MICROSPORUM SPECIES ISOLATED FROM SOILS IN PRIMARY SCHOOLS IN JOS METROPOLIS OF PLATEAU STATE

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ABSTRACT

Soil samples from eight primary schools in Jos metropolis were investigated for Microsporum species using the hair – baiting technique. Seventy-two soil samples were collected and cultured accordingly. Hair from a three-year-old child was sterilized three consecutive times and sprinkled unto the soil samples in 9cm Petri dishes. The soil was moistened with sterile distilled water and incubated in the dark, in closed cupboards for a period of 3-4 weeks. All subsequent fungal growth observed on the hairs were subcultured into plates of Sabouraud-dextrose agar supplemented with 0.05mg/cc of Tetracycline and 0.05mg/cc of chloramphenicol. Fungi were identified by cultural characteristics and morphological appearances. Nine genera of fungi including three species of Microsporum and saprophytic moulds were identified. Microsporum canis, M. cookie and M. gypseum were isolated. Statistical analysis shows that there is significant difference in the distribution of Microsporum species in soil from public and private primary schools in Jos metropolis with means of 5.08 and 2.4 respectively. This disparity could be attributed to their ecology.

INTRODUCTION

The three genera of dermatophytes that are known to cause disease include *Microsporum, Trichophyton* and *Epidermophyton.* species. A classification of dermatophytes based on habitat or ecology was proposed in 1954. This broad survey grouped dermatophytes into zoophilic, anthropophilic and geophilic species. This classification has been found useful because it clarifies the source of fungi and consequently ringworm infections. Based on this; anthropophiles are restricted to man as host; the zoophilic are primarily animal pathogens but also infect man. The few dermatophytes that occur naturally as saprophytes on keratinous materials in soil are the geophilic which cause occasional infections on both animals and man (Otcanaseck, 1978).

Microsporum species is one out of the three genera of dermatophytes commonly referred to as "ring worm" fungi. They are keratinophilic, utilizing hair or skin cells shed by animals or humans as well as other keratin products during the natural and continuous cycle of skin and coat shedding. In the soil they feed on organic substances as saprophytes using keratin as nitrogen source. They have been

described as undergoing natural evolution from keratin utilizing soil saprophytes to association with and invasion of keratinous tissues of living animals (Glyn *et al.*, 1985).

However it is presently known that virtually all dermatophytes are geophilic and that soil is the natural habitat and source of most infections. Fungi capable of causing mycoses in man are known to occur in many types of soils and natural habitats. Microsporum species have been recovered from soil in different parts of the world. This includes the isolations of *Microsporum gypseum* from soil in the U.S.A. (Stockdale 1963; Ajello1959); in Norway Lindquist, (1961); Beohm, (1966) in Germany; Seth et al (1967) in India. On the African scene Al-doory (1969) from soil in Egypt and Ajello 1962 in Nigerian soil.

This study is to further investigate the distribution patterns of Microsporum species from soil in public and private primary schools. It would help ascertain or refute the higher cases of ring worm infections in primary public schools, due to ecological differences in their soil environments the ultimate origin of these dermatophyte organisms.

Materials and Method

Jos metropolis the sampling area lies in the Plateau State of Nigeria about 3500 meters above sea level with an annual rain fall of 58mm and mean temperature of 27°C maximum and 17°C minimum. The vegetation is savannah grassland.

Seventy-two soil samples were collected from eight randomly selected four public and four private schools The public primary schools included Zololo, Asaodin Moslem Primary School; Angwan Rogo and Sabon Layi Public Primary schools; While the private primary schools included Gaskiya; University of Jos Women Association Primary; University of Jos Women Association Nursery; University of Jos Nursery/Primary. Three sets of soil samples were collected from semi-dry soil, wet soil and dry soil respectively from the surface at a depth of 2-4cm using a sterile shovel into sterile plastic bags around the playground and classrooms. Soil texture was observed to be dark loamy with high organic matter. Animals such as goats, sheep and cattle were found to graze in the playgrounds of the public schools. The private schools were fenced, round thereby excluded such roaming animals. All soil samples were cultured using the hair-baiting technique, (Vanbreusegham 1952). A portion of each soil sample after mixing thoroughly was poured into pertri dishes. The soil was then moistened with sterile distilled water and then baited with segments of hair from a 4 year old child which had been sterilized two consecutive times by autoclaving. All fungi growing on hair segments were subcultured onto Sabouraud dextrose agar supplemented with 0.05mg/cc of Tetracycline and 0.05mg/cc of chloramphenicol to suppress bacterial contaminants.

