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Mobile phone and its associated contamination that predispose bacterial infection in Southwest Nigeria

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Abstract

Background: Mobile phone are portable handset telecommunication device that is available for the use of young, adult and old individuals as means of communication. Attention is often attributed to hospital care givers as major infected subjects but not generally so because great number of people are involved outside teaching hospital /clinical settings. This form the basis of the study to know the extent amongst the university community.

Method: A cross sectional study was conducted from April 2019 to June 2019 on 140 subjects of student and staff of the Federal university of Technology Akure aged 15 to 50 years. Data were collected using a self-administered questionnaire. Swab sample of each individual subject of student and staff of the university were taken and transported to the laboratory. These were processed, identified, following the standard microbiology techniques.

Result: Indication revealed that the mobile phone of the subjects were contaminated with bacterial pathogen which are *Staphylococcus epidermidis, Staphylococcus aureus, Streptococcus species and Pseudomonas aeruginosa.* The percentage of overall contamination is 65 (46.4%).

Conclusion: It is established from the analysis conducted that the mobile phone of students and staff of the university was contaminated with bacterial infection therefore, steps should be taken to minimize the rate of the infection simply by hand washing and being conscious of clean and hygienic environment.

Keywords: Mobile phone; Students; Staff; University

1. Introduction

A mobile phone is a long range personal telecommunication device, easy to handle and affordable to everybody (1). It is the most indispensable accessory of professional and social life throughout the world. (2) During every phone call the mobile phone come into close contact with strongly contaminated human body areas with hands to hands to other areas like mouth, nose and ear (3). This may be because types of bacteria increase in optimum temperature and mobile phones are perfect for breeding these microorganism as they are kept warm and easy to handle in pockets, handbags and brief cases. As mobile phones cut as perfect habitat for microbes to breed, especially in high temperature and humid conditions (4). A study in the United State of America (USA) revealed more than 80% of the common bacteria that make up our bacterial finger prints end up on mobile phone screens (5).

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Mobile phones are used routinely all day long and the same phone are used both inside and outside the hospital playing a possible role in spreading infections to the outside community (6). Routine cleaning of mobile phones with alcohol disinfectant wipes (2) or antimicrobial additive materials may be effective in reducing the risk of cross contamination (7) ln the future mobile phones could be produced with protective materials against bacterial contamination (8). Microbial contamination of the mobile phones and their increased use among health care workers pose a significant epidemiologic risk to the public. Simple measures such as proper hand hygiene and regular decontamination of the mobile phones with alcohol wipes may reduce the risk of hospital acquired infection caused by these devices (9).

2. Material and methods

A cross sectional study was conducted April 2019 to June 2019. 140 mobile phones of student and staff of the university aged 15 to 50 years. 68 (48.6%) were male while 72 (51.4%) were female.

The laboratory personnel involved in sampling put on alcohol based sanitizer and disposable glove prior to collection of swabs to prevent cross contamination. The swab was mixed gently with 10mls of sterile distilled water (10).The number of bacteria suspected present in each sample is enumerated with standard plate count (11).After that, 1ml of each diluted sample was poured in a sterile petri dish then 20 ml of sterile nutrient agar was added mixed and allow to solidify in room temperature. The plates incubated aerobically at 37 0C for 18-24 hours. The bacterial colonies were identified macroscopically and microscopically. The second step each swab mixed with 10mls of Brain Heart infusion broth to enhance the bacterial growth before culturing on other enriched, selective and differential culture media. Blood agar, MacConkey agar, Nutrient agar and Mannitol salt agar were incubated with brain heart infusion .All the plates were incubated for 18 -24hours. The identification of isolated bacteria was done by examined the morphology of colonies, gram stained, coagulase, catalase and other biochemical tests to identify the particular bacteria (12).

3. Results and discussion

140 swabs were taken from the mobile phones of participants.65 (46.4%) had bacterial pathogens while 75 (53.6%) had no bacterial infection found in the mobile phones. The isolates are*: Staphylococcus epidermidis* 30 (21.4%) *Streptococcus* species 18(12.8%) *Staphylococcus aureus* 10 (7.1%) and *Pseudomonas aeruginosa* 7(5%) respectively.

