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Isolation and Identification of Bacterial Pathogens from Mobile Phones of Volunteered Technologists in Rufus Giwa Polytechnic, Owo, Ondo State.

Ibrahim TA[1]*, Akenroye OM[1], Opawale BO[2], and Osabiya OJ[2].

[1]Department of Food Science and Technology, Rufus Giwa Polytechnic, P.M.B 1019, Owo, Ondo State. Nigeria.
[2]Department of Science Lab. Technology, Rufus Giwa Polytechnic, P.M.B 1019, Owo, Ondo State. Nigeria.

Research Article

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*For Correspondence

Department of Food Science and Technology, Rufus Giwa Polytechnic, P.M.B 1019, Owo, Ondo State. Nigeria.
Phone: +2348035774200

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ABSTRACT

The bacterial density of mobile phones of volunteered technologies in the Food Science Department of Rufus Giwa Polytechnic, Owo was examined using standard bacteriological methods. A total of 174 colonies belonging to 10 genera were isolated from the mobile phones. The isolated genera were *Staphylococcus sp(12(24.14), Klebsiella sp(23(13.22%), Enterococcus sp (08(4.59%). Bacillus sp(14(8.05%), Acinetobacter sp(13(7.47%), Corynebacterium sp(10(5.75%), Pseudomonas sp(24(13.79%), Proteus sp (13(7.47%), Serratia sp(10(5.75%) and E.coli (17(9.75%)* when their morphological, gram staining and biochemical characteristics were compared with known taxa. This study showed that all mobile phones under consideration were infected by several microbes, most of which belong to the natural flora of the human body. This means that it is necessary to sterilize hands after contact with phones since it is a source of disease transmission.

INTRODUCTION

Hands play a major role in the transmission of infection in healthcare institutions in industrial settings such as food industries and also in all community and domestic setting [1] . Hands and instrument used by workers serve as vectors for the transmission of micro-organisms [2] . A mobile or cellular telephone is a long-range, portable electronic device for personal telecommunication. The vast majority of mobile phones are hand-held. In less than 20 years, mobile phones have gone from being rare and expensive pieces of equipment used primarily by the business elite, to a common low-cost personal item. In many countries, mobile phones outnumber landline telephones since most adults and many children now own mobile phones. At present, Asia has the fastest growth rate of cellular phone subscribers in the world. The use of mobile phones by teachers and lectures may serve as a potential vehicle for the spread of pathogenic microorganisms [3]. Because of the achievements and benefits of the mobile phones, it is easy to overlook its hazard to health; this is against the background that many users may have to regard for personal hygiene, and the number of people who may use the same phone. This constant handling of the phone by different users exposes it to an array of microorganisms, and makes it good carrier for microbes living on each square inch of the phone [4].

Microbiologist say that the combination of constant handling with the heat generated by the phones create a prime breeding ground for many microorganisms that are normally found on the skin. A well-practiced infection control plan that encompasses hand hygiene, environmental decontamination, and surveillance contact isolates is effective for prevention of such pathogenic organisms [5] . Colonization by potentially pathogenic organisms on various objects such as duster, marker, pen, chalk, pagers, computer, keyboards and mobile phones has been reported and these materials are implicated in transmission of pathogens[6] .In recent times there has been an increase in the use of mobile phones by academic and non-academic staff of educational institutions. Innovations in mobile phones have led to better strategic life with good communication [7] .Therefore the use of mobile phones in the course of a working day has made mobile phones potential agents of microbial transmission [8] . The increase use of mobile phones is seen as responsible for rise in community infection rates reported by ecological findings [3] . Hand washing may not usually be performed often enough and many people may use personal mobile phone in the course of a working day, the potential act of mobile phones as a source of microbial transmission is considerable

[9]. This work was carried out to investigate the bacterial density from mobile phones of volunteered technologists to examine the potential role of phones in vehicular transmission of pathogenic bacteria.

MATERIALS AND METHODS

Specimen Collection

Five mobile phones were collected from 5 volunteered technologies from the department of Food science and Technology, Rufus Giwa Polytechnic, Owo.

Bacteriological Examination

Sterile swabs moistened with sterile water rolled over the surface of both sides of the phones. The swabs were streaked on surface of nutrient agar. MacConkey agar and Eosine methylene blue agar. The plates were incubated at 37^{0}C for 24hours. The distinct colonies were examined using morphological gram staining and biochemical reactions as described by [10] . Their characteristics were compared with known taxa for identification to generic level as described in the Manual of Microbiology (Tools and Techniques) by [11].

