
THE PREVALENCE OF *Aspergillusniger* ON THE HANDS OF PRIVATE SCHOOL PUPILS IN OZORO

Okobia U. B and Orogu J.O.

Department of Science Laboratory Technology,
Delta State Polytechnic Ozoro, Delta State, Nigeria

Email- joshuaorogu4@gmail.com

ABSTRACT

Microorganisms live as transient contaminants in fomites or hands where they constitute a major health hazards. Fungi contaminate our body, houses, workplaces and whole environment. This study evaluates the prevalence of *Aspergillusniger* from the hands of private school's pupils in Ozoro. Sterile swap sticks previously soaked in normal saline was used to palpate pupils hand in fifteen (15) different schools. Six (6) fungi species were isolated; *Fusarium spp*, *Aspergillus spp*, *Candida albican*, *Rhizopus spp*, yeast and Penicillum. The total heterotrophic count of the isolates ranges from 1.2×10^5 - 8.4×10^5 . *Aspergillusniger* have 40.90% which is the highest percentage occurrence among all isolated organisms. *Rhizopus sp* and *Fusarium sp*. have 9.09% occurrence which are the least percentage occurrence of isolated organisms. The presence of these organisms can be attributed to the fact these pupils play with objects, soils and animals which may have been contaminated with these organisms already.

INTRODUCTION

Human beings have a marked tendency to pick up microorganisms from environmental objects, and the hand has been shown to play a role in the transmission of microorganisms (Onuoha and Fatokun, 2014). Children are particularly susceptible to dermatophytic infections because of their poor personal hygienic habits and poor environmental sanitation. As human contact among children is more frequent between the ages of 4 and 16 years than in very early childhood, these age group is similarly at greater risk of contracting infectious diseases (Adefemi *et al.*, 2019). The hand serves as a major vehicle of transmission of various microbes, including the enteric species (Prescott *et al.*, 2005). Contamination of hands plays a major role in faecal-oral transmission of diseases (Ray *et al.*, 2011). The unhygienic habits of most of the people lead to the various infections via hands and fingernails. One of the ways of healthy living is hand hygiene (Patel *et al.*, 2010). Faecal contamination of hands is one of the important

route by which children are exposed to pathogenic organisms (Langford, 2009); Wachukwu *et al.*, (2007)

Fungi have worldwide distribution, and at present, there are 40 recognized species in the dermatophyte genera. Of these, about 25 species belonging to the genera Epidermophyton, Microsporum and Trichophyton are presently known to infect man. Dermatophytes are a unique group of fungi that infect keratinous tissues of lower animals and humans. They are characterized by their ability to invade the superficial layers of the epidermis, particularly, the stratum corneum and the high keratin-concentration containing appendages, the hair and nails of the living host (Fernandes *et al.*, 2001). Only under exceptional circumstances do they survive or proliferate in the deeper tissues of the body (Chastain *et al.*, 2001).

Microorganisms have so many beneficial and harmful effects. Some of their beneficial effects include in the cycle of elements, food source for man and other animals (Prescott *et al.*, 2005) and transformation of organic materials to mineral and modification of substances for use by other organisms. On the other hand, their harmful effects are seen in the destruction of plantation, decay of food, and agents of diseases and epidemics (Oniya *et al.*, 2006). This study is centered on the prevalence of fungi from the hands of private schools pupils in Ozoro. And it will be carried out in Ozoro town.

MATERIALS AND METHODS

Study Area

Ozoro is the headquarters of the Isoko North Local Government Area, one of the two administrative units in the Isoko region of Delta State, southern Nigeria. As the administrative center for the local government, it houses the council offices. Ozoro is made up of five communities: Uruto, Erovie, Etevie, Urude, Uruamudhu. The main economic activity is food crop farming accompanied by some hunting. And the staple food crops include cassava and yams. Women form a large proportion of the farming population. They also engage in trade of food crops for cash to meet other basic household needs. Ozoro has several primary, secondary and post-secondary schools. Secondary institutions in Ozoro include Notre Dame College, Saint Joseph Teachers College and Anglican Grammar School (formerly a girls-only school called "Anglican

Girls Grammar School"). Post-secondary institutions include the Delta State Polytechnic, Ozoro.

Sample Collection

Sterile swap sticks previously soaked in normal saline was used to palpate pupils hand in three different schools in Ozoro. Fifteen samples (5 from each school) were collected and brought in sterile polythene bags to the laboratory for analysis.

Materials

The following materials were used for this research:

Incubator, Autoclave, Microscope, Petri dish, Weighing balance, sterile swap stick. Reagents: Sabour and Dextrose Agar (SDA) and Distilled water

Method

All the glass wares used in this study were sterilized. The other materials were sterilized by autoclaving at 121°C for 15mins. Sabour and Dextrose Agar (SDA) which is a common medium to grow fungi was used in this study. SDA was dissolved in distilled water. Then this medium was autoclaved at 121°C for 15mins. After sterilization it was allowed to cool down to about 50°C. About 20ml of the medium was poured into each sterilized petri dish. The SDA medium in petri dish was allowed to solidify. The swap medium was inoculated onto the plates. The plates were incubated in an upright position at 30°C for 5 days. The same procedure was carried out for all the samples.

