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THE RISK OF TRANSMISSION OF ETIOLOGICAL AGENT OF TINEA BARBAE AMONG MALE STUDENTS IN NIGER DELTA UNIVERSITY, WILBERFORCE ISLAND, NIGERIA.

[1]Oluwayemisi A. Olorode (PhD MLS)[*], [2] Ibinabo Kennedy Willie
[1,2]Department of Medical Laboratory Science, Faculty of Basic Medical Sciences Niger Delta University

Abstract
Tinea barbae is a dermatophytic infection caused by Trichophyton species and other dermatophytes. The fungi attack the keratinized layer of the skin and breaks down keratin for its source of amino acids and nitrogen. The aim of this research was to ascertain the risk of Tinea barbae infection among male students in Niger Delta University, Wilberforce Island, Amassoma, Bayelsa state. A total of 196 skin scrapings samples (100 male students, 80 animals in the university farm, 16 soil) collected using sterile well labelled shaving sticks with twin razors and sterile universal bottle respectively were immediately taken to Medical Microbiology department research laboratory for culture on Sabouraud Dextrose agar after each razor was smeared with an applicator stick; the plates were incubated at 24^{o}C (room temperature). Soil samples were serially diluted and cultured by pour plate method. Fungi morphology on SDA plate were observed, microscopy examination using lactophenol cotton blue and fungi atlas for characterization and identification were carried out. The findings showed that a total of 240 fungi isolated comprised of *Aspergillus fumigatus* 5(2.08%), Mucor species 36(15%), *Aspergillus flavus* 22(9.17%), *Penicillium species* 42(17.50%), Microsporum species 3(1.25%), *Aspergillus niger* 9(3.75%), Trichophyton species 5(2.08%). *Cryptococcus neoformans* 48(20%), *Exophiala dermatitidis* 35(14.58%), Bipolaris species 5(2.08%) and Candida species 30(12.50). Observation showed that Mucor species was predominant in all category of samples with percentage frequency of 15%) while *Cryptococcus neoformans* that was only isolated in animal sample had 20%. Trichophyton species recorded a low frequency of 2.1% implying a relatively low risk of transmission of infection among adult males in the University. The fast rate of growth among Aspergillus species and Mucor species was observed to suppress the growth of Trichophyton species which could result in low risk of Trichophyton infection among the study subjects. Trichophyton species, being a slow growing pathogen, can be suppressed by the normal flora of human body combined with the increased fatty acid production among adolescents and adults with proper hygiene. In conclusion, Trichophyton species was found to have a low risk of transmission of infection among the study subjects

Keywords: Tinea barbae infection; University male students; Dermatophytes; animal skin scrapes; human skin scrapes; fungi isolates

Corresponding Author: Dr. Oluwayemisi Agnes Olorode, Department of Medical Laboratory Science, Faculty of Basic Medical Sciences, Niger Delta University, Wilberforce Island, Amassoma, Bayelsa Stat. Nigeria. E mail address: yemisiolorode@yahoo.co.uk

Introduction

Dermatophytes are the infections of fungi which belong to eukaryotic class of microorganisms having organelles such as Mitochondria, golgi bodies. One of the dermatophytic infections is Tinea barbae which has the ability to establish at the beard region of humans especially males, the infection is accompanied with itching of the infected area, hence t derives its name barber's itch or beard ringworm. This infection could be common in rural areas and overcrowded environment where hygienic practices are substandard and unclean sharp blades are used for the removal and dirty clothe for the cleaning of the shaved beard. Likewise, the commercial hair treatment such as

