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A Study of Hand Contamination and Hand Washing Practices in Toilet Door Knobs Pollution Public Health

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ABSTRACT

The increasing incidence of disease epidemics and their spread from one group to another have become important concerns for public health. The bacterial contamination was examined for door handles / public convenience grips for selected government offices, motor parks and markets in India. 156 samples were positive out of the 180 samples grown in Swab (86.7%). There were more positive studies of female clothes handles / knobs (41.7%) and door handles / knobs in bathrooms (11.5%) than male ones. The study also found that toilet door handles / knifes were infected more often in markets, motor parks and restaurants than in government offices and banks. In the door handles / knot, contamination was also higher (87.2%) than in the door handles / knobs for bathrooms (85%). Coliforms were mainly bacterial pathogens. Isolated bacterium pathogens include Staphylococcus aureus (30.1%), Klebsiella Pneumoniae (25.7%), Escherichia coli (16 Community Health Officers, Environmental Protection Board and health officials), as well as private public education agencies on human and environmental health. It indicates that the popular places in the city have highly pathogenic bacteria, which will soon cause epidemics. The public will thus be educated on personal and environmental hydration by community health authorities, health officials, and the Environmental Protection Board and private organisations.

1. Introduction

Everywhere micro-organisms are present and form a major part of all ecosystems. They live either openly or as parasites in these settings. We live as transient pollutants in fomites or paws, sometimes as a source of population and hospital-acquired infections, which present major health risks. The rising occurrence of disease epidemics and their spread from one group to another have become important issues for public health. While the risk of infection is accepted as less severe than that associated with hospital patients, the annual increase in food toxicity, which involves household outbreaks, requires an assessment of possible causes and sources. In fact , the main source of and spread of community diseases is formitism in addition to daily interactions among individuals, who constitute one way to spread disease. Forms that constitute an important source of infectious disease transmission in direct contact with humans or the natural habitats of pathogenic organisms. These formats include grips for doors, bathrooms, toilets and faucets, sinks, lockers, chairs and tables, especially those found in public rooms, hospitals, hotels , restaurants and toilets. Door handles of toilets and the bathroom are one of the most common sources of infection. Public toilets and toilets are commonly used by people who throng their own microbial flora and other species they've picked and put them in door handles / buttons when they go in and out. The probability of formite disease transmission depends on the frequency of site contamination and exposure; host excreted level of pathogen; possibility of transportation of infectious agent to susceptible people; organism virulence; immunocompetence of contact persons; control action practices such as disinfectant use and personal hygiene. Unfortunately, there is a lack of water supply in the majority of public toilets found in parks and markets, in particular, in India. Users can not wash hands after use and bear pollutants from these conveniences. This could lead to community-related Staphylococcus aureus methicillin-resistant outbreaks in high prevalence zones and cholera outbridges.

2. Materials and methods

Tests were collected using full aseptic precaution from toilet door handles / knobs in selected public places in India. Samples were obtained using the American Public Health Association's (Reynolds, 2005) Swab-rin method. Samples were collected. Sterile, cotton-tipping applicator (swab stick) with sterile peptone water is used in door handles / knobs. Then it was placed into bottles of jewelry containing clear, shaken and loosely collected peptone water. The jewelry bottles had been cellophane wrapped and shipped from the Teaching Hospital in ice bag, where the samples were analysed. The pepton water in which the samples of the swab from door handles / knobs were rinsed was threaded, gently shook and spilled on MacConkey agar, Blood agar and chocolate-stick plates. It would allow all species taken up in the swab to be quickly recovered. The plates were then incubated for 24 hours at 37oC aerobically.

Identification and characterisation of bacterial contaminants

The macroscopic analysis of the colonies first separated bacterial isolates. Colonies were distinguished according to

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their length, colour, pigmentation, height, surface and marginal texture, blood haemolysis and chocolate agar plates and MacConkey agar lactose fermentation. Several biochemical experiments were also conducted in order to better classify the different Barrow and Feltham isolates (1993).

3. Results

Bacterial contamination was collected by tests of both toilet and door handles / knobs in selected public places. Eighty (180) swab samples; 70 of male toilets, 70 of female toilets, 20 of male toilets and 20 of female bathrooms respectively. Of the 180 samples of bacterial infection, 156 (86.7 percent) were positive (table 1). Of the 140 toilet door handles / knobs collected, 122 (87.1 percent) showed bacterial contamination, while of the 40 toilet handles / knobs collected, 34 (85 percent) showed bacterial contamination (Table 2). Staphylococcus aureus had the highest prevalence of bacteria contaminant, following 25.7% Klebsiella pneumoniae, 15.6% Escherichia coli, 11.2% Enterobacter, 7.1% Citrobacter, and 5.9% Pseudomonas, while the Proteus had a minimum prevalence, 4.5%, as shown in table 4. Among isolated bacteria, Staphylococcus Areus had the highest prevalence 31%.

