STUDY ON MICROORGANISMS INVADED IN THE COMPUTER COMPONENTS

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Abstract
Microorganisms play a major role in humans life. They are present in all kind of the objects utilized by people. In our present study two objects like computer keyboard and mice has been selected from which the microbial samples were collected using sterile cotton swabs. Among hundred samples collected 4 3% of them were non pathogenic, 28% were opportunistic pathogens and remaining are pathogenic. The isolates were morphologically and biochemically characterized and identified to be Klebsiella sp, Staphylococcus aureus, Bacillus sp, E. coli, Pseudomons sp, Eneterobacter aerogens and Staphylococcus aureus. The results indicate that computer accessories can act as a carrier for transmission of pathogens which might cause and spread dreadful diseases.

Key Words: Computer accessories, dust, pathogens and non pathogens, infections

I. INTRODUCTION

Microorganisms are ubiquitous in nature. They are found in each and every object in the environment. Among microbes few may be beneficial and few are harmful. Day to day use of objects by human beings have microbes. Microbes are transferred to the objects from human by the bare hands of people who are in various hygienic conditions. Lack of knowledge on microbes has the cause of spread of many diseases which had created health issues in human beings. Al Ghamdi *et al.* (2011) has stated in his research work that 80% of infections are spread through hand contacts or with other objects. Invisible fluorescent tracers were used to detect the artificial such as counter tops and telephone hand pieces (Reynold *et al*., 2005). Though skin flora are usually non pathogenic, they still can cause diseases via penetrating into the blood stream and fabricate life threatening diseases in people with weak immune system (Cogen *et al*., 2008). Development in technology has made computer a part of human life. Mostly in schools, colleges, offices the computer system handled by many persons acts as fomites (Huber and Pelon, 2005). The main objective of our study was to investigate the presence of bacterial organisms in two different objects like computer key board and mice that are frequently used by the communities of academic people of Hindusthan College of Arts and Science, Coimabtore.

II. MATERIALS AND METHODS

Samples were collected from the computer keyboard and mice by using a sterile swab stick with sterilized peptone moistened cotton wool (Muhammad *et al*., 2016). The collected samples were subjected to serial dilution technique followed by pour plate technique with nutrient media to obtain total bacterial count. Well defined colonies were picked up, pure cultured and preserved at 4°C for further studies. The shape, size and arrangement of the isolates and their differentiation into gram negative or gram positive bacteria were found. The bacterial isolates were characterized biochemically by various tests like Indole, MR, VP, Citrate etc.,

including carbohydrate fermentation (Collins and Lyne, 1989; Harold, 2002).

III. RESULTS AND DISCUSSION:

It was observed that all the 100 samples collected from the keyboards of computers and mice were contaminated. The contaminants which were subjected to serial dilution technique showed variation in results on nutrient agar pour plates. 60% of the samples were uncountable (Too Numerous To Count (TNTC)) and 40 % of the sample were countable (less than 300 colonies) (Fig 1).

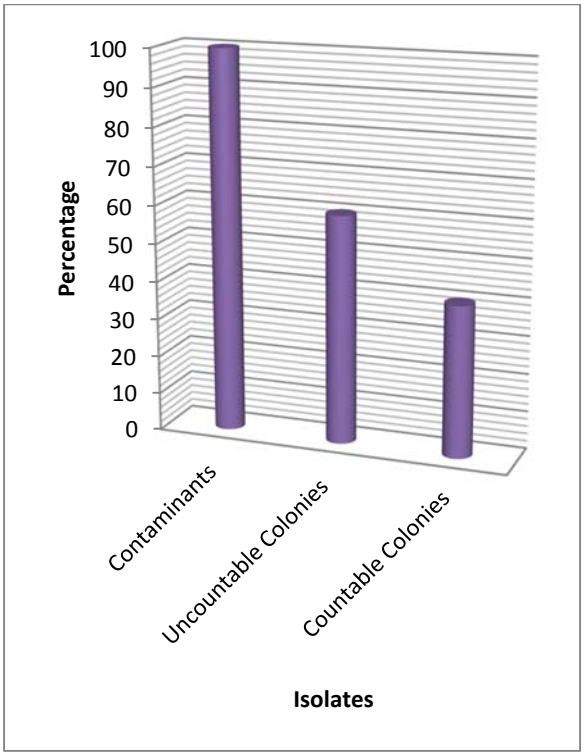

Fig 1: Nature of the isolates

Table 1 Morphological and Biochemical characterization of bacterial isolates from computer accessories