barbers can be doing their business transaction in an unkempt environment making use of uncleaned and unsterilized instruments; barbers could aid in the spread and transmission of this infection, Tinea barbae from person to person; animal to human and animal to animal. This infection causes a lesion which could be on the skin, forming follicles or granules and at times it may not swell up, but flattened inform of follicles, it can as well have similar features with Tinea corporis, the ringworm of the body cavities. Trichophyton genera are associated with T barbae and the species involved are *Trichophyton mentagrophytes*, *Trichophyton verrucosum*, these fungi can be found in the farm among agronomists especially those who are animal keepers or caretakers of animals in uncivilized areas where illiteracy is rampaging and lack of knowledge of the implication of sharing sharp objects such as syringes, razors, scalpels could cause in their midst. Common clinical manifestations in infected individuals with Tinea barbae on the affected areas include red and lumpy skin, crusting forming a circle crimps' and nodular beside the hair, difficulties in the removal of the affected hair, severe pain while touching accompanied with scratching. Clinical diagnosis of this infection starts with proper investigation through information from the infected individuals to get facts of the patients' condition, working place and interactions with the animals or in overcrowded areas. This vital information will provide guidance for the clinicians on the way of diagnosis which must include laboratory test of the skin scraping, infected hair, ultraviolet light penetration to the infected area. The gravity of treatment is corresponding to the intensity of the infection and the level of immunity in the host. Human contact with infected animal's hair or skin could also be an avenue for transmission of the disease among animals and humans. According to Miner *et al.* (2015) which stated that wet environment triggers the spread of this disease, Courtellemont *et al*. (2017) while dry condition reduces its proliferation. People especially men who have attained stage of maturity are prone to this fungi infection as a result of fatty acid protection to hair and hair follicle especially during reproductive maturity (Bonifaz-Ramirez-Tamayo and Saul, 2014). Overuse of high strength topical steroids has been greatly associated with Tinea barbae Kirten *et al*. (2019), absence of sebum increases the spread, which is a natural inhibitory secretion produced by sebaceous glands and secreted into the hair follicles (Iikit and Durdu, 2015). Apart from Trichophyton as one of the genera, Epidermophyton and Microsporum are also dermatophytic agents of infections that colonize the outer epidermal layer of the skin, nails and hair establishing diseases in these regions. These diseases could be transient affecting the deeper *Trichophyton verruosun* parts of the skin resulting into blood and tissues infections. Taxonomy classifications based on clinical appearance and the current one gave concurrently 22 and 16 classes respectively, (Klinger, Theiler and Bosshard, 2021). These dermatophytes can cause diseases in human and animal and are classified as Anthropophilic trichophyton species and zoophilic type respectively; the later examples include, *Trichophyton mentagrophytes* while human infections causing Tinea barbae include *Trichophyton violaceum*,

Trichophyton schoenleinii, Trichophyton megninii and Trichophyton rubrum. The infection Tinea barbae is passive, but can be activated in immunosuppressive individuals like patients living with pneumonia, high sugar level in the blood, tuberculosis and Human immunodeficiency virus. The aim of this work is to determine the

occurrence of Tinea barbae among male students of Niger Delta University, Wilberforce Island, Niger Delta region of Nigeria.

Materials and Methods

Study Area

Amassona community (4°57 - 4°58N and 16°9 -610'E) is an ancient community located onWilberforce Isłand, in the Southern Izon Local Government Area of Bayelsa State and is 20 kilometers from Yenagoa, the state capital of Bayelsa State, Nigeria (Amawulu and Asumpta.2021). The area belongs to a tropical region with hot, humid climate.

Ethical Clearance/ consent

Ethical clearance was obtained from the ethical committee of Niger Delta University Amassoma and all human samples were collected by their consent. Tinea barbe is highly zoophilic. Therefore, animal samples were collected. These included farm animals and pets. Soil samples around animals whose sample are collected were also collected for analysis. Human samples were also collected. Trichophyton spp. Can be found in hair, nails, skin and soil. Hair and skin scrapings were both collected from animals and humans.

