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ORIGINAL ARTICLE

Mycoflora Associated With Crude Herbal Drugs of Agra Region

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ABSTRACT

Sixty samples of crude herbal drugs comprising of 10 samples each of Safed musli (Chlorophytum borivilianum), Satavar (Asparagus racemosus), Sarpgandha (Rauvolfia serpentina), Ashvagandha (Withania sominifera), Mullathi (Glycyrrhiza glabara) and Anantmul (Hemidesmus indicus) showed presence of 33 fungal species. Out of these, 22 fungal species were found associated with samples each of satavar, sarpgandha and ashvagandha, 21 fungi were recorded from anantmul samples, however, safed musli showed presence of 19 species and mullathi samples were found to be contaminated with 17 fungal species. The most dominant and frequent mould was Aspergillus flavus, followed by Alternaria alternata, Aspergillus ochraceus, Fusarium moniliforme, Penicillium citrinum, P. patulum and Cladosporium herbarum. These fungi are known to elaborate different mycotoxins, which can deteriorate quality of drug and also pose problem of health hazards in human beings.

Key words: *Mycoflora, crude herbal drugs, mycotoxins*

INTRODUCTION

The herbal medicines are probably the first and certainly the oldest system of human health care. Almost all civilizations and cultures have employed plants and their products in the treatment of human diseases. The Indian system of Ayurveda is probably 5000 years old. The Chinese system is equally ancient methods of healing practised by the people of the Mediterranean region and the orient found expression in the first European herbal, DeMateria Medica, written by the Greek physician Pedanios Dioscorides in the 1st Century A.D. Plants have also contributed significantly to the allopathic medical armory. It is documented that about 80% of the world's population has now faith in traditional medicines particularly herbal drugs for their primary healthcare (Dubey, *et al.*, 2004).

Interestingly, the crude herbal drugs or drug yielding parts of plants are stored under unhygienic conditions by farmers and traders in rural, sub-urban and urban areas, therefore liable to mould association and consequently contamination with mycotoxins. This contamination not only deteriorates the active drug constituent of crude herbal drugs but also makes it toxic due to mycotoxins which are thermostable highly toxic metabolites of fungal origin. These metabolites decrease quality of herbal drugs and also pose problem of health hazards when taken in crude form. Thus, the present investigation was undertaken to evaluate mycoflora associated with crude herbal drugs obtained from roots of safed musli (*Chlorophytum borivilianum*), satavar (*Asparagus racemosus*), sarpgandha (*Rauvolfia serpentina*), ashvagandha (*Withania sominifera*), mullathi (*Glycyrrhiza glabara*) and anantmul (*Hemidesmus indicus*).

Materials and Methods

Sixty samples of crude herbal drugs comprising of 10 samples each of safed musli (*Chlorophytum borivilianum*), satavar (*Asparagus racemosus*), sarpgandha (*Rauvolfia serpentina*), ashvagandha (*Withania somnifera*), mullathi (*Glycyrrhiza glabara*) and anantmul (*Hemidesmus indicus*) were collected from traders of Agra region. The samples were collected in sterilized polythene bags and sealed over flame. These samples were analysed in laboratory for association of moulds following dilution plate method using PDA medium (Graves and Hesseltine, 1966).

For this purpose, 25 gm sample was placed in 100 ml sterilized distilled water in 250 ml Erlenmeyer flask and shaken vigrously for some time, so that mould spores and mycelial bits may

be dispersed in water. Then the suspension was centrifused at 3000 r.p.m. for 5 minutes. The supernatant was discarded and the spore mass present in the bottom of centrifuge tube was dissolved in 10 ml water. One ml of this suspension was poured in sterilized petriplate and 20 ml of the PDA medium was added to the plate. The plates were shaken slowly to mix spore suspension with medium. In this way, 10 plates per sample were made. These plates were later incubated at 28±1ºC for 7 days in B.O.D. incubator. After incubation period, the petriplates were studied for the presence of moulds by routine method under compound microscope. The different fungi present in the plates were identified following Barnett (1960) and Gilman (1975). The occurrence of fungi in crude herbal drug samples is depicted in Table 1.

Table 1: Mycoflora associated with samples of crude herbal drugs collected from Agra region