Identification of Organisms

The fungal count was recorded. The different types of colonies were used as inocula to obtain pure cultures by sub culturing in SDA. A small portion of each sub-cultured colony was cut using a sterile scapula. It was placed on a sterile glass slide using a sterile forceps. The slide was covered with a cover slip and placed in a petri dish. Similar procedure was carried out for other fungal colonies as well. These petri dishes were left at 30°C for 5 days. The cover slips were taken with forceps and placed on slides containing cotton blue. The excess stain was removed and observed under the microscope. The morphology i.e shape, structure of conidia, conidiophores, pigmentation, shape of sporangia, sporangiophores were recorded. The identification was based on the standard keys available.

RESULTS AND DISCUSSION

Results

Table 1 showing results for isolation of fungi from the hands of private school pupils in ozoro

Fungi	Shape	Colour
<i>Aspergillus niger</i>	Long and globose	Black, white/yellow
<i>Rhizopus spp</i>	Smooth-walled, Septate, simple branched	non-white cottony at first or becoming brownish grey to blackish-grey salmon or gray
<i>Fusarium spp</i>	Chains or false heads	
<i>Penicillium spp</i>	septate, wooly with profuse growth	white
<i>Candida albican</i>	non seplate, one cell wall globase ir	creamy, without profuse growth dry

Table 2. Shows, the total heterotrophic count of fungi

Samples	Cfu/ml
A	1.4×10^5
B	2.6×10^5
C	2.4×10^5
D	2.1×10^5
E	1.4×10^5
F	3.1×10^5
G	1.6×10^5
H	5.1×10^5
I	7.8×10^5
J	1.2×10^5
K	4.1×10^5
L	5.9×10^5
M	3.5×10^5
N	8.4×10^5
O	7.1×10^5

Table 3 showing the results for the frequency of occurrence of Fungi Isolates

Isolates	No.	% Occurrence
<i>Fusarium spp</i>	2	9.09
<i>Aspergillus niger</i>	9	40.91
<i>Candida albican</i>	5	22.73
<i>Rhizopus spp</i>	2	9.09
<i>Pencillium spp</i>	4	18.18
Total	22	100

DISCUSSION

Table 1 above shows the results for the isolation of fungi from the hands of private school pupils in ozoro. The isolated fungi are; (*Aspergillus niger*, *Rhizopus spp.*, *Fusarium spp*, *Penicillium spp* and *Candida albican*). Table 2. Shows, the total heterotrophic count of fungi it ranges from 1.2×10^5 - 8.4×10^5 . Table 3 shows the results for the frequency of occurrence of Fungi Isolates. *Aspergillus niger* have 40.90% which is the highest percentage occurrence among all isolated organisms. *Rhizopus spp* and *Fusarium spp*. have 9.09% occurrence which are the least percentage occurrence of isolated organisms. The presence of these pathogenic organisms re-occurring in this study has attributed to the fact that these organisms can cause disease and infection to students these schools. The Presence of other non-dermatophytes particularly *Aspergillus spp* and *Penicillium spp* may be due to the ubiquitous nature of their spores in our environment carried transiently on health skin (Maruthi *et al.*, 2008).

Opportunistic pathogens such as bacteria, viruses and fungi can survive on inanimate surfaces for long periods of time and items such as watches, pens, and mobile phones are permanent surfaces for transmission of these types of infections (Akinyemi *et al.*, 2009; Ryan *et al.*, 2004). According to Cohen and Powdery (2004) and Kathleen (2005) fungi thrive on warm and moist skin and also survive directly on the hair shaft or in their interiors. This may be why the scalp is a major site of infection because it provides a

conducive environment for fungus survival. The occurrence of *Aspergillus niger* could lead to mycotoxin elaboration and when consumed, they induce gastrointestinal and metabolic disturbance (Martin,2008).

CONCLUSION

Results from this study have shown that the students of private primary school pupil's hands in Ozoro carry the following organisms (*Aspergillus spp*, *Rhizopus spp*, *Fusarium spp*, *Penicillium spp* and *Candida albican*) and the presence of these organisms can be attributed to the fact these pupils play with objects, soils and animals which may have been contaminated with these fungi.

RECOMMENDATIONS

It is recommended that proper care of primary school pupils should be taken as a serious business because they can easily contact these organisms and fall sick. Also staff and teachers of these pupils should teach and encourage them to always wash their hands properly after using the toilets and playing with either animals or other objects in the school or at home.