Sample Collection

Traces of topical agents and contaminants were removed with an alcohol wipe. Sterile shaving stick was used to collect both hair and skin scraping due to its efficient design or sachets labeled to A-C1 to A-C6 that contained 5 shaving sticks each numbering to a total of 40 samples for cow. A similar organization was carried out for sheep samples and each sachet was labeled 'AS', denoting animal-sheep. A total of twenty samples were collected for sheep. All pig sample sachets were labeled 'A-P', denoting animal-pig. A total of twenty pig samples were collected. Each shaving stick contained skin and hair particles collected from people and animals respectively. A sachet of shaving stick contained 5 sticks. A total of 20 sachets of shaving sticks were used to collect 100 human skin scrapings from the college of health sciences boys' hostel and male students off campus. Each sachet was labelled 'H' denoting human samples with a serial number attached starting with number l . Therefore, a total number of 20 sachets were labelled HI to H20. Each shaving stick in a sachet was labelled in an ascending order of I to 5 immediately after sample collection. A total of 16 soil samples were collected at random points on the

farm where the animals graze and move around. Samples were collected in universal containers and labeled 'S', denoting soil. Each sample container was labeled numerically in ascending order starting from number I to 16.

Materials

Materials involved those used for sample collection and processing.

Sample collection:

Labelled sterile shaving sticks; Alcohol wipe/swab; Swab stick

Sample processing: Sabouraud dextrose agar; Petri dish; Weigh balance; Conical flask; Volumetric flask; Autoclave; Hot oven; Wire loop; Bunsen burner; Microscope; Lactophenol blue reagent; Glass slides; Emersion oil

Sample Processing

All samples were cultured on the SDA and incubated at room temperature for I to 2 weeks.Colonial morphology was observed and each culture plate smear was stained and viewed microscopically to observe and identify the genus fungi isolated.

Culture

All skin scrapings samples were cultured on SDA via streaking method while soil samples were diluted to a lower concentration and cultured via pour plate method. Each shaving stick was uncapped and swabbed with a swab stick dipped in normal saline. A primary inoculum was made on the agar and streaked with a flame-sterilized wire loop in a simple continues streaking method. The agar plates were labeled according to their sample labelling in the following fashion: H ^{1}1, H^{2} 5, A-C^{4}2; letter stands for the type of sample which are human or animal and type of animal. The superscript stands for the numerical label on the sachet, the shaving stick was retrieved from and the number attached represents the label on the shaving stick. Soil samples were mixed with distilled water and I ml of each suspension was pipetted into 9mI of distilled water to make a 10-1 dilution. 1mil of the 10-1 dilution was added to 9ml of distilled water to make a 1 0-2 dilution. I ml of the of the 10-2 dilution was added to 9ml of distilled water to make a 10-3 dilution. Zero point one (0. I) ml of the 10-3 dilution volume is spread with a plate spreader on the SDA surface and incubated at room temperature.

Microscopy

After observation of colonial morphology, a smear is made on a grease free glass slide from the culture media and stained with lactophenol blue. On a clean glass slide, a drop of 70% ethanol was added. Then a smear from the fungal colony was made on the slide using a sterile wire loop. After which two drops of lactophenol blue was added to the smear and carefully cover slipped and viewed at x40 objective lens.

Result

A total of eleven fungi were identified from all categories of samples namely humans. animals and soil. They were *Aspergillus fumigatus*, Mucor species, *Aspergillus flavus*, *Penicillium species*, *Microsporum species*, *Aspergillus niger*, Trichophyton species, *Cryptococcus neoformans*, *Exophiala dermatitidis*, Bipolaris species and Candida species. Human samples produced a total of 113 isolates. A total of 112 isolates were gotten from animals and 15 1solates in total were gotten from soil samples which gave a total sum of 240 isolates. *Aspergillus fumnigatus* had a 3.459% in human samples, a 6.67% in soil samples and no isolates from the collected animal samples. Mucor species had a 7.08% isolation frequency in human samples, a 17.8% in animal samples and a 53.33% frequency in soil samples. *Aspergillus flavus* had a percentage frequency isolation of 18.58% in human samples and 0.89% in animal samples. Penicillium species had a 36.28% frequency in human samples and 6.67% in soil samples with no isolates from animal samples. Microsporum species had a 0.88% in human samples and 1.97% in animal samples. *Aspergillus niger* had a percentage frequency of 3.549% in human samples, 0.89% in animal samples and 26.67% in soil samples. Trichophyton species had an isolation frequency of 1.77% in humans, 1.79% in animals and 6.67% in soil samples. *Cryptococcus neoformans* was only isolated from human and animal samples with a percentage frequency of 26.55% and 16.07% respectively. *Exophiala dermatitidis* was only found in animal samples with a frequency isolation of 31.25%. Bipolearis species had an isolation frequency of 1.77% and 2.68% in human and animal samples respectively. Candida species had an isolation frequency of 26,79% in animal samples only.

