

## Isolation and Diagnosis of Pathogenic Bacteria from the Upper Surface of the Cell Phone Screen and Conduct an Antibiotic Sensitivity Test

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### ABSTRACT

A total of 120 samples (80) female samples and 40 male samples were collected from the front of the personal communication (the cell phone) for female students of Education College for Women (65) as well the medical staff of Ramadi Teaching Hospital (55), The samples are collected by swabs, The ages ranged between 19-60 years, These samples were initially culture on the blood agar medium and then on different selective and differential culture media. Api test strips were also used for the final diagnosis of bacterial isolates. The results showed that all samples gave 100% a positive result of general bacterial culture and 80% of pathogenic bacteria. The results of isolating and diagnosis indicated the presence of the pathogenic bacteria *Staphylococcus aureus* (58.3% of the total sample), *Escherichia coli* (44.2%), *Enterococcus faecalis* (25.8%), *Pseudomonas aeruginosa* (23.3%), *Proteus sp.* (5%), The results showed that the positive bacterial culture rate for male samples was 87.5%, whereas the female bacterial culture rate was 76.3%. The most important isolates were highly resistant to cephalixin, followed kanamycin. *Proteus sp.* gave the largest percentage of the resistance to 100% of those antibiotics, except for nitrofurantoin followed by *Pseudomonas aeruginosa* in the proportion of resistance to antibiotics used in this study.

**Keywords:** Pathogenic Bacteria; Antibiotic; Cell Phone.

### INTRODUCTION

At the beginning of 1980, the civil used of the cell phone started, It was first manufactured in large size and put in front of the driver in the cabs. Later, with the development of the technologies of the device can easily be carried in hand by anyone, The surface tissue of the human being is exposed to the environment of the bacteria on the surface of the cell phone ,which can be normal flora or pathogenic microbes<sup>1</sup>. The cell phone is now an essential and indispensable to communicate with others in different areas. The cell phone is also used by the medical staff in hospitals which cause contamination of medical devices by different pathogenic bacteria<sup>2,3</sup>. Pathogenic bacteria can be found on living and non-living substances, and may cause epidemiological diseases<sup>4</sup>. Several studies have shown that contaminants on surface, including cell phones, play an important role in the spread of many pathological infections<sup>5,6</sup>. The cell phone is considered one of the important areas in the transmission of pathogenic bacteria<sup>7,8</sup>. Medical staff in hospital units are one of the vectors of hospital infection pathogens that may in any way cause skin injury<sup>7,9</sup>. Several studies have shown that (43-9)% of personal cell phones used by medical staff in hospitals are contaminated with pathogenic bacteria<sup>10,11,12</sup>. The cell phone in Iraq used among Iraqis in general since 2003, and today it is one of the most widely used devices for Iraqis of different age groups, especially young people. Today, employees and

student of all, institutions, whether health or not's use this device during work hours. Two institutions university and hospital were chosen to be the subject of this research and study the relationship of personal cell phones with the presence of pathogenic bacteria which may be cause spread of some diseases and the extent of bacterial resistance to some antibiotics.

### MATERIAL AND METHODS

#### Sampling

The study samples were collected by taking swabs from the surface of the upper screen of cell phones, collected (120) samples (65) sample swabs of cell phones for female students of Education College for Women and (55) of the cell phone from medical staff of Ramadi Teaching Hospital. These samples divided to (80) female samples and (40) male sample.

#### Isolation and diagnosis of bacteria

Samples were transferred to the research laboratory at the Faculty of Education for girls. The samples were initially culture on the blood agar medium, and then the colonies were purified to obtain pure cultures of the bacteria. For the purpose of the diagnosis, the clean colonies were developed on elective and differential circuits with biochemical tests. Api test kit for the emphasis diagnosis of bacterial isolates.

