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Study of the Dermatophytes in the Students Houses of Minia University, Egypt

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A survey of dermatophytes and other fungi was carried out in 100 air – dust samples from bedrooms and dinning halls of male and female student resident houses. By hair baiting technique the common dermatophytes were obtained namely *Microsporum canis, M. gypseum* and *Trichophyton mentagrophytes.* Also five species of *Chrysosporium* were isolated in the following order of dominance *C. tropicum, C. keratinophilum, C. indicum, C. pannicola* and *C. queenslandicum.* By dilution plate method, 37 species representing 20 genera of which *Aspergilus niger, A. flavus, Rhizopus nigricans, Penicillium chrysogenum* and *Cladosporium cladosporioides* were most frequently isolated.

Key words: dermatophytic fungi, saprophytic fungi, dust.

INTRODUCTION

Student population in the residential halls of Minia University are crowded and the presence fungi on floor dust creats an opportunity for them to become invasive of the skin or hair. Relatively few studies have been made on the mycoflora of air dust (S a a d, E l - G i n d y, 1990; B u t e r a et al., 1991; W i c k m a n et al., 1992; M a g h a z y, 1989; A b d e l - M a l l e k et al., 1988; A b d e l - H a f e z and S h o r e i t, 1985; M e r c a n t i n i et al., 1983 and S i m o r d o v a, 1968). This investigation reports the presence of dermatophytes and saprophytes in the floor dust in the infection of the students.

MATERIAL AND METHODS

This study was carried out in residental halls of Minia University which contain about ten thousand students. One hundred samples of the dust were collected

randomly from bedrooms and dinning halls of male and female students during the period from October 1990 till April 1991. The dust samples were sieved to remove the gross debris. Samples were placed in clean plastic bags and transferred to the laboratory.

Estimation of dermatophytes. According to hair baiting technique (Vanbreuseghem, 1952), samples of dust were put in sterile Petri dishes, moistened with sufficient quantity of sterile distilled water and remoistened whenever necessary. Pieces of sterile human hair were sprincled on the surface of moistened dust. The plates were covered and incubated at room temperature for about 6 weeks. The moduls which appeared were transferred to the surface of Sabouraud's dextrose agar medium (Moss, McQuown, 1965) which contains combination of antibiotics comparised of 20 IU/ml of sodium penicillin, 40 µg/ml of dihydrostreptomycin and 0.05 % cycloheximide. The plates were incubated at 28°C for 2-3 weeks and the moulds which appeared were examined microscopically and identified.

Estimation of saprophytes. The dillution plate method was used and the floor dust fungi were allowed to grow on Czapek's Dox agar medium with rose bengal (1/15000) was used as a bacteriostatic agent. Five plates were used for each sample and incubated at 28°C for 10 days. The developing colonies were examined, identified and counted.

RESULTS AND DISCUSSION

Dust dermatophytic fungi. Using the hair baiting technique it was possible to identify 11 genera and 18 species of dermatophytes and cycloheximide resistant fungi (Table 1).

The isolated dermatophytes were represented by *Microsporum* and *Trichophyton*. *Microsporum* was the most common dermatophyte and was represented by *M. canis* (8 %) and *M. gypseum* (6 %).

Many available records indicated that *M. canis* was the main causative organism of tinea capitis, tinea corporis and tinea pedis (Naggse et al., 1980; Eduado, Etta, 1986 and Moubasher et al., 1993). Abdel-Mallek, Bagy, Moharram (1988) and Maghazy (1989) did not succeed in isolating any *Microsporum* species from floor of students resident halls of Assiut University and primary schools as well. *Trichophyton* was the second dermatophyte and was represened by *T. mentagrophytes*. It was encountered in 2 % of the tested samples. *T. mentagrophytes* was recorded as a causative organism of tinea capitis and tinea pedies (Verrone et al., 1985). In Egypt, Abdel-Mallek, Bagy, Moharram, (1988) and Maghazy (1989) and Moubasher et al. (1993) isolated unidentified species of *Trichophyton* from floor dust of residental halls,

