as phytochemicals or secondary metabolites [3]**.** A large number of plants are used to combat different diseases and possess antimicrobial activity. The phytochemicals are antimicrobial substances present in the spices which are capable of attracting benefits and repel harmful organisms [11].

Plants produce a diverse range of bioactive molecules, making them rich source of different types of medicines. Most of the drugs today are obtained from natural sources or semi synthetic derivatives of natural products and used in the traditional systems of medicine. Natural products are a major source of new drugs and their use as an alternative medicine for treatment of various diseases has been increased in the last few decades [2]**.**

Asafoetida is a spice and herbal medicine used to treat nervousness, bronchitis and gas pain. Other names for Asafoetida include Ferula foetida, Devil's dung and Giant fennel. Asafoetida is extracted from the

Ferula plants which have massive taproots or carrot-shaped roots which is 12.5 to 15 cm in diameter at the crown when they are 4 to 5 years old.

The genus *Ferula* of the plant family Umbelliferae consists of 140 species which are widespread from Mediterranean region to central Asia [12]. *Ferula asafoetida* is one of the important species of Ferula. This species is native to India and is locally known as 'Hing'. Its cabbage like raw tops is consumed as salad by the locals. The gum like exude of *Ferula asafoetida* finds application as flavour in Indian vegetarian cooking [7]. It is useful for bronchitis, hysteria, stomach pain, insect bite and headache. It is also used as antidote for flatulence. The gum is also recommended for pharmaceutical preparations as local stimulant to mucous membrane of the alimentary canal [8].

The present work deals with the investigation of the antimicrobial activities of *Ferula asafoetida* against gram positive and gram negative bacteria.

MATERIALS AND METHODS

Collection and preparation of sample

Resin or exudates of asafoetida plant is used as a sample for experiment. This was purchased from the local market of Gwalior, Madhya Pradesh. Resin is that substance which is leaked out from the plant cracking. Crude form and powdered form of asafoetida were used. Crude asafoetida was crushed with the help of pestle and mortar [11].

Test organisms

Asafoetida extracts were evaluated for their antibacterial potential against four bacterial strains. The tested bacterial strains were collected from Microbial type culture collection and Gene bank, Institute of Mirobial Technology, Chandigarh. Bacterial species employed were *Escherichia coli* (MTCC 443), *Bacillus subtilis* (MTCC 441), *Staphylococcus aureus* (MTCC 3160), *Psuedomonas aueruginosa* (MTCC4673). These bacterial cultures were maintained on nutrient agar slants and trypticase soya agar at 37°C. Each of the bacteria used prior to susceptibility testing was inoculated in 24 hours fresh culture media [14].

Preparation of Extracts

Five grams of asafoetida powder and asafoetida crude form each was dissolved in the 50 ml. of Ethanol (95%), Acetone, Petroleum ether, mixture of Carbon tetrachloride and methanol [9]. Soxhlet extraction was run for 48 hours [5]. All extracts were concentrated by evaporating the solvent at 30°C and preserved at 5°C in airtight bottles until further use. Samples were then centrifuged at 5000 RPM for 10 minutes. This mixture was filtered through whatman no.1 filter paper. The filtrate was used as an extract. The extracts thus obtained were then stored in a refrigerator at 4^{o}C for further use.

Determination of antibacterial activity

Bacterial Susceptibility Assay

In vitro bacterial test were carried out by disc diffusion method of Das *et al.,* [6]. Tetracycline antibiotic discs were used as positive controls while corresponding extraction solvent was used as negative control along with. The discs of tetracycline were prepared by impregnating disc with 10 µL of the antibiotic solution (5mg/ml concentration) and then left for air drying similarly the disc of samples were made by impregnating the disc with 10 µL of respective each sample and then left for air drying [4]. The discs for negative control were prepared by impregnating the disc with 10 µL of solvents used to prepare extracts. After that 100 µL of suspension of test bacteria i.e*., E.coli, P.aeruginosa, S.aureus* and *B.subtillis* were prepared on TSA and NAM plates respectively [13]. Then two discs each of samples, one disc each of positive control and disc of negative control were placed on agar plates. Inoculated plates were incubated at 37°C for 24 hrs and the antibacterial activity were calculated and evaluated by measuring the zone of inhibition surrounding the antibiotic disc against the tested bacteria [1]**.**

RESULTS AND DISCUSSIONS

Extract of Acetone, Ethanol, mixture of carbon tetrachloride and methanol, petroleum ether with crude sample of asafoetida showed 12mm, 4.5mm, 10mm, 5mm diameter zone of inhibition against *Staphylococcus aureus;* 14mm, 8mm, 16mm, 15mm zone of inhibitions were reported against *E.coli;* 14mm, 4mm, 6mm of inhibition zones were seen against *Pseudomonas aeruginosa.* There was no zone of inhibition against *Bacillus subtilis*.

