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Isolation And Characterization of The Microbial Flora on Biometric Fingerprint Scanners in the University of Northern Philippines

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Abstract

Introduction

This study aimed to isolate and characterize the microorganisms isolated on the biometric fingerprint scanners in the University of Northern Philippines. Specifically, it sought response to the following objectives: (a) to determine the microorganisms isolated on the finger print scanner device in UNP; (b) to determine the colony counts of the bacteria isolated on the finger print scanning devices located at different stations in UNP and collected at different times of the day.This study made use of the experimental research design and was conducted in actual laboratory setting. It was limited to the detection of the different microorganisms present in the four out of the six biometric scanners stationed in the different locations within the university. After identification of the microorganisms, characterization and colony count of these microorganisms were likewise conducted. The collection of specimens was done at the administration building, CHS building and the Guestel building. The primary cultivation of the microorganisms was conducted at the Bacteriology Laboratory of the College of Health Sciences, UNP while the colony count and identification of the individual microorganisms was performed at the Mariano Marcos Memorial Hospital and Medical Center in Batac City, Ilocos Norte. The isolation and cultivation of the bacteria was done manually. Characterization of the bacteria involved the use of biochemical testing and gram staining. Identification and colony count was performed using the VITEC machine.

Result

There were seven microorganisms isolated from the different biometric machines (BM) installed in different buildings within the University campus. Four of these organisms are cocci or round-shaped. These are Staphylococcus aureus, Staphylococcus epidermidis, Micrococcus luteus and Propionebacterium acnes. Two of the organisms are bacilli or rod-shaped. These are Escherichia coli

and Corynebacterium diphtheria. Only one of the isolated organism is a fungus. This is Trichophyton mentagrophytes. All seven microorganisms were isolated from the BM installed at the CHS building. In the same way, all organisms except T. mentagrophytes were isolated in the BM installed at the Guestel building. The minimum number of organisms isolated from the BM were five and all BM harbors an organism coming from human and animal feces (Escherichia coli).

Introduction

Biometric devices are now commonly used in the working environment. The use of biometric fingerprint scanner is commonly found in public places such as hospitals, schools, universities, hotels, government institutions, metro stations etc. These devices have become a necessary tool to record accurately the time when an employee enters and goes out of work.

Because of the worldwide uses of biometric devices for public purposes, there is a great possibility of transferring microorganisms present on our skin like *Staphylococcus epidermidis, Staphylococcus aureus, Corynebacteria, Propionibacterium acnes, Micrococcus luteus,* etc, from one person to another person by fingerprint scanner device.

It is therefore the aim of this research to isolate and characterize the microorganisms isolated on the biometric fingerprint scanners in the University of Northern Philippines.

Its importance is directed but not limited to faculty and employees who are using biometric fingerprint scanner about the microorganism that are commonly found on human skin that could be transferred from one person to another by the use of the above mentioned devices.

This will also further encourage people to take precautionary as well as preventive steps to avoid transmission of microorganisms by using these devices. This research also serves as a springboard for more research on microbial analysis, which will then be very useful for the future prevention of any harmful diseases that can be transmitted via any devices.

Materials and Methods

Specimen collection and cultivation of the microorganisms were conducted at the Bacteriology Laboratory of the College of Health Sciences, University of Northern Philippines (UNP), Vigan City while the isolation, characterization, identification, confirmation and

colony count of the microbial isolates were performed at the Mariano Marcos Memorial Hospital and Medical Center Bacteriology Section, Batac City, Ilocos Norte.

Plate 1. *Bacteriology Laboratory of the College of Health Sciences*

Sample were taken from four biometric fingerprint scanners in the University of Northern Philippines (UNP), Vigan City, which were used for logging in and logging out of their employees

The reagents used in the experiment were 95% ethyl alcohol, to disinfect the working tables; sterile test tubes containing 5 mL of Normal Saline Solution (NSS), to cultivate the microorganisms collected in the biometric devise screens; Nutrient Broth (NB), Nutrient Agar (NA), Blood Agar Plates (BAP), McConkey Agar (MCA), and Potato Dextrose Agar (PDA) to cultivate the microorganisms; Gram Stain solution, to color the bacterial smears, and distilled water, to dissolve and prepare the culture media.

