Isolation, Identification, and Determination antimicrobial Susceptibility of Bacteria Isolated from Mobile Phones of Student

Enass G. Sweedan

University of Baghdad - College of Science

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ABSTRACT
In general from this study it can be concluded that the rate of bacterial contamination of mobile phone is height. A total of 25 samples were collected from the cell phones of the students of college of science biology department, Baghdad University. Bacteria encountered include: (gram positive; S. aureus, coagulase negative staphylococci (S. peidermidis), S. Pyogenes, B. spp.), and gram negative; E. coli, and P. aeruginosa) most of these bacteria species are harmful and cause infection to humans. And in this study was found the percent of contamination in mobile phones of male (61.11%) more than in female (38.88%) mobile phones. The antibiotic sensitivity test showed the variety of resistance of isolated bacteria to antibiotics used in this study, but most isolated bacteria were sensitive to streptomycin and kanamycin except the isolates of B. spp. and P. aeruginosa were the most resistant bacteria for antibiotics used in this study approximately.

Introduction:

Today mobile phones have become one the indispensable accessories of professional and social life. The use of cell phones often occurs in hospitals, laboratories, etc. (2) Also mobile phones have become parts of health professional’s equipment and are used extensively for Communication in clinical setting (1). Mobile phones can provide source of information of their owners: Sample data on their personal micro biome. The personal micro biome, here defined as the collection of microbes associated with an individual’s personal effects (i.e., possessions regularly worn or carried on one’s person) likely varies from person to person. Research has shown there can be significant variation in human micro biota, including for those microbe fond on the skin (6,7). Pathogen microorganisms can be spread through direct physical contact among people or through with contaminated inanimate objects and Surface. Numerous studies have demonstrated that the contaminated phones play a role in the spread of infectious disease (10).

Pathogenic bacteria can be present on the fomites can survive for a long of time depending on microbial characteristics, and environmental factor such as relative air humidity and temperature (8). There are several from various countries regarding the role of mobile phones in transmission of hospital infections. But in these, bacteria such as coagulase negative Staphylococci that are normal flora of skin Staphylococcus aureus, Klebsiella spp., E. coli, pseudomonas aeruginosa, and many other causing opportunistic infections such as Bacillus have been isolated (5).

The aims of this study were: Isolation and Identification of bacteria carried on the mobile phones of students. Determine antimicrobial resistance patterns. The isolates were assessed. Compare prevalence rates of isolated bacteria from the mobile phones of students by gender.

Materials and Methods:
Isolation and Identification:
A collection of 20 samples from (10 males, and 10 females). The Samples were collected from mobile phones of students in Biology department, Colleges of Science, University of Baghdad. The Samples were taken by sterile cotton swabs streaking on the keys of mobile phones and were at first inoculated in to Brain heart in fusion broth as transport medium, then
incubated at 37°C for 18-24 hrs. The samples cultured on this medium to increase the number of bacteria before isolation of them. Then cultured of loop full of bacteria on MaConkey agar, Nutrient agar and incubated at 37°C for 18-24 hrs. The bacteria were identified by Microscopic examination to observe the shape and arrange of colonies, biochemical tests (4, 16); and all isolates maintained on nutrient broth containing 20% glycerol in deep freeze. The identification was confirmed by API 20 E, and API staph system (BioMeriex).

**Antibiotic Susceptibility test:**

The sensitivity test of bacteria to antibiotics discs (bio analyses) (Cefotaxim 30 μg/ml, Gentamycin 10 μg/ml, Streptomycin 10 μg/ml, Ciprofloxacin 5 μg/ml, Amoxicillin 10 μg/ml, Augmentin (Amoxicillin, Clvulanic acid) 30 μg/ml, Cefixim 10 μg/ml, and Kanamycin 30 μg/ml) was tested by method of (19). Results were interpreted after measuring the zone of inhibition and compared with standard inhibition zones (17).

**Results and Discussion:**

**Isolation and Identification:**

Out of 25 samples evaluated. Growth was observed in all samples (100%) of them were collected from mobile phones of students in Biology department, college of science, Baghdad University. Six genera bacteria were identified from cultures.