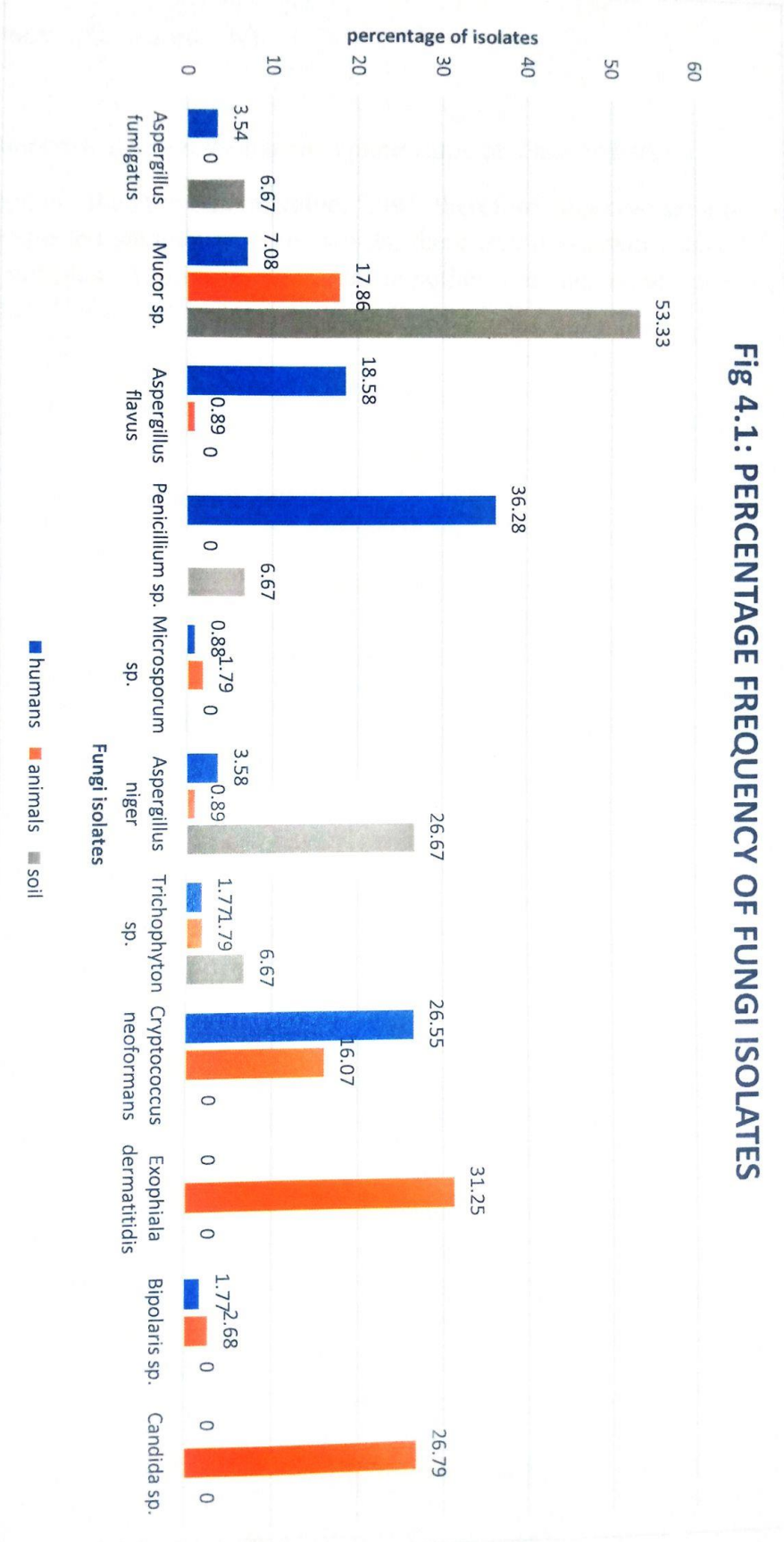

Fig 4.1: PERCENTAGE FREQUENCY OF FUNGI ISOLATES

Discussion

Out of a total of fifty (50) samples collected eleven (11) {22%}had fungi growth and two hundred and forty fungi species were isolated. Out of all isolates, the dermatophytic fungi were *Microsporum sp* (1.25%) and

Trichophyton sp (2,08%). Although many of the isolated fungi species are not classified as dermatophytes, they are still capable of dermatomycosis. This is in agreement with a case study by (Zhang *et al.* 2021) during which a case of primary cutaneous aspergillosis caused by *Aspergillus fumigatus*, and the underlying genetic and immunological mechanisms were discoursed. Primary cutaneous infection in immunocompetent host is highly associated with trauma especially agricultural trauma (Ozer *et al*, 2009); this suggests that non dermatophytic fungi may establish infection due to immunocompromising factors. Usually however, aspergillosis begins as a pulmonary infection and by hematogenous dissemination, invades other organs, including the skin (Zhang *et al*, 2021). In this regard, it would be of no advantage to consider *Aspergillus sp.* as any less dermatophytic. *Aspergilluus sp*. are known to produce very light weight spores that can be easily disseminated in the geosphere, hydrosphere and atmosphere. Therefore, it would be safe to assume that their spores are everywhere including the air we breathe. It becomes imperative that proper first aid should be administered under any form of trauma and closed spaces should be aired regularly to reduce dampness which can promote fungal growth. *Cryptococcus neoformans* (20%) was isolated from both human and animal

samples. Primary or localized dermatotic Cryptococcus is very rear. According to (Noguchi *et al.*, 2019). Only 65 cases were reported during the 50-year study period in Japan from 1968 to August 2018, with the patients divided into two groups: immunocompromised patients (n=44, 68%) and immunocompetent patients (n=21, 32%). *Cryptococcus neoformans* appears on SDA as large mucoid white yeast colonies. A very interesting feature about *C. neoformans* is their retainment of yeast form despite growing at room temperature. *Penicillium sp.