#### Sensitivity test

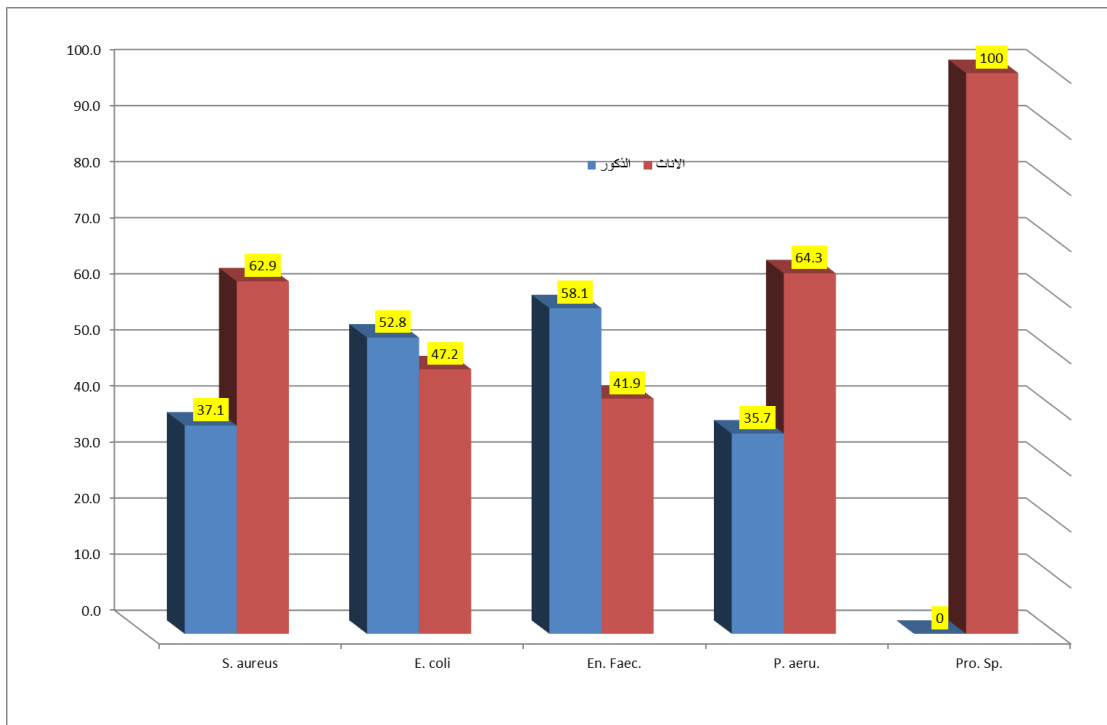


Figure 1: Percentage of bacterial pathogenic positive culture of males and females by bacterial genus isolated.

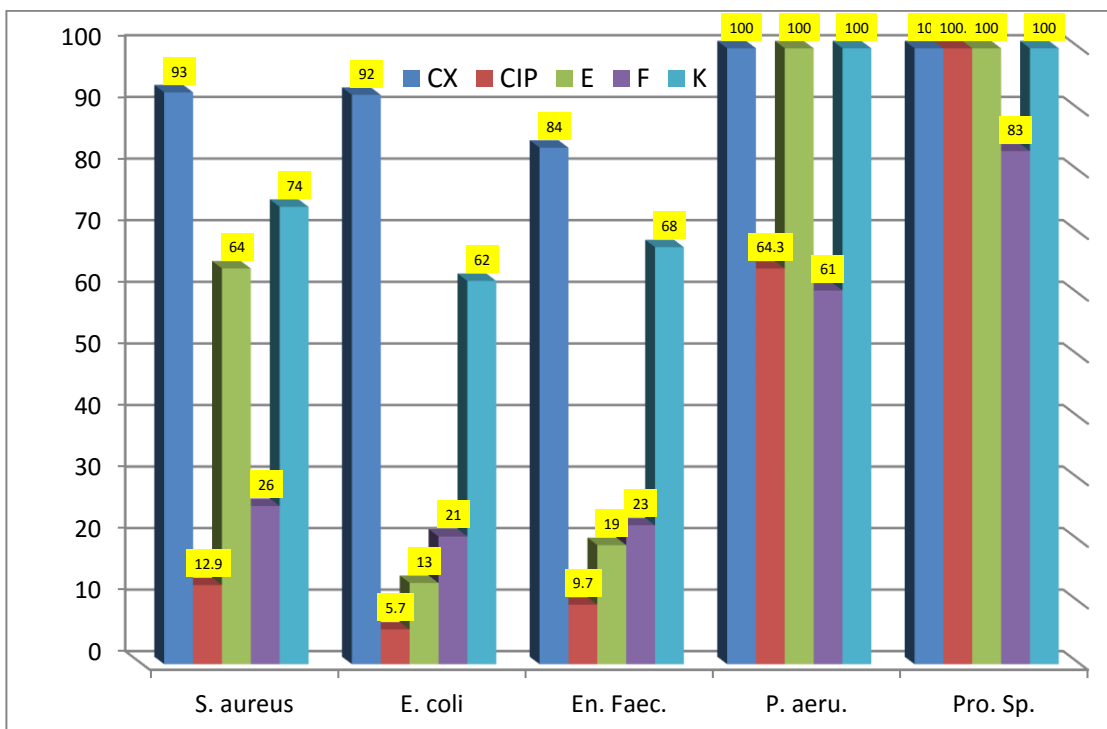


Figure 2: Percentage of the sensitivity test for bacterial isolates of five Antimicrobials.