RESULT AND DISCUSSION

A total 174 colonies belonging to 10 different genera of both gram positive and gram negative were isolated from 5 mobiles phones of 5volunteered technologist in the department of Food science, Rufus Giwa Polytechnic, Owo. The occurrence pattern of bacterial isolates and their frequency of occurrence are shown in table I. The isolated bacterial general were *Staphylococcus sp (42(24.14), Klebsiella ap (23(13.22%), Enterococcus sp (08(4.59%), Acinetobacter sp (13(7.47%) Corynebacterium sp (10(5.75%) Pseudomonas sp (24(13.79%) Proteus sp (13(7.47%), Serratia sp (10(5.75%) and E.coli (17(9.77%)*, it was observed in this study that the present study investigated mobile phone bacterial contamination it was found out that *Staphylococcus sp* has the highest occurrence on mobile phones (42(24.14%) followed by *Pseudomonas sp (24(13.79%)*, and *Klebsiella sp (23(13.22%).* The presence of *Bacillus sp, Acinetobacter sp and Corynebacterium sp* on the mobile phones further highlighted the ability of these organisms to survive in non nutrient medium. Table 2 showed the mobile phones and bacterial isolated from them. The phone coded VLT FONE 1 has the least microbial contamination (16(9.19%), followed byVLT FONE 3 and VLT FONE 2 with bacterial load of (43(24.71%) and (36(20.69%) respectively while VLT FONE 4 has the highest density of (54(31.03%). Table3 showed the biochemical characteristics of the bacterial isolates. Out of the 174 isolates, 10 different genera were identified.This investigation confirms such a deviation, as a variety of microbes were found on mobile phones. The research findings indicate that *Staphylococcus aureus, Pseudomonas sp, Proteus sp, Bacillus subtilis* and *Enterobacter aerogenes* are the main bacteria isolates frequently associated with mobile phones as shown in Table 1. These organisms may probably have found their way into the phone through the skin and from hand to hand. This is because the isolated bacteria are a subset of the normal microbiota of the skin as advanced by earlier researchers [12] .Frequent handling by many users with different hygiene profiles producing regular skin contact with the phones may have resulted in the frequency and the degree of populationof the isolates. This has many health implications. *Staphylococcus aureus* is known to cause illnesses ranging from pimples and boils to pneumonia and a scenario supported by the high population of colony isolates.According to the report of [13], mobile phones may get contaminated with such bacteria as *Escherichia coli, Pseudomonas aeruginosa* and *Klebsiella pneumonia,* which cause hospital infections, and may serve as a vehicle for the spread of nosocomial pathogens. Users of mobile phones are found everywhere in the market, the home, hospitals and schools. They could therefore, be the cause of the spread of the infection in the community. Our resulted indicate that isolates were associated with various strata of society. The isolated bacterial species were those that can be transferred from person to person or from inanimate object such as computer pagers, mobile phones and ballpoint pens to hands and vice versa [14] .

Other investigation reported that telephones, intercoms, and Dictaphones may be contaminated with potentially pathogenic with bacteria [14]. The use of mobile phones by lectures in the classroom and technologists in the laboratories may have serious hygiene consequences, because unlike fixed phones, mobile phones are often carried about within and outside the classrooms and laboratories. Not conclusive nearly if not all of the lectures in the polytechnic owns a mobile phone, and increasing technological application have lead to increase use of these devices to provide better communication thus simple cleaning of computers and telephones with 70% alcohol or methylated spirit may decrease the bacterial load [15] .In Nigeria, there has been an increase in the use of the environment where the percentage presence of bacteria is likely high, such as in laboratories, schools, industries, hospitals, in animal slaughter areas, and in toilets. A study was conducted to determine whether mobile phones could play a role in the spread of bacterial pathogens and to proffer possible control or preventive measures that could be instituted to avoid this likely vehicle of infection. In the study, 62 percent of 400 mobile phones from all of the study groups were found to be contaminated by bacterial agents [2] .Control measures are quite simple and can include engineering modification such as the use of band free mobile phones cleaning and disinfection of appropriate mobile surface to reduce transmission of pathogenic organisms from these gadgets to persons [16] ..In

addition, people should be informed that these devices may be a source for transmission of infections to and from the community. Further studies for the possible means of decontamination of mobile phones, such as the use of alcohol and/or disinfection tissues, should be found and employed in laboratories. The laboratory environment plays a critical role in the transmission of organisms associated with infections. Micro-organisms can be transferred from person to person of from inanimate objects (such as stethoscopes, bronchoscopes, pagers, ballpoint pens, hospital charts, computer keyboards, mobile phones and fixed telephones, microscopes, autoclaves, water bath, ovens, incubators fridges) to hands and vice versa [2].Hard activities touching of contamination objects, toilet environs, shaking of hands could be a factor also. Control measures are quite simple and can include engineering modifications, such as the use of hands-free mobile phones, surfaces that are easy to clean and disinfect, hand washing, and the wearing of gloves by the appropriate personnel [7].

