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A PRELIMINARY STUDY ON DISTRIBUTIONOF KERATINOPHILIC FUNGI INSOIL OF JAIPUR, INDIA

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Fungi is one among the widely distributed kingdom on earth, most of the fungi survive as saprophyte. During the course of evolution one of a very special group of fungi has developed which was able to utilize keratin as a sole source of nutrition. Such group of organisms developed the skills to survive as the keratinolytic agent. The best keratinophilic molds belong to *Microsporum*, *Trichophyton* and *Epidermophyton* genera. In the present study, geographical distribution of keratinophilic flora was evaluated in soil of Jaipur, India. Total 50 soil samples from poultry farms, animal farms, barber's dump, public parks and Sambhar lake were collected and screened by using hair baiting techniques on different keratinsbaits. Human hair was found to be most potent bait for growth of keratinophilic fungi than others. In the present study, 79% soil samples were recorded to be positive for keratinophilic flora. *Trichophyton* was most predominant genera.Our results indicated that soils of Jaipur are most suitable reservoirs for keratinophilic and related fungi.

Keywords: Dermatophytes; Earth; Fungi; Hair Baiting; Keratinophilic.

Introduction

Soil acts as a reservoir for various microorganisms, such as bacteria, algae, fungi, and micro-animals such as rotifers[1]. Soil fungi acquire nutrition by various modes which are grouped as saprophytic, parasitic and symbiotic fungi[2,3]. Saprophytes obtain their nutrition from dead organic matter of biotic composition of nature and transform it into fungal biomass, carbon dioxide and organic acids. However, keratin as the dead organic matter is decomposed by keratinophilic fungi. Keratinophytes are morphologically and physiologically allied molds[4]. In past years, these fungi are propagated in considerable amount throughout the world which has become potential causatives of fungal infection in human[5-9].

Soils of forest, farmyard, sediments of the rivers and oceans, in humus and organic material sites such as cattle sheds, garbage, animal burrows, sewage, bird's nest, barber's hair dumping area and in public places like parks, schools, marketplace, poultry sheds, herbivore or carnivore muck etc are major favorable habitation of Keratinophytes[10-12]. The main objective of present study was to preliminary estimate the geographical

distribution of keratinophilic fungi in soil of Jaipur, Rajasthan.

Material and Methods

Soil samples collection: A total 50 soil samples were collected randomly from road sides, poultry farm, barber shop, animal farms of Jaipur from August 2014 to November 2014. Most of the samples were collected in the morning (8:00-12:00 am). Soils were sandy in nature containing 3-4% clay and slit. Before collection of soil samples, superficial debris and other vegetative materials were removed from the soil surface. The soil samples were collected from depth 2cm with help of sterile spatula. Each plastic bag was labelled indicating the date and site of collection. These samples were then tightly closed to maintaining original moisture and kept in the culture room at a temperature of 28 ± 2°C as per the need. Water was added to provide moisture to the soil.

Isolation and Identification of Keratinophilic fungi: Vanbreuseghem's hair bait technique was used for isolation the keratinophilic fungi[13]. About 50 gm of each soil sample was placed in the sterile Petri plate and autoclaved defatted human hair and nails, animal hair, and chicken feathers were dispersed over the surface of each soil sample respectively. The baited plates were moistened by adding 10-12 ml of sterile distilled water. The baited plates incubated at 27ºC ± 2ºC in low light for 21-25 days with regular examination at an interval of 3 days. The observed growth mycelium was cultured on the slants of Sabourad's dextrose agar medium (Hi-Media).

The fungal growth isolated from culture test was identified basis on macroscopic characteristics such as colony color, texture and reverse pigmentation and microscopic characteristics as presence of hyphae and spore shape.

Results and Discussion

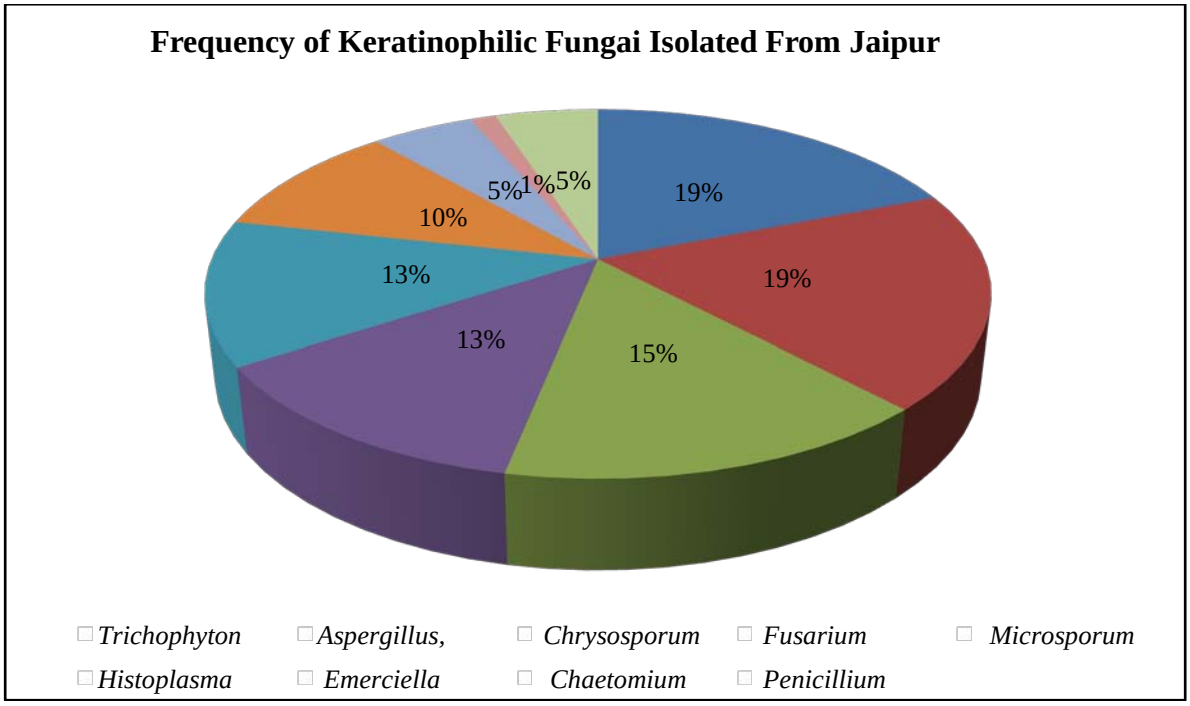
In the present study, 79% (79out of 100 plates on four baits i.e. human hair and nails, animal hair and chicken feather) soil samples were recorded to be positive for keratinophilic flora. Out of all applied baits, human hair was found to be most potent bait for growth of keratinophilic fungi with 23(92%) positive soil samples followed by Animal hair 21(84%), chicken feather 19(76%)and human nail 16(64%). Among isolates, the all respective locations from slaughter house, Animal Farm,barbersdump and poultry farms were recorded to comprise maximum occurrence of fungal growth whereas none of keratin baits were found to be supportive for growth of keratinophiles in Sambhar Lake soil sample (Table-1).