A number of antibiotics were used to test the sensitivity of isolated bacteria from the upper surface of cell phones using Mueller Hinton Agar medium. These antibiotics are Erythromycin (E), Cephalexin (CX), Ciprofloxacin (CIP), kanamycin (K) and Nitrofurantoin (F), This test is performed by Kirby Bauer method<sup>14</sup>. The microbial suspension adjust at a concentration of  $1.5 \times 10^8$  CFU/ml, Which was determined by using McFarland tubes<sup>14</sup>.

statistical analysis

Statistical analysis was carried out using a Chi square analysis ( $X^2$ ) at significant differences ( $P < 0.05$ ).

## RESULTS AND DISCUSSION

The results of isolating and bacterial diagnosis showed isolated a number of bacterial pathogens from upper screen surface of cell phone, These pathogenic bacteria included *Staphylococcus aureus* (70) isolates (58.3% of the total sample), *Escherichia coli* (53) isolates (44.2%),

*Enterococcus faecalis* (31) isolates (25.8%), *Pseudomonas aeruginosa* (28) isolates (23.3%), *Proteus sp.* (6%) isolates (5%), These percentages corresponds to many studies that confirmed that *Staphylococcus aureus* is the most pathogenic bacteria that are isolated from personal cell phone devices more than the rest of the other pathogenic bacteria and this is normal result because this bacteria is more widespread than the rest of the pathogenic bacteria that spread on the skin of the human and thus be one of the most numbers of bacteria contact to the surface of the screen of the cell phone when the contact with the skin, both the face of the person or his hands, in addition to the compatibility of these studies isolate of other genus of bacteria but different rates<sup>15,16,17</sup>. The results showed that *Proteus sp.* is less than isolated bacteria and this is consistent with the findings of a number of studies<sup>18</sup> while there was no isolation of these bacteria in many studies<sup>16,19,20,21</sup>, This may be due to the fact that these bacteria are found only in patients suffering of inflammatory conditions such as Otitis media disease and therefore rarely exist on the surface of the cell phone except through the secretions of ear wax because of the condition of inflammation that the bacteria is the causative agent, The other bacterial isolates were of varying degrees *E. coli*, which was consistent with the findings of many researchers, but they had a percentage of the presence of these bacteria on the surface of screen of cell phone 10% or less, which is naturally to be isolated from the surface of the cell phone, especially from the medical staff In hospitals that may be close to contact with cases and samples of different diseases on the grounds that the *E. coli* bacteria are most prevalent, especially in the digestive system of the human body in addition to that these bacteria can contaminate the cell phone device due to lack of personal hygiene<sup>15,16,22,23</sup>, The same reason may be due to *Enterococcus faecalis*, but at a lower rate, *Pseudomonas aeruginosa* was also isolated from the surface of the cell phone by two other researchers, but also by less than<sup>12,19</sup>, On the other hand one study showed that *E. coli* and *Pseudomonas aeruginosa* is the most bacteria isolated from the cell phone of people in hospitals<sup>18</sup>.

The results showed that the percentage of positive pathogenic bacterial culture cell phone in female of the study sample was 76.3%, while in the male the percentage was 87.5% and there were no significant differences between males and females for positive pathogenic bacterial culture, The results as shown in Figure (1). There were significant differences in the presence of *S. aureus* and *En. Faecalis*, *P. aeruginosa*, and *Proteus sp.* In the swabs taken from the interface of the personal cell phone device for males and females, while it was observed that there were no significant differences in *E. coli* bacteria and these results varied in conformity with the findings of one study as in our study isolates which isolated from the cell phone device for males more than what was isolated as a number of the female cell phone device, contrary to what was observed in this comparative study, especially in *S. aureus* and *P. aeruginosa*<sup>16</sup>. This may be attributed to the use of

disinfectant females more than males as they improve as a psychological condition than fear of pollution more than males, we noticed this casses in the college female students in particular.

The results of the sensitivity test showed that *Proteus Sp.* was the most resistant bacteria in this study. The resistance to this species was 100% percent for antibiotic include erythromycin, cephalexin, ciprofloxacin and kanamycin, followed by *Pseudomonas aeruginosa* which was 100% resistant to cephalexin, erythromycin and kanamycin and other bacterial species varied in their antibiotic resistance ratios in this study. At the same time, the antibiotic nitrofurantoin showed varying resistance levels, but it was the only antibiotic that did not reach 100% of the isolates of the bacteria. The results showed that the antibiotic cephalexin was the most antibiotic against which the bacterial isolates showed resistance kanamycin as shown in Figure (2).

The results of the sensitivity test of different antibiotics were close in terms of the differences between these antibiotics, as indicated by one of the studies in the results obtained in a study on cell phones for group of student from the University of Baghdad<sup>24</sup>.

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