

## Original Research Article

### **BARBING EQUIPMENTS: TOOLS FOR TRANSMISSION OF TINEA CAPITIS**

#### **Abstracts**

This efficacy of sterilization and cleaning methods used in the barbing salons and the possibility of those equipments acting as vehicles of transmission of fungal pathogens from one customer to another was assessed in this study. Thirty barbing saloons were randomly selected from the five wards in Calabar South. Ninety samples were aseptically collected using sterile swab sticks to brush out debris from combs, hair brushes and sterilized clippers into sterile paper envelopes. Samples were subjected to microscopy, culture and physiological tests. The recovery rate of fungal organisms from barbing equipments was 52(34.7%). Dermatophytes recovery rates was 40(26.7%) and non dermatophytes recovery rates was 12(8.0%). There was a statistically significant relationship between dermatophytes and barbing equipments recovered from ( $\chi^2 = 25.0$ ,  $p = 0.01$ ). *Trichophyton mentagrophytes* 12(30.0%) was the most common dermatophyte recovered from barbing equipments, followed by *Trichophyton rubrum* 9(22.5%). *Malazessia* species 5(41.6%) was the most common non dermatophytes recovered followed by *Aspergillus flavus* 3(25.0%). Hair brushes were the most contaminated equipments (60.0%) by dermatophytes while the least contaminated were the hair clippers 17.5%. Dermatophytes and non dermatophytes were recovered from barbing equipments which depicts that they could serve as vehicles for transmission of fungal infections. Although the clippers were sterilized by all Barbers, dermatophytes and few non dermatophytes were still recovered from them. This point to incomplete sterilization either by disinfectant inefficacy or methods inefficiency.

**Key words:** Barbing equipments; Tine capitis, sterilization; transmission

#### **Introduction**

Barbers are important professionals in the community. Barber's shops are owned and managed by individuals in the community. Barbers use instruments such as knives, blades, clippers, brushes and combs which may serve as vehicles for transmission of fungal infections [1-2].

From 2002 till date, there has been an increase in the establishment of barbing industry, the majority of which is controlled by people with little or no training and knowledge on infection **controlled practices**. The barbing industry is known for its **control practice**

38 aesthetics but research however shows the possibility of it making its customers  
39 return home with one infection or the other [3].

40 Tinea capitis, an infection of the scalp and hair caused by *Trichophyton*,  
41 *Microsporum* and *Epidermophyton* species of dermatophytes [4], is characterized by  
42 invasion of dermatophytes into hair follicles and keratinized layer of hairy skin  
43 leading to hair loss, scaling, kerion, folliculitis, favus, black dot and grey patch  
44 lesions [4]. The infection originates from diverse sources (human, animals and soil)  
45 [5], with high prevalence in prepubertal, school age children between 6 to 10 years.  
46 Nevertheless, this infection occurs across age and sex groups with high occurrence  
47 being reported among males [5-6].

48 Although **Tinea** *Tinea capitis*, like other dermatophytosis, is of public health  
49 importance, it is not a notifiable disease and as a result, little is known on its  
50 prevalence in many endemic areas [7-8]. Investigations carried out on the  
51 prevalence of tinea capitis infection among primary school children in a rural setting  
52 in Central Nigeria revealed a prevalence rate of 15.4% [9].

53 Tinea capitis can be transmitted via infected persons, fallen infected hairs,  
54 and select animal vectors. Spread of tinea capitis by fomites (contaminated  
55 barbershop instruments, hairbrushes, combs and shared hats) is common [10].  
56 Factors affecting disease transmission are personal hygiene overcrowding and low  
57 socioeconomic status. Even after shedding, hairs may harbour infectious agents for  
58 more than one year. Asymptomatic carriers are common, making tinea capitis  
59 difficult to eradicate [11]. Despite the possible risk associated with barbering  
60 operations, their activity is still under little or no scrutiny as a means of spreading  
61 infectious diseases [10].

62 Barbers use equipments which are always contaminated after some customer  
63 usage. Their sterilization methods include disinfecting and flaming. Some of the

64 materials used are never sterilized, while some are sterilized but the sterilization  
65 efficacy is questionable since customers still get infected after saloon visits. This  
66 study was designed to assess the possibility of transmission of tinea infections from  
67 otherwise sterilized barbing equipments in Calabar, Nigeria.

68

## 69 **Materials and methods**

70 The study area for this research was Calabar South Local Government Area  
71 of Cross River State. It has an area of 264km<sup>2</sup> and the population of 191,630 with  
72 the headquarters at Anantigha. Thirty barbing saloons were randomly selected from  
73 the five wards in Calabar South. Ethical approval was not sought since samples  
74 were obtained from inanimate objects. One hundred and fifty samples were  
75 aseptically collected using sterile swab sticks to brush out debris from combs, hair  
76 brushes and sterilized clippers into sterile paper envelopes. Samples were  
77 transported to the Department of Medical Microbiology/Parasitology, University of  
78 Calabar Teaching Hospital, Calabar for analysis.

