

Original Research Article

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The Antibacterial Effect of some Household Detergents against *Staphylococcus aureus*

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ABSTRACT

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The activity of Four commercial types of household detergents; Dettol, Clorex, Elrajih and Jett were assessed against *Staphylococcus aureus*. Filter paper disks were impregnated with 100%, 50% and 25% concentration of each detergent and applied on Mueller-Hinton Agar plates inoculated with *S. aureus*. After incubation at 37°C for 24 hours inhibition zones were recorded. The largest inhibition zone (37 mm to 25 mm) was obtained by Dettol while the smallest one (13 to 7 mm) was obtained by Elrajih.

Introduction

Health is one of the most important factors in human life. Contracting an illness can be bad, and can even cause death. Over the years, rather than using antimicrobial drugs, antiseptics and disinfectants have played important roles in the control of infectious disease, microbial food spoilage and unwanted microbial generally (Awodele et al, 2007).

Using a disinfectant detergent that will effectively kill harmful bacteria can help people stay healthy. Detergents are substances, it could be liquid, solid or semi solid, which are used to remove dirt, stains and microorganisms in order to maintain health (Moses et al, 2013 and Wang et al, 2012).

These disinfectants cause distraction of microorganisms by two variables: the concentration of the detergent and the length of time the detergent is applied (Levinson, 2012).

For many years, hand washing with soap and water had been considered a measure of personal hygiene. Bacteria are very diverse and present everywhere such as in soil, water, sewage, standing water and even in human body. Bacteria's that attacks on human body is of great importance with reference to health (Bhat et al, 2011).

Foodborne diseases affect human by ingestion or drinking contaminated water with specific microorganisms, these

microorganisms may be ingested directly or indirectly. One way of indirect infections is using contaminated kitchen utensils, Staphylococcus mainly *S. aureus* causes foodborne gastroenteritis. The symptoms of staphylococcal food poisoning usually develop within 4 hours of the ingestion of contaminated food, although a range of 1 - hours has been reported. The symptoms include nausea, vomiting, abdominal cramps, diarrhea, sweating, headache and prostration (Jay et al, 2005). In order to prevent infection it's highly important to use trusted detergents that kill pathogenic microorganism.

This study was done to evaluate the effectiveness of some cleaning products that widely used in homes and healthcare settings by determining how effective they are in inactivate one of the most commonly encountered pathogenic microbes in day to day activities, *Staphylococcus aureus*.

Materials and Methods

Source of Detergents and their Constituent

Each of the following detergents (Table 1) was obtained from a local market, Gaza, Palestine.

Inoculation of the Test Organisms

S. aureus was obtained and confirmed at microbiology laboratory of the Islamic University of Gaza. Bacteria colonies were maintained on Mueller-Hinton Agar medium (Himedia, India). Twenty-four hour old pure cultures were prepared for use each time.

Preparation of the Disinfectants

Disinfectants from the original packages were considered to be absolute concentration (100%). Using sterile distilled

water, serial dilutions of each of the disinfectant were prepared to obtain 50% and 25% concentrations.

Preparation of Sterile Disc

Filter disks about 5 mm in diameter were made from Whatman's No.3 filter paper and wrapped in aluminum foil and sterilize in an oven at 75oC for 30 minutes. Each sterile disc was incorporated individually with 40 µl of detergent with various concentrations (25%, 50% and 100%). These discs were allowed for air drying.

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 37oC for 24 hours. The zones of inhibition were observed, and then measured accurately (Okore et al, 2014).

Results and Discussion

Commercial products of four detergents (Dettol®, Clorex®, Elrajeh® and Jett®) were used with three concentrations 100 %, 50 % and 25 %.

After 24 hours of cultivation, inhibition zones were measured. All detergents showed considerable antimicrobial activity. The results show that *S. aureus* vary in its response to different types of antiseptics and detergent. Elrajih® was the least effective one. On the other hand, Dettol® was found highly effective against *S. aureus* where the zones of inhibition ranged from 25mm to 37 mm (Fig.1). The zones of inhibition exhibited by the detergents with their

dilutions against *S. aureus* are shown in table 2.

The effect of Dettol® was assessed by (El-Mahmood and Doughari, 2008) against some microorganisms associated with nosocomial infection including *S. aureus*, it was highly effective like this study results, results of this study regarding Dettol® are similar to that obtained by (Saha *et al*, 2009) as the study recorded inhibition zones ranging from 28 to 17 mm for 100% to 5% concentration. The results proved that the

antibacterial effects of antiseptics and disinfectants are not only dependent on the types of antiseptics and disinfectant but also on their concentrations. Sodium hypochlorite has a good activity against *S.aureus*, and it is the most used antiseptic compound in homes cleaning, (Lee *et al*, 2009) concluded from this study that the optimum washing and sanitizing conditions for lettuce containing *S. aureus* using sodium hypochlorite are depending on concentration, period of immersion and temperature.