Identification of fungi was by their cultural and morphological characters.

Results

Microsporum gypseum, *M. canis* and *M. cookie* were isolated. Other genera

of fungi included *Trichophyton*, Rhizopus, *Mucor, Trichoderma, Aspergillus, Penicillium, Fusarium* and *Torula* species. (Table I). The results showed that the highest number of Microsporum species were isolated from public Schools as follows Zololo 19.3%, Asaodin 15.99%, Angwan Rogo and Sabon Layi 17.01% each.
From the private Schools 13.1%, 7.82% , 5.78% and 3.40% fungi isolate respectively were recovered from Gaskiya, University of Jos Women Association Primary School (UWAP), University Women Association Nursery School (UWAN); University of Jos Nursery and Primary School (UJNP). (Fig. I).

Statistical analysis showed that the mean occurrence of *Microsporum* species from public schools of 5.08 was greater than that of private schools at 2.42. Null hypothesis showed that there is a significant difference in the pattern of distribution of *Microsporum* species between public and private schools.From the result of the statistical analysis of test of significance 3.41>2.07 with 22degree of freedom (Fig2)
Results obtained also show that there is a significant decrease in the total number of fungi recovered from dry soil as compared to semi-dry and wet soil samples in the different locations (Table 2, 3 and 4).

Discussion and Conclusion
Medical mycologist have reported cases of scalp ring-worm epidemics principally caused by Anthropophilic and sometimes Zoophilic strains with evidences of man or animal origin. Adriavo Montovanic (1978). The fact still remains that the soil is the predominant source of most pathogenic micro-organisms especially the fungi. With the advent of the hair-bait technique these dermatophytes are more readily isolated.

Among all the genera of dermatophytes, Epidermophyton species was not isolated. This is not surprising as cases of its isolation from the soil have bean rare Kishimoto et al (1969). Species of Trichophyton were isolated. Trichophyton have been implicated as agents of infection in School pupils. *Microsporum cookie* a known geophilic was also isolated. This specie of dermatophyte has not yet been implicated as a human pathogen. While *Microsporum canis* is known to be prevalent among school children as the agent of *tinea capitis*. It has been established to be acquired through contact with infected pets Alteras et al , (1976); Lindquist (1960). Their survival in the soil is aided by the presence of keratinophilic organic material in the soil. In this survey they were found to be present is School playground that were visited by cattle, goats and sheep for grazing and situated near barbing salons. The hairs could serve as subtrates resulting in what is termed as "Animalization". That is hair, scales, skin, animal droppings serve as debris within the soil, ultimately a suitable environment for the growth of fungi.

Furthermore *Microsporum gypseum* is a typical representative of

dermatophyte found in garden soil rich in organic matter.

The soil still remains a possible source of dermatophyte infection among primary and Nursery School children. The control of infection among this group of the population should not be restricted to screening alone but should also involve environmental and soil protection measures. The degree of moisture content as well as aeration of the soil surface are microclimatic factors that affect the distribution of these organisms.

Ringworm infection among Primary and Nursery School pupils would greatly decrease if surveillance is improved and proper hygienic care given to their school playgrounds.

Table 1

Distribution of Microsporum species from different soil types and Schools.

Nature of soil	Public Schools				Private Schools			
	Zololo	Asaodin	AR. S/L.		Gaskiya	UWAP	UWAN	UJN & P
Semi dry	6	7	6	6	2	2	3	5
Wet	6	6	7	7	1	3	4	5
Dry	5	1	2	2	-	1	1	2
Mean (X)	5.70	4.70	5.0	5.0	1.0	1.70	2.30	4.0
Occurrence								
Percentage	19.39	15.99	17.01	17.01	3.40	5.78	7.82	13.61
Occurrence								

