Original article:

A Study on Bacterial Flora Found on Fingerprint Scanners of Biometric Attendance Devices at a Tertiary Care Hospital of Southern Rajasthan

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Abstract

Background: Microorganisms are present everywhere and are involved in many clinical, industrial, and environmental phenomena. Biofilm-forming potential pathogens and their dispersal from Biometric devices (BDs) can't be ignored because biofilm growth of bacteria is reported on almost all solid surfaces. Hence; the present study was conducted for assessing bacterial flora found on Fingerprint scanners of biometric attendance machines.

Materials & Methods: A total of 2 biometric machines, installed on different entry gates of the hospital, were included for analysis. A total of 188 employees used the biometric devices. Collection of the samples was done from fingerprint scanners (FPS). Rubbing of sterile wet cotton swabs was done on selected fingerprint scanners. Transferring of the collected swabs was done in sterile tubes which contained five ml of normal saline solution (NSS). Out of twenty-six isolates, ten isolates were classified resistant & rest were classified as antibiotic sensitive by Kirby disc diffusion assay. Minimum inhibitory concentration of Imipenem and Meropenem was determined by broth dilution method.

Results: A total of 26 samples were collected. Bacterial growth was present in 61.54 percent of the samples. Among these, coagulase negative staphylococcus species were present in 46.15 percent of the patients while gram positive bacilli and gram-negative bacilli were present in 11.54 and 3.85 percent of the samples respectively. Cotrimoxazole, Erythromycin and Carbapenems antibiotic resistance was seen in 12, 14 and 7 isolates respectively. Linezolid, Oxacillin and Vancomycin antibiotic resistance was seen in 2, 12 and 11 isolates respectively. Gram negative bacilli identified were Enterobacter spp., Acinetobacter spp and Aeromonas spp.

Conclusion: Biometric finger printing devices are highly susceptible for transmitting the microorganisms directly or indirectly from one person to another.

Key words: Bacterial Flora, Fingerprint, Scanners.

INTRODUCTION

Over Microorganisms are present everywhere and are involved in many clinical, industrial, and environmental phenomena. While the outbreak and richness of infectious diseases and food poisoning that are caused by microorganisms has declined through the years, the total numbers of these diseases is still highly prevalent. Furthermore, the contamination of food/drug and cosmetic products with microorganisms or their derivatives remains a big challenge for industries operating in these markets. Present in all of these issues is the need for timely, ideally on-line, analyses of dangers, and compromised materials.[1- 3]

Biofilm-forming potential pathogens and their dispersal from BDs can't be ignored because biofilm growth of bacteria is reported on almost all solid surfaces. Biofilm formation may be associated with an increased level of mutations activating certain genes responsible for the production of virulence factors. Moreover, bacteria in biofilms can be many folds more drug-resistant than their siblings. Thus, the risk might be much more with biofilm-bacteria being more persistent on BDs and other surfaces than those acquired from other sources.[4-6]Hence; the present study was conducted for assessing bacterial flora found on Fingerprint scanners of biometric attendance machines.

MATERIALS & METHODS

The present study was conducted for assessing bacterial flora found on Fingerprint scanners of biometric attendance machines. A total of 2 biometric machines, installed on different entry gates of the hospital, were included for analysis. A total of 188 employees used the biometric devices. Collection of the samples was done from fingerprint scanners (FPS) between 10:30 am to 11:30 a.m. A total of 26 samples were obtained. Rubbing of sterile wet cotton swabs was done on selected fingerprint scanners. Transferring of the collected swabs was done in sterile tubes which contained five ml of normal saline solution (NSS). This was followed by transferring of the swabs to individual buffered peptone water tubes for incubation at thirty-seven degree centigrade for ten hours. Serial dilution of the remaining NSS was done with the purpose of assessing bacterial load by employing pour plate method. Streaking of the growth from buffered peptone water tube was done on the blood agar plates followed by incubation. Identification of the individual colonies was done based on staining, morphological, biochemical, cultural and growth characteristics. Testing of the isolates was done for assessing antibiotic sensitivity pattern. Out of twenty-six isolates, ten isolates were classified resistant & rest were classified as antibiotic sensitive by Kirby disc diffusion assay. Minimum inhibitory concentration of Imipenem and Meropenem was determined by broth dilution method.

All the results were recorded in Microsoft excel sheet and were analysed by SPSS software. Chi- square test and student t test were used for evaluation of level of significance.

