



Incidence of Tinea pedis and Other Pathogenic Fungi Organisms from Okrika (Belgium) Shoes and Canvass Sold in Markets of Enugu Metropolis

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ABSTRACT

Among the fungi responsible for superficial mycoses, the dermatophytes constitute the major group. Dermatophytosis may not be fatal but causes a high morbidity and the psychological embarrassment accompanying it can be traumatic. A total of 100 shoes and canvas were used for the study.

The study constitutes 50 belgium (Okrika) shoes and 50 belgium (Okrika canvass). It was conducted in the rainy season when the fungi infections thrive most.

The shoes and canvass materials were soaked briefly in water and sterile cotton wool swab sticks were used to collect swab samples from them for cultivating, implanting fragments of specimen of dermatophyte test medium and microscopic demonstration of fungal hyphae and arthrospores.

The specimens were cultured in sabouroid, dextrose agar and allowed to incubate in anaerobic condition for 24-48 hrs. Final plate reading result was concluded after 3 weeks.

Results from the study showed that the incidence of non pathogenic fungi are very high in shoes (Aspergillus niger 40%, Aspergillus fumigates 25%, penicillin notatum 20% compared to the pathogenic fungi (Trichophyton 10%, and Epidermophyton 5%) compared to their incidence in canvas. It could be seen from this study that the incidence of Tinea pedis in human is very low as a result of their low occurrence of the causative pathogenic fungi.

INTRODUCTION

The occasional incidence of *Tinea pedis* and other pathogenic fungi infections among some subjects living in Enugu metropolis has necessitated this research study. Though most of the victims may not understand the source of the infection hence they keep silence about the matter and suffer in silence.

Tinea pedis also called foot ringworm or athlete foot in man. It is under the genus *Trichophyton*. This genus consists of *T. Mentagrophytes*, *T. rubrum*, *T. Schoeleinii*, *T. Sulphureum* (*T. tonsurans*), *T. Verrucosum* and *T. Violaceum* (Abbey, 1995).

There are two variants of *Trichophyton metagrophytes*, also called the antropophilic. They are *T. Mentagrophytes var granulare*, *T. mentagrophytes var interdigitale* and the zoophilic. It is said *T. ermacei* and *T. quinqueanum* are other variants within the species.

The subspecies, *T. interdigitale* is the commonest agent of feet ring worm or athlete foot and groin in men. It is also responsible for other forms of tinea in man. Each variant causes infections in the specific host. Infections are by the small-spored ectothrix type, but there is no accompanying fluorescence. Lesions tend to be inflammatory.

Pathogenicity of Tinea

The fungus grows in the keratinized layers of the skin, throughout the thickness of nails and inside the nail shafts, the keratin being attacked by extracellular enzymes. Except in very rare circumstances the hyphae do not penetrate into living tissue and the mechanisms by which these superficial infections stimulate an inflammatory response are not clear. It could be a reaction to products of fungal metabolism (Cruishank et al 1973) or to fungal constituents.

As well as a variable pathogenicity for different hosts, the dermatophytes vary in their ability to attack particular structures or areas of the body. *M. audouinii* usually confines its attacks to the hair of children under the age of puberty and no microsporum species attacks the nails. *T. rubrum* is a common cause of skin and nail infections but does not attack hair. *E. floccosum* usually attacks the skin of groins or feet, rarely attacks the upper half of the body and never the hair shaft.

The usual name given to these infections is ringworm or tinea and this name is qualified by the name of the site affected. When skin is infected, the fungus spreads radically in the dead keratinized layer in the form of branch hyphae with occasional arthrospores. The inflammatory reaction from living tissue below may be very mild and only a little dry scaling or hyperkeratosis is seen. More commonly, there is irritation, erythema, oedema and some vesiculation especially at the

spreading edge and this irregular pink periphery gave rise to the name ring worm. Animal strains of dermatophytic, secondary infection or vigorous treatment may give rise to an exaggerated reaction with weeping vesicles, pustules and ulcerations. Clinically, characteristic appearances may be associated with particular species e.g *tinea imbricata* with *T. concentricum* the species that commonly attack the skin are *Trichophyton* spp, *E. floccosum* (groins and feet) and *M. Canis*.

Fungi impart a characteristic moldy fragrance to shoes (Leshner et al, 2014). Shoe materials are susceptible to mold growth under adverse conditions. Mold attack on partially or fully completed shoes could occur in processing and storage (Tamil, et al 2015). It has been observed that vegetable tanned leather is more susceptible to growth of mold than chrome tanned leather (Edy Vean, 2005).

Okrika (Belgium) items come from many places, predominantly the United States, the United Kingdoms and some countries in Europe and Asia. These fairly used items come in various grades and are packed as such, depending on their state – how close they are to the original in quality or their level of fading. First grade bales are rated as the best being that they are next to new brands in quality, you also have second grade which is good as well, and then third grade which is lowest and attracts the cheapest price.

The common use of this Okrika shoes and canvas as the easiest means of having shoes and canvas in our metropolis and the occasional incidence to *Tinea Pedis* and other fungal infection in the users stimulated our curiosity to embark on this research study.

