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# Evaluation of Environmental Hygiene and Microbiological Status of Contamination on Mobile phones from University of Kota

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**A B S T R A C T**

Invasion of communication technology does not only bring dependence but also a major contribution of infection. Digital devices are possibly potential worldwide vectors of nosocomial infection. Mobile phone has increased the dependency irrespective of the geographical barriers, demographic factors like age, social and economic background. These digital devices have great prominence but they are also potential disease carrying elements. Mobile phones were collected and investigated for potential contamination of microbial flora. Total 25 Mobile phones sample were collected from different departments of university of kota and Sampled using a sterile cotton swab. Collected samples were cultured on Nutrient Agar, MH media and Mac-Conkey using streak plate's method. The Sample phones collected include Mobile phones of Vice Chancellor, Faculty, Security Gaurd, Students, Sweepers, and Other employees. The Microbial species isolated include as *Klebsiella pneumoniae, Actinobecter, Pseudomonas spp., Enterococcus spp, Staphylococcus aureus, Staphylococcus epidermidis, Escherichia coli* and *Candida spp.* 24 Out of 25 showed 100% contamination. This study provides all the necessary fact that Mobile phones are potential vectors of various diseases and lifestyle change should be adopted by every individual using mobile phone. Better sanitization practices and knowledge may prevent the spread diseases from Mobile Phones.

## Introduction

Mobile phones are a telephone that you can carry around with you. It is a wireless hardware device used in communication, exchange information, entertainment, listening music and reading articles. It accompanies us from home to office, kitchen to bathroom, gym to theatres. The devices you are using possibly harbour million of bacterial species. Mobile phones are crucial part of our lives these days. They are equipped with software's and applications which are of great use. Mobile phone of healthcare practitioner contains cosmopolitan bacterial species but it isn't limited to profession or surrounding. Through modern world and digitalization old days are over when student have to look days and months for research article in libraries or write to scientists about their publications to find desired information. Hundreds of publication to read, learns and tons of knowledge are available in a

single devices like Mobile phone. Nowadays we carry whole encyclopaedia in our pockets. It is a hands-on resource assisting us in educational purpose. In developing countries, they are being considered as the fifth necessity after food, clothes, shelter, and education (Gireesh K. Gupta, 2011).

Technology has revolutionized the education sector by providing knowledge in every corner of globe but giving thought to the tedious regime and overall hygiene measures followed by students their phone is found contaminated by various bacterial species. This friendly hardware devices is considered to be pool of unwanted guests like bacteria, fungi, bacteriophage, protists even viruses as well (Pillet and Berthelot, 2015). They are also in close proximity with our face, hands and overall Body (Smith *et al.,* 2009). The heat generated provide the favourable growth to these microbes (Abubakar *et al.,* 2017)

## Materials and Methods

The mobile Phone of each category person was held with the aid of Sterile gloves. Sterile swabs moistened with sterile saline were used. The samples were collected aseptically by rotating the swabs over the mouthpiece, earpiece, screen of the mobile phones (Barolia *et al.,* 2011).

## Sample Collection

Mobile phones were selected on the basis of academic/non-academic profession. Sterile disposable swabs were dipped in sterile normal distilled water. Sample were collected by rubbing the moisten swab on the surface of the cell phones. The swabs were transported to the laboratory in a sterile test tube.

## Microbial Isolation and identification

Microbial load was analysed by performing a surface medium, Enriched media and selective media is used for culture. The swabs were rolled maintaining sterile condition on the surface of the nutrient agar taken in 100 mm Petri dish. The plates were incubated at 37℃ for 24 hrs. After this incubation the bacterial colonies were counted. The number of microbial colonies present in each swab collected from each cell phone was noted.

The isolated colonies were subculture by transferring them to slants of Nutrient agar prepared in Test tubes. Isolated microbes were identified on the basis of colony Morphology, Gram's stain (Tripathi and Amit Sapra, 2022) findings. Further biochemical test and catalase and coagulase reaction were done.

## Results and Discussion

Among 25 mobile phones samples were collected and sampled 24 mobile phones showed 100% bacterial contamination. Most of the Mobile phone showed more than 2 Microbial species. The highest percentage of bacterial species is found through the experiment was *Staphylococcus aureus* followed by *Enterococcus spp* and *Staphylococcus epidermidis*. Lowest is of *Candida spp.*. Two Bacterial species showed equal contamination percentage are *Actinobecter* and *Escherichia coli. Pseudomonas spp., Klebsiella pneumoniae* and *Escherichia coli* were in moderate concentration. The results obtained included mobile phones of both the genders. The hygiene practices were also noted when collecting samples. The presence of *S. aureus* was also reported by Akinyemi *et al.,* (2009).

