

# Mobile Phones Contaminated with Bacteria among Workers in Dental Clinics

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## ABSTRACT

Unfortunately, cross Infection in dental field is a critical issue that most commonly occurs via different ways. The possible transmitters are (dentists, students, workers, mobile phone and other dental instruments). thus, the aim of this study is to investigate the level of contamination by measuring the percentages and type of bacteria isolated by swabbing from different surface sites of (30) mobile phones devices of (dentists, students, and workers) in a hospital of Dentistry Faculty - Babylon university. Collection of swaps samples from (30) mobile phones of dental workers was conducted at University clinics and then transmitted to the laboratory of microbiology to evaluate their bacterial contamination levels. Both McFarland standard tubes and optical density methods were used for performing of bacterial quantification and the standard microbiological techniques were used for identification of the isolated bacterial agent. All of the investigated dental workers mobile devices have some degree of bacterial contamination (100%) either with single or mixed microbial agents. *S. epidermidis* having the higher chance of contamination (23.3%), (16.6%) *E. coli* and *Enterococcus fecalis* (20%) *Bacillus* spp., (10%) for *S. aureas*, (6.67%) *Pseudomonas* spp., (10%) *Streptococcus* spp., (3.33%) for each of *Salmonella* spp, *Klebsiella* spp., *Shigella* spp. and *Proteus*.spp. respectively. The mean bacterial count was (1.5×10<sup>9</sup>) method. By using the surface spread method, the corresponding figures were an organisms/phone. Hand hygiene is very important in prevention mobiles contamination and suggestion of prevent using mobiles phones in side dental clinics units.

**Keywords:** Mobile phone, Bacterial contamination, hand hygiene

## Introduction

The mobiles make life easier, but they pose a number of new hazards also <sup>(1)</sup>. A vast number of microbes presents on the surfaces of the mobiles making them as a risk for human health <sup>(2)</sup>. Our Mobiles can be considered as one of the necessities in our social and professional life today. As they are small and very useful during emergencies, they are the much preferred and most used routes of communication <sup>(3)</sup>. Dental profession is no exception to cellphone use. Workers in dental field may exposed to many microorganisms exist in saliva and blood. Their cellular phones are rarely

cleaned and they usually touch their phones without hand washing especially during and after finishing of the patient examination <sup>(3, 4)</sup>. Infection control is one of the biggest challenges that facing the dental professionals, it is important risk factor for both the patient and dentist <sup>(5)</sup>. However, microbial transmission in the dental field can occurs either directly from one person to another or indirectly, by contaminated tools and environmental surfaces that are not sterilized and disinfected regularly <sup>(6)</sup>. Therefore, one of the most important ways of preventing the cross infection and dangerous diseases in dentistry is to increase awareness of dental workers about the scientific methods of disinfection and sterilization of dental equipment and devices dental offices <sup>(7)</sup>.

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## Materials and Method

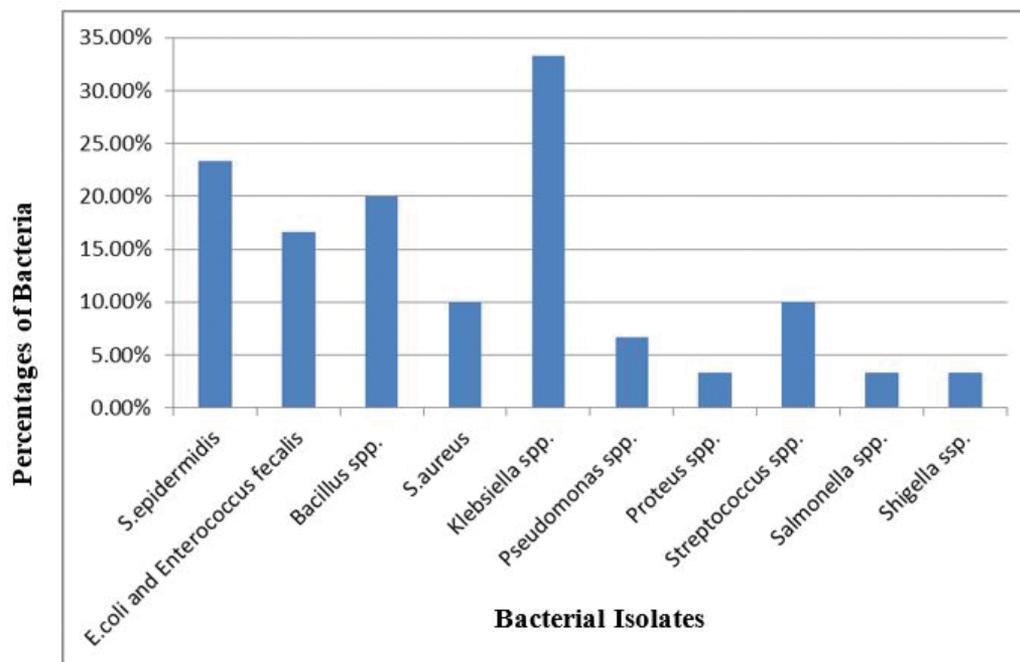
**Sample Collection and Laboratory Diagnosis:** The present study was done at the hospital of dentistry faculty of Babylon University. Random sampling of (30)

mobile phones from subject persons (students, workers and dentists) by swabbing determined five different sites in a measure (1cm<sup>2</sup>) using a dry sterile cotton swabs and were put in (5ml) (BHIB) tube and incubated overnight at (37°C). The positive growth tubes were compared with the turbidity of different concentration of McFarland tube and were subjected to optical density measurement by spectrophotometer. The samples were analyzed in the laboratory of microbiology for culturing each sample on blood and macConkey agar and incubated under aerobic and an-aerobic condition for bacterial identification. For bacterial identification, purely isolated colonies were gram differentiated and after that biochemically distinguished by (urease, oxidase, coagulase, catalase, indol, TSI and MRVP) (8).