Table 1 Socio demographic characteristic of the subjects

Socio demographic characteristic	Number (%)
Age (years)	
15-20	27 (19.3)
21-25	36 (25.7)
26-30	19 (13.6)
31-35	15 (10.7)
36-40	13 (9.3)
41-45	20 (14.3)
46-50	10 (7.1)
Gender	
Male	68 (48.6)
Female	72 (51.4)
Number of Students	97 (69.3)
Number of Staffs	43 (30.7)

The prevalence rate of mobile phone contamination due to bacterial infection is 46.4% in this study. Table 1 showed the socio- demographic characteristics of the subjects. This study was not in agreement with many researchers (7) showed 89.4 %, (8) was 94.5% (3) 96.5%, and (13) 94.2%. Also a study in United State of America (USA) revealed more

than 80% of common bacteria that make up our bacteria fingerprint end up in mobile phones (5). The rate of contamination and bacterial infection encountered by the researchers were high based on the fact that it happened in the hospital environment, unlike the situation in the university which is less prone to infection. Table 3 illustrated the isolates isolated from the study. The most frequent isolated bacteria was Staphylococcus epidermidis which was 30 (21.4%).The bacteria is a normal flora of the skin though it has become increasingly recognized as the most common cause of nosocomial bacteremia associated with indwelling devices (15).Staphylococcus epidermidis in a similar report from Egypt accounted for 33% (16).The second isolated bacteria was Streptococcus species 18(12.8%) while Staphylococcus aureus followed with 10 (7.1%).This report of Staphylococcus aureus was not in consonance with similar study conducted in lndia which was 18% (17).The least isolate and the only gram negative bacilli was Pseudomonas aeruginosa 7 (5%) isolated. Some other bacterial such as Escherichia coli, Klebsiella species and Micrococcus reported by other studies from lndia (18) and Belgium (15) were not isolated in this study. There are factors associated with contamination of mobile phones.Table 4 attested to it, where the male subjects 41 (63%) were more contaminated than the female 24 (37%). This concur with study conducted in lndia (19)and lran (20) This was in contrast to the finding of (21) which reported no sex association. The difference might be due to female habits of keeping their mobile phones in the handbag and using phone less frequently in the lecture class or putting their phone on silence while lecture is going on.

Table 2 The age bracket and gender

Ages	Number of samples	Percentage	Male	Female
15 -20	27	19.3	13	14
21 -25	36	25.7	17	19
26 -30	19	13.6	10	9
31 -35	15	10.7	8	7
36 -40	13	9.3	6	7
41 -45	20	14.3	8	12
46-50	10	7.1	6	4
Total	140	100	68	72

Table 3 Bacterial isolated from mobile phones

Isolated pathogens	Mobile phones involved	Percentage
Staphylococcus epidermidis	30	21.4
Streptococcus species	18	12.9
Staphylococcus aureus	10	7.1
Pseudomonas aeruginosa	7	5.0
Total	65	46.4

Table 4 Number of bacteria isolated from the gender mobile phones

lsolates	Male	Female
Staphylococcus epidermidis	20	10
Streptococcus species	11	7
Staphylococcus aureus	5	5
Pseudomonas aeruginosa	3	2
Total	41(63%)	24(37%)

4. Conclusion

It is evidence from the study that mobile phones are harbinger of contamination for bacterial infection as revealed by the bacteria isolated from the students and staffs of the university. Although the rate was not as high when compared to report from the health care providers. Nevertheless, the need for education campaign to raise awareness about it role as vehicle for transmission of microbes and the need for hand washing after lecture class or the close of work by staff will curtail it prevalence.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare no conflict of interest.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

Authors Declaration

The authors hereby declare that the work presented in this manuscript is original and that any liability for claims relating to the consent of this manuscript will be borne by them.

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