Research Paper

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A Preliminary Study of Bacterial Contamination from Elevators

Microbiology

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ABSTRACT

The present study aims to understand the level of bacterial contamination of elevator buttons at the Faculty of Science building, Jazan University, Jazan, Kingdom of Saudi Arabia. A total of 20 samples (n = 20) were collected using sterile cotton swabs from buttons of 4 different elevators (5 samples each from 4 elevators). Samples were isolated on Nutrient agar and MacConkeys agar. The agars were incubated at 37°C for 24 hours and observed for growth. The colonies were subjected to Grams' staining and observed under a microscope. All the samples (100%) showed bacterial contamination. Staphylococcus species (20 samples, 100%), Gram negative bacilli (9 samples, 45%), Streptococci spp. (6 samples, 30%) and Gram positive bacilli (3 samples, 15%) were isolated. Staphylococcus species was most dominant followed by Gram negative bacilli, Streptococci and Gram positive bacilli. Staphylococcus aureus was isolated from 75% samples. Three samples (15%) were found contaminated by single type of bacteria while 85% samples were contaminated by more than 1 type of bacteria. The presence of bacterial contaminants on elevators indicated the probable tool for spread of pathogenic microorganisms.

Introduction:

Microorganisms are found everywhere. Most of them are found on the things we use in our daily lives. They are found in our houses, offices, cars, gardens, hospitals and everywhere (Reynolds et al. 2007). The presence of normal flora on humans and the existence of microbes in the environment are the factors resulting to this. Bacterial contaminants have been found in kitchens, playground equipment, office desks, computer keyboards, escalator buttons, etc. Studies have found elevator buttons to be a hot spot for bacterial contamination. Al-Ghamdi et al. (2011) described 96% contamination of elevator buttons in shopping malls and 98% contamination in residential buildings. Researchers have found that an elevator button harbors nearly 40 times as many germs as a toilet seat. These contaminants can be a source for different diseases (Bloomfield, 2008).

The faculty of Science building has more than 5000 students and Staff members. And there are a total of 10 elevators. The present study was undertaken to study the bacterial contaminants found in elevators used by staff and students of the Faculty of Science, Jazan University.

Materials and Methods:

The study was carried out in the Department of Biology, College of Science, Jazan University, Jazan, Kingdom of Saudi Arabia from January to March 2011.

A total of 20 samples were collected using sterile cotton swabs from buttons of 4 different elevators (5 samples each from 4 elevators) in the faculty of science building, Jazan University, Jazan, Saudi Arabia. Samples were isolated on sterile Nutrient agar and MacConkeys agar (Himedia Labs, India). The agars were prepared as per the instructions provided with the media. The agars were incubated at 37°C for 24 hours and observed for growth. Colonies were counted using a colony counter. Smears were prepared from the isolated colonies and were subjected to Grams' staining technique (Cheesebrough, 2006). The slides were observed under oil immersion lens of a microscope.

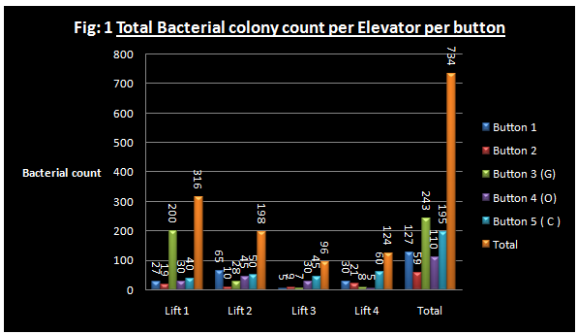
Results:

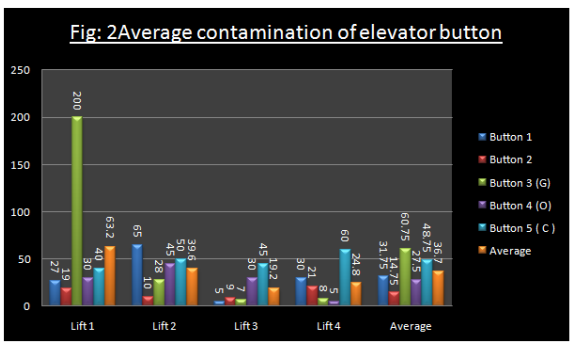
In the present study, all the samples showed bacterial contamination (100%). As seen in table 1. Elevator 1 was the most contaminated, followed by elevator number 2 and elevator number 3 was the least contaminated. As seen in figure 1, bacterial colony count was most on button 3 (ground floor) with 243 colonies and was the most contaminated, followed by button 5 (close door) with 195 colony count. Button 2 (second floor) was the least contaminated with 59 colonies.

