

# Antibacterial Activity of Some Household Surface Cleaners against Common Pathogens

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## ABSTRACT

Surface cleaner has been widely used to control infections and its transmission. In Hospitals Antiseptics are used to control microbial growth on living tissues and inanimate objects. The activity of six commercial household surface cleaner, Dettol, Phenyl, Harpic, Max, sweepy and local surface cleaner were tested against common pathogens of 10 different species of each strains of *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa* and *Bacillus subtilis*. Disc diffusion method were implanted with different concentrations of 100%,75%,50%,25% for each surface cleaner and applied on MHA. After incubation of 24 hours inhibition zones were measured as the maximum zone of inhibition were observed by *Staphylococcus aureus* at 75 % concentration and the minimum zone of inhibition were observed by *Bacillus subtilis* at 25 % concentrations. This conducted study showed effectively killing of Disinfectant in all test organisms and provide greatest protection in the transmission of diseases.

### Keywords

Antimicrobial activity, Surface cleaners, Potential pathogens, Health risk.

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### Article info.

Received: April 3, 2017

Accepted: May 29, 2017

**Cite this article:** Naz S, Afaque F. Antibacterial Activity Of Some Household Surface Cleaners Against Common Pathogens. RADS j. biol. Res. Appl. Sci 8(1):23-25.

**Funding Source:** Nil

**Conflict of Interest:** Nil

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## Introduction

The health of a man is the major part of life, health hazards can be very severe and more often leads to death (1). Therefore, the environment should be clean and free from harmful microorganisms to prevent as much diseases as possible to remain healthy. This condition can be accompanied by using disinfectants and surface cleaners (2,3). The personal hygiene should be maintained by proper hand washing and using different cleaners and disinfectant to avoid the attack of bacteria that are the major cause of health hazards (4) and causes the GIT infections which are the main reason of food borne diseases.

Food borne diseases affect human by ingestion or drinking contaminated water and food with microorganisms. The kitchen utensils become contaminated with *Staphylococcus* mainly *S. aureus* causes food borne gastroenteritis. They include nausea,

vomiting, abdominal cramps, diarrhea, sweating, headache and prostration (5). In order to prevent infection it's highly important to use trusted detergents that kill pathogenic microorganism.

According to Osborn and Grobe by using antiseptic Surface 65 to 85% removal of bacteria could be attained from human skin (6). Transient bacteria are attached to the skin and cause many infections these bacteria include *Pseudomonas aeruginosa* (7) and *Staphylococcus aureus* (8).

Cleaning surfaces are essential to obtain the germs free environment. Many products are used to clean the surfaces but all products give the varying results. Some products are designed to work best on specific surfaces and/or soils few of them are Dettol, Harpic, Phenyl etc that can be effective to *E.coli*, *S.aureus*, *Pseudomonas* and *B.subtillus*.

Using wel diffusion method, different disinfectants are evaluated on the human skin flora and surface flora (9). Identification of bacterial species that are most resistant to the antibacterial surface cleaners of daily use was also made.

In an analysis of the action of a disinfectant, there are some compounds that act upon different components of the cell such as acidic or alkaline compounds, chlorine derivatives, amphoteric compounds, phenolic compounds, Hydrogen Peroxides and Ozone. It may often be difficult to distinguish between the primary stage (characteristic of the mode of action) and the secondary stage (merely a consequence of the action). Precisely these compounds act upon cell wall, cell membrane, energy metabolism, cytoplasm, nucleus and even kill the spores (10).

This study shows the comparison of different surface cleaners such as the branded surface cleaners against locally manufactured surface cleaners as well as this study also shows the effect of selected surface cleaners against different pathogens.

## Materials and Method

**Sample collection and culture preparation:** The samples are taken from different companies including Dettol, Phenyl, Harpic, Sweezy, Max and local surface cleaner. Nutrient broth used for each culture including *S.aureus*, *E.coli*, *P.aeruginosa*, *B.subtilis* and incubate for 24 hours.

**Preparation of Sterile Disc:** Filter disks about 5 mm in diameter were made from Whatman's No.3 filter paper wrapped in aluminum foil. Each sterile disc was incorporated individually with 40 µl of detergent with various concentrations (25%, 50% and 100%).

