

# Microbial Contamination in Mobile Phones and Measures for its Prevention

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**Abstract** -The main aim of this study is to investigate the different studies done in microbial contamination, the speed in which it is spread, measures that can be taken to control or prevent the contamination and various approaches towards solving this issue. The major device- participants in these studies were mobile phones, computer keyboards and elevator buttons along with other regularly-used immovable surfaces. In most of the studies the sample set was limited to 500 or less sample sets, however, the collection of these samples were from multiple everyday-places and the interval of the experiments was kept low so that to verify the speed of contamination and the threat these microbes presented. Also, the contamination has been done with a mixture of bacterial and viral microbes. In most cases, the bacteria, Bacilli turned out to be a dominant pathogen which showed its existence even after carefully cleaning and scrubbing the surfaces multiple times. These objects were also responsible for community-spread of the pathogens in a lot more ways than previously thought. The ability of the microbes to transfer anywhere without being seen is the greatest advantage they have and to survive better, one must know the different objects that are responsible for the contamination. To prevent or control the development of a reservoir of microbes on the mobile phones and computers, researching and inventing novel disinfectants would be the next great step humanity can take.

**Key Words:**mobile phone, computer keyboard, bacteria, disinfection, reduction of contamination

## 1.INTRODUCTION

Since the beginning of the times, microbes have demonstrated their metal in surviving and adapting to the environment no matter how worse it becomes for them. Day by day, they have shown to the world that the planet is theirs and they are here to stay. Changing their strategies and attributes almost daily, microbes carry with them limitless powers and our careless interactions with different objects where they habitat and prosper, doesn't help our case in limiting their contamination. The more devices that we are surrounded with, without their proper handling, the more we invite the pathogens to grow their network and transfer. Movable devices such as mobile phones pose a greater risk as they become a pool of microbial colonies and can be transported anywhere. Scrubbing the surfaces with disinfectants filled with alcohols, when used regularly, does lower the spread but also makes the bacteria adapt to different environment and chemicals. Hence, next time we use such sanitizing products, there is a little difference made

to the microbes' lives while we are left to think that we have done our work.

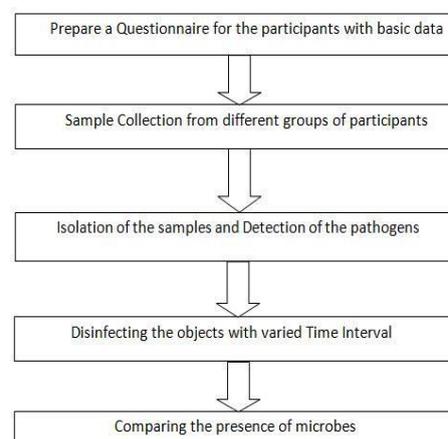
Harmful pathogens can stay alive at a surface for about 5 months without any signs. This becomes risky as all these times they are actively being transferred from one place to another without any surveillance available. The surface of mobile phones being sticky with sweat every few hours also increases the problem with the cleaning.

Examples of disinfectants are chlorine containing substances, peroxide, bromine, silver-copper, ozone and UV. All disinfectants have benefits and drawbacks. To prevent this contagion, regular cleaning of the devices and limiting their transportation and exposure, can be helpful in at least controlling the spread of any potentially dreadful diseases. UV disinfection is one of the most effective methods used. However, it is not possible for the general public to have access to it every day and also there are major drawbacks attached with this procedure. Although, this technology can be certainly used in hospitals in reducing the burden of the contamination.

## 2. METHODS

Before collecting the samples, a questionnaire asking for basic data such as the profession of the participants, amount of cleaning done of the equipment, duration of cleaning, hand washing, travelling and other information is collected. It has been maintained that the samples are from different groups to ensure a better understanding of the contamination.

After the sample collection, these are kept in isolation. Multiple disinfectant are experimented on the devices in varied time intervals and in the end, the devices are checked for the presence of the microbes.



### 3. RESULTS

In order to understand how UV disinfection functions, two samples of swabs, one below 2.5 cm, and another swab from the surface were cultured on a plat. The pathogens for observation were chosen as mostly occurring pathogens for example: e. coli, staph aureus, salmonella, pseudomonas aeruginosa and along with this, yeast and mould count was also taken into consideration. Table 1 and Table 3 clearly demonstrate how without UV Light exposure, there has been a growth within 48 hours of incubation. Table 2 and Table 4 demonstrate how UV Light can remove the pathogen to a considerable amount.