The temperature, huge surface area and moisture present on mobile phones favors the luxurious growth of flora (Purnima R. Chitlange, 2014). The touch screen phone (Smart) bears less pathogen because of the flat surface limiting the adherence of bacteria (Kabir O Akinyemi *et al.,* 2009). Poor sanitization practices, lack of knowledge and Negligence may expose the population with various virulent disease and infection. They are potential vectors transmitting disease from one to other. Periodic cleaning of mobile phones is necessary to avoid diseases.

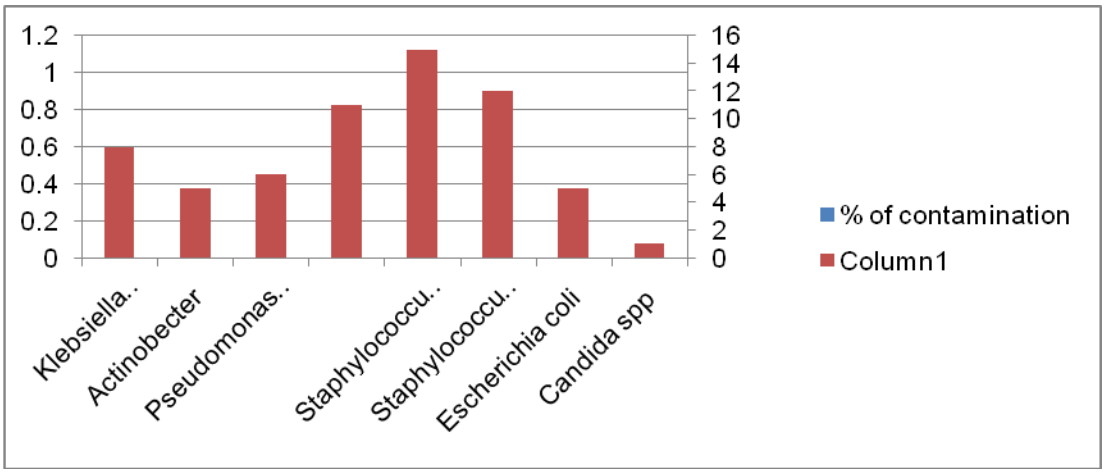
**Table.1**

| S. No. | Microorganism | Number of Phone |
|---|---|---|
| 1 | *Klebsiella pneumoniae* | 8 |
| 2 | *Actinobecter* | 5 |
| 3 | *Pseudomonas spp..* | 6 |
| 4 | *Enterococcus spp* | 11 |
| 5 | *Staphylococcus aureus,* | 15 |
| 6 | *Staphylococcus epidermidis* | 12 |
| 7 | *Escherichia coli* | 5 |
| 8 | *Candida spp.* | 1 |

**Table.2**

| S. No. | Profession | No. of phones |
|---|---|---|
| 1 | Faculty | 4 |
| 2 | Security Guard | 4 |
| 3 | Vice Secretary | 1 |
| 4 | Students | 4 |
| 5 | Other Employees | 4 |
| 6 | Mess worker | 4 |
| 7 | Sweepers | 4 |