ANOVA

Count

School Type		Sum of Squares	df	Mean Square	F	Sig.
Public	Between Groups	40.167	2	20.083	16.814	0.001
	Within Groups	10.75	9	1.194		
	Total	50.917	11			
Private	Between Groups	7.129	2	3.564	1.85	0.219
	Within Groups	15.417	8	1.927		
	Total	22.545	10			

Oneway

Descriptives

Count

School Type		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval		Minimum	Maximum
						Lower Bound	Upper Bound		
Public	Semi Dry	4	6.25	0.5	0.25	5.4544	7.0456	6	7
	Wet	4	6.5	0.57735	0.28868	5.5813	7.4187	6	7
	Dry	4	2.5	1.73205	0.86603	-0.2561	5.2561	1	5
	Total	12	5.0833	2.15146	0.62107	3.7164	6.4503	1	7
Private	Semi Dry	4	3	1.41421	0.70711	0.7497	5.2503	2	5
	Wet	4	3.25	1.70783	0.85391	0.5325	5.9675	1	5
	Dry	3	1.3333	0.57735	0.33333	-0.1009	2.7676	1	2
	Total	11	2.6364	1.50151	0.45272	1.6276	3.6451	1	5

Key

UWAP - University Women Association Primary School
UWAN - University Women Association Nursery School
UJN & P - University of Jos Nursery and Primary School

Table 2: Fungi Isolated from Semi-Dry Soil

Fungi Isolated	Public Schools: Zololo	Asaodin	Angwan Rogo	Sabo Layi	Private Schools: Gaskiya	UWAP	UWAN	UJN &P
Microsporum gypseum	2	3	3	2	1	1	1	2
Microsporum scanis	2	2	2	3	-	-	2	2
Microsporum Cookie	2	2	1	2	1	1	-	1
Trichophyton species	3	1	1	1	1	-	1	1
Rhizopus species	2	2	1	1	1	1	1	2
Mucor species	3	2	1	1	1	1	2	2
Trichoderma species	1	2	1	1	2	1	-	2
Aspergillus species	2	1	1	-	2	2	2	3
Penicillium species	2	1	2	2	1	2	1	2
Fusarium species	3	2	3	2	3	2	1	2
Torula species	1	-	1	-	=	1	1	1
Total	23	18	17	15	13	12	12	20

Keys:

UWAP - University Women Association Primary School
UWAN - University Women Association Nursery School
UJN & P - University of Jos Nursery and Primary School

Table 3: Fungi Isolated from Wet Soil

	Public Schools				Private Schools			
Fungi Isolated	**Zololo**	**Asaodin**	**Angwan Rogo**	**Sabo Layi**	**Gaskiya**	**UWAP**	**UWAN**	**UJN&P**
Microsporum gypseum	3	3	3	3	1	2	1	3
Microsporum canis	2	2	2	3	-	1	2	1
Microsporum cookie	1	1	2	1	-	-	1	1
Trichophyton species	1	-	2	1	-	1	-	1
Rhizopus species	2	1	2	-	2	-	2	-
Mucor species	2	1	2	1	-	1	2	-
Trichoderma species	1	1	-	3	2	1	3	2
Aspergillus species	2	2	2	-	-	2	-	2
Penicillium species	-	2	1	3	2	1	1	2
Fusarium species	2	2	3	2	2	1	1	2
Torula species	2	-	1	3	1	1	1	2
Total	15	15	20	20	10	11	14	16

Keys:

UWAP - University Women Association Primary School

UWAN - University Women Association Nursery School

UJN & P - University of Jos Nursery and Primary School

Table 4: Fungi Isolated from Dry Soil

	Public Schools				Private Schools			
Fungi Isolated	**Zololo**	**Asaodin**	**Angwan Rogo**	**Sabo Layi**	**Gaskiya**	**UWAP**	**UWAN**	**UJN&P**
Microsporum gypseum	1	1	1	1	-	-	-	1
Microsporum scanis	3	-	1	1	-	1	1	1
Microsporum Cookie	1	-	1	1	-	-	-	-
Trichophyton species	-	1	-	2	-	-	1	1
Rhizopus species	1	2	1	-	-	-	3	2

Mucor species	-	-	1	2	1	2	1	1
Trichoderma species	1	1	1	1	2	2	1	-
Aspergillus species	3	2	2	2	1	-	1	2
Penicillium species	-	-	1	1	-	1	2	2
Fusarium species	2	-	2	1	-	1	2	3
Torula species	-	1	-	1	-	-	2	1
Total	12	8	11	13	4	7	14	14

Keys:

UWAP - University Women Association Primary School

UWAN - University Women Association Nursery School

UJN & P - University of Jos Nursery and Primary School

Fig. 1 Distributional Pattern and comparison of *Microsporum* species between Public and Private Primary Schools.

