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Antibacterial activity of Cassia angustifolia Extract Against Some Human Pathogenic Bacteria

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ABSTRACT: Medicinal plants play a major role in all the traditional system of medicine and contain the rich source of natural products. Most of which have been used for human welfare especially to cure disease caused by pathogenic microorganisms without any side effects. The present study was carried out to determine the potential antibacterial agent of extracts *Cassia angustifolia* against some human pathogenic bacteria .The antimicrobial effect of methanol and ethanol extracts of *Cassia angustifolia* on pathogenic bacteria namely *Escherichia coli*, *Klebsiella pneumoniae* and *Shigella shinga* were determined using broth microdiluation method.The result show that, the MIC value of leaf methanol extract of Cassia angustifolia exhibited stronger activity against K. pneumoniae (MIC: 0.62mg/ml). From these findings it is indicative that *Cassia angustifolia* may have antibacterial principles that could be useful in microbial diseases.

***Keywords*:** Human pathogen, *Cassia angustifolia,* Antibacterial activity

INTRODUCTION

Anti-microbial agents are undeniably one of the most important therapeutic discoveries of the 20th century. However, with the antibiotic era barely five decades old, mankind is now faced with the globa problem of emerging resistance in virtually all pathogens (Peterson et al., 2004). The medicinal plants continue to play an important role for the management of different microbial diseases. In recent years there has been a resurgence of scientific interest in the use of medicinal plants for the development of new phannacotherapeutic agents against different species of microorganisms including the resistance organisms (Hatano et al., 1999; Palombo et al., 2002). *Cassia angustifolia* Vahl. (syn *Cassia senna*) in commerce is known as Indian or Tinnevelly Senna, is a well known traditional medicinal plant belonging to family Leguminosae(Wallis, 2004). The parts of this plant used medicinally are the leaves and the pods. Both the leave and pods are used in many over- the- counter pharmaceutical preparation. It is recognized by British and USA pharmacopoeias. The leave are useful in habitual (Balakumbahan et al., 2010). Senna is a strong purgative that should be taken in proper dosage otherwise it may lead to gripping and colon problem (Bhattacharjee, 2004). The leaves containing sennosides are efficient sources of health teas (Kojima et al., 2001) and are considered as astringent, cathartic, depurative, anthelmintic, cholagogue, expectorant and febrifuge, useful for leprosy, leukoderma, jaundice, typhoid fever, tumors (Warier, 1994). The present study was carried out to determine the potential antibacterial agent of extracts Cassia angustifolia against some human pathogenic bacteria .

MATERIALS AND METHODS

Plant material

The leave of *Cassia angustifolia* was purchased from Municipal market at Zahdan-Iran during February, 2012 and kept in sterilized screw-cap glass container. Samples were crashed and transferred into glass container and preserved it until extraction procedure in the laboratory.Twenty gram of grinded powders from each plant was soaked in 60 ml organic solvents i.e. ethanol (95 %v/v) and methanol with occasionally shaking. After one day of dissolving materials were filtered through a Whatman no. 1 filter paper. Then the filtrates were evaporated using rotary evaporator. At last, 0.97 g of dried extracts was obtained and then stored at 4^0C in air tight screw-cap tube (Hanafy et al., 1999).

Bacterial strains and culture conditions:

Bacterial strains were obtained from standard laboratory of Veterinary department in Islamic Azad University, Kerman, Iran. Evaluate the antibacterial activity of the plant extracts were investigated using strain of gram-negative bacteria [*Escherichia coli* (ATCC8739), *Shigella shinga* (ATCC1013), *Klebsiella pneumonia* (ATCC1318)] .The typed cultures of bacteria was sub-cultured on Nutrient agar (Oxoid) and stored at 4^oC until required for study.

Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration(MBC)

The broth microdilution method was used to determine MIC and MBC (Wiegand et al., 2008). All tests were performed in Mueller Hinton broth supplemented with Tween 80 at a final concentration of 0.5% (v/ v). Briefly, serial doubling dilutions of the extract were prepared in a 96-well microtiter plate ranged from 0.3 mg/ml to 10.00 mg/ml. To each well, 10 µl of indicator solution (prepared by dissolving a 10-mg extract in 2 ml of DMSO) and 10 µl of Mueller Hinton Broth were added. Finally, 10 µl of bacterial suspension (10^6 CFU/ml) was added to each well to achieve a concentration of 10^4 CFU/ml. The plates were wrapped loosely with cling film to ensure that the bacteria did not get dehydrated. The plated were prepared in triplicates, and then they were placed in an incubator at 37°C for 18-24 hours. The color change was then assessed visually. The lowest concentration at which the color change occurred was taken as the MIC value. The average of 3 values was calculated providing the MIC and MBC values for the tested extract. The MIC is defined as the lowest concentration of the extract at which the microorganism does not demonstrate the visible growth. The microorganism growth was indicated by turbidity. The MBC was defined as the lowest concentration of the extract at which the incubated microorganism was completely killed.

Statistical analysis:

Analysis was performed using Microsoft Excel 2007. The one way ANOVA test was used to determine any statistically significant difference in the MIC of the extracts and the antibiotics. P-values <0.05 were considered significant

RESULTS AND DISCUSSION

Result:

Antibacterial property of extractions on human pathogen bacteria

The table 1 shows the MIC values of plant extracts of all tested microorganisms.The MIC concentrations ranged between 0.62 to 1.25 mg/ml for methanol extract and concentrations ranged between 1.25 to 2.5 mg/ml for ethanol extract. The MIC value of leaf methanol extract of Cassia angustifolia exhibited stronger activity against K. pneumoniae (MIC: 0.62mg/ml).

Discussion:

Medicinal herbs possess curative properties due to the presence of various complex chemical substance of different composition, which are found as secondary plant metabolites in one or more parts of these plants (Patil et al., 2009). In the study ,the MIC value of leaf methanol extract of Cassia angustifolia exhibited stronger activity against *K. pneumoniae* (MIC: 0.62mg/ml) . The result show that, The leaf extracts of *Cassia angustifolia* exhibited comparatively better activity displaying their zones of inhibitions 10-19 mm and largest zone was shown against *Shigella Dysenteriae* (19 mm). Whereas root extracts showed smaller zones of inhibitions (09-14 mm) (Awal et al., 2010). Hatano *el al.,* (1999) showed that methanol extract of *Cassia tora* seed exhibited potent antibacterial effects on methicillin-resistant *Staphylococcus aureus*(Hatano *e*t al., 1999). The study of Gnanavel, the n-butanol extract of *Cassia angustifolia* exhibited maximum zone of inhibition against *staphylococcus* (15mm) and *Salmonella*

(13mm).The n-butanol extract of *Cassia angustifolia* showed maximum zone of inhibition against *Staphylococcus* (10mm) and *Salmonella* (13mm) The aqueous extract of *Cassia angustifolia* showed any activity against both the Isolated(Gnanavel et al., 2012).The study of Kasetsart, the result show the ethanol extract of *Cassia angustifolia* exhibited maximum zone of inhibition against *Klebsiella pneumonia* (16.33+1.53mm)(Phattayakorn et al., 2009). On the bases of above studies it can be concluded that *Cassia angustifolia* may play a beneficial role in the management of bacterial infections. However, detailed study may be needed for this purpose.

Table 1. Antibacterial effects of plants extracts against human pathogenic bacteria

Bacterial	Concentration methanol extract(mg/ml) MIC/MBC	Concentration ethanol extract(mg/ml) MIC/MBC
Escherichia coli	1.25/2.5	1.25/2.5
Shigella shinga	1.25/2.5	1.25/ 2.5
Klebsiella pneumonia	0.62/1.25	2.5/5

REFERENCES

Awal MA, Ahsan SM, Haque E, Asghor QH and Ahmed M.2010. In-vitro Antibacterial Activity of Leaf and Root Extract of Cassia Fistula. Dinajpur Med Col J ., 3 (1):10-13.

Balakumbahan R and Rajamani K. 2010. Effect of Bio Stimulants on Growth and Yield of Senna(Cassia angustifolia KKM.1). Journal of Horticultural Science&ornamental plants .,2(1): 16-18.

Bhattacharjee SK. 2004. A hand book of medicinal plant. Jaipur, India, Pointer Publisher ., 74–79.

Gnanavel S, Bharathidasan R, mahalingam R, Madhanraj P and Panneerselvam A.2012. Antimicrobial Activity of Strychnos nux-vomica Linn and Cassia angustifolia Linn. Asian J. Pharm. Tech ., 2(1): 08-11.

Hanafy M, Hatem M. 1999. Studies on the antimicrobial activity of Nigella sativa seed (black cumin). Journal of ethnopharmacology ., 34**,** 275-278.

Hatano T, Uebayashi H, Ito H, Shiota S, Tsuchiya T and Yoshida T. 1999. Phenolic constituents of *Cassia* seeds and antibacterial effect of some naphthalenes and antraquinones on methicillin-resistant *Staphylococcus aureus.* Chern. Ph atm. Bull ., 47(8): 1121-1127.

Hatano T, Uebayashi H, Ito H, Shiota S, Tsuchiya T and Yoshida T.1999. Phenolic constituents of *Cassia* seeds and antibacterial effect of some naphthalenes and antraquinones on methicillin-resistant *Staphylococcus aureus.* Chern. Ph atm. Bull ., 47(8): 1121-1127.

Kojima T, Kishi M, Sekita S and Satake M. 2001. Origin of sennosides in health teas including Malva leaves. Shokuhin Eiseigaku Zasshi ., 42: 202–205.

Palombo EA , Semple SJ. 2002. Antibacterial activity of Australian plant extracts against methicillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant enterococci (VRE). J Basic Microbiol., 42(6): 444-8.

Patil SB, Naikwade MNS and Magdum CS. 2009.Review on phytochemistry and pharmacological aspects of Euphorbia hirta Linn. JPRHC ., 1: 113-33.

Peterson LR, Dalhoff A. 2004. Towards targeted prescribing: will the cure for antimicrobial resistance be specific, directed therapy through improved diagnostic testing. J Anti Chemo., 53: 902-905.

Phattayakorn K, Wanchaitanawong P. 2009. Antimicrobial Activity of Thai Herb Extracts Against Coconut Milk Spoilage Microorganisms. Kasetsart J .,43 : 752 – 759.

Wallis TE .2004. Text book of Pharmacognosy. CBS publishers, New Delhi, Edition 5., 136-138.

Warier PS. 1994. Indian Medicinal Plants, New Delhi, Orient Longman Publication ., 2: 31.

Wiegand I, Hilpert K and Hancock REW.2008. Agar and broth dilution methods to determine the minimal inhibitory concentration (MIC) of antimicrobial substances. Nature protocol ., 3**:** 163-175.