**Table 1:** Swab Culture from Infected Surface (Plastic Dish) Pre – Without UV Light Exposure

S.N.	Test Parameters	Results/Observations	Remarks
1	Swab below 2.5 cm (Culture on Plat)	Growth Observed (48 hrs of incubations)	Not Satisfactory
2	Yeast & Mould Count	Growth Observed	---
3	Pathogens	----	---
A	E. Coli	Present	---
B	Salmonella	Present	---
C	staph Aureus	Present	---
D	pseudomonas Aeruginosa	Present	---

**Table 2:** Swab Culture from Infected Surface (Plastic Dish) Post – After UV Light Exposure

S.N.	Test Parameters	Results/Observations	Remarks
1	Swab below 2.5 cm (Culture on Plat)	No growth of any organism (48 hrs of incubations)	Satisfactory
2	Yeast & Mould Count	Nil	---
3	Pathogens	----	---
A	E. Coli	Absent	---
B	Salmonella	Absent	---
C	staph Aureus	Absent	---
D	pseudomonas Aeruginosa	Absent	---

UV Light source effective about 25 min. of the expose as 3 log reduction achieved against reference culture.

**Table 3:** Swab Culture from Infected Surface (Plastic Dish) Pre – Without UV Light Exposure

S.N.	Test Parameters	Results/Observations	Remarks
1	Swab from Surface (Culture on Plat)	Growth Observed (48 hrs of incubations)	Not Satisfactory
2	Yeast & Mould Count	Growth Observed	---
3	Pathogens	----	---
A	E. Coli	Present	---
B	Salmonella	Present	---
C	staph Aureus	Present	---
D	pseudomonas Aeruginosa	Present	---

**Table 4:** Swab Culture from Infected Surface (Plastic Dish) Post – After UV Light Exposure

S.N.	Test Parameters	Results/Observations	Remarks
1	Swab from Surface (Culture on Plat)	No growth of any organism (48 hrs of incubations)	Satisfactory
2	Yeast & Mould Count	Nil	---
3	Pathogens	----	---
A	E. Coli	Absent	---
B	Salmonella	Absent	---
C	staph Aureus	Absent	---
D	pseudomonas Aeruginosa	Absent	---

UV Light source effective about 25 min. of the expose as 3 log reduction achieved against reference culture.

### 4. DISCUSSIONS

Since the beginning of the times, microbes have demonstrated their metal in surviving and adapting to the environment no matter how worse it becomes for them. Day by day, they have shown to the world that the planet is theirs and they are here to stay. Changing their strategies and attributes almost daily, microbes carry with them limitless powers and our careless interactions with different objects where they habitat and prosper, doesn't help our case in limiting their contamination. The more devices that we are surrounded with, without their proper handling, the more we invite the pathogens to grow their network and transfer. Movable devices such as mobile phones pose a greater risk as they become a pool of microbial colonies and can be transported anywhere. Scrubbing the surfaces with disinfectants filled with alcohols, when used regularly, does lower the spread but also makes the bacteria adapt to different environment and chemicals. Hence, next time we use such sanitizing products, there is a little difference made to the microbes' lives while we are left to think that we have done our work. Harmful pathogens can stay alive at a surface for about 5 months without any signs. This becomes risky as all these times they are actively being transferred from one place to another without any surveillance available. The surface of mobile phones being sticky with sweat every few hours also increases the problem with the cleaning. Computing time would regardless be shown on the graphs representing the freezing time which in turn is a measure of fear memory forming in a live rodent.

### 5. CONCLUSIONS

Mobile phones can play a much larger role in microbial contamination than ever thought before. Hence, the proper cleaning of the devices along with the equipment used in hospitals and hand-washing is the standard protocol for minimizing the effects of these microbes. As found in research, the microbes can survive or persist on the inanimate objects or surfaces even for months without showing any kind of activity, and hence, continuously posing a threat of contamination throughout their existence, it has been recommended strongly to put an end to these risk by using alcohol based sanitizers and other disinfectant. In the recent view of the pandemic faced by the world, research and activity in finding novel ways to remove threatening microbes from human lives and constant cleaning of hands and regularly-touched surfaces, can save more lives than ever before. This practice with not only improve health but also save a lot of finances from going into major treatments which could have been avoided with proper care.

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