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Antifungal Activities of Different Crude Fractions of *Aerva javanica*

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This is a preliminary study, the antimicrobial activities of butanol, methanol, ethyleactate, chloroform, *n*-hexane and water crude fraction of *Aerva javanica* were reported. The fungal strains used in this study are *Fusarium nigar, Aspergillus fumigates* and *Aspergillus solani.* Significant results are obtained in the present investigation. Butanol crude fraction showed 12 mm zone of inhibition against *Fusarium nigar.* The *n*-hexane crude fraction of *Aerva javanica* found active against all the three tested fungal strains. The highest zone of inhibition resulted for *n*-hexane crude fraction is 11 mm against *Aspergillus fumigates.*

Key words: Antifungal activity, *Aerva javanica*, Amranthaceae.

The plant *Aerva javanica* belongs to family Amaranthaceae. It is a perennial herb, native to Africa, Asia and extensively scattered in the far away areas of the world[1]. This plant has got lot of application for example, this herb is used as diabetic demulcent, diuretic, the resultant liquid of plant is used to get rid of swellings. Powder of the plant is used to cure ulcers of domestic animals. It seeds are used to mitigate headache and also used in rheumatism. Carbohydrate, flavonoid, steroids and triterpenoids have also reported by Srinivas and Reddy[2]. Plants are the main source of anti-infective agents like quinine, emetine, and berberine remain highly effective instruments in the fight against microbial infections. Phytoremedies have also shown great promise in the treatment of intractable infectious diseases including opportunistic AIDS infections[3]. Infectious diseases and global antibiotic resistant pathogens are an increasing public health problem. The lack of development of new antimicrobial agents in the last decades, associated with their misuse, led to the emergence of multiresistant microorganisms[4]. Many efforts have been made to discover new antimicrobial compounds from various species of medicinal plants. Medicinal plants are heavily and worldwide used in folk medicine. Screening of such plants may result in the discovery of novel effective compounds against pathogenic microorganisms. The compounds that can either inhibit the growth of pathogens or kill them and have no or least toxicity to host cells are considered candidates for developing new antimicrobial drugs[5].

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MATERIALS AND METHODS

Plant material

Plant material was collected in flowering season March-April 2010. The whole plant was dried under shade and then powder by grinder.

EXPERIMENTAL

Antifungal Activity

For antifungal study each extract was resuspended in DMSO at a concentration of 100 mg/ml and stored in a refrigerator till further used. *Antifungal activities of* the extracts were evaluated by means of agar well diffusion assay. The assay was carried out according to the method of (Hufford CD *et al.*[6]. Sabouraud dextrose agar (Difco) was used for the growth of fungus. Media with acidic pH (pH 5.5 to 5.6) containing relatively high concentration of glucose (40%) is prepared by mixing (SDA) Sabouraud dextrose agar and distilled water and autoclaved at 121 °C for 15 minutes. Twenty ml of molten (45°C) SDA medium was aseptically transferred into each l00 mm x l5mm sterile Petri dish. All these dishes were inoculated with 4mm diameter piece of inoculums removed from a seven days old culture of fungus[7]. For counting of colonies another 4mm culture (fungi) were suspended in normal saline to make volume up to 1 ml and then counted with help of heamocytometer (neubar chamber). Once the agar was hardened 2 mm wells were bored using a sterile cork borer. Then (4mg/100ml) solution of each extract prepared and tested accordingly and placed in each the well and the plates were incubated at 27-29 °C for 7-10 days. Two wells in each Petri dish were supplemented with DMSO and reference antifungal drug, Gentamycin (4mg/100ml) dissolved in DMSO (sigma) serve as negative and positive control respectively. The tests were carried out in triplicate. The antif*ungal activity* was measured as the diameter (mm) of clear zone of growth inhibition. The humidity in incubation room should be maintained from 40 % to 50 % [8].

RESULTS AND DISCUSSION

In vitro antifungal study was performed by subjecting different micro organisms to various fractions of *Aerva javanica*. Six fractions were used in the studies named aqueous, chloroform, hexane, methanol, butanol and ethyl acetate. Among these *n*-hexene fractions showed significant antifungal activities and active against all the three tested pathogen. Diameter of zones of inhibition in mm of *n*-hexene against *Fusarium nigar, Aspergillus fumigates* and *Aspergillus solani* were 10, 11 and 09 mm respectively. These results are found very closed to the zone of inhibition of standard for *Fusarium nigar, Aspergillus fumigates* and *Aspergillus solani* which are 13, 12 and 11 mm respectively. Significant results are obtained for butanol and ethyl acetate fraction 12 mm zone of inhibition (for both) against *Fusarium nigar*. Except *n*-hexane all the tested fractions found inactive against *Aspergillus solani* while the entire tested fractions found active against *Aspergillus fumigates.* Similarly the significant results obtained for 11 mm zone of inhibition for both water and chloroform fractions against *Fusarium nigar*. All results are tabulated in Table 1. Concentration of sample 4mg/100ml in dimethyl sulfoxide (DMSO) and reference antifungal drugs Gentamycin were served as negative and positive controls, respectively. The test tubes were incubated at 27-29 °C for 7-10 days. Growth in the medium containing the sample was determined by measuring linear growth (mm) and growth inhibition was calculated in % with reference to negative control[9, 10]. Our results are approximately in consistent with the antibacterial activity shown by other species of the genus Aerva. Vijayan *et al*.[11] enclosed report of antibacterial and antifungal

Table 1. Antifungal activities of different crude fractions of *Aerva javanica*

Fungal strains	C_4H_9OH[a]	CH_3OH[a]	H_2O	Ethyl Acetate[a]	$CHCl_3$[a]	n-Hexane[a]	Gentamycin[a] standard
Fusarium nigar	12	-	11	12	11	10	13
Aspergillus fumigatus	8	9	8	7	9	11	12
Aspergillus solani	-	-	-	-	-	9	11

[a] zone of inhibition in mm, Concentration for all tested extract was (4mg/100ml).

activity of *Aerva lanata*. It was effective against all bacterial species except *Klebsiella*. Earlier researches showed that ethyl acetate and methanol extracts of *Aerva lanata* have some interesting antimicrobial properties[12]. Fungi cause multiples infections e.g. infection of blood, liver, lungs and mouth etc [13-15]. In most of the cases they cause skin problems in humans and other animals[16]. *Aspergillus niger* typically cause infectivity in lungs and has also been detected on skin of burnt injuries[17]. *Aspergillus fumigatus, Aspergillus flavus* and *Fusarium solani* have been found to be engaged in lungs and eye infections[18].

CONCLUSION

Plants are natural factories of secondary metabolites (Ahmad *et al.,* 2011). These secondary metabolites may be responsible for antimicrobial activities. In future specific antimicrobial agent can be possible to isolate from this specie.

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