

Comparative Efficacies of Disinfectants against Clinical and Non Clinical Microorganisms

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Abstract – Microbial population on an inanimate objects like eating utensils and surgical instruments are main causes of hospital acquired infections. This work focused on comparative efficacies of disinfectants (Hydrogen peroxide, Hypo and Izal) against clinical and non clinical microorganism. The disinfectant were tested against different microorganisms namely; clinical *S. aureus*, clinical *C. albicans*, non clinical *S. cerevisiae* and non clinical *Lactobacillus spp.* The microbicidal activities of disinfectants were evaluated by examining the viability of cells after 24hr period of contact. The result revealed that hydrogen peroxide has the higher potency, most active and exhibited pronounced activity against *Lactobacillus* and *S.aureus*. While Hypo and Izal has less activity against *S. cerevisiae* and *C. albicans*. Microbicidal activities of disinfectants were more pronounced on bacteria than fungi. This hydrogen peroxide can effectively replace the hypo and Izal employed in this study.

Keywords – Chemical Disinfectants, Clinical, Non-Clinical, *Staphylococcus Aureus*, *Candida Albicans*, *Saccharomyces Cerevisiae* *Lactobacillus Spp.*

I. INTRODUCTION

Over last century, scientists have continued to develop a variety of physical and chemical agents to control microbial growth (Fisher, et al., 2009). Activity to control microbial growth on inanimate objects like eating utensils and surgical instruments of considerable importance. Disinfectants are agents, usually chemical used to carry out disinfection are normally used on inanimate objects (Prescott *et al.*, 1999). The primary cause of hospital acquired fungal infections have been recognized as a serious threats to immune compromised patients. These fungal infