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ANTIMICROBIAL ACTIVITY OF THE ESSENTIAL OIL OF *PAVONIA ODORATA* WILLD

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ABSTRACT: *The essential oil from the rhizomes of Pavonia odorata Willd was extracted in an yield of 0.2% by hydrodistillation, and screened for antibacterial and antifungal activity against ten bacteria and thirteen fungi using paper disc agar diffusion technique. The oil was found to inhibit the growth of Staphylococcus aureus, Diplococcus pheumoniae, Escherichia coli and Klebsiella sp at 0.55 concentration. The oil was also found to inhibit the growth of keratinophilic fungi Trichophyton mentagreophytes and Chrysosporium indicum along with Aspergillus sp., Botrydiplodia sp. Fusarium solani etc.*

INTRODUCTION

Pavonia odorata Willd. (Family – Malvaceae) is an erect annual herb, distributed in the warmer parts of India like Bihar, Orissa and Uttar Pradesh[1]. The rhizomes of the plant are aromatic and possess refrigerant properties and have been reported useful in dysentery and inflammation and haemorrhage of intestines[2]. The present communication reports the antimicrobial activity of the essential oil derived from the rhizomes of *P. odorata* against 4 gram positive bacteria, 6 gram negative bacteria and 13 fungi organisms.

MATERIALS AND METHODS

Essential oil : The rhizomes of *Pavonia odorata* were procured from local market of Sagar and extracted by hydrodistillation in a Clevengar's apparatus when a yellowish – green colored essential oil was obtained in an yield of 0.2% (v/w).

Cultures

The pure cultured of bacteria were obtained from the Pathology Department of M.G. Medical College, Indore, M.P. and the fungal organisms were procured from the Botany Department, Dr. Hari Singh Gour University, Sagar, M.P.

Media

The test bacterial organisms were grown in Oxoid nutrient broth medium having beef extract (1.0g), yeast extract (2.0g), peptone (5.0 g), Sodium chloride (5.0g) dissolved in distilled water and volume made upto 1 litre. The medium was sterilized at 15 lbs/p.s.i for 15 minutes and used for inoculum. The gel medium was prepared by the addition of 2% agar to the above medium and sterilized. Potato dextrose broth was used for the growth of fungal organisms. PDA basal medium was prepared by adding 2% agar agar to the above broth.

Determination of activity: Filter paper disc agar diffusion method of Maruzzella and Henry[3] was used for the *in vitro*

evaluation of the antimicrobial activity. Twenty ml of sterilized medium had hardened, 2 ml of 24 hours old broth culture of subcultured organism was distributed evenly over the surface of the plate medium and mixed thoroughly by rotatory motion of the plate and allowed to set. The sterilized Whatman filter paper no.1 discs (6 mm diameter) were thoroughly moistened with 5 ul neat oil and in dilutions of 1:50, 1:100 and 1:200 of the oil made in Tween-80. The standard (Difco) discs of potassium pencillin G (1000 ppm) and streptomycin sulphate (1000 ppm) were placed as standards for antibacterial and the discs moistened with 5 L aqueous solution of gresifulvin (1000 ppm) were used as standard for antifungal activity. Discs moistened with Tween-80 were also placed as control.

The plates were inverted and placed in an incubator for 36 hours at 37EC in case of bacteria and for fungi the plates were incubated at 27EC for 72 hours till perfect growth was observed. After incubation, the relative susceptibility of the organism to the oil was demonstrated by a clear zone of inhibition around the disc. The zone of inhibition was measured with the help of a divider. All the tests were conducted in 5 sets for each organism. The average results for antibacterial activity were recorded as in Table – I and those for antifungal activity were recorded as in Table – II.

RESULTS AND DISCUSSION

The results (Table-I) indicates that the oil from the rhizomes of *P. odorata,* is effective against all the test bacteria, even at the dilution of 1:200. The neat oil possess excellent activity against Gram (+ve) bacterium *Diplococcus pneumonia* and Gram (-ve) bacterium *E.coli.* At 1:100 dilution the oil has exhibited 28 mm zone of inhibition against *D. pneumonia* and 19mm against *E.coli.* 1:200 against these bacteria. The results demonstrate the credibility of the use of *P.odorata* in the treatment of dysentery in the Indian system of medicine.

The date of Table-II indicates that the oil has also exhibited good antifungal activity against the test fungal organisms. The neat oil has exhibited very remarkable activity against *Botrydiplodia* sp. (55 mm), *fusarium solani* (44 mm), *Aspergillus niger* (40 mm) and *A. flavus* (38 mm). The activity of the oil in the neat form has been found more than the well known antifungal agent Griseofulvin (1000 ppm). The essential oil has also exhibited good activity against *Rhizophus nodosus, Alternaria sp., Helminthosporium sp., C. capsici* and *Rhizoctonia sp.* The activity of the oil decreased on serial dilution. The susceptibility of the keratinophilic fungi *Trichophyton mentagrophytes* and *Chrysosporium indicum* to the oil is very remarkable and may be exploited against these dermatophytes.

A detailed *in vivo* study of the oil of *P. odorata* shall bring to fore the actual potentiality of the antimicrobial efficacy of the oil against the test organisms.

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TABLE – I

In *vitro* Antibacterial Activity of the Essential Oil of *Pavonia odorata* Willd.

S.No.	Micro-organism	Diameter of zone of inhibition (mm)				Tween 80	Standard
		Neat oil	1:50	1:100	1:200		
	Gram positive bacteria						Potassium penicillin G (1000 ppm)
1	*Staphylococcus aureus*	35	32	28	15	-	22
2	*Bacillus subtilis*	28	25	20	10	-	20
3	*B. mycoides*	25	19	12	08	-	15
4	*Diplococcus pneumonia*	38	32	28	12	-	12
							Streptomycin sulphate (1000 ppm)
5.	*Salmonella typhi H*	15	10	08	-	-	21
6.	*S. Paratyphi A.*	22	18	14	09	-	15
7.	*Shigella flexneri*	26	20	15	11	-	12
8.	*Virbrio cholerae Ogawa*	18	13	10	-	-	13
9.	*Escherichia coli*	36	30	19	15	-	14
10.	*Klebsiella sp*	33	29	22	12	-	16

TABLE - II

***In vitro* Antifungal Activity of the Essential Oil of *Pavonia odorata* willd.**

S. No.	Micro-organisms	Diameter of zone of inhibition (mm)				Tween 80	Standard Gresiofulvin in (100 ppm)
		Neat oil	1:50	1:100	1:200		
1	*Helminthosporium sp.*	30	20	15	10	-	24
2	*Fusarium solani*	44	32	19	12	-	20
3	*Aspergillus flavus*	38	32	22	15	-	07
4	*A. niger*	40	37	35	20	-	13
5	*A. nidulans*	25	20	15	09	-	10
6	*A. fumigatus*	15	11	08	-	-	09
7	*Botrydiplodia sp.*	55	33	28	15	-	20
8	*Alternaria sp.*	30	25	10	08	-	26
9	*Rhizophus nodosus*	20	10	08	-	-	19
10	*Colletotrichum capsici*	32	18	14	11	-	20
11	*Trichophyton mentagrophytes*	35	24	20	15	-	20
12	*Chrysosporium indicum*	30	25	18	13	-	17
13	*Rhizoctonia sp.*	15	10	-	-	-	15

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