Table 1: Distribution and percentages of positive samples of male and female toilets and bathrooms door handles/knobs

Door handles/knobs	Total samples Examined	Number positive	% of positive samples
Male toilets	70	57	36.5
Female toilets	70	65	41.7
Male bathrooms	20	16	10.3
Female bathrooms	20	18	11.5
Total	180	156	86.7

Table 2: Distribution of bacterial contamination on toilets and bathroom door handles/knobs swabbed

Toilets		Bathrooms	
Number of samples	Culture positive (%)	Number of samples	Culture positive (%)
140	122 (87.1)	40	34 (85)

Table 3: Distribution and percentage bacterial contamination of toilets and bathroom door handles/knobs in relation to the establishments sampled

	Banks	Markets/parks	Churches	Restaurants	Government establishments
Number of samples	8	80	4	4	84
Number of positive samples	5	72	3	4	72
Percentage of positive samples	62.5	90	75	100	85.7

Table 4: Prevalence and degree of growth of bacteria isolated from contaminated door handles/knobs

Bacteria	Number isolated	Degree of growth	Prevalence (%)
Staphylococcus aureus	81	++++	30.1
Klebsiella pneumoniae	69	+++	25.7
Escherichia coli	42	++++	15.6
Enterobacter spp.	30	+++	11.2
Citrobacter spp.	19	+++	7.1
Pseudomonas aeruginosa	16	++	5.9
Proteus spp.	12	+++	4.5

4. Discussion

The door handles and knobs have been well-documented in bacterial , fungal and viral contamination and are in turn used as a form of trans-infection and recontamination of the hands being washed. Any of the pollutants can be highly pathogenic and transferable to another individual or contribute to auto-inoculation. In this study to determine the extent of bacterial contamination and to classify bacterial pollutants, door handles and knobs of bathrooms in churches, markets / parks, banks, restaurants and government establishments in India were assessed. Of the 180 samples analyzed, bacterial contamination was found in 156 (86.7 percent). This is slightly smaller than what Otter and French (2009) reported, in similar settings, to 95% positive cultures. The use of the water system , particularly in examined public offices, may be due to this. The cleaning contractors working with such establishments may also be attributed to the continuous cleaning of these toilets. The analysis also reveals that the toilet door handles / bags contamination level (87.1 percent) was marginally higher than on door handles / bags for bathrooms (85%). This disparity in pollution rates can be due to the broader use of toilets than to bathrooms in the population. It is well known that less people in public bathrooms use their baths in contrast with people going to the toilets. In addition , this study indicates the increased bacterial contamination (41.7% and 11.5%, respectively) of females toiletries and door grips / basins relative to male toilets and door handle / baskets (36.5% and 10.3%). This is similar to what Kennedy et al .(2005) have found. It may be because of other women's habits that appear to raise pollution. For example , women carry many beauty

objects (hand creams, lotions, eyelids, papers, mirrors, maquillages and much more) in their bags and use them every time they come into the public domain. The consequence of this life-style is that pollutants are left at the doors of these products, a circumstance which is rarely seen in male toilets.

The study also found that door handles / knobs of toilet and bathroom markets / parks and restaurants were highly contaminated (90% and 100%), compared to banks, churches and government institutions (62,5%, 75% and 85,7%, respectively). This is in line with Boone's and Gerba (2010) reports that traffic, exposure and climate rates of convenience pollution differ. The level of traffic in laundry facilities in the latter group was much higher than in banks, churches and public institutions in the former group. In the former, the use of bacterial pollutants on the surfaces is often limited to the employees, and/or continuously cleansed by contract workers who clean and wipe door handles / buttons after few uses, thereby and the traffic in toilets and bathrooms in their surfaces, while in the latter ones there are only a few such facilities. This is similar to the Kennedy et al. study (2005) which states that high traffic toilets, such as airports, bus terminals, education facilities, and toilets with one or less urinals have been polluted more often. In addition, restaurants, motor parks and markets lack cleaners and a majority of those available do not have the equipment or desinfectants training to perform their work at these sites, resulting in high contamination levels.

Previous research has shown that the formitis used regularly or seriously are most likely to be infected, resulting in increased heterotrophic loads of bacteria (Bright et al., 2010). Staphylococcus aureus (30,1%), then Klebsiella Pneumoniae (25.7%) and Escherichia coli (15.6%), are the most widely used bacterial pollutants throughout this report. The isolation of Pseudomonas aeruginosa (5.9%) is also important to the health risk of an ever-growing population. This is similar to the one provided by Kennedy et al .(2005) and Rusin et al . (2002). The majority of positive samples tested were bacterial isolate of more than one kind, but most cases are from samples obtained from parks and markets. The high level of these pollutants in these environments is especially significant because of the growing number of immuno-compromised patients and cases of transplantation.

5. Conclusion

In addition, we will remember that bacterial contamination is high and that bacterial pollutants are extremely prevalent. It can be a time bomb due to its outbreak potential. It will include the education of the public on personal and environmental hygiene through the community health superintendents, sanitary officers and environmental protection council and private organisations.

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