Table 1: Distribution of bacterial load

Growth		**Number of samples**	**Percentage of samples**
Absent		10	38.46
Present	**Coagulase negative staphylococcus spp.**	12	46.15
	Gram positive bacilli	3	11.54
	Gram negative bacilli	1	3.85

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Table 2: Distribution of isolates in clusters

Phenotypic resistance to antibiotics	Number of isolates in clusters
Linezolid	2
Oxacillin	12
Vancomycin	11
Cefotaxime	8
Cefotaxime + Clavulanic acid	7
Cotrimoxazole	12
Erythromycin	14
Carbapenems	7

RESULTS

In the present study, a total of 26 samples were collected. Bacterial growth was present in 61.54 percent of the patients. Among these, coagulase negative staphylococcus species were present in 46.15 percent of the patients while gram positive bacilli and gram-negative bacilli were present in 11.54 and 3.85 percent of the samples respectively. Table 2 summarizes the isolates in clusters. Cotrimoxazole, Erythromycin and Carbapenems antibiotic resistance was seen in 12, 14 and 7 isolates respectively. Linezolid, Oxacillin and Vancomycin antibiotic resistance was seen in 2, 12 and 11 isolates respectively. Gram negative bacilli identified were Enterobacter spp., Acinetobacter spp and Aeromonas spp.

DISCUSSION

Microorganisms have always been extremely important for human life and bacteria, yeasts and molds have been known for both positive and negative reasons. Just like in the past, as it is now, they are inevitably associated with biotechnology, food sciences, medicine, genetic engineering, and other fields of life. Regardless of the technology used for the detection of microorganisms, the immobilisation of a biological particle on the surface of some measurement circuit is a real challenge. This step allows for the bio-reporter, which determines the specificity of a kit for a special target, to attach properly on the surface of the kit, and is therefore a crucial effort towards improved kit performance in terms of sensitivity, specificity and long-term stability.[7- 9]

The time needed for microorganism identification based on the traditional approach which includes morphology, physiology, chemistry, and biochemical characterization is estimated to be at least 2 to 5 days, or even up to a dozen days in the case of molds. In addition, most phenotypic methods used in the microbiological laboratories are labor intensive as well as material consuming. Importantly, phenotypic methods are not always useful to identify unambiguously the microorganism to the species level, or much more often to the strain level.[8- 10]Hence; the present study was conducted for assessing bacterial flora found on Fingerprint scanners of biometric attendance machines.

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respectively. Bhatta DR et al determined the bacterial contamination of common hospital objects frequently touched by patients, visitors and healthcare workers. A total of 232 samples were collected from various sites like surface of biometric attendance devices, elevator buttons, door handles etc. A total of 232 samples were collected and 219 bacterial isolates were recovered from 181 samples. Staphylococcus aureus was the most common bacterial isolate (44/219). Majority of S. aureus isolates were recovered from elevator buttons, biometric attendance devices and door handles. The majority of MRSA isolates 62.5% (10/16) were biofilm producers. Acinetobacter was the most common Gram-negative isolate followed by E coli and Pseudomonas species. High bacterial contamination of frequently touched objects with variety of potential pathogens and normal flora was detected. S. aureus was the most common bacterial isolate.[11]Economic aspect is also important to be looked into in more details, repeated contacts and manhandling, if the internet connectivity is poor to register the clock in and clock out time, makes BDs more costly for operation and in the Institute at any point of time at least two to three BDs are reported malfunctioning due to mechanical and electrical problems. The initial installation cost of touchless devices may be more than BDs but in the long run, both may be costing at the same level.[10- 12]

In the present study, Cotrimoxazole, Erythromycin and Carbapenems antibiotic resistance was seen in 12, 14 and 7 isolates respectively. Linezolid, Oxacillin and Vancomycin antibiotic resistance was seen in 2, 12 and 11 isolates respectively. Gram negative bacilli identified were Enterobacter spp., Acinetobacter spp and Aeromonas spp. Nirupa S et al assessed the risk of transmission of pathogenic bacteria through fingerprinting devices by isolating the bacterial flora which may be present in the Biometric fingerprinting device. Of the total of 84 samples that were collected from the surface of the biometric fingerprinting devices, 39 (46%) samples were culture positive. Among the culture positives, Coagulase negative Staphylococcus species (CONS) was the commonest organism to be isolated 19 (49 %), followed by Gram positive bacilli 17 (44 %) and Gram-negative bacilli of 3(7%). The Gram-negative bacilli isolated were Enterobacter spp., Acinetobacter spp and Aeromonas spp.[12]

CONCLUSION

From the above results, the authors concluded that biometric finger printing devices are highly susceptible for transmitting the microorganisms directly or indirectly from one person to another. However; further studies are recommended

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