S. No.	Name of Fungi	Herbal drug plants					
		SF	ST	SR	AS	MU	AM
1.	*Acremonium vitis*	+(2)	–	+(1)	–	+(2)	–
2.	*Actinomucor repens*	–	+(2)	+(2)	–	–	+(2)
3.	*Alternaria alternata*	+(4)	+(3)	+(3)	+(4)	+(2)	+(3)
4.	*Aspergillus flavus*	+(10)	+(8)	+(7)	+(8)	+(6)	+(7)
5.	*A. fumigatus*	–	+(2)	–	+(3)	–	–
6.	*A. japonicus*	–	–	+(3)	–	+(2)	–
7.	*A. nidulans*	+(2)	+(1)	+(2)	–	–	+(2)
8.	*A. niger*	+(3)	+(3)	+(2)	+(2)	+(1)	+(2)
9.	*A. ochraceus*	+(3)	+(4)	+(3)	+(3)	+(2)	+(3)
10.	*A. sydowii*	–	–	–	–	–	+(2)
11.	*A. tamari*	–	+(2)	+(1)	+(1)	–	+(2)
12.	*A. terreus*	+(1)	–	–	+(1)	–	–
13.	*A. ustus*	–	–	–	+(2)	+(1)	–
14.	*Cephalosporium acremonium*	+(2)	+(1)	–	+(2)	–	–
15.	*Cladosporium herbarum*	+(2)	+(2)	+(1)	+(1)	+(1)	+(2)
16.	*Chaetomium globosum*	–	–	+(2)	–	–	–
17.	*Cunnighamella sp.*	+(1)	+(2)	–	–	–	+(1)
18.	*Curvularia lunata*	–	+(2)	+(1)	+(1)	–	–
19.	*Fusarium equiseti*	+(2)	+(3)	+(2)	+(4)	+(2)	+(2)
20.	*F. moniliforme*	+(3)	+(2)	+(2)	+(2)	+(2)	+(3)
21.	*F. oxysporum*	–	–	–	–	+(2)	+(1)
22.	*F. roseum*	+(2)	–	–	–	–	+(3)
23.	*Mucor circinalis*	–	–	+(2)	+(1)	–	–
24.	*M. hiemalis*	+(2)	+(2)	+(1)	–	+(1)	+(1)
25.	*Penicillium chrysogenum*	–	–	+(2)	+(1)	–	–
26.	*P. Citrinum*	+(3)	+(1)	+(1)	+(2)	+(3)	+(2)
27.	*P. cyclopium*	–	+(1)	+(1)	+(1)	–	+(1)
28.	*P. patulum*	+(2)	+(2)	+(2)	+(1)	+(1)	+(2)
29.	*Rhizopus nigricans*	+(3)	+(2)	+(3)	+(3)	+(2)	+(2)
30.	*R. arrhizus*	+(2)	+(3)	+(2)	+(2)	+(3)	+(3)
31.	*Rhizoctonia solani*	–	+(2)	–	+(2)	+(1)	–
32.	*Trichothecium roseum*	+(2)	+(1)	–	–	–	–
33.	*Verticillium alboatrum*	–	–	–	+(1)	–	+(1)
Total No. of Fungal Species		**19**	**22**	**22**	**22**	**17**	**21**
Total No. of Sample screened		**10**	**10**	**10**	**10**	**10**	**10**

Figure in parenthesis denote number of samples showing fungal association-

SF	=	Safed musli	ST	=	Satavar
SR	=	Sarpgandha	AS	=	Ashvagandha
MU	=	Mullathi	AM	=	Anantmul
+	=	Denotes presence	–	=	Denotes absence

RESULTS AND DISCUSSION

It is quite evident from Table 1, a total of 33 fungal species were found to be associated with samples of different crude herbal drugs. These include 10 species of Aspergillus (*A. flavus, A. fumigatus, A Japonicus, A. nidulans, A. niger, A. ochraceus, A. sydowii, A. tamari, A. terreus* and *A.*

ustus); 4 species each of *Fusarium* (*F. equiseti, F. moniliforme, F. oxysporum, F. roseum*) and *Penicillium* (*P. chrysogenum, P. citrinum, P. cyclopium, P. patulum*); 2 species each of *Rhizopus* (*R. nigricans, R. arrhizus*) and Mucor (*M. circinalis, M. hiemalis*) and 1 species each of *Acremonium, Actinomucor, Alternaria, Cephalosporium, Cladosporium, Chaetomium, Cunnighamella, Curvularia, Rhizoctonia, Trichothecium* and *Verticillium*. Further, 22 fungal species were found associated with samples each of satavar, sarpgandha and ashvagandha, followed by 21 fungal species in anantmul, 19 in safed musli and 17 in mulhathi. Thus, minimum fungal contamination was recorded in samples of mullathi.

It is interesting to note that *Aspergillus flavus* was most frequent and abundant mould associated with different samples of crude herbal drugs. It was found in all herbal drugs showing 100% frequency. The next most abundant and frequent mould was *Alternaria alternata* followed by *Aspergillus ochraceus* and *A. niger*. The other fungi, which showed 100% frequency include *Cladosporium herbarum, Fusarium equiseti, F. moniliforme, Penicillium cetrinum, P. patulum, Rhizopus nigricans* and *R. arrhizus*. Among these moulds *Cladosporium herbarum* was less abundant though it showed 100% frequency. Interestingly, *Chaetomium globosum* was recorded from 2 samples of sarpgandha only.

It is worth mentioning here that the most dominant mould *Aspergillus flavus* and co-dominant moulds viz., *A. ochraceus, Alternaria alternata, Fusarium moniliforme, Penicillium citrinum* and *P. patulum* are known to produce highly toxic mycotoxins and association of these moulds is not only important from the point of view of decreasing quality of crude herbal drugs but also in relation to health hazards in human beings.

Roy (2003) pointed out mycological problems of crude herbal drugs in India and suggested that species of *Aspergillus* particularly *A. flavus, A. parasiticus, A. ochraceus, Alternaria alternata, Fusarium oxysporum, Fusarium moniliforme, Penicillium citrinum* and *P. patulum* are more important in quality deterioration and mycotoxin contamination of herbal drugs. Gautam and Bhaduria (2009) reported mycoflora and mycotoxins in some important herbal drugs thereby supporting the findings of present communication.

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REFERENCES

1. Barnett H.L. (1960): Illustrated genera of imperfect Fungi. IIed. Burgess Pub. Co., Minneapolis.
2. Dubey N.K., Kumar R. and Tripathi P. (2004): Global promotion of herbal medicines; India's opportunity. Current Sci., 86: 37-41.
3. Gilman J.C. (1975): A mannual of soil fungi. Oxford and IBH Pub. Co., New Delhi.
4. Graves M. and Hesseltine C.W. (1996): Fungi in flour and refrigerated dough products. Mycopath et. Mycol. Appl., 29: 277-290.
5. Gautam A.K. and Bhadauria R. (2009): Mycoflora and mycotoxins in some important crude and powdered herbal drugs. Biological forum, 1: 1-7.
6. Roy A.K. (2003): Mycological problems of crude herbal drugs – overview and challenges. Indian Phytopath, 56: 1-13.