MATERIALS AND METHODS

Experimental Design:

This research was conducted in the rainy season when the soil used to be wet and rain soaks the shoes and canvas of Belgium products hence encouraging their survivals. A total of 100 shoes and canvas were used. The study Group is made up of Group 1 fifty shoes and Group 2 fifty canvas worn by male subjects. They were collected from the market areas of our town Viz, Ogbete main market, New Market and Ori Market Emene all located at Enugu State.

The shoes and canvas materials were soaked briefly in water and sterile swab sticks were used to collect the swab samples. The shoes and canvas were placed on a table and swab samples were collected from their inner surfaces where the toes normally rest.

Media preparation (Imarenezer et al, 2017)

The medium used (saboreid Dextrose agar) was prepared from dehydrated commercial products and was made strictly according to manufacturer's instructions. 65g of the saboreid dextrose agar was dissolved in 1 liter of distilled water and was sterilized by autoclaving at 12⁰C for 15 minutes. After sterilization, chloramphenicol was added to the medium. The chloramphenicol (250mg) was dissolved in ethanol before adding to the medium. The medium was then allowed to cool to about 48⁰C before dispensing into appropriate sterile petri dishes.

Determination and isolation of fungi

Bacteriological studies

The swab samples collected from the Belgium (Okrika) shoes and canvass were plated in the prepared

saboreid agar by the method of culturing techniques as described by Baker and silverton, 1998. The samples were allowed to incubate in anaerobic condition for 24-48hrs before reading out and examining the isolated organisms. The final result was concluded after 3 weeks.

Microscopic demonstration of fungal hyphae and arthrospores, in the keratinized tissue.

Implanting fragments of specimen on Dermatophyte, Test Medium (Cruishank, 1973).

RESULTS

The results obtained from this study were presented with histogram

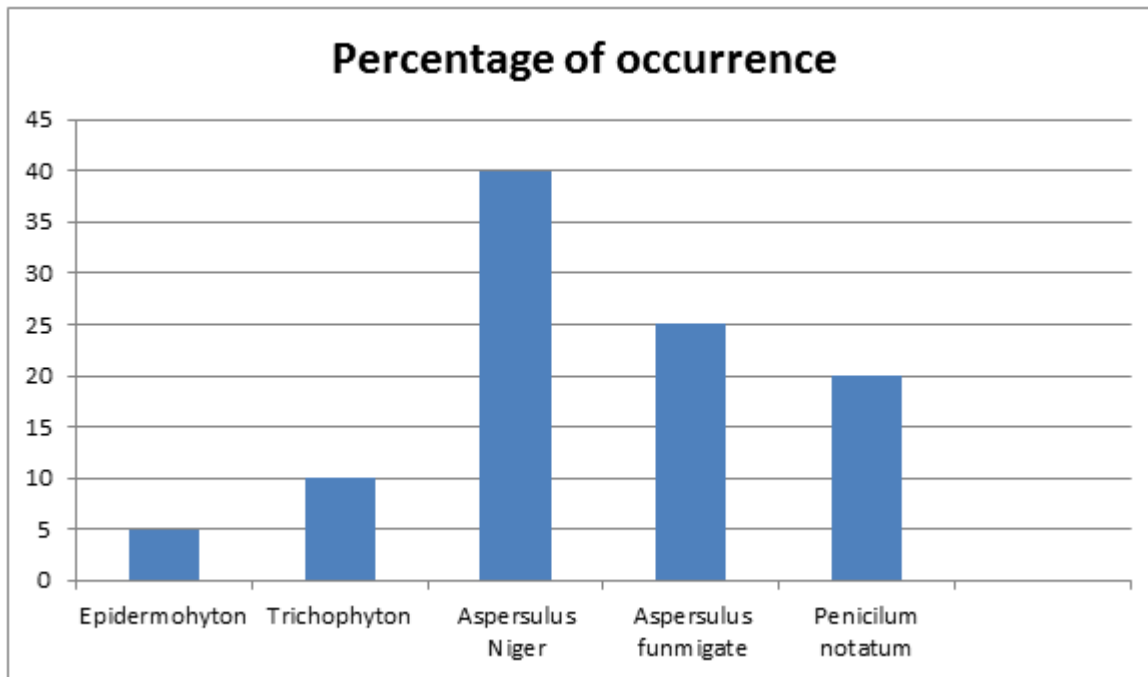
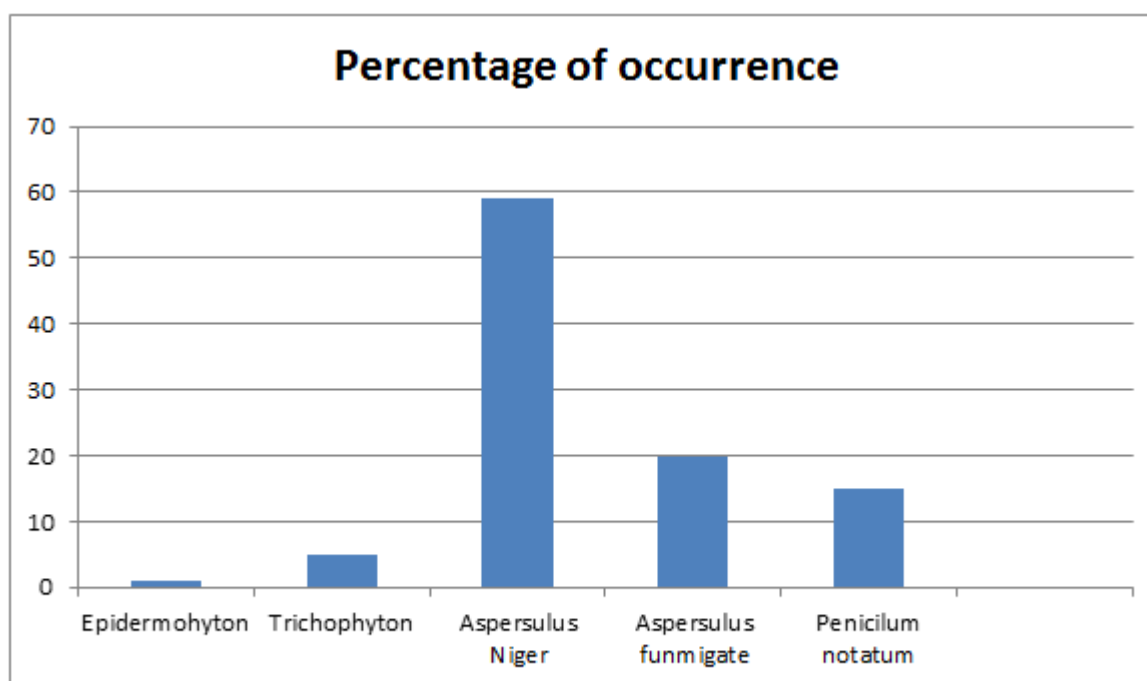


