

Research Article

ISOLATION AND IDENTIFICATION OF FUNGI FROM BARBING EQUIPMENTS IN SOME SELECTED BARBING SALONS IN EKPOMA, EDO STATE

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Received 02th October 2023; Accepted 11th November 2023; Published online 29th December 2023

Abstract

Fungal infections continues to be a problem all over the world, particularly in the developing countries, where poor living conditions and massive un-enlightenment prevails. Barbingshops/salons which are classified as personal service establishments and such services may pose potential health concerns to their clients including the risk of infection and sometimes injury. The aim of this research work is to isolate and identify fungi from barbing equipments in some selected barbing salon in Ekpoma, Edo State, Nigeria. Twenty-five (25) barbing salons were randomly selected from Ekpoma and environ. Sterile swab sticks were used to swab the barbing equipments (clippers, hair brushes, bench surfaces) from each barbing salon. A total of one hundred samples were collected. After collection, the samples were immediately sent to the laboratory for analysis. Out of the 25 swab samples collected from the barbing clippers, 1 (4.2%) yielded fungal growth while from the hair brushes and working benches, 2 (8.3%) each yielded fungal growth from each group. In the study, 4 fungi species were isolated which include, *Aspergillus fumigatus* 1 (20%), *Penicillium chrysogenum* 2 (40%), *Trichophyton rubrum* 1 (20%) and *Acremonium* spp 1 (20%). It was observed from the study that *Aspergillus fumigatus* was isolated from the barbing clippers, *Penicillium chrysogenum* was isolated from the hair brush while *Trichophyton rubrum* and *Acremonium* spp were isolated from the bench surface of the barbing salon, and the barbing aprons were free of fungal contaminants. From these findings, it is clear that hygienic practices in these barbing salons are far below expected standards. Thus, barbing salons equipments were found to be good medium of transfer of fungal diseases among most users of local barbing salons in Ekpoma and environs in Edo State, Nigeria.

Keywords: Barbingsalon, Equipments, Fungi, Clipper.

INTRODUCTION

Barbing shops which are classified as personal service establishments, may pose potential health concerns to their clients including the risk of infection and sometimes injury (Adeleye & Osidipo, 2014; Barn & Chen, 2021). Information appearing in the literature suggests that barbing tools can be an important source of fungal infection (Uslu, Uyanik, & Ayyildiz, 2018; David, Edward, Zaruwa & Addass, 2020; Enemour *et al.*, 2022). These health risks vary depending on the nature of the service, the tools and equipment that are used, the health status of the clients and service providers as well as the infection control procedures implemented which may be associated with bacterial, viral and fungal infection risks (Stout *et al.*, 2021). Fungal infections continue to be a problem all over the world, particularly in the developing countries, where poor living conditions and massive un-enlightenment prevails (Mackenzie *et al.*, 2016). Although it has no obvious fatal consequences, it can have far-reaching social, economic and psychological impacts on the afflicted individual (Carla, Amanda *et al.*, 2014; Mackenzie *et al.*, 2016). Transmission of fungal infection can be by direct person to person contact, or indirectly by shared formites or instruments (Mackenzie, 2013; Soyinka, 2018). There are several communicable diseases of the scalp that are of concern in barbering and this is because of the re-use of barbing equipments without appropriate disinfection or sterilization (Soyinka, 2018). Despite the possible risk associated with barbering operations, their activity is still under little or no scrutiny as a means of spreading infectious diseases.

Infections that can be spread in Barbingshops premises include skin infections on the scalp, face and neck such as impetigo and fungal infections such as *Tinea capitis* and ring worm (Brown, 2016; Amodio, Benedetto, Gennaro, Maida, & Romano, 2020; Barn & Chen, 2021). There are reports of people who have been infected with head lice from direct hair-to-hair contact with someone who has head lice (Ruddy, Cummins, & Drabu, 2021). Unfortunately, there are no established regulations, guidelines and best practices for many of these salons in our environment. Our goal is to protect the health of the public and one important aspect of minimizing health risks is to understand the infection risks of these salons, hence the aim to isolate and identify fungi from barbing equipments in some selected barbing salon in Ekpoma, Edo State.

MATERIALS AND METHODS

Study Area

This study was carried out in Ekpoma. The administrative headquarter of Esan West Local Government Area of Edo State which lies between latitude 6.45'N to 6.75'N of the Equator and longitude 6.08'E to 6.13'E of the Greenwich Meridian with altitude of about 332m above sea level (Aziegbe, 2016). Ekpoma has a population of 89,628 in 1991 and 127,718 in 2006, majority of which are civil servants, traders, business men/women, transporters, farmers, teachers/lecturers and students by occupation. A university (Ambrose Alli University) is situated in this town.