In a number of examined mobiles, one in some others more than one species of bacteria were found. And these genera in our study were gram positive bacteria: coagulase negative staphylococci (Staphylococcus epidermidis), staphylococcus aureus. Streptococcus pyogenes, and Bacillus spp.), and gram negative bacteria (E. coli, Pseudomonas aeruginosa). Gram positive bacteria percentage were (82.77%); and gram negative bacteria percentage were (17.33%) this showed in (Figure 1).

The most frequently bacteria were detected (cons) 10 isolates (34.5%), them S. aureus 6 isolates (20.7%), B. spp. 5 isolates (17.23%), and the S. pyogenes 3 isolates (10.34%). And E. coli 3 isolates (10.34%); P. aeruginosa 2 isolates (6.89%). The results showed in (table 1).

**Compare prevalence rates of isolated bacteria by gender:**

The percentage of prevalence rates of isolated bacteria from the mobile phones of students its by gender were 18 isolates (61.11%) more frequency in mobile phones of males than females were 11 isolates (38.88%), and the most frequent genus cons (S. epidermidis) in both gender at the same number 5 isolates (17.24%), Bacillus spp. were 5 isolates (17.24%) from male mobile phones, and 0 isolate (0.00%) from female mobile phone. While S. aureus bacteria from male mobile only (13.67%) 4 isolates compare with female mobile only 2 isolates (6.89%) and the percentage of S. pyogenes in mobile of females 2 isolates, (6.89%) and from male mobile 1 isolate (3.44%). And gram negative bacteria E. coli were 2(6.89%) and 1(3.44%) isolates in male ;female frequency. With the same number of P. aeruginosa isolate was 1(3.44%) in both gender, Showed in table (2)

**Antibiotic Susceptibility test of isolated bacteria:**

The isolated bacteria showed variable sensitivity patterns for different antibiotics tested. All isolated bacteria from four genera were resisting to Amoxicillin, Cefotaxim, Augmentin. The results indicated that S. epidermidis isolates were sensitive to Streptomycin and Kanamycin, and resist to other resident antibiotic that used. The isolates of S. aureus sensitive to Streptomycin, Kanamycin, and resistant to Cefotaxim, Gentamycin; while the S. pyogenes isolates showed sensitivity to Gentamycin, Kanamycin, Ciprofloxacin, Cefixim and resist to Augmentin, Cefotaxim, Streptomycin, the genes B. spp. were resist to all antibiotics only sensitive to Gentamycin, and E. coli resist to Gentamycin,Cefotaxim, Ciprofloxacin, and sensitive to other antibiotics used in our study, and P. aeruginosa was sensitive to Ciprofloxacin only and resist to persist antibiotics used in this study.

**Discussion:**

Mobile phones are indispensable tools of communication, both at home and at work. They are always picked, dropped or pocketed, therefore has the potential of acquiring microbes from the handlers and the environment. Mobile phones as inanimate objects has been shown to possess the potential for survival of microorganisms some bacteria can survives for months, viruses such as corona, influenza can persist for few days; and herpes virus can persist for a week (9,11).

The high rate of bacteria colonization mobile phones of students suggest their regular exposure to the bacteria in their environment, contact with surfaces infected materials, and the individual’s level of personal hygiene may influence the rate of colonization(20).In our study high prevalence rate 100% this high prevalence might be because students deal more directly with aerosol created in laboratories and contact their mobile phones with the laboratory benches might account for the slightly high prevalence rate. And our study agree with another study was done in Yemen showed that percentage of contaminated mobile phones also 100%. As compared to the current study lower values were reported from Saudi Arabia.
(43.6%) India (4.62%), turkey (61.3%) (1). When the types of organisms’ isolation are considered, despite the difference in the isolation rate, most studies have reported similar type of organisms (15, 13). S. aureus were the most frequently isolated organisms in those studies which is agree with our study because Klebsiella spp. , and Enterobacter, P. aeruginose, E.coli, Neisseria spp were reported (14) in our study were isolated gram positive bacteria and gram negative bacteria and those results agree with other studies. Our results showed that the frequency of contamination mobile phones of male higher than in female. On the other hand the percentage Of frequency rate of isolated bacteria from mobile phones of medical personal by gender were male 15.6%, 7.6% female (3) in another study showed in female the percentage of contamination was more Was more than in male and this disagree with our study (12). May be in our study in male more than in female the percentage of contamination because most female keep their mobile phones in their hand bags protected from contamination. The possibility of the mobile phones of the male counterparts in the same professional harboring more bacteria are likely Because male always hold mobile phones in their palms, pocked or on tables or other surface from which they may acquires additional microbes. Antibiotic sensitivity testing of sample that had the highest frequency was performed by the disc diffusion for B. spp isolates were resist by the most antibiotic used in this study and the S. aureus and S.epidermidis (cons) in the same frequency rate of resistance to kanamyacin (18) and this agree with our results. On the other study showed that B. spp also resist to all antibiotics that used may be because its forms spore and this reasons increase their resistance to antibiotics .Found E .coli in the mobile phone of students that’s mean fecal contamination and poor hygiene for persons.While presence of P. aeruginosa in our study is very dangerous because these bacteria were resisting of many antiseptic and antibiotics, so caused many infection like: UTI, wound infection, RTI, etc.