* like *Penicillium marneffei* are opportunistic fungi that can cause disseminated mycosis in immunosuppressed and immunocompromised hosts. (Luo *et al*, 2011), in a case study described a 46-year-old Chinese woman who had a 10 years history of SLE, associated with disseminated *Penicillium marneffei* infection, which presented as fever, subcutaneous masses, and fine nodular shadows disseminated over lung fields. *Penicillium marneffei* was observed to secrete a red pigment which easily diffused into the SDA media, creating a red zone around the growth. *Exophiala dermatitidis* was isolated from only animal samples; on SDA. it was observed to have a black smooth surface with smooth edges. *Exophiala dermatitidis* is a dematiaceous fungus that causes Phaeohyphomycotic infections (Teixeira *et al*, 2017). They are made up 31.25% of animal isolates and 14.58%

of total isolates. Candida sp. was isolated from animal samples and make up 12.50% of total fungi isolates. Trichophyton sp. had a frequency of 2.08% which is considered low and indicates a relatively low risk of transmission and infection in adults; this is in line with Mendez-Tovar, (2010), who stated that Tinea barbae infection is rear in this group of people. Although Tinea infections are more frequent in children due to their frequent contact with the soil and certain undeveloped hormone as they play and their reduced production of fatty acids in their skin.

Conclusion

The etiological agents of *Tinea barbae* have a low risk of transmission among male students in Niger Delta university, Wilberforce Island, Amassoma, Bayelsa state.

Recommendation

Good hygiene and sanitary practices are important to limiting likelihood of infection. Some of the factors known to increase risk or cause Tinea barbae include; Topical steroid application, pet or animal contact, diabetes, immunosuppression.

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