ram Reaction	Morphology	Indole	Methyl Red	VP	Citrate	Catalase	Urease	Lactose	Glucose	Sucrose	Organisms Identified
+	Cocci	+	-	-	+	+	+	-	+	+	*Staphylococcus epidermis*
+	Rod	-	+	+	+	+	+	+	+	+	Bacillus sp
-	Rod	+	+	-	-	-	+	-	+	-	*Escherichia coli*
+	Cocci	-	+	+	-	+	+	+	+	+	*Staphylococcus aureus*
-	Rod	-	+	-	+	-	-	+	+	+	*Enetrobacter aerogenes*
-	Rod	-	-	-	+	+	-	-	-	-	Pseudomonas sp
-	Rod	-	-	+	+	+	+	+	+	+	*Klebsiella pneumonia*

Zeba Gul Burki et al., 2015 has stated that 150 samples were collected from computer accessories in which more than 60% samples showed uncountable bacterial counts.

The pure isolates were biochemically characterized and morphologically identified (Table 1). The isolates were identified to be Klebsiella sp, *Staphylococcus aureus*, Bacillus sp , *E. coli*, Pseudomons sp, *Eneterobacter aerogens* and *Staphylococcus aureus* in which 43% of them were non pathogenic , 28% were opportunistic pathogens and remaining are pathogenic (Fig 2).

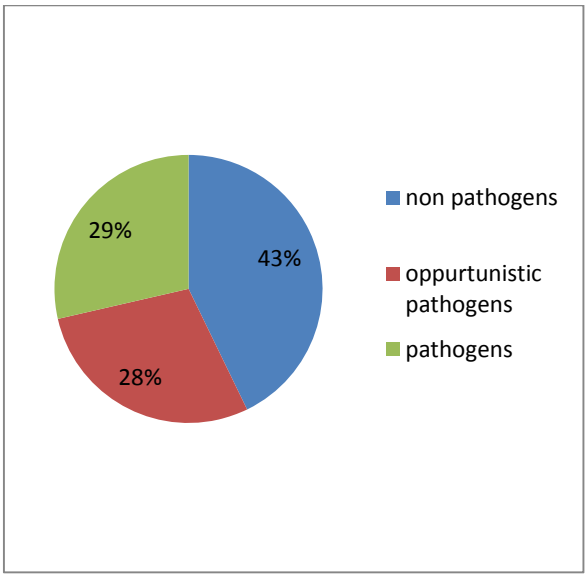

Fig 2: Percentage concentration of contaminants

The isolate Klebsiella pneumonia is an important opportunistic pathogen and causes nosocomial infections. Staphylococcus aureus due to its extensive virulence factors has the ability to cause wide range of infections. They are resistant to several antibacterial agents and can be responsible for several nosocomial infections. Bacillus sp are gram negative non pathogenic but infects incidentally. E.coli bacteria normally live in the intestines of people and animals. They are harmless and are important part of a healthy human intestinal tract. Pseudomonas sp is an opportunistic pathogen causes infections only in unhealthy people whose host defense mechanisms is less effective. Enterobacter aerogens is found in human gastrointestinal tract and does not generally cause disease in healthy people. Staphylococcus epidermis does not produce aggressive virulence in people.

IV. CONCLUSION

The collected dust samples by using sterile cotton swabs from computer's mice and keyboard were found to be contaminated. The isolated samples were identified to be pathogenic and non pathogenic. Pathogens are lethal to human life and can affect their immune defense mechanism which might be harmful or even can cause immediate death. Awareness on the presence of such microbes on computer accessories among computer users and common people are very poor. The individuals can even be a carrier for dreadful disease. Public awareness program can spread the knowledge on usage of computers with hygiene before and after use must be done.

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