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Personal Hygiene and Microbial Contamination of Mobile Phones of Food Vendors in Ago-Iwoye Town, Ogun State, Nigeria

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Abstract: The microbial contamination of mobile phones belonging to food vendors in different canteens in Ago-Iwoye town, Ogun State was investigated. Fifty swab samples were randomly collected from the food vendors. Sterile swabs were firmly pressed on the handset both front and back and then inoculated into nutrient, MacConkey and Sabroud dextrose agar for bacteria and fungi growth. The predominant bacteria isolated were *Staphylococcus aureus* (50%), *Streptococcus faecium* (34%) *Bacillus cereus* (32%), *Escherichia coli* (26%), *Micrococcus luteus* (10%), while the fungi isolated were *Penicillium notatum* (24%), *Aspergillus fumigatus* (16%), *Aspergillus niger* (14%), *Mucor sp.* (14%) and *Aspergillus flavus* (4%). It was concluded that mobile phones of food vendors pose a potential health threat to consumers. Personal hygienic and sanitation measures such as hand washing, cleaning of the environment and washing of hand before and after handling of food and phone decontamination should be adopted by food vendors to prevent food borne disease.

Key words: Mobile phones, food vendors, microbial contamination, ago-Iwoye, Nigeria

INTRODUCTION

The usage of cell phone in Nigeria commenced in 2000. Since then, the number of subscribes has increased greatly to more than forty million in more than eight service providers. Thus, increases the number of base stations in villages and cities all over the countries (Nwadike, 2007).

Research has shown that mobile phone could constitute a major health hazard. In 2000, World Health Organization (WHO), described the electromagnetic radiation emitted from phones and base stations has a threat to lives because, the electromagnetic radiation has been reported to alter the electric activity of the brain causing sleeplessness, headache, malaises, memory retentiveness and low sperm quality. It damages the DNA of manufacturing sperm cell.

Mobile phones have also been reported to be a reservoir for microorganisms. It has been reported that a mobile phone can harbor more microorganisms than a man's lavatory seat, the sole of a shoe or the door handle. The combination of constant handling and the heat generated by phones creates a prime breeding ground for all sorts of microorganisms that are normally found on our skin (Brady *et al*., 2006).

Soto *et al.* (2006) showed that mobile phones could be contaminated via source such as human skin or hand, bag, phone pouch, bags, pockets, environment and food particles, these sources are links through which microorganisms colonized the phone, thus causing diseases that range from mild to chronic. Although, microorganisms isolated so far by health researchers are mostly normal flora of the source of contamination. They can cause opportunistic infections.

The aim of this study was to investigate the personal hygiene and microbial contamination of mobile phones belonging to food vendors in Ago-Iwoye, Ogun State and if any the major health threat pose by these mobile phones.

MATERIALS AND METHODS

Fifty (50) mobile phones belonging food vendors in Ago-Iwoye town in Ogun State, Nigeria were screened for microbial contamination. Samples were held with the aid of sterile hand gloves. Sterile swab sticks were moistened in normal saline and rotated over the surface and sides of the mobile phones. The swabs were returned to their sterile casing and labeled correctly after each sampling. The swabs were then streaked on Nutrient, MacConkey and Sabouraud dextrose agar plates respectively. The inoculated nutrient agar and MacConkey agar plates were incubated aerobically at 37°C for 24-48 h while Sabouraud dextrose agar plates were incubated at 25°C for 3-5 days.

Pure cultures of bacterial isolates were characterised based on morphological and biochemical tests. Bergy's manual of systematic bacteriology (Sneath *et al*., 1986) was used as reference for identification while fungal isolates were characterized as described by Barnett and Hunter (1972).

RESULTS

The rate of bacterial contamination of food vendors' mobile phones was 100%. The organisms isolated and their percentage frequency of occurrence were *Staphylococcus aureus* (50%), *Streptococcus faecium* (34%), *Bacillus cereus* (30%), *Esherichia coli* (26%),

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Table 1: Frequency of bacteria Isolated from mobile phone

Bacteria	Mobile phones (n = 50)	Prevalence rate (%)
Staphylococcus aureus	25	50
Streptococcus faecium	17	34
Bacillus cereus	16	32
Escherichia coli	13	26
Micrococcus luteus	05	10

Table 2: Frequency of fungi isolated from mobile phone

Fungi	No. of occurrence	Prevalence rate (%)
Penicillium notatum	12	24
Aspergillus fumigatus	08	16
Aspergillus niger	07	14
Mucor sp.	07	14
Aspergillus flavus	02	04

Micrococcus Luteus (10%) (Table 1). The rate of fungi contamination on the mobile phone was also 100%. The percentage frequency of occurrence of the fungal isolates were *Penicilium notatum* (24%), *Aspergillus fumigatus* (16%), *Aspergillus niger* (14%), *Mucor sp.* (14%) and *Aspergillus flavus* (4%) Table 2.