whereas M a g h a z y (1989) did not found any *Trichophyton* species in floor dust of primary schools. Dermatophytes are isolated from soils of many countries. F a g g i and S o g a n e (1990) isolated *Microsporum gypseum, M. cookei, K. ajelloi* and *Trichophyton terrestre* from soils of bathing beach sand and soil from city parks, fields and woods in Italy. A b d e l - H a f e z, M o u b a s h e r, B a r a k a t (1990) isolated *T. verrucosum* and *Trichophyton* sp. from air dust particles of Egypt and V o l z, W l o s i n s k i, W a s s e r (1990) recovered *M. gypseum* and *K. ajelloi* from soils of Ukraine. A w a s t n i and S e e m a G o t e w a l (1991) isolated *Trichophyton rubrum, T. mentagrophytes* and *Microsporum gypseum* from Indian soils.

T a b l e 1

Total isolates NCI (out of 100), percentage of frequency and occurrance remarks (OR) on keratinolytic fungal genera and species

Genera and species	NCI	% of frequency	OR
Chrysosporium	68	68	H
C. tropicum Carmichael	39	39	M
C. keratinophilum (Frey) Carmichael	18	18	L
C. indicum	7	7	R
C. pannicola (Rand et Sand.) Garg	2	2	R
C. queenslandicum Apinis et Rees	2	2	R
Aspergillus	22	22	L
A. flavus Link	18	18	L
A. ochraceus Wilhelm	4	4	R
Penicillium	16	16	L
P. chrysogenum Thom	11	11	R
P. funiculosum Thom	5	5	R
Microsporum	14	14	L
M. canis Rodin	8	8	R
M. gypseum Rodin	6	6	R
Scopulariopsis brevicaulis (Sacc.) Bainier	12	12	L
Gliocladium roseum (Link) Thom	6	6	R
Acremonium kiliense Gruetz	4	4	R
Malbranchea chrysosporioides Siglerf Carmichael	4	4	R
Candida sp.	2	2	R
Geotrichum candidum Link	2	2	R
Trichophyton mentagrophytes Blanchard	2	2	R
Unidentified yeasts	10	10	R

H = High occurence (> 50 cases)
M = Moderate occurrence (25-50 cases)
L = Low occurrence (12-25 cases)
R = Rare occurrence (12 cases or less)

The broadest spectra of species was demonstrated in the true keratinolytic fungus *Chrysosporium* (5 species), where it emerged from 68 % samples. *C. tropicum* and *C. keratinophilum* were the most common species (Table 1). The three remaining *Chrysosporium* spp. were rare. Abdel-Hafez, Moubasher, Barakat (1990) isolated 10 species of *Chrysosporium* from air dust in Egypt. Abdel-Malek, Bagy, Moharram (1988) isolated 6 species from students residential halls of Assiut University and Maghazy (1989) isolated 8 species of which *C. tropicum* was the most common species from Assiut primary schools. In India Nigam and Kushawa (1989) isoalted *C. tropicum*, *C. carmicheli* and C.*farmicola* during their studies. Few *Chrysosporium* species were reported as pathogens to humans and animals. Also, they intraperitoneally inoculated white mice with *C. keratinophilum* and found that the different strains of the fungus caused marked splenomegaly, noduoles on the liver and omentum and on abscess in the intestine.

The remaining fungi (8 genera and 10 species in addition to unidentified yeasts) were recovered in low or rare frequencies (25-12 or less).

Dust saprophytic fungi. Thirty seven species attributed to twenty genera were isolatd of which *Aspergillus* contributed the broadest spectra and the largest occurrence of species (11 species in 100 % of samples). *A. niger* and *A. flavus* were the most dominant species (95 % and 76 % of samples respectively). *A. terreus* appeared in low frequency in the tested samples (Table 2). The remaining *Aspergillus* (8 species) were recovered in rare frequency of occurrence (less than 12 samples).

Penicillium was represented by six species of which *P. chrysogenum* was the most frequent. *Rhizopus nigricans* and *Cladosporium cladosporioides* were isolated in moderate frequency (Table 2).

Altenaria alternata and *Fusarium oxysporum* were isolated in low frequency. The remaining genera and species were recovered in rare frequency. (Table 2).

