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Full Length Research Paper

Fungal contamination of eye lenses and frames of patients attending optometry clinic at Abia State University, Uturu, Nigeria.

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Fungal contamination of eye lenses of eye patients attending the Optometry Clinic in Abia State University, Uturu, Nigeria, was investigated using culture technique. Of the four hundred and fifty patients' lenses screened between March 2003 – February 2004, sixty-eight (15.11%) had fungal contamination. Aspergillus species (41.1%) was the most prevalent, followed by Penicillium species (30.9%) while Microsporium species was the least (14.7%). Candida and Trichophyton species prevalence were 26.4 and 19.1%, respectively. Lenses used by the males were slightly, though not statistically significant (P < 0.05), more contaminated (16.04%) than those from their female counterparts (13.02%). Age significantly affected the level of eye lenses contamination, as individuals between 21 - 30 years had the highest level of lenses contamination (30.97%), followed by those of 31 - 40 years (15.47%), 41 - 50 years (15.68%), and above 50 years had (11.0%). Individuals of 0 - 10 and 11 - 20 years had only 2 and 5.0% contamination, respectively. The presence of these fungal species could be significant, as some of them are well-known dermatophyes. Occupational influences showed that individuals in contact with soil have the most contaminated lenses.

Key words: Lenses, frame, patients, fungi, occupational influence.

INTRODUCTION

A lens is a piece of glass or similar transparent material with one or two curved surface(s), shaped for use in optical instrument (spectacles). The lens makes things /images appear clearer, larger/smaller or better when looked through with defective eyes (Stern 1998; Eisenhart, 1985). The lens also refers to the transparent part of the eyeball, behind the pupil that focuses light or picture/images in the eyes naturally. While some individuals use spectacles (sunshades) as a mark of fashion, others mostly use them for correction of refractive errors of the eyes. These days, there are also the contact lenses, which are more in direct contact with the conjunctiva of the eye without frames (Eienhart, 1985).

Some micro-organisms especially bacterial species have been reported to colonize these eye lenses. These include various species of *Streptococcus*, *Staphylococcus*, *Aeromonas*, *Citrobacter* and *Pseudomonas* (Brooks et al., 2001; Sankaridurg et al., 1996; Slusher et al., 1987) . Most eye lenses contamination and even eye infections have been attributed to bacterial contaminations with little or no attention to the fungal co-contaminates. This work therefore examines fungal involvement in eye lenses and frames contamination with a view to explaining the likely involvement in eye or ocular invasion. This is because the contaminative organisms could be pathogenic to man.

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MATERIALS AND METHODS

Eye-patients attending Abia State University, Uturu Optometry Clinic were the target population. 450 spectacles (lenses and frames) of patients were swabbed with sterile commercial swab sticks. The spectacles were swabbed at two points; the lenses and the bent joints of the frame. The obtained swabs were examined in the Microbiology Laboratory of the same University within 20 min to 1 h of collection using two methods: direct wet mount and culture

Table 1. Prevalence of fungal contaminates on eye lenses and frames crevices.

Parameter	Value
No Screened	450
No contaminated (%)	68 (15. 11%)
Organisms Observed	
Aspergillus species	185 (41.11%)
Penicillium species	139 (30.9%)
Candida albicams	119 (26.44%)
Trichophyton species	86 (19.11%)
Microsporium species	66 (14.67%)

technique. The swabs were inoculated on SDA and Corn Meal Agar and incubated for 3 - 5 days.

The swabs were collected between March 2003 and February, 2004. Information relating to sex, age, occupation, etc was obtained directly from the patients' medical records in the clinic or during the medical examination in the clinic directly from the patient. The fungal organisms observed in the cultured samples were characterized and identified according to Larone (1976) and Alexopolous and Mims (1981).

The Reynold-Bruides test (Germ tube test) to identify Candida albicans was done as describes by Chessbrough (1987).

Analysis of data

The results obtained in this work were subjected to statistical analysis using chi-square and analysis of variance. This was to test the significance of the results obtained.

RESULTS

Of the four hundred and fifty (450) patients' lenses and frames screened, sixty-eight (15.11%) had fungal contamination. *Aspergillus* species (41.11%) was the most prevalent, followed by *Penicillium* species (30.9%) while *Microsporum* species had the least (14.67). *Candida* and *Trichophyton* species prevalence were 26.44% and 19.11%, respectively (Table 1).

In Table 2, the influence of sex, age and occupation on the prevalence of fungal contamination of eyes lenses and frames of the patients are shown. Out of the 258 males examined, 43 (16.64%) had various fungal contaminations on their spectacles while 13.02% (25) of the females had similar contaminations. The difference was not statistically significant ($P < 0.05$). Age played a significant role ($P < 0.05$) on the prevalence of the contamination. Individuals of 21-30 years were more affected (30.97%), followed by the 31 - 40 year (15.49%) while the least was < 10 years group (2.00%). Values obtained for the other age groups are shown in Table 2.