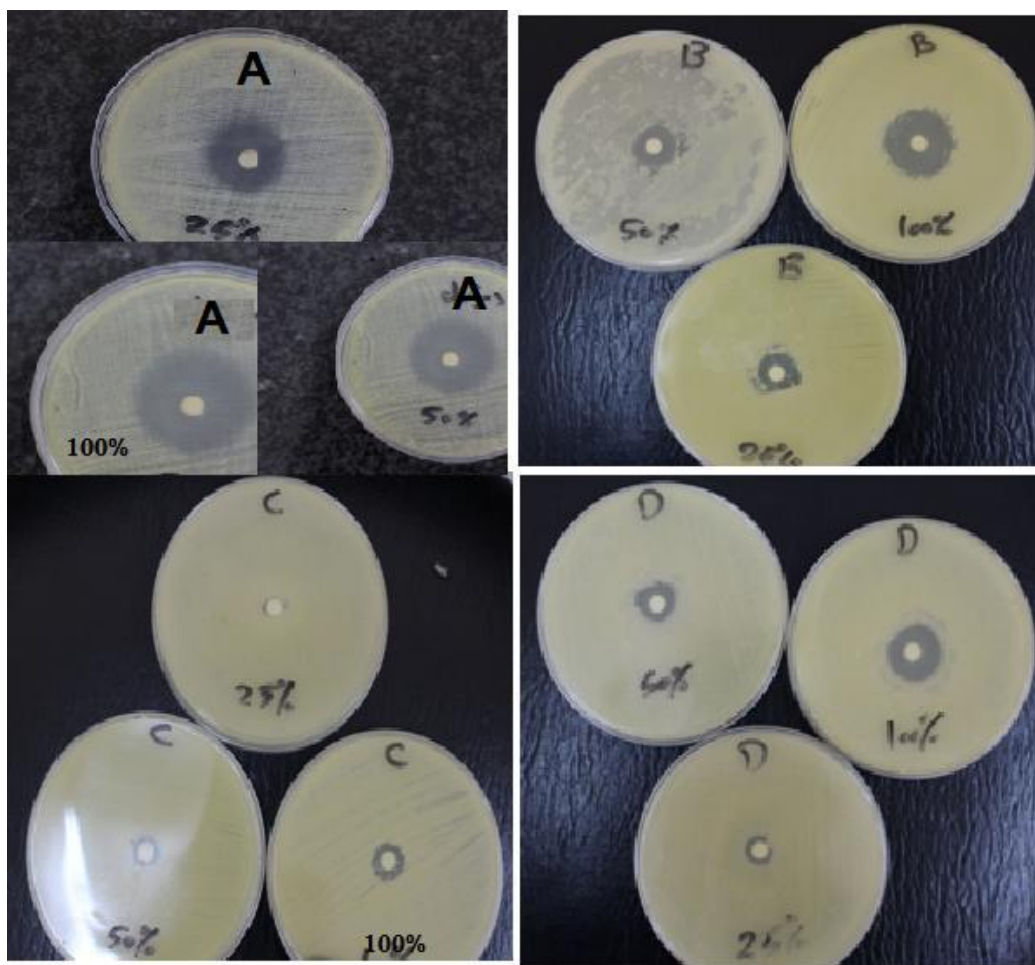
Table.1 The Main Chemical Constituent of Detergents

Detergents	Chemical constituent
1. Dettol®	Chloroxlenol 4.85% w/w, Pine oil, Isopropyl Alcohol, Castor Oil, Caramel and Deionized Water.
2. Clorex®	Sodium hypochlorite 12 %.
3. Elrajeh®	Sodium alkyl benzene sulphonate and coconut diethanol amide (12%) concentration.
4. Jett®	Chloroxylenol 1.2 %

Table.2 Zone of Inhibition Produced by the used Four Detergents

Detergents	100 % Inhibition zone (mm)	50% Inhibition zone (mm)	25% Inhibition zone (mm)
A-Dettol®	37	28	25
B- Clorex®	25	17	15
C- Elrajeh®	13	10	7
D- Jett®	21	15	11

Fig.1 The Diameter of the Zones of Inhibition after 24 Hours. A= Dettol®, B= Clorex®, C= Elrajeh® and D= Jett®



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