Many reports overall the world agreed with our results. Saad and El-Ginedy (1990) collected 30 samples of the floor house dust in Saudi Arabia and found that the common species were *Aspergillus repens*, *A. amstatelodami*, *A. versicolor*, *A. fumigatus*, *Penicillium purpurogenum*, *P. crustosum*, *Cladosporium cladosporioides* and *C. herbarum*. Also, Abdel-Hafez and Shoreit (1985) observed that *Aspergillus niger*, *A. flavus*, *A. flavus* var. *columnaris*, *Penicillium chrysogenum*, *P. citrinum* and *P. nigricans* were the dominant species in the air dust particles from Saudi Arabia. Wickman et al. (1992) found that *Penicillium*, *Alternaria* and *Cladosporium* were the three most common fungi in house floor dust in Sveden. In Japan, Hamada and Yamada (1991) studied the seasonal variation in the fungal flora of house dust and found that *Aspergillus* and *Wallemia* were more frequent and were the highest fungal population in September and November. In Egypt, Abdel-Hafez et al. (1986) reported that *Aspergillus* was the most common genus, occured in 100 % of 20 air-dust samples collected from roofs of houses and

they found that *A. niger, A. flavus, A. ochraceus* and *A. terreus* are the most prevalent. The remaining *Aspergillus* were recovered in rare frequency of occurrence. Abdel-Mallek et al. (1988) isolated *Aspergillus niger, A. flavus* var. *columnaris, Rhizopus nigricans, Syncephalastrum racemosum* and *Penicillium chrysogenum* from floor dust of the residential halls of Assiut University.

Table 2

Total isolates NCI (out of 100) and percentage frequency of saprophytic fungal genera and species of floor dust to recovered on Czapek's agar medium at 28°C

Genera and species	NCI	% of frequency	OR
Aspergillus	100	100	H
A. niger van Tieghem	95	95	H
A. flavus Link	76	76	H
A. terreus Thom	12	12	R
A. ochraceus Wilhelm	9	9	R
A. versicolor Tiraboschi	2	2	R
A. melleus Yukawa	2	2	R
A. amestelodami (Mangin) Thom et Church	2	2	R
A. flavipes Thom et Church	1	1	R
A. ustus Thom et Church	1	1	R
A. sydowii (Bain et Church) Thom et Church	1	1	R
A. clavatus Desm.	1	1	R
Penicillium	54	54	H
P. chrysogenum Thom	28	28	M
P. funiculosum Thom	16	16	L
P. lanosum West.	7	7	R
P. cyclopium West	1	1	R
P. frequentans West	1	1	R
P. rubrum Stoll	1	1	R
Rhizopus nigricans Ehrenb.	46	46	M
Cladosporium cladosporioides (Fres.) de Vries	28	28	L
Alternaria alternata (Fr.) Kessler	16	16	L
Fusarium	17	17	L
F. oxysporum Schlecht. emend. Snyd. et Hans.	13	13	L
F. solani (Mart.) Appel et Wollenw.	4	4	R
Acremonium	9	9	R
A. kiliense Gruetz	6	6	R
A. strictum Gams	3	3	R
Mucor racemosus Fres.	8	8	R
Syncephalastrum sp.	6	6	R
Botryotrichum piluliferum Saccardo et Marshal	2	2	R
Chaetomium globosum Kunz: Fr.	1	1	R
Curvularia lunata (Walker) Boedijn	1	1	R
Humicola grisea Traaen	1	1	R
Microascus trigonoporus Emmons et Dodge	1	1	R
Myrothecium verrucaria (Alb. et Schw.) Ditm.: Fr.	1	1	R
Neurospora sp.	1	1	R
Paecilomyces varioti Bainier	1	1	R
Trichoderma viride Pers: Fr.	1	1	R
Urocladium botrytis Preuss	1	1	R

Explanations see Table 1

CONCLUSION

The results of investigation show that the keratinolytic fungi (which include dermatophytes) are a small component of the air dust fungi, can play a favourable role in invading the skin, hair and nails causing primary or secondary infection. The data help also to conclude that the quantitative variation in air dust fungi observed in the residential halls seem to reflect a complex pattern of interactions between the numerousintrinsic and extrinsic parameters that groven the prevalence of microorganisms in the air.

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