**Fig.1** % of microbial contamination on Mobile Phone




Owners of mobile phones practice different hygiene measures

**Fig.2** Hygiene practices followed by Mobile phone users

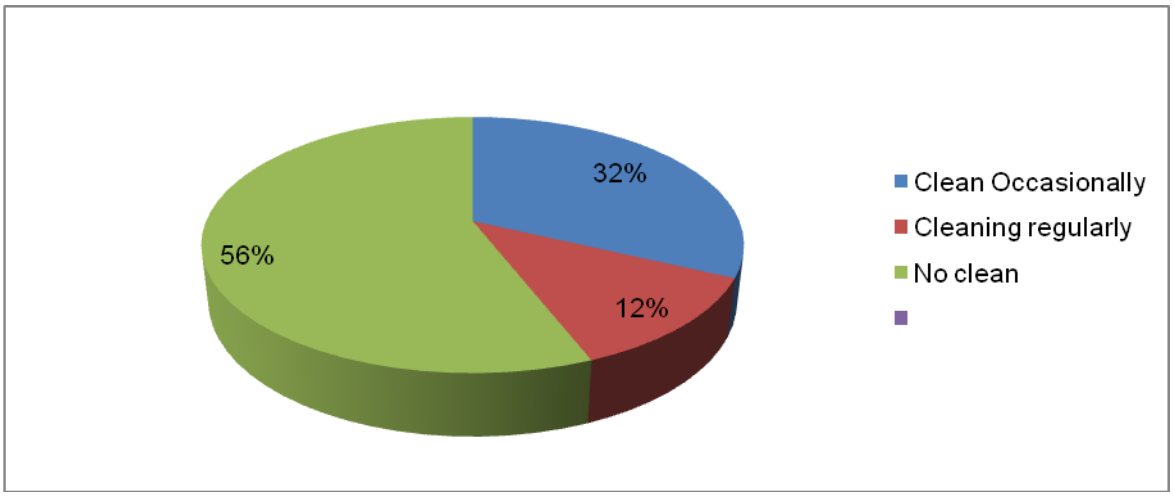



**Fig.3** Bacterial colonies (cfu / ml) according to categories of owners

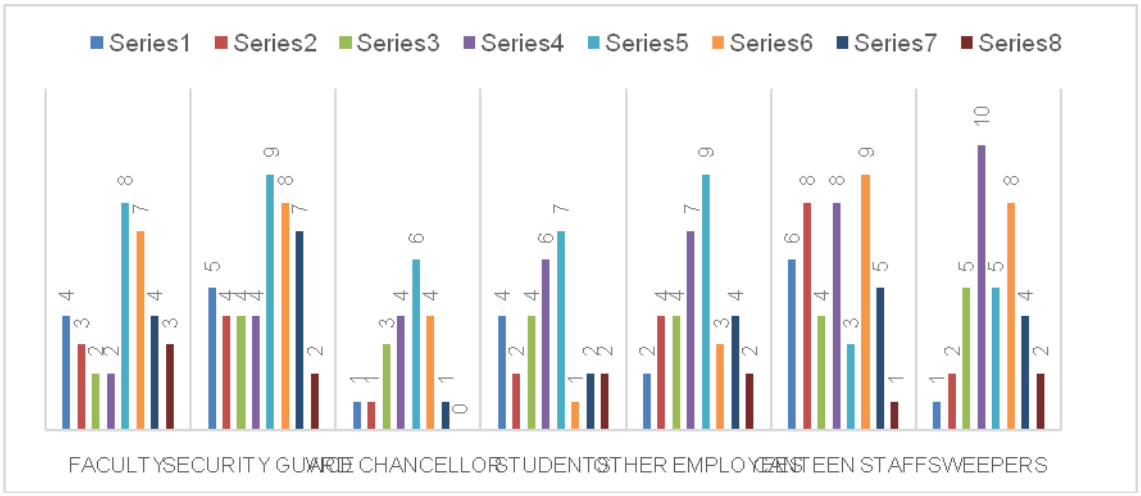



**Fig.4** Quadrant streaking on blood agar and Nutrient agar media

Professional medical staffs should add a regime of properly sterilizing their mobile phones as they are surrounded by various virulent pathogens. This lifestyle change should be adopted by every individual using mobile phone. Limiting using mobile phone in bathroom and while eating could also lower the chances of directly catching the infection.

## References


Abubakar, Bello A. Y. *et al.*, 2017 Occurrence of Bacterial Species from Mobile Phones of Students from Two Departments in Niger State Polytechnic Zungeru, Nigeria Article. Lapai Journal of Applied and Natural Sciences LAJANS Vol 2(1): 72 - 77.

Akinyemi, K. O., Audu, D. A., *et al.*, (2009). The potential role of mobile phones in the spread of bacterial infections. Journal of Infectious Diseases,3(8): 628-632. https://doi.org/10.3855/jidc.556

Barolia S.K, S.Verma and Verma B.K., 2011. Coliform Contamination on different Paper Currency in Ajmer, Rajasthan, India. Universal Journal of Environmental Research and Technology Reserved Eurasian Publications e-ISSN 2249-0256 Volume-1, Issue 4: 552-556.

Barolia S.K. and B.K. Saini. Microbial Contamination on different Paper Currency in, Jhunjhunu, Rajasthan, India: A Review IJRAR1904222 International Journal of Research and Analytical Reviews (IJRAR) www.ijrar.org 786 2018 IJRAR October 2018, (E-ISSN 2348-1269, P- ISSN 2349-5138) Volume 5, Issue 4.

Gireesh K Gupta 2011 Ubiquitous mobile phones are becoming indispensable ACM Inroads, Volume 2, https://doi.org/10.1145/1963533.1963545pp32-33

Kabir O Akinyemi *et al.*, 2009 "The potential role of mobile phones in the spread of bacterial infections". Journal of Infection in Developing Countries InfectDevCtries 3(8):628-32. https://doi.org/10.3855/jidc.556pp628-632

Purnima R Chitlange 2014 "Short Communication: Contamination of cell phones by pathogenic microorganisms: Comparison between hospital staff and college students" Nusantara BioscienceVol. 6 No. 2 (2014) https://doi.org/10.13057/NUSBIOSCI/N060213

Pillet, S., P. Berthelot *et al.*, 2015 Contamination of healthcare workers' mobile phones by epidemic viruses.Clinical Microbiology and Infection 22(5): 456.e1–456.e6. https://doi.org/10.1016/j.cmi.2015.12.008

Smith, S., Opera, I. *et al.*, (2009), Antibiotic susceptibility pattern of Staphylococcus species isolated from telephone receivers, Singapore Medical Journal, 7; 208-211.

Tripathi N and Amit Sapra (2022) Gram Staining StatPearls Publishing LLC.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