DISCUSSION

Microbiological standards in hygiene are necessary for a healthy life, most especially in food selling booths or canteen. However, practices that shift from normal standards of hygiene have been observed in both the developing and developed world. This investigation confirms such a deviation, as a variety of microbes were found on mobile phones. This present study concurs with that of Akinyemi *et al.* (2009) in Lagos, Nigeria in which food vendors and marketers mobile phones had the highest rate of contamination when compared with the other groups of people whose mobile phones were sampled. The high prevalence of bacterial agents isolated from their mobile phones was attributed to the poor hygienic and sanitary practices associated with the low level of education among marketers and food vendors, especially those involved in handling raw meats and vegetables There was also a correlation between the micro organisms isolated in the work done by Walther and Ewald (2004) and the organisms found on the mobile phones of the food vendors of Ago-Iwoye town in that *S. aureus* had the highest occurrence in the mobile phone (50%) of the food vendors. Ekrakene and Igeleke (2007) also reported that *S.aureus* was isolated from mobile phones of health care staff and showed that infection may occur through this organism. The main reservoir of *S. aureus* is the hand, from where it is introduced into food during and after preparation (Hui *et al*., 2001) *S. aureus* is a well known micro biota of the human skin which could be transferred into food via hand to hand or contact. It causes illnesses ranging from pimples and boils to pneumonia and meningitis which are not unlikely to be found in vendors and their consumers as corroborated by the high population of colonies. *Streptococcus faecium* apart from been a normal commensal of the skin, can also be found in the vaginal and intestinal tract, can cause diseases such as urinary tract infection, biliary tract, ulcers, abdominal wound, endocarditis and so on.

Bacillus cereus is a normal flora of the water, vegetables, cereals and cooked food. It can cause food poisoning and opportunistic infections in immuno compromised persons. This undoubtly contributes a great deal to food prepared or eating with infected hands (Jay, 2000).

Escherichia coli and *Micrococcus luteus* are both normal flora of the skin, soil and water. *E. coli* can also be found in the intestinal tracts. They are member of the coliforms, which presence on the mobile phones indicated the presence of faecal contamination. *E. coli* produces endotoxins which could aid their pathogenecity in man (Al-Abdalall, 2010).

Therefore, the presence of *E. coli*, *S. faecium* and *Micrococcus luteus* in food sold by food vendors has shown that there is presence of faecal and soil contamination in the food during preparation or after preparation. This is in agreement with the work done by Roth and Jenner (1998).

The presence of the isolated fungi showed that the food vendors' phones and environments had been contaminated by fungal spores. Ekrakene and Igeleke (2007) also isolated some of these fungi in their research. Tiny food particles, soil particle and decayed dirt in the pouch or pocket over a long period of time will favour the growth of saprophytic fungus. These isolates can significantly cause food spoilage and food infection through the production of toxins. Most of the isolated fungi are also natural inhabitants of the soil and air. Their colonization of phones can cause infections like Aspergillosis, food intoxication, food spoilage and allergic reactions if these spores are introduced into foods, drinking water or inhaled_t (Flavia *et al*., 2001). Mobile phones could pose a great threat at food selling spots, hospitals, among children, etc. (Al-Abdalall, 2010). These pathogens may caused food borne infections, lowering of semen, brain disorder, cancer, headache, nosocomial infections, cell damages, etc. (Neely and Sittig, 2002).

The result of this study showed that microbial contamination of food vendors' mobile phones in different canteens in Ago-Iwoye town is high and these mobile phones may assume the vehicle of pathogenic agents of food borne disease outbreak and transmission. Food vendors are encouraged to adhere to strict personal hygiene and environmental sanitation in order to prevent disease outbreaks and transmission. Apart from those who sell foods, the phone user can personally contaminate his or her food when eating. For instance, using the phone while in the toilet or bathroom

and thereafter going to eat food could easily lead to the contamination of the food, despite washing hands after using the toilet hence mobiles phones should not be taken to toilets, bathrooms or put on dirty surfaces.

Control measures such as disinfecting mobile phones, surfaces such as tables and other platforms where food are placed, regular hand washing and the wearing of gloves by the food vendor should be practiced.

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