**Estimation Bacterial Counts:** Bacterial counts in area of (1cm<sup>2</sup>) of mobiles phones estimated using McFarland standard tubes (9,10).

## Results

From (30) different cellular mobile devices samples were collected in this study (students, workers and dentists) and were subjected to laboratory diagnosis the result revealed different percentages of bacteria (figure 1) show (23.3%) *S. epidermidis*, (16.6%) *E. coli* and *Enterococcus fecalis* (20%) *Bacillus spp.*, (10%) for *S. aureus*, (6.67%) *Pseudomonas spp.*, (10%) *Streptococcus spp.*, (3.33%) for each of *Salmonella spp.*, *Klebsiella spp.*, *Proteus spp.*, and *Shigella spp.*



**Figure 1: Percentages of bacterial isolates from different mobile phones**

The Quantity of bacterial contamination was estimated using McFarland standard tubes, the mean of bacteria was (1.5×10<sup>9</sup>).

## Discussion

Mobile phones may be considered a source of infections because of their own temperament and nearness to touchy piece of our bodies, for example, faces, ears, lips and hands. Using of mobiles is highly prevalent among medical and dental workers, playing a significant role and positively affect their

communication abilities. However; this referred only to technical point of view and have no consideration of their possible role in infection transmission. Preventing of infection transmission in is a critical issue in dental profession, because of the infectious diseases can be easily transmitted in dental environment<sup>(11)</sup>.

The mobiles are usually carried by their owners in all places, and considering that the human's hand and environments like kitchen, hospital, and toilet have a large number of microbes such as potentially pathogenic bacteria, so the mobiles can be also considered as a major device of transmitting disease in the community<sup>(12)</sup>.

Cellular phones due to their high temperature and moisture content of the operatory becomes suitable surface for microbial growth. The results of this study revealed that different contamination ratio of the mobiles of (students, dentists, and workers) in a hospital of dentistry faculty of Babylon University, but the highest level were showed in *Staphylococcus epidermidis* (23.3%) (Figure 1) The high isolation percent of *Staphylococcus epidermidis* clarified that the source of most mobile phones contaminated bacteria are the skin<sup>(13)</sup>.

Other isolates of bacteria obtained from the samples of the present study are *E. coli*, *Enterococcus faecalis* (16.6%) for each one, *Proteus* spp.(3.33%), *Salmonella* spp.(3.33%) and *Shigella* spp.(3.33%) this is due to fecal contamination of these mobiles, which can result in community-acquired infection and disease outbreak<sup>(14)</sup>.

The spread of *Bacillus* spp. suggests the ubiquitous nature of *Bacillus* spp. giving it greater contamination of (students', workers, and dentists) mobile phones with different microbial isolates.

The results of our study showed (*Bacillus* spp. (20%), *S. aureus* (10%), *Klebsiella* spp.(3.33%) and *Pseudomonas* spp., (6.67%). This is due to the isolated bacteria are a subset of the normal skin microbiota as advanced by earlier researchers<sup>(15)</sup>.

The percentage of streptococcus spp. in our study was (10%). It was well known that *Streptococcus* species can cause illnesses such as meningitis, pneumonia, pharyngitis<sup>(16)</sup>.

The high level of bacterial agents that was isolated from mobiles was attributed to the poor hygienic and sanitary practices. However, the discrepancies showed among different studies might be due to the influence of sampling method, sample size and different laboratory processes<sup>(1)</sup>.

Result recorded high number of bacterial isolates found on the surface of mobiles ( $1.5 \times 10^9$ ), these bacteria may cause infections if the conditions permit for finding its route to the human body.

### Conclusion

The mobile users are found in the market, hospitals, home, and schools. therefore, they can be considered as a

major cause for spreading of infection in our community. According to bacterial isolates were obtained from mobile phones in the present study by culturing, staining, biochemical test and comparing the isolates with MacFarland tubes and measure the optical density of its. Our study showed that mobiles would serve as vector for bacterial transmission among individuals. This proposes the capability of the mobile phones as a fomite, which can lead to community-acquired infections with possible public health implications. Periodic use of disinfectants or hand cleaning cleansers for cleaning of the mobiles and regular hand-washing ought to be supported as a method for shortening any potential disease transmission.

**Ethical Clearance:** The Research Ethical Committee at scientific research by ethical approval of both environmental and health and higher education and scientific research ministries in Iraq

**Conflict of Interest:** The authors declare that they have no conflict of interest.

**Source of Funding:** Self-funding

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