Of the six (6) biometric machines installed in the university, only four (4) were used in the experiment. These are: Biometric Machine (BM) 1 – outside the Cashier's Office, BM 2 – outside the Registrar's office, BM 3 – University Canteen, and BM 4 – CHS building. These were chosen by their accessibility to employees. Each BM was disinfected with absolute ethyl alcohol at 6:30AM and specimen collection was done at 30 minutes after sterilization or at 7:00AM, at 8:30AM, at 12:30PM and at 5:30PM. These were repeated three times and were conducted every other day.

Bioethical Clearance

Before starting the experiment, clearance from the UNP Bioethics Committee was sought. The Ethics Review Committee forms 1 and 2 were properly filled out and submitted to the committee before conducting the experiment.

Statistical Treatment of Data

Only the mean was used to treat the data in the experiment. It was employed to describe the colonial features in terms of the average colony count of the microorganisms isolated from the biometric machines.

RESULTS

This section deals with the presentation, analysis and

interpretation of data gathered in the study. The data are presented in the tabular, graphical and textual forms.

Table 1 : Microorganisms Isolated from each of the Biometric Machines

Microorganisms Isolated	Biometric Machine 1 (Outside the Cashier's Office)	Biometric Machine 2 (Outside the Registrar's Office)	Biometric Machine 3 (University Canteen)	Biometric Machine 4 (CHS Building)
Staphylococcus aureus	Present	Present	Present	Present
Staphylococcus epidermidis	Present	Present	Present	Present
Micrococcus luteus	Present	Present	Present	Present
Propionebacterium acnes	-	-	-	Present
Escherichia coli	Present	Present	Present	Present
Corynebacterium diphtheria	-	-	Present	Present
Trichophyton mentagrophytes	-	-	-	Present
Undifferentiated life forms	Present	Present	Present	Present

The table above presents the different microorganisms isolated from the four biometric machines installed at different sites inside UNP. This was identified using the VITEC machine and was confirmed through gram staining technique.

Table 2: Colony Count of the Microorganisms Isolated

Biometric Machine	Number of Colonies / Trial			Average	Grand Ave. Colonies
	1	2	3		
Biometric Machine 1					
• After Disinfection	0	0	0	0	
• 8:30AM	15	17	13	15	67
• 12:30PM	24	22	20	22	
• 5:30PM	32	30	29	30	
Biometric Machine 2					
• After Disinfection	0	0	0	0	

• 8:30AM	19	16	17	17	76
• 12:30PM	28	23	25	25	
• 5:30PM	36	31	33	34	
Biometric Machine 3					
• After Disinfection	1	0	1	1	
• 8:30AM	21	22	19	21	94
• 12:30PM	31	32	32	32	
• 5:30PM	40	41	39	40	
Biometric Machine 4					
• After Disinfection	0	1	0	1	
• 8:30AM	25	25	21	24	106
• 12:30PM	39	36	30	35	
• 5:30PM	48	44	44	46	

Biometric machine 1 – Outside the Cashier's Office
Biometric machine 2 – Outside the Registrar's Office
Biometric Machine 3 – University Canteen
Biometric Machine 4 – CHS Building

The table shows that all the scanner machines were disinfected prior to the specimen collection. This was to ensure that there were no microorganisms present in those biometric machines. Thirty minutes after disinfection, the baseline count was obtained.

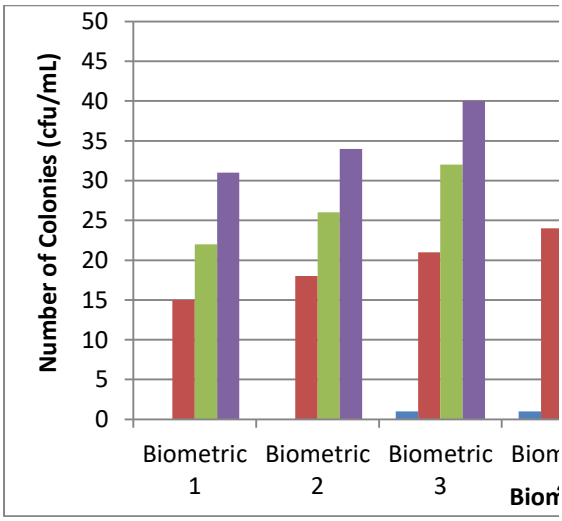

Figure 1. Colony count of microorganisms isolated in the different biometric machines at different times of the day.