Figure 1: percentage occurrence of fungi Species in Belgium shoes



Different fungi species isolated in canvass

Figure 2: percentage occurrence of fungi species in Belgium canvass

DISCUSSION

The incidence of fungal infections in our society, though minimal, calls for a series and genuine study. Incidence of Tinea pedis and other pathogenic fungal organisms from Okrika (Belgium) shoes and canvass sold in markets of Enugu Metropolis has been elucidated.

The identification of Tinea species Viz Epidermophyton Floccosum, Tri-cophyton species in this work was based on the fact that the fungus forms a fairly fast growing colony which takes a velvety and powdery appearance. The centre becomes flat or folded while radiating furrows and tufts of floccose white hyphae develop. No diffusible pigment is produced but macroconidia are numerous while chlamydospores develop in old cultures (Abbey, 1995).

As each garment worn by a person since the very first garment is likely to have hosted some microbes, (Deaja, 2020), so also each shoe and canvas worn by a person since the very first shoe and canvass is likely to have hosted some microbes and fungi organisms, served as a mechanism for the transfer of others and simultaneously created conditions on the body that have favoured still other microbes

Fungi organisms such as Aspergillus niger (40%) occurred highest in the shoes, followed by Aspergillus fumigates (25%), Penicillium notatum (20%), trichophyton (10%) and lastly epidermophyton (5%) in the shoes (fig 1) Aspergillus niger, Aspergillus

fumigatus are commensal organisms while Trichophyton Spp are pathogenic to man.

Epidemophyton species are more in occurrence in shoes (5%) (fig 1) than in canvass (1.0%) Aspergillus niger 59%, Aspergillus fumigates 20%, Penicillium notatum 15% and Trichophyton 5% (fig 2) This could be attributed to the fact that canvass are easily washed and dried after use than shoes which are just merely cleaned after use. Penicillin species are known to cause the deterioration of the cellulosic foot wears. It has hydrolytic tendencies when acting on cellulose materials such as leather, skin and hide (Van, Wyk et al, 2010).

Studies at the national bureau of standards of vegetable tanned strap leather indicated that considerable tensile strength was lost when a heavy growth of mildew was supported on its surface (Fulton et al, 2014). It is apparent that the fungi used the oil and grease as nutrient. Vegetable tanned shoes were observed to have fungicidal effect on trichophyton, mentagrophytes, T. gypseum, the causative agent of "athletic feet" whereas chrome tanned leather had no such effect.

The incidence of Tinea pedis (athletic feet) is very low in our locality because of low occurrence of Trichophyton species in the shoes (fig 1). This could be possible because most times shoes are worn along with stockings, except where one puts on infected shoe from a carrier without stockings.

Athlete foot (Tinea pedis) infection may not occur through the wearing of canvass. Many people do not often put on canvass except sports men and women. Again the method of washing canvass after use reduces the possibility of accumulation of pathogenic fungi organisms (Trichophyton mentagrophyts), unlike in the shoes which are not often washed after use.

Dermatophytes may not be fatal but causes a high morbidity and the psychological embarrassment accompanying it can be traumatic.

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