REFERENCES

- Adefemi, S. A, Odeigah, L.O, Alabi, K.M (2019): Prevalence of dermatophytosis among Primary School Children in Oke-oyi Community of Kwara state. *Nigerian Journal of Clinical Practice*. IP: 129.205.113.178
- Boyd F. Robert and Joseph J. Marr (1980) *Medical Microbiology* 2nd Edition. Little Brown and Company Boston 177 -581, 582-590.
- Cohen, J. and Powdery, W. G. I (2004) *Infectious Diseases*. Mosby Edinburgh London New York vol.1 pp.173–179, vol. 2 pp 2341-2353
- Dubey, R. C. and Maheshwari, D. K. (2006) *A Text Book of Microbiology*. Revised Edition , S. Chand and Company Ltd pp. 49-53.
- Fernández-Torres B, Carrillo A, Martín E, Del Palacio A, Moore M, Valverde A, (2001): In vitro activities of 10 antifungal drugs against 508 dermatophyte strains. *Antimicrobial agents and chemotherapy*. 2001;45(9):2524-8.

- Forbes B.A., Sahm F.D., Weissfeld S.A. (2002) Diagnostic Microbiology 11th edition. Mosby International pp 711-788.
- Greenwood, D. Slack, R. C. B. and John Peutherer, J. F. (2005) Medical Microbiology 7th edition. Churchill Livingstone pp 568-588.
- Heritage, J., Evans E.G.V. and Killington R. A (1996). Introductory microbiology 2ND edition Worth publishers 57- 67.
- Idodo-Umeh, (2004). "Idodo-Umeh college biology." *Jadhav, Savita, Rabindranath, M., Nageshawari, G., Mahadev, U., Purbasha, G*, vol. 21,
- Orogu, J. O. Ehiwario N. J. , and Okobia U.B. (2018): Microbiological Assessment of the Pedestrian Hand Rails of Delta State Polytechnic, Ozoro. *Sumerianz Journal of Scientific Research, 2018, Vol. 1, No. 1, pp. 16-21 ISSN(e): 2617-6955, ISSN(p): 2617-765X*
- Joseph, M.T. Rodriquez. and Olga L. j. (2002) Epidemiology of Nail Infection due to keratinophilic Fungi. *Clinical and Experimental Research Group* pp 122.
- Kathleen, P.T. (2005): Foundation in Microbiology. 5th Edition. James m. Smith pp.136-137,143-145, 510, 514
- Kannan,P., Janak,C. and Selvi, G.(2006) Prevalence of dermatophytosis and other Fungal Agents Isolated from Clinical Samples. *Indian Journal of Medical Microbiology, 24:(3) 212-215.*
- Langford RM, 2009. Hand-Washing and its Impact on Child Health in Kathmandu, Nepal. Doctoral Thesis, Durham University
- Mandell, G. L., Bennet, J. E. and Dolin, R. (2000). Principles and Practice of Infectious Diseases 5th Edition vol.2 Churchill living stone pp. 2656-2781
- Michael, J., Pelczar, J. R., Krieg, N. R. and Chan, E. C. S. (1986) Microbiology 5th Edition Little, Brown and Company Boston pp. 182 -174

- Murray, P.R., Rosenthal, K.S. and Pfaller, M.A. (2005) Medical microbiology 5th edition Elsevier mosby pp. 709- 817.
- Oniya M. O., Obajuluwa S. E., Alade E. T. and Oyewole O. A. (2006): Evaluation of Microorganisms Transmissible through Handshake. *African Journal of Biotechnology Vol. 5 (11), pp. 1118-1121*
- Prescott LM, Harley JP, Klein DA (2005). *Microbiology* 6th ed. McGrawhill Company, Inc. NY: p. 960
- Patel H. R., Daniel P. S., Anand I. S. and Patel C. N. (2010). Role of Community Pharmacist in Assessing the Awareness of Hand Hygiene in Rural Area. *Journal of Global Pharma Technology, 2(5): 59-61*
- Ray S. K., Amarchand R., Srikanth J. and Majumdar K. K. (2011). A Study on Prevalence of Bacteria in the Hands of Children and their Perception on Hand Washing in Two Schools of Bangalore and Kolkata. *Indian Journal of Public Health, 55(4):293-297.*
- Sendron D.R. and Araro A, R. (1999)A Text Book of Microbiology 2nd Edition S. Chand and Company ltd pp. 580 – 912.
- Thappa, D.M. (2002). Common Skin Problems. *Indian Journal of Pediatrics, 69:701-706.*
- Uneke C. J., Ngwu B., Egemba O. (2006) Tinea capitis and pityriasis Versicolor Infections among School going Children in South East Nigeria. *Internet Journal of Dermatology* vol. 4 no.2.
- Wachukwu, C. K., S. D. Abbey, A. O. Ollor and Obilor N. L. (2007). Public Health Implication of Artificial Finger Nails Used by Health Workers and Food Handlers in Port Harcourt, Nigeria. *Journal of Applied Sciences, 7:3580-3583.*
- Wright, S. and Robertson ,V, J.(2001) An Institution Survey of tinea capitis in Harare Zimbabwe and Trial miconazole Cream Versus Whitfield Ointment in its Treatment *Britain Journal of Dermatology 11 :371-377.*