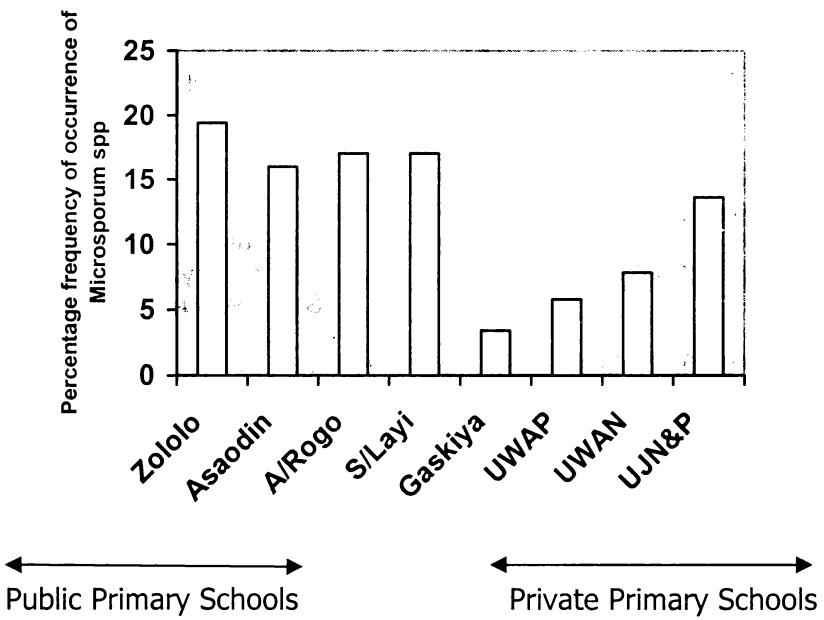
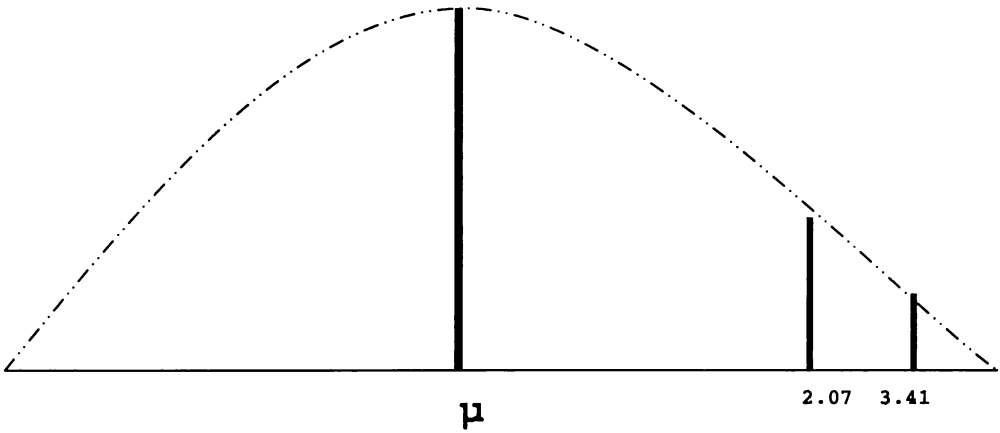


FIGURE 2 : PROBABILITY TEST FOR DISTRIBUTION BETWEEN PUBLIC AND PRIVATE PRIMARY SCHOOLS.

T-test

H_o(Null hypothesis): There is no significant difference in the means of the the distribution of microsporum species between public and private schools.



Degree of freedom = 22

T calculated (3.41)> t- tabulated(2.07)

Therefore we reject the null hypothesis and say there is significant difference in the mean distributions of microsporum species between public and private primary schools.

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