References:


Figure (1): The percentage of bacteria isolated from student’s mobile phones

Table 1: number and percentage of isolated bacteria from mobile phones:

<table>
<thead>
<tr>
<th>Bacteria</th>
<th>No. isolated</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. epidermidis (cons)</td>
<td>10</td>
<td>34.5%</td>
</tr>
<tr>
<td>S. aureus</td>
<td>6</td>
<td>20.7%</td>
</tr>
<tr>
<td>B. spp</td>
<td>5</td>
<td>17.23%</td>
</tr>
<tr>
<td>S. pyogenes</td>
<td>3</td>
<td>10.34%</td>
</tr>
<tr>
<td>E. coli</td>
<td>3</td>
<td>10.34%</td>
</tr>
<tr>
<td>P. aeruginosa</td>
<td>2</td>
<td>6.89%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>29</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Table 2: the number and percentage of isolated bacteria from mobile phone by gender

<table>
<thead>
<tr>
<th>Isolated bacteria</th>
<th>No. of isolates in male (%)</th>
<th>No. of isolates in female (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. epidermidis (cons)</td>
<td>5 (17.24%)</td>
<td>5 (17.24%)</td>
</tr>
<tr>
<td>S. aureus</td>
<td>4 (13.79%)</td>
<td>2 (6.89%)</td>
</tr>
<tr>
<td>B. spp</td>
<td>5 (17.24%)</td>
<td>0 (0.00%)</td>
</tr>
<tr>
<td>S. pyogenes</td>
<td>1 (3.44%)</td>
<td>2 (6.89%)</td>
</tr>
<tr>
<td>E. coli</td>
<td>2 (6.88)</td>
<td>1 (3.44%)</td>
</tr>
<tr>
<td>P. aeruginosa</td>
<td>1 (3.44%)</td>
<td>1 (3.44%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>18 (61.11%)</strong></td>
<td><strong>11 (38.88%)</strong></td>
</tr>
</tbody>
</table>

عزل و تشخيص وتحديد الحساسية الضد المايكروبية للبكتريا المعزولة من الهواتف النقالة للطلاب

إيانس غسان سويدان

الخلاصة

ممكن أن نستنتج من هذه الدراسة بصورة عامية، أن معدل التلوث بالبكتريا عالي في الهواتف النقالة للطلاب، فمعدل 25 عينة تم جمعها من الهواتف النقالة للطلاب في قسم علوم الحياة، كلية العلوم، جامعة بغداد، البكتريا الموجودة تتضمن البكتريا الموجبة لصبغ غرام ضعيف أو الموجبة لصبغ غرام مثبتة (S. aureus, coagulase negative staphylococci peidermidis, S. Pyogenes, B. spp) معظمه: (E. coli, P. aeruginosa) هذه الأنواع البكتيريا مضرة وتشير السجلات للإنسان، ووجد أن نسبة التلوث في الهواتف النقالة للذكور 38.88% أعلى منها في الإناث 31.11% اذن هناك اختلافاً كبيراً في معاينة البكتريا المعزولة للمضادات الجيدة المستخدمة في الدراسة. لكن أغلب الأنواع المعزولة كانت حساسة للسستريتوسميسن والكاراماباسن، لذا نستنتج أن النتائج مشابهة لما جاء في المراجع. 

P. aeruginosa, B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والكاراماباسن، ما عدا P. aeruginosa، B. spp للسستريتوسميسن والك...