At 8:30 in the morning, the colony count isolated was few but in the afternoon, the colony count exhibited a sharp increase in number.

The result of the experiment indicates that biometric scanning device can be a medium where microorganisms can be deposited waiting for the opportunity to be transferred to another medium via direct contact with the fingers. The microorganisms may not multiply in the scanners because they need culture media to grow but they can still cause an illness once these bacteria enter the body through ingestion, inhalation and direct contact via jeopardized intact skin.

Conclusions

From this study we can conclude *Staphylococcus aureus, Staphylococcus epidermidis, Micrococcus luteus, Propionebacterium acnes, Escherichia coli, Corynebacterium diphtheria* and *Trichophyton mentagrophytes* were the most common organism isolated from the BM installed in UNP.

Recommendations

Based on the conclusions formulated, the following recommendations are forwarded for consideration:

1. Posters bearing "***Always sanitize your fingers before and after using this Biometric Machine***" be mounted beside all the BM installed all over UNP to remind employees to be more cautious every time they use the device.
2. Hand sanitizers be installed beside each biometric machine. Although this may entail additional expenses on the part of the administration but there are ways to do this without incurring much expenses.
3. Daily disinfection of the biometric machine either through swabbing or spraying is highly recommended.

Bibliography

Aragon, M.J., Gonzales, M.L. and Ong-Lim, A (2011). The Clinical and Epidemio Logic Profile of Community-Associated Methicillin-Resistant Staphylococcus aureus Infection Among Pediatric patients Admitted at the PGH. (Retrieved from http://www.pidphil.org/journal summary. Retrieved on May 1, 2018).

Burton, G.R.W. & Engelkirk, P.G. (2000). Microbiology for Health Sciences. 6th Ed., United States of America: Lippincott Williams and Wilkins.

Cortez, A.M, John Paul Dewey. (2008). Diagnostic Bacteriology with Laboratory Manual. Thompson Publishing Co., New Wales, England.

Delost, Maria (2010). Introduction to Microbiology: a Handbook and a Workbook Elsevier Publishing Co., New York, USA.

Engelkirk, P.G. & engelkirk, J.D. (2011). Burton's Microbiology for the Health

Sciences. 9th ed. Philippines: Lippincott, Williams and Wilkins.

Forbes, B.A., Sahn D.F. and Weissfeld, A.S., (2010). Bailey and Scott's Diagnostic Microbiology, 10th ed., Mosby, Inc New York. pp. 722, 876-890.

Nierva, P.T., Orpia, D.P., Ocampo, A.M. (2012). In Vitro Study on the Efficacy of
Aqueous Akapulko (cassia alata) Solution in Inhibiting the Growth of Trichophyton mentagrophytes Using Agar Well Diffucion Method. Journal of Health Sciences. UERMMMC. Manila.

Romero, R.C., David Filoteo, L. De Veyra, T.R., Espino – Pechache, M.R. Fangonil Barril, F.D. Feliciano-Cabahug, A. Javaloa, M., Malvar-Villaflor, B. (2010). National Prevalence Survey of Fungal and Skin Diseases. The Journal of Philippine Dermatological Society. 8 (2): 115-119.

Strasinger, S.K. & di Lorenzo, M. S. (2008). Urinalysis and Body fluids. 5th Edition. Philadelphia: F.A. Davis Company.

Tagoe, B.M., Alba, M. S. (2007). Bacterial Contamination of Mobile Phones. Master's Thesis, University of the Philippines, Manila. http://en.blogspot.org//Staphylococcus_aureus