Tables -1: Incidence of keratinophilic fungi in different habitat area of Jaipur.

Sr. No	Habitat	Total No. Of Sample	Human Hair	Human Nail	Animal Hair	Chicken Feather	Total +Ve Samples
1.	Poultry Farm	14	14	10	10	10	44
2.	Animal Farm	8	6	4	6	6	22
3.	Barber Shop	10	10	8	10	8	36
4.	Slaughter House	16	16	10	16	14	56
6.	Sambhar Lake	2	-	-	-	-	-
	Grand Total	50	46	32	42	38	158
	Percentage		92.0%	64.0%	84.0%	76.0%	79.0%

In microscopic examination, a total of 79 isolates of keratinophilic and related fungi were identified which were distributed in 9 genera. The dominant genera were: *Trichophyton, Aspergillus, Chrysosporum, Fusarium, Microsporum, Histoplasma, Emerciella, Chaetomium* and *Penicillium*. The highest prevalence was recorded for *Trichophyton* (19%) and *Aspergillus* (19%) genus while least (1%) was for *Chaetomium* (Graph-1).

In recent years, the distribution of



Graph -1: Occurrence of keratinophilic fungal species isolated in different habitats of Jaipur.

keratinophilic fungi in Indian soils was given by many workers[14-22]. The results of present study are in agreement with findings of earlier study conducted in North Iran in which out of total 244 soil samples, 79.91% samples were recorded positive for the presence of keratinophilic fungi in soils[23].

The finding of our study was in agreement with the findings of study conducted in Jaipur[24]. In this study, it was recorded that 65 soil samples out of 67 were positive with fungal growth. The different sites were PG study centers, playgrounds, gardens, hostels, administrative blocks, library, bank, canteen and roadside of University of Rajasthan Campus, Jaipur whereas human hair and animal hair were applied as baits.

However, the present study was similar with findings of with a previous study in Jaipur; where recorded 44 positive samples with fungal growth examined out of 50 soil samples belonging to school and college playgrounds of Jaipur. Human hair baits were also found most suitable in compared to nail baits for growth of fungi[25].

The results of the present study were in agreement with the finding of a study in Kanpur, Uttar Pradesh. In this study, 215 and 239 fungi were recovered from 230 and

235 soil samples of hospitals and houses respectively. It was also found that 19 fungi distributed in 11 keratinophilic genera were identified, in which dominant genus was *Chrysosporium* followed by *Arthroderma*, *Trichophyton*, *Acremonium*, *Ctenomyces*, *Microsporum* and *Penicillium*[26].

The present study is in agreement with a previous retrospective study, where 17 species of keratinophilic fungi were recorded in soils of North Iran[23]. 174 colonies of different keratinophilic fungi were recordedin a study from Ranchi, Jharkhand and categorized into 15 species belonging to 9 genera[27]. In Mumbai, *Trichophyton* was reported as most frequent keratinophytes in soils of Public Parks[28]. Afterward, the unexplored soils of Ladakh was assessed and reported to yield 29 keratinophilic species belonging to 13 genera from by using human hair, nails, bird feathers and sheep wool as keratin substratum[29]However, results of the present study are similar to a study from Bharatpur Bird Sanctuary's soil[30].

Conclusion

Our results indicated that soils of poultry farms, animal farms, barber shops, slaughter houses of Jaipur are most suitable reservoirs for keratinophilic and related fungi. Due to keratinolytic properties, keratinophilic and non-keratinophilic fungi get opportunity to cause rapid infections and become parasitic by accident; which may cause infections in both humans and animals. Such fungi are recognized as dermatophytes that can cause significant health infections affecting children, adolescents and adults. Further we will study about the pathogenic keratinophyles (dermatophytes) and their distribution in Jaipur district and also compare them morphologically and biochemically from geophilic keratinophyles for discrimination of pathogen from non-pathogen.

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