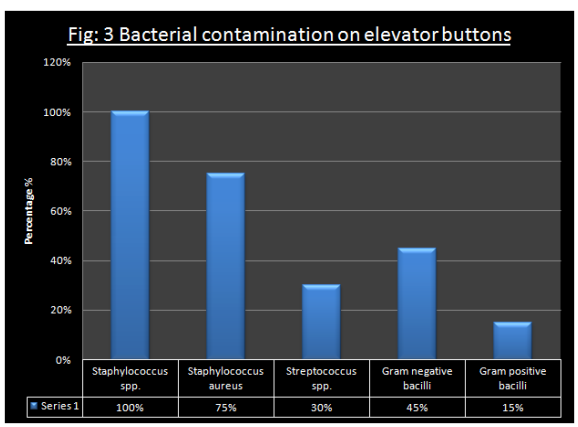
As seen in Fig 2. An average of 63.2% colonies were seen in elevator 1. From our samples, Staphylococcus species (20 samples, 100%), Gram negative bacilli (9 samples, 45%), Streptococci spp. (6 samples, 30%) and Gram positive bacilli (3 samples, 15%) were isolated (Fig. 3). Staphylococcus species was the most dominant followed by Gram negative bacilli, Streptococci and Gram positive bacilli. Staphylococcus aureus was isolated from 75% samples. Three samples (15%) were contaminated by single type of bacteria, while 85% samples were contaminated by more than 1 type of bacteria.

Table 1: Distribution of Microorganisms isolated from different Elevator buttons.

TABLE1	Button 1	Button 2	Button 3	Button 4	Button 5	Total
Elevator 1	27 colonies Staph. spp. Staph. aureus GNB	19 colonies Staph. spp. Staph. aureus	200 colonies Staph. spp. Staph. aureus	30 colonies Staph. spp. Staph. aureus GNB	40 colonies Staph. spp. Staph. aureus GNB	316 colonies
Elevator 2	65 colonies Staph. spp. Staph. aureus GNB, GPB	10 colonies Staph. spp.	28 colonies Staph. spp. Staph. aureus GNB	45 colonies Staph. spp. Staph. aureus	50 colonies Staph. spp. Staph. aureus GNB, GPB	198 colonies
Elevator 3	5 colonies Staph. spp. GPB	9 colonies Staph. spp.	7 colonies Staph. spp. Staph. aureus	30 colonies Staph. spp. Staph. aureus	45 colonies Staph. spp.Staph. aureus, GNB	96 colonies
Elevator 4	30 colonies Staph. spp. Staph. aureus GNB	21 colonies Staph. spp. Staph. aureus GNB	8 colonies Staph. spp.	5 colonies Staph. spp.	60 colonies Staph. spp.	124 colonies
Total	127 colonies Key: Staph.spp. =	59 colonies Staphyl-ococcus Species	243 colonies Staph.aureus =	110 colonies Staphyl-ococcus Aureus	195 colonies GNB=Gram Negative bacilli	734 colonies GPB=Gram Positive Bacilli







Discussion:

The occurrence of bacterial contaminants in elevators was studied. All the samples showed bacterial contaminants (100%). These results are in correlation with the study of Al-Ghamdi et al (2011). They found 96% contamination in elevator buttons in shopping malls and 98% contamination in residential buildings. Our study showed 2 % more bacterial contaminants. This may be because of high student number using the elevators.

Elevator 1 is the most contaminated elevator with a total bacterial count of 316 colony count followed by elevator number 2 with 198 colonies then elevator number 4 (123 colonies) and then elevator 3 (96 colonies). Elevator number 1 is closest to the main gate of the Faculty of science building and is most likely to be used more than the other elevators and is the most contaminated. Elevator number 2 is farther from the main gate and is next likely to be used by the students and was found to be the next most contaminated elevator. However, the elevators 3 and 4 are farthest away from the main gate and are comparatively less used by the students and thus, found least contaminated. This indicates that the elevator most in use is the one that is near to the main gate and hence, has the highest rate of contamination.

Staphylococcus species were isolated from all the elevator samples. These were not showing yellow colored colonies. *Staphylococcus aureus was found in 75 % samples followed by Gram negative bacilli (40%), Streptococci (30%), and Gram positive bacilli (15%). Al-Ghamdi et al. also found Staphylococcus species in 84% of their elevator samples followed by 60 % Gram positive bacilli, 11 % Staphylococcus aureus and 7% Gram negative bacilli. The high percent of Staphylococcus aureus in our study is alarming because of its potentially pathogenic nature.*

Conclusion:

The present study thus, gives us the importance of hand hygiene which would decrease the microbial load of hands. And there is the necessity to frequently use disinfectants to clean elevator buttons to decrease spread of potential pathogenic microorganisms in society. Further detailed studies are however required.

REFERENCE

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