**Assay of Antimicrobial Activity:** Using sterile forceps, discs impregnated with different dilution and different disinfectants were placed on each of the plates inoculated with the test organisms. The forceps was used to press down each of the disc gently against the agar surface so as to ensure good contact. The plates were incubated in an inverted position at 37°C for 24 hours. The zones of inhibition were observed.

## Results

The average sensitive zone for *Escherichia coli* were 3.2cm, *Staphylococcus aureus* were 2.7cm, *Pseudomonas aeruginosa* were 2.6cm, *Bacillus subtilis* were 2.4cm at 100%. The intermediate zones for *Escherichia coli* were 2.4cm, *Staphylococcus aureus* 2.8cm, *Pseudomonas aeruginosa* 2.4cm, *Bacillus subtilis* were 2.2cm at 75%. Intermediate zones for *Escherichia coli* were 2.7cm, *Staphylococcus aureus* 2.6cm, *Pseudomonas aeruginosa* 2.4 cm, *Bacillus subtilis* were 2.1cm at 50%. Other zones for *Escherichia coli* 2.6cm, *Staphylococcus aureus* 2.7cm, and *Pseudomonas aeruginosa* were 2.5cm, *Bacillus subtilis* 0.8cm. Whereas Harpic, Phenyl, Sweezy were not show any zones.

## Discussion

The effect of Dettol® was assessed by (11) against some microorganisms associated with nosocomial infection including *Staphylococcus aureus*, it was highly effective like this study results, results of this study regarding Dettol® are similar to that obtained by (12) as the study recorded inhibition zones ranging from 28 to 17 mm for 100% to 5% concentration.

The antimicrobial properties of surface cleaner are very helpful against some pathogenic organisms such as multi-drug-resistant pathogens such as *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, and *Bacillus subtilis*.

The Results of our Research is that the antibacterial effects of antiseptics different pathogens are not only dependent on the types of antiseptics but also on their concentrations. Sodium hypochlorite has a good activity against *Staphylococcus aureus* and it is the most used antiseptic compound in homes cleaning.

It also shows that different types of microorganisms vary in their response to different types of antiseptics. Dettol, Max, and local surface cleaner were having highest activity against all pathogens. Antibacterial effect of Dettol was more effective against *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, and *Bacillus subtilis*. Max was more effective against *Escherichia coli* and *Bacillus subtilis*. Local surface cleaner was showed better antibacterial efficacy against common pathogens.

**Table I:** Antimicrobial activity of Dettol and Lemon Max against different bacteria

Concentration	Dettol				Max			
	<i>S.aureus</i>	<i>B.subtilis</i>	<i>E.coli</i>	<i>P.aeruginosa</i>	<i>S.aureus</i>	<i>B.subtilis</i>	<i>E.coli</i>	<i>P.aeruginosa</i>
100%	2.7 cm	2.3 cm	3.2 cm	2.6 cm	No Zone	27 cm	27 cm	No Zone
75%	2.8 cm	2.2 cm	2.4 cm	2.5 cm	No Zone	26 cm	17 cm	No Zone
50%	2.6 cm	2.1 cm	2.7 cm	2.4 cm	No Zone	21 cm	16 cm	No Zone
25%	2.7 cm	0.8 cm	2.6 cm	2.6 cm	No Zone	16 cm	15 cm	No Zone

**Table II:** Antimicrobial activity of Local Tile ash, Harpic, Sweezy and Phenyl against different bacteria

Concentration	Local Tile Wash				Harpic	Phenyl	Sweezy
	<i>S.aureus</i>	<i>B.subtilis</i>	<i>E.coli</i>	<i>P.aeruginosa</i>			
100%	2.1 cm	2.1 cm	2.0 cm	1.3 cm	No Zone	No Zone	No Zone
75%	1.9 cm	2.2 cm	1.3 cm	1.0 cm			
50%	0.8 cm	1.6 cm	1.2 cm	1.0 cm			
25%	0.8 cm	1.5 cm	1.2 cm	0.9 cm			

All strains of *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, and *Bacillus subtilis* are resistant to Phenyl, Harpic, and Sweezy .

### Conclusion

The research concludes that the surface cleaners and disinfectants can kill the bacterial pathogens and having bacteriostatic properties which is beneficial for preventing the people from many infections. The health care providers can use these cleaners to protect the immunocompromised patients from transmission of pathogenic or oportunist organisms.

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