The occupation of the subjects influenced the prevalence of the fungal contamination of the spectacles screened. Those individuals who are engaged in stone quarrying activities had the highest contamination (24.21%), followed by those from farmers (18.86%) and then the metal miners (17.64%). The least came from the civil servants (6.66%), followed by those schooling (8.06%). Statistical analysis showed a significant influence ($P < 0.05$).

DISCUSSION

The fungal species observed in this work include *Aspergillus, Penicillium, Candida, Trichophyton* and *Micrsporim* species. Some authors and researchers had earlier mentioned them (Cord et al., 1984; El-Gilary et al., 2002; Hedberg, 1990). *Aspergillus* and *Penicillium* species are often contaminants of various materials (Chessbrough, 1987; Larone, 1976), hence the high prevalence. The observation of *Candida*, *Trichophyton* and *Microsporsium* species is of enormous health significance. *C. albicans* has been implicated in various human systemic and dermatological infections (Freeman, 1979) while *Trichophton* and *Microsporum* species are well-known dermatophytes (Larone, 1976; Freeman, 1979; Alexopolous and Mims, 1981; Nester et al., 1989). Observation of these organisms in this work signifies possible infection for the users of such contaminated glasses. The eyes and regions around them could be infected resulting in various complications.

Further observation showed that males and females had contaminated spectacles with the same organisms. This suggests similar sources of contamination as individuals of both sexes are exposed to the same conditions and the same organisms. The slightly but statistically non-significant higher prevalence in males could be attributed to slight environmental/cultural influence; males are more out doors than females. On the other hand, age played a significant role in the observed fungal contamination. Individuals of 21 - 30 years had the highest prevalence (30.97%), followed by 31 - 40 years while the least was < 10 years group (2.00%). The > 10 years are still under parental care hence safe. The 21 - 30 years are very active in search of various economic ventures and could contaminate their wears in the process. Prior to this age, very few individuals use glasses because the eyes become naturally defective with age (El-Gilary et al., 2002; Krumpazky and Klaus, 1996). For 31 years above, most people are parents, who place a lot of responsibilities on them, making them very careful. This therefore accounts for the fall in prevalence of the spectacle contamination with age from 31 years and above.

The values obtained in the occupational influence suggest two distinct features-contact with soil and educational awareness. Nduka et al. (2004) reported a similar observation in helminthes infection in the area. Krumpazky and Klaus (1996) also attributed some eye infections to carelessness of the people. The most contaminated lenses came from those people engaged in stone quarrying, (24.2%), metal mining (18.86%) and farming (17.64). These are people who come in regular contact with soil. The soil has been described as home to

Table 2. Prevalence of the contamination according to age, sex and occupation.

	Parameters	No Screened	Number (%)
			Infected
Sex	Male	258	43 (16.64%)
	Female	192	25 (13.02%)
Total		450	68 (15.11%)
Age in years			
	< 10	50	1(2.00%)
	11-20	60	3 (5.00%)
	21-30	113	35 (30.97%)
	31-40	108	17 (15.49%)
	41-50	70	8 (11.43%)
Total		450	68
Occupation			
	Metal Mining	85	15 (17.64%)
	Stone Quarrying	95	23 (24.21%)
	Schooling	62	5 (8.00%)
	Farming	53	10 (18.86%)
	Trading	63	7 (11.11%)
	Civil Servants	60	4 (6.66%)
	Artisans	32	4 (12.5%)
Total		**450**	**68 (15.11%)**

all organisms hence organisms from the soil contaminate those in contact with it. Farming, metal mining and stone quarrying involve soil tilling, hence stir up dust particles. If these glasses are not contaminated by direct touching, the dust particles in the air will do so. On the other hand, civil servants and scholars are not soil-related individuals hence are not highly contaminated. Again, these groups (scholars and civil servants) are probably more aware and educated (Nduka et al., 2004) hence take more care of themselves. The prevalence observed in traders and artisans are between those of the other groups.

Much attention has been paid to bacterial involvement in ocular contamination and diseases (Liesengang and therefore calls for some measure of attention to be extended to fungal species too. This becomes more Lissengang and Forster, 1980; Lass et al., 1982; Slusher et al., 1987; Abbot and Abrams, 1987; Stern, 1998). This work pronounced as most ophthalmic solutions and disinfectants used in cleaning these spectacles have little or no effects on fungal spores (Chessbrough, 1987) hence could result in ocular contamination and invasion.

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