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Research Design

The research was designed to investigate prevalence of causative organisms of fungal contaminants on barbing equipments in Ekpoma, Edo State, Nigeria in Medical Microbiology Laboratory of the Faculty of Medical Laboratory Science, Ambrose Alli University, Ekpoma. Swab specimens were collected from the barbing equipments in each barbing saloons from different areas in Ekpoma. A total of 100 specimens were collected from barbing clipper, hair brushes, barbing aprons and working benches (tables) from randomly selected barbing salons in Ekpoma and environ.

Collection of Samples

Twenty-five (25) barbing salons were randomly selected from Ekpoma and environ. Sterile swab sticks were used to swab the barbing equipments (clippers, hair brushes, bench surfaces and Barbing apron) from each barbing salon. After collection, the samples were immediately sent to the laboratory for analysis.

Isolation and Identification of Isolates

The specimens were immediately inoculated onto two (2) prepared plates of Saboraud's 4% Dextrose Agar (SDA). Samples were labeled and one of the cultured plates was incubated at room temperature for 3 - 7 days while the other cultured plate incubated in an incubator at 37°C for two (2) days. Growth was observed from the second and seven days respectively. Macroscopically, the colonial morphology of the fungal growth were reported based on colour and pigmentation, rate of growth and texture. Microscopically, those classified as mould were stained with lacto phenol cotton blue and observed under X10 and X40 of the microscope. While those classified as yeast were stained with gram stain and observed under X100 oil immersion of the microscope. The test was considered as negative for dermatophytes when no growth is seen after 4 weeks of incubation (Fisher & Cook, 2018).

Data Analysis

The data generated was analyzed statistically using the mean±SD to ascertain the significance of the study.

RESULTS

Table 1 shows the different barbing equipments examined and bench surfaces. One hundred samples were collected in all with 25 each from the clippers, hair brush, bench surfaces and working aprons. Out of the 25 swab samples collected from the barbing clippers, 1 (4.2%) yielded fungal growth while from the hair brush and Bench surfaces, 2 (8.3%) yielded fungal growth from each group, No fungi was isolated from Barbing Aprons.

Table 2 shows the occurrence of fungal isolates on barbing equipments and working bench surface in Ekpoma. In the study, 4 fungi species were isolated which include, *Aspergillus fumigatus* 1 (20%), *Penicillium chrysogenum* 2 (40%), *Trichophyton rubrum* 1 (20%) and *Acremonium* spp 1 (20%).

Table 3 shows the distribution of the fungal isolates on the barbing equipment's and working benches examined. It was observed from the study that *Aspergillus fumigatus* was isolated from the barbing clippers, *Penicillium chrysogenum* was isolated from the hair brush while *Trichophyton rubrum* and *Acremonium* spp were isolated from the Bench surfaces of the barbing salons.

Table 1. Prevalence of fungi isolates on barbing equipments examined in the research

Barbing Equipments	Numbers of samples examined	Cultured that yielded fungal growth (%)	Cultured that yielded no fungal growth(%)
Clippers	25	1 (4.2%)	23 (95.8%)
Brushes	25	2 (8.3%)	22 (91.7%)
Bench Surfaces	25	2 (8.3%)	22 (91.7%)
Barbing Aprons	25	0 (0.0%)	25 (100.0%)
Total	100	5 (6.9%)	92 (93.1%)

Table 2. Occurrence of fungal isolates on barbing equipments in Ekpoma Examined

Fungal Isolates	Incidence (%)
<i>Aspergillus fumigatus</i>	1(20)
<i>Penicillium chrysogenum</i>	2(40)
<i>Trichophyton rubrum</i>	1(20)
<i>Acremonium</i> spp	1(20)
Total	5(100)

Table 3. Distribution of the fungal isolates on the barbing equipment's examined

Equipment	Organisms Isolated
Clippers	<i>Aspergillus fumigatus</i>
Brush	<i>Penicillium chrysogenum</i>
Bench Surfaces	<i>Trichophyton rubrum</i> <i>Acremonium</i> spp
Barbing Aprons	Nil

Table 4. Cultural Characteristics (Macroscopic and Microscopic) of the Fungi Isolates

Organism	Macroscopy	Microscopy
<i>Aspergillus fumigatus</i>	Blue-green pigmentation with a fluffy surface with demarcation	Branched hyphae with conidia
<i>Trichophyton rubrum</i>	Slightly raised, white cotton-like texture, with red pigmentation.	Presence of numerous micro conidia, septate hyphae.
<i>Acremonium</i> spp	Cotton like texture with pink colour.	Possess hyaline, septate hyphae which are typically very fine.
<i>Penicillium chrysogenum</i>	Filamentous and cotton like texture with grey colour.	It shows typical filamentous hyphae with conidia, the hyphae are colourless, slender, branched and septate hyphae.

DISCUSSION

In this study, out of the 100 samples cultured at room temperature and at 37°C, 1 (4.2%) of the clippers yielded fungal growth while from the hair brush and Bench surface, 2 (8.3%) yielded fungal growth, while no growth was observed from the barbing apron. This result is in disagreement with the study of David *et al.* (2020) who reported all barbing equipments as (69.44 %), and among clippers (59.11%) in Mubi, Adamawa State-Nigeria. In Nigeria, most common fungal infections/diseases were found to be prevalent among people serviced by local barbers (Soyinka, 2018). Four (4) fungi species were isolated with *Aspergillus fumigatus* 1(20%), *Penicillium chrysogenum* 2 (40%), *Trichophyton rubrum* 1 (20%) and *Acremonium* spp 1 (20%). This result is in agreement with the study of Omoruyi and Idemudia (2021) with *Trichophyton* spp in Benin City, Edo State, Nigeria and also in agreement with the study of Ekong, Uwah & Grant, (2010) and David *et al.* (2020) with *Aspergillus* spp. The difference in incidence rate could be as a result of endogenous infection or mere commensals among local population (Soyinka, 2018). The practice of good hygiene also must have helped in preventing most superficial cutaneous infections (Viani *et al.*, 2018). Studies have examined the presence of potential pathogens as well as infection control practices of personal service establishments such as salons so as to better understand and characterized potential hazards in salons. For instance, Sekula, Havel & Otilar, (2012) performed an environmental survey of four salons providing personal services in which swab samples collected from randomly selected instruments at each salon were analyzed for the presence of bacteria and fungi and their results showed that all instruments from three of the four salons were contaminated with bacteria and fungi. Due to the presence of these potential pathogens, the authors concluded that current disinfection techniques used at each salon were inadequate in preventing health risks among clients. It has been observed that sterilization techniques differ between service providers with 38% reporting the use of ultraviolet (UV) light, 18% using glass beads and 1% using ultrasonic cleaners, all of which are not approved methods of sterilization in many jurisdictions (Rideout, 2020). Isolation of the organisms from the equipment and items used in these salons indicate that the sterilization methods employed by the operators are not effective if at all they sterilize the items between clients. *Trichophyton rubrum* isolated from one of the samples indicates that ringworm or dermatophytosis can also be spread via these salons. From these findings, it is clear that hygienic practices in these barbing salons are far below expected standards. This could imply that operators or workers in these salons are almost ignorant or less informed of the risks involved in their work. This situation calls for the agencies in public health sector to awake to their responsibilities in sensitizing and organizing lectures, training workshops and seminars for the operators and workers of hairdressing and beauty salons in our different communities. If the people are informed of the dangers or hazards associated with their profession they would help in improving on their practices and by so doing reduce the spread of these infections.

Conclusion

This study has revealed that fungi could be isolated among barbing salon equipments and working benches (Dermatophytes; *Trichophyton rubrum* 1 (20%) and

Acremonium spp, and non-dermatophytes; *Aspergillus fumigatus* and *Penicillium chrysogenum*). *Penicillium chrysogenum* had the highest incidence among fungi isolated in the study. The hair brush and working benches had the highest fungal isolates. Thus, barbing salon equipments were found to be good carriers of fungal diseases in barbing salons in Ekpoma and environs in Edo State, Nigeria.

Based on the outcome of this study, the following recommendations are suggested:

- There should be specific infection control practices and implementation of the appropriate measures to prevent the spread via salons since unsafe and unhygienic practices may affect the health of the people.
- All equipments must be cleaned before disinfection and sterilization, to remove organic matter and other residues, which may cause a layer of buildup that may prevents disinfection and sterilization.
- Salon operators should be educated about occupational risks and should understand the need to use universal precautions with all clients, at all times, regardless of infectious status. Regular in-service training should be provided for all personnel in the beauty industry. In addition, pre-service training for all salon operators should address universal precautions.
- Adequate supplies of combs, towels, and removable clippers, should be made available to comply with basic infection control standards, even in resource-constrained settings.
- If a salon operator observes the presence of an infectious skin disease on a customer the barber/hairdresser shall disinfect all appliances which they have used, and cleanse his or her hands by scrubbing them with a nail brush and soap or antibacterial cleansing agent.

Conflict of interest: The authors declare no conflicts of interest. The authors alone are responsible for the content and the writing of the paper.

Funding: This research did not receive any grant from funding agencies in the public, commercial, or not-for-profit sectors.

Acknowledgements: The authors would like to thank all the Laboratory staff of the Department of Medical Microbiology, Faculty of Medical Laboratory Science, Ambrose Alli University, Ekpoma and the research and technical staff of St Kenny Research Consult, Ekpoma, Edo State for their excellent assistance and for providing medical writing support/editorial support in accordance with Good Publication Practice (GPP3) guidelines.

REFERENCES

- Adeleye, I.A. & Osidip, O.O. (2014). Isolation and characterization of microorganism from instruments used by pedicurists operating within Lagos Metropolis, Nigeria. *West Indian Medical Journal*, 53, 413-415.
- Amodio, E., Benedetto, M.A., Gennaro, L., Maida, C.M. & Romano, N. (2020). Knowledge, attitudes and risk of HIV, HBV and HCV infections in hairdressings of Palermo City (South Italy). *European Journal of Public Health*, 20, 433-437.
- Araoye, M.O. (2004). *Research Methodology with Statistics for Health and Social Sciences* (1st edition, 25-120). Nathadex Publishers, Ilorin.

- Aziegbe, F. I. (2016). Sediment sources, redistribution and management in Ekpoma, Nigeria., *Journal of Human Ecology*, 20(4),259-268.
- Barn, P. & Chen, T. (2021). Infections associated with personal service establishments: aesthetics. National Collaborating Centre for Environment Health. *Journal of Human Ecology*,7, 1-10.
- Brown, N. J. (2016). Guideline for public health standards of practice for hairdressing (2nd ed., pp. 1-4). Elsevier, Australia.
- Carla, A.A.P., Amanda, M.L., Francisca, Regina, O.C., Natasha, F.S., Priscila, O. & Alena, M.D.M. (2014). Clinical, epidemiological, and therapeutic profile of dermatophytosis. *Annual Bulletin of Dermatology*, 89(2), 259-264.
- David, D.L., Edward, A., Zaruwa, M.Z. & Addass, P. A. (2020). Barbing saloon associated fungal disease infection in Mubi, Adamawa State-Nigeria. *World Journal of Medical Sciences*, 5(1), 17-21.
- Ekong, E., Uwah, A. & Grant, I. (2010). Prevalence and types of opportunistic fungal infections in HIV/AIDS patients in Nigeria. *International Drug Therapy on HIV*, 14(4), 22-26.
- Enemour, S.C., Atabo, A.R. & Oguntibeju, O.O. (2012). Evaluation of microbiological hazards in barbers' shop in a University setting. *Scientific Research Association*, 7(9), 1100-1102.
- Mackenzie, D.W. R. (2013). Hairbrush diagnoses in detection and eradication of non-fluorescent scalp ringworm. *British Medical Journal*, 2, 3-11.
- Mackenzie, D.W.R., Loeffler, W., Mantovani, A. & Fujikura, T. (2016). *Guidelines for the Diagnosis, Prevention and Control of Dermatophytosis in Man and Animals* (pp. 84-86). Worldhealth Organization, Geneva, Switzerland. WHO/CDS/VPH.
- Rideout, K. (2020). Comparison of guidelines and regulatory frameworks for personal services establishments. Vancouver, BC: National collaborating centre for environment health Retrieved from www.nceeh.ca.
- Ruddy, M., Cummins, M. & Drabu, Y. (2021). Hospital hairdresser as a potential source of cross-infection with MRSA. *Journal of Hospital Infections*, 49, 225-227.
- Sekula, S.A., Havel, J. & Otilar, L. J. (2012). Nail salons can be risky business. *Archives of Dermatology*, 138, 414-415.
- Soyinka, F. (2018). Epidemiologic study of dermatophytes infection in Nigeria (clinical survey and laboratory investigation). *Mycopathologia*, 63, 99-103.
- Stout, J.E., Gadkowski, L.B., Rath, S., Alspaugh, J.A., Miller, M.B. & Cox, G.M. (2021). Pedicure-associated rapidly growing mycobacterial infections: an academic disease. *Clinical Infectious Diseases*, 53, 787-792.
- Uslu, H., Uyanik, M. & Ayyildiz, A. (2018). Mycological examination of the barbers' tools about sources of fungal infections. *Mycoses*, 51, 447-450.
- Viani, C., Bouchara, J. & Mignon, B. (2018). Updates on the epidemiology of dermatophyte infections. *Mycopathologia*, 166, 335-352.