It was found that acetone extract of asafoetida crude form was more effective than those of other extracts. Solvents treated against test organisms showed no inhibition zone against any test organism.

Powder form of asafoetida with Acetone, Ethanol and carbon tetrachloride with methanol showed 2, 4.5 and 10 mm. zone of inhibition against *Staphylococcus aureus*.10mm, 8mm, 16mm, 9mm zone of inhibitions against *E. coli* were recorded. Extract of acetone and ethanol showed 14 mm and 4mm. zone of inhibition against *pseudomonas aeruginosa*.

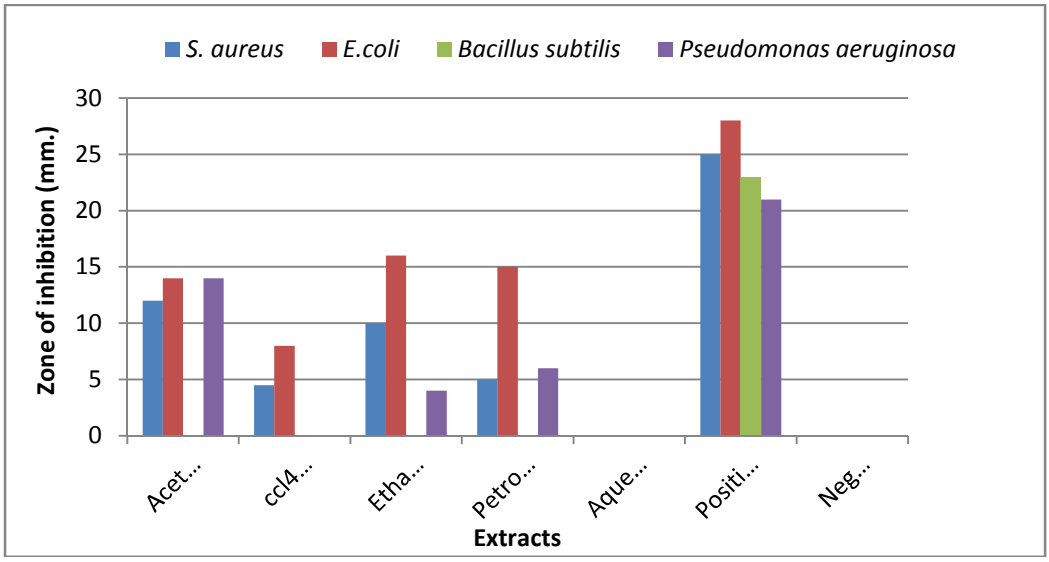

Figure 1- Antimicrobial activities of extracts of crude asafoetida

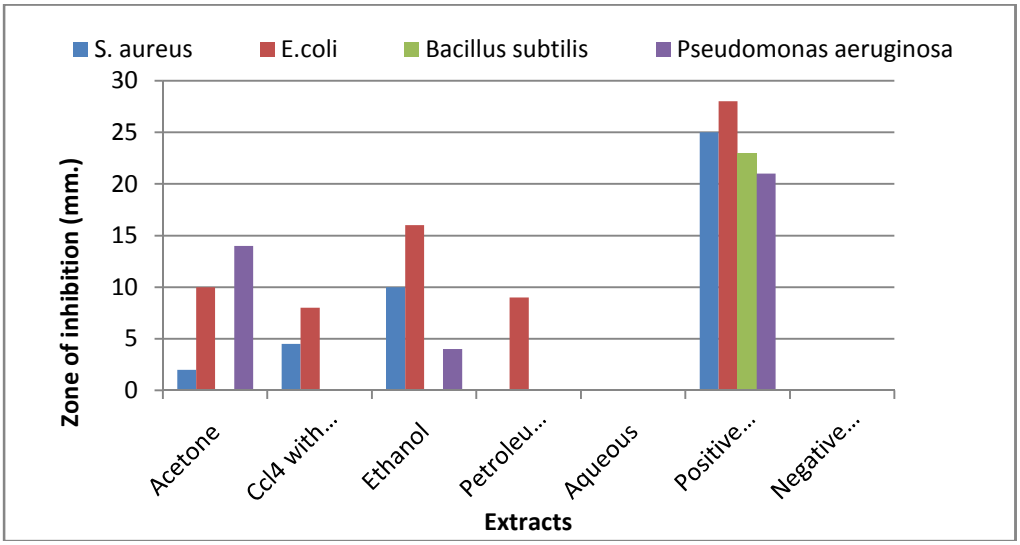

Figure 2- Antimicrobial activities of powder form extracts of asafoetida

It was observed that Ethanol extract of asafoetida powder form was more effective than other extracts. Solvents of powder form of asafoetida treated against test organisms showed no inhibition zone against any test organism.

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