Table 1: Bacterial Population Density of Bacterial Isolates from the Mobile Phones

Identified Bacterial Isolates	No. of Colonies	% Occurrence
Staphylococcus sp	42	24.14
Acinetobacter sp	13	7.47
Corynebacteria sp	10	5.57
Enterococcus sp	08	5.76
Bacillus sp	14	8.05
Proteus sp	13	7.47
Pseudomonas sp	24	13.79
Serretia sp	10	5.75
E.coli	-17	9.77
Klebsiella sp	23	13.22

Table 2: Mobile Phones and the Associated Bacterial Isolates

Mobile phones codes	Isolated Bacterial Species
VLTFONE1	*Pseudomonas sp, Staphylococcus sp, Acinetobacter, Bacillus sp*
VLTFONE2	*Klebsiella sp, Staphylococcus sp, Corynebacterium sp, Bacillus sp, Pseudomonas sp. E.coli*
VLTFONE3	*Pseudomonas sp, Staphylococcus sp, Bacillus sp, Proteus sp*
VLTFONE4	*Proteus sp, Klebsiella sp, Staphylococcus sp, Acinetobacter sp, Corynebacteria sp, Enterobacter sp, Pseudomonas sp, E.coli*
VLTFONE5	*Proteus sp, Klebsiella sp, Staphylococcus sp, Enterobacter sp, Pseudomonas sp, Serretia sp, E.coli*

Table 3: Biochemical Characterization of bacterial isolates from the mobile phones

	Tests									
Gram staining	+Ve	-Ve	+Ve	-Ve	-Ve	-Ve	-Ve	+Ve	+Ve	-Ve
Citrate	+Ve	-Ve	+Ve	+Ve	+Ve	+Ve	+Ve	+Ve	-Ve	+Ve
Oxidase	-Ve	-Ve	+Ve	+Ve	-Ve	-Ve	-Ve	-Ve	-Ve	-Ve
Catalase	+Ve	+Ve	+Ve	+Ve	+Ve	+Ve	+Ve	+Ve	+Ve	-Ve
Urease	-Ve	-Ve	+Ve	-Ve	-Ve	-Ve	-Ve	+Ve	-Ve	-Ve
Indole	-Ve	-Ve	+Ve	-Ve	-Ve	-Ve	+Ve	+Ve	-Ve	-Ve
Motility	+Ve	-Ve	-Ve	+Ve	+Ve	-Ve	+Ve	-Ve	-Ve	+Ve
Methyl Red	-Ve	-Ve	+Ve	-Ve	-Ve	-Ve	+Ve	-Ve	-Ve	+Ve
Voges Proskauer	+Ve	-Ve	+Ve	-Ve	+Ve	+Ve	-Ve	-Ve	-Ve	+Ve
Proposed Bacterial	BAC	ECO	STAPH	PSEU	SERR	KLEB	PROT	ACIN	CORY	ENTE

Key: **BAC**: *Bacillus* sp, **ECO**: *E.coli*, **STAPH**: *Staphylococcus sp*, **PSEU**:*Pseudomonas sp*, **SERR**: *Serratia sp*, **KLEB**: *Klebsiella sp*, **PROT**: *Proteus sp,* **ACIN:***Acinetobacter sp*, **CORY:***Corynebacter sp*, **ENTE**: *Enterobacter sp.*

CONCLUSION

The study showed that the bacterial isolates from the mobile phones were mostly skin flora were epidemiologically important pathogens and can be eradicated or reduced by regular cleaning of the phones with alcohol or methylated spirit. Technologists need to take note of how and where they use their cell phones, draft new guidelines and prevention tips, and help raise awareness.Cellphones are now an extension of a person's lifestyle, accompanying them everywhere. Everyone should clean their cell phones but especially technologists in the microbiology and food science laboratory whose hygiene impacts consumers' well-being.

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