Journal of Bangladesh Academy of Sciences, Vol. 34, No. 2, 201-203, 2010

– Short communication

ANTIMICROBIAL ACTIVITY OF THE RHIZOMES OF *CURCUMA ZEDOARIA*

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ABSTRACT

Successive extraction of the dried rhizomes of *Curcuma zedoaria* Rocs. provided n-hexane, ethyl acetate and methanol extracts. The antimicrobial activity of the different extracts of *Curcuma zedoaria* was investigated at an initial dose of 500 µg/disc against gram positive, gram negative bacteria and fungi. The methanol extract of the herb showed significant activity against some tested gram negative bacteria. The ethyl acetate extract exhibited moderate activity while the n-hexane showed little activity against some gram negative bacteria.

Key words: *Curcuma zedoaria*, Rhizomes, Antimicrobial activity

Curcuma zedoaria Rosc. (Bengali name - Shoti, English name - Zedoary), Zingiberaceae family, is a perennial rhizomatous herb with tufted large elliptical leaves, short stem and pink or yellow flowers, grows wild and cultivated commonly all over the country in the hilly areas and also in the plains of some areas. The plant is indigenous to Bangladesh and India and widely cultivated in China and Thailand. Plants of this family have been reported to possess antioxidant (Masuda *et al.* 1992) and anti-inflammatory (Masuda *et al.* 1993) activities. The local people has been used the plant for its rubefacient, carminative, expectorant, demulcent, diuretic and stimulant activities and the root has been used in flatulence, dyspepsia, cold, cough and fever (Ghani 1998). Literature survey revealed that the plant contains sesquiterpenes like curcuminone, curcuminolide A, curcuminolide B, zedoarol, 13-hydroxygermacrone, curzeonone (Shiobata and Asakawa 1985, Shiobata and Asakawa 1986) curcumol, curdione, procurcomenol, *iso*-curcumenol, cucolone and furanodiene (Ghani 2001). Different extracts and isolated compounds from the plant exhibited hepatoprotective (Matsuda and Ninomiya 1998) and Ca^{2+} channel blocking (Irie *et al*. 2000) effects and also have anti-cancer properties (Chevallier 1996). In this study the antimicrobial activity was examined of different extracts of the rhizomes of *Curcuma zedoaria* as the part of my preliminary studies.

The rhizomes of *Curcuma zedoaria* Rosc. were collected from Sylhet and identified properly by a taxonomist of the National Herbarium of Mirpur, Dhaka. The rhizomes were washed and cut into small pieces then dried and pulverized into a coarse powder.

About 800 gm of dried powder of the rhizome was percolated successively with n-hexane, ethyl acetate and methanol (3 liters of each) to obtain n-hexane extract (1.8 gm), ethyl acetate extract (2.5 gm) and methanol extract (4.5 gm). All the extracts were

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dissolved in methanol separately, kept in refrigerator for 24 hours at 4^0C for precipitation of fatty materials, filtered off through a piece of folded cloth and finally concentrated to get defatted extracted.

About 1.5 gm of the n-hexane extracted was subjected to silica gel column chromatography with n-hexane/ethyl acetate gradient, and four fraction namely, HF-1 (n-hexane-ethyl acetate; 9 : 1), HF-2 (n-hexane-ethyl acetate; 7 : 3), HF-3 (n-hexane-ethyl acetate; 5 : 5), HF-4 (n-hexane-ethyl acetate; 1 : 9) were obtained. The column fraction HF-2 gave crystal on evaporation of the solvent. The crystals were separated and washed with n-hexane twice. Then it was dissolved in ethyl acetate, filtered off and allowed to recrystallize. The pure strains of both Gram positive bacteria (*Staphylococcus aureus, Bacillus subtilis, B. cereus, B. megaterium, Sarcina lutea),* Gram negative bacteria *(Salmonella paratyphi* A, *S. paratyphi* B, *Escherichia coli, Shigella boydii, Sh. dysenteriae, Sh. sonei, Vibro cholerae, V. mimicus, Klebsiella* sp., *Pseudomonas aeruginosa)* and four fungi (*Saccharromyces cerevaceae, Aspergillus niger, Candida albicans, Rhizopus oryzae*) were collected from Department of Microbiology, University of Dhaka.

The antimicrobial activity of the n-hexane, ethyl acetate and methanol extracts of the root were investigated by disc diffusion method (Villanova 1988). Standard Kanamycin disc (30 µg/disc) and blank disc impregnated with the respective solvent were used as positive and negative controls, respectively.

The antibacterial activity of the different extracts of *Curcuma zedoaria* was investigated at an initial dose of 500 µg/disc against gram positive, gram negative bacteria (Table 1).

Table 1. Antibacterial activity of different extracts of *Curcuma zedoaria* at 500 µg/disc.

Name of bacteria	Diameter of zone of inhibition (mm)			
	n-hexane extract	Ethyl acetate extract	Methanol extract	Kanamycin (30 µg/disc)
Gram negative bacteria				
Salmonella typhi	7	15	16	26
S. paratyphi A	6	13	15	27
S. paratyphi B	7	13	14	25
Escherichia coli	6	16	18	28
Shigella boydii	10	16	15	29
Sh. dysenteriae	9	17	19	26
Sh. sonei	6	17	17	30
Vibrio cholerae	NS	NS	NS	28
V. mimicus	NS	NS	NS	31
Klebsiella sp.	NS	NS	NS	30
Pseudomonas aeruginosa	NS	NS	NS	24
Gram positive bacteria				
Staphylococcus aureus	NS	NS	NS	32
Bacillus subtilis	NS	NS	NS	28
B. cereus	NS	NS	NS	30
B. megaterium	NS	NS	NS	24
Sarcina lutea	NS	NS	NS	26

NS = Not sensitive.

The methanol extract of the herb showed significant activity against some tested gram negative bacteria. The ethyl acetate extract exhibited moderate activity while the n-hexane showed little activity against some gram negative bacteria. No extract was found to be active against gram positive bacteria. On the other hand, in the antifungal activity testing none of the extracts showed any activity against the tested organisms (data not shown).

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(*Received revised manuscript on 30 May, 2010*)