79 Samples were subjected to microscopy using 10% KOH. The samples were  
80 cultured on dermatophyte test medium (DTM) with actidione (LabM Limited,  
81 Lancashire, UK) and Sabouraud dextrose agar with chloramphenicol [12]. Plates  
82 were incubated at room temperature and at 37°C, and examined for growth up to 2  
83 weeks.

84 Pure culture of the isolates were obtained by sub culturing individual isolates  
85 onto fresh Sabouraud dextrose agar (SDA) at room temperature (26°C-29°C) for up  
86 to 10-14 days. In cases of no or slow sporulation, slide culture was carried out [12].  
87 Isolates were identified by **colony** colonial morphology, microscopy and physiological tests.  
88 The physiological tests used in the identification of the isolates include: in vitro hair  
89 perforation test and urease test [1].

Isolates were identified based on <sup>colony</sup> ~~colonial~~ morphology: (color, pigmentation, rate of growth and texture), microscopy and physiological tests. The Physiological tests carried out include: urease test, catalase test, hair penetration test, growth on rice grains, tween assimilation and lipid test [14-17].

#### 94 **Data analysis**

The data obtained in this study were analyzed with Epi-Info CDC, 2012 and Microsoft excel data analysis packages. Descriptive statistics were carried out. Frequencies were calculated for categorical variables. Interactions between specific categorical variables were tested for significance using the  $\chi^2$  test. A p-value of 0.05 was considered statistically significant.

#### 100 **Results**

Out of the 150 samples collected from hair barbing equipments 52(34.7%) were infected with fungal organisms. Table 1 shows the distribution of fungal isolates <sup>from</sup> ~~by~~ barbing equipments. Hair brushes were the most contaminated barbing items 27(51.9%) followed by combs 15(28.8%). Only 10(19.2%) isolates were recovered from hair clippers.

Dermatophytes recovery rates was 40(26.7%). The most common dermatophyte was *Trichophyton* <sup>interdigitale</sup> ~~mentagrophytes~~ 11(28.9), followed by and *Trichophyton rubrum* 8(21.1%) and *T. tonsurans* 6(15.7%). *Trichophyton soudanense* 3(7.5%) was the least recovered isolate. Hair brushes were the most contaminated equipments 24(60.0%) by dermatophytes and the least contaminated were the hair clippers 7(17.5%). There was a statistically significant relationship between the barbing equipments and dermatophytes recovery rates ( $\chi^2 = 25.0$ , p =0.01) (Table 2).

Non dermatophytes recovery <sup>rate</sup> ~~rates~~ was 12(8.0%). The most common non-dermatophyte recovered from barbing equipments was *Malassezia* species 5(41.6%)

116 followed by *Aspergillus flavus* 3(25.0%). Combs were the the most contaminated  
 117 barbing items 6(50.0%). There was no statistically significant relationship between  
 118 non-dermatophytes recovery rate and **barbing** equipments ( $\chi^2 = 11.0$ ,  $p = 0.16$ )  
 119 (Table 3).

120 **Table 1 Distribution of fungal isolates in barbing equipments**

121

| Equipments | No. examined | No. (%) infected |                                |
|------------|--------------|------------------|--------------------------------|
| Clippers   | 50           | 10 (19.2)        | 20%                            |
| Brushes    | 50           | 27 (51.9)        | 54%                            |
| Combs      | 50           | 15 (28.8)        | 30%                            |
| Total      | 150          | 52 (34.7)        | please re-calculate percentage |

122

123 Table 2 Distribution of dermatophytes on barbing equipments

124

| Dermatophytes isolates             | Barbing equipments (n=150) |         |         |          |
|------------------------------------|----------------------------|---------|---------|----------|
|                                    | No (%) of isolates         |         |         |          |
|                                    | Clippers                   | Brushes | Combs   | Total    |
| <i>Microsporum audouinii</i>       | 0(0.0)                     | 4(80.0) | 1(20.0) | 5(12.5)  |
| <i>Microsporum gypseum</i>         | 0(0.0)                     | 4(80.0) | 1(20.0) | 5(12.5)  |
| <b>Trichophyton interdigitale</b>  |                            |         |         |          |
| <i>Trichophyton mentagrophytes</i> | 2(16.7)                    | 7(58.3) | 3(25.0) | 12(30.0) |

|                                |         |          |         |          |
|--------------------------------|---------|----------|---------|----------|
| <i>Trichophyton rubrum</i>     | 2(22.2) | 5(55.6)  | 2(22.2) | 9(22.5)  |
| <i>Trichophyton soudanense</i> | 0(0.0)  | 1(33.3)  | 2(66.7) | 3(7.5)   |
| <i>Trichophyton tonsurans</i>  | 3(50.0) | 3(50.0)  | 0(0.0)  | 6(15.0)  |
| <b>TOTAL</b>                   | 7(17.5) | 24(60.0) | 9(22.5) | 40(26.7) |

Please recalculate

Table 3 Distribution of non-dermatophyte isolates on barbing equipments

| Non-dermatophyte isolates    | Clippers | Brush   | Combs   | Total   |
|------------------------------|----------|---------|---------|---------|
| <i>Aspergillus flavus</i>    | 0(0.0)   | 2(66.7) | 1(33.3) | 3(25.0) |
| <i>Aspergillus fumigatus</i> | 2(100)   | 0(0.0)  | 0(0.0)  | 2(16.7) |
| <i>Aspergillus niger</i>     | 0(0.0)   | 0(0.0)  | 2(100)  | 2(16.7) |
| <i>Malassezia species</i>    | 1(20.0)  | 1(20.0) | 3(60.0) | 5(41.6) |
| <b>TOTAL</b>                 | 3(25.0)  | 3(25.0) | 6(50.0) | 12(8.0) |

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## Discussion and conclusion

This present study assessed the efficacy of the sterilization and cleaning methods used in the barbing salons and the possibility of those equipments acting as vehicles of transmission of fungal pathogens from one customer to the other.

The barbers in the salons recruited for the study were of wide range of barbing experience with mean years of practice  $6.4 \pm 3.5$  yrs. They could reasonably

135 be reflective of overall attitude of the barbers in the locality. Barbers in this part of the  
136 world are barely educated and often primary or secondary school leavers. Becoming  
137 a barber usually requires a few months of apprenticeship; the actual length of time  
138 varies, and is often dependent on the agreement between the apprentice and his  
139 master; no form of certification or license is involved. We found out that majority of  
140 the barbers were aware that their clippers could transmit ringworm infection, but  
141 were ignorant about other items doing same.

142 In this study, all the barbers decontaminated their clippers with the application  
143 of methylated spirit followed by flaming. Other barbing equipments were rarely  
144 decontaminated while some barbers washed the combs and brushed with detergents  
145 and hypochlorites once or twice a month.

146 The recovery rate of fungal pathogens may depict the infectivity rate in the  
147 locality or the inefficiency of the sterilization processes in the barbing salons. In this  
148 study *T. interdigitale* 12(30.0%) was the most common dermatophyte  
149 recovered from barbing equipments, followed by *Trichophyton rubrum* 9(22.5%).  
150 This is in agreement with the study of Oyeka and Eze [18], Ayanbimpe *et al* [9] and  
151 Mbata and Nwajagu [14] who reported *Trichophyton mentagrophytes* and  
152 *Trichophyton rubrum* as the most predominant species causing tinea capitis in the  
153 South Eastern and North Central zones of Nigeria. However, our findings differ from  
154 the study of Oke *et al* [19] who reported *Microsporum audouinii* (28.0%) as the  
155 commonest dermatophyte species among their subjects South western Nigeria.  
156 These differences may be due to variation in distribution of dermatophytes species in  
157 different geographical areas in the country.

158 In this study hair brushes were the most contaminated equipments 51.9% by  
159 fungal organisms while the least contaminated were the hair clippers 19.2%. This  
160 shows that the sterilization method of the clippers by the application of methylated  
161 spirit followed by flaming is more effective than washing with detergents and  
162 hypochlorite which is applicable to the brushes and combs.

163 The 17.5% recovery rates of dermatophytes from clippers depict incomplete  
164 sterilization leading to mere reduction in microbial load. The location with the highest  
165 recovery rate was Malabor, University of Calabar male hostel. This may be due to  
166 high patronage caused by high population of students which leaves the barbers with  
167 little or no time for sterilization of equipments.

168 The presence of nondermatophyte molds on the scalp is becoming  
169 increasingly common. Adefemi *et al* [20] and Chepchirchir *et al* [21] attributed this to  
170 the ubiquitous nature of their spores in our environment which enables them to be  
171 carried transiently on healthy skin. The non-dermatophyte moulds identified in the  
172 study were *Aspergillus flavus* 25.0%, *Aspergillus fumigatus* 16.7% and *Aspergillus*  
173 *niger* 16.7%. Oke *et al* [19] in their study among children in South Western Nigeria  
174 also isolated lower rates of *Aspergillus fumigatus* (8.4%), and *Aspergillus niger*  
175 (6.4%). This suggests the possibility of transmission of these moulds from improperly  
176 sterilized barbing equipment from one customer to the other.

## 177 **Conclusion**

178 Dermatophytes and non dermatophytes were recovered from barbing  
179 equipments which depicts that they could serve as vehicles for transmission of  
180 fungal infections. Although the clippers were sterilized by all Barbers, dermatophytes  
181 and few non dermatophytes were still recovered from them. This point to incomplete

sterilization. Customers that cannot afford hair clippers should insist on longer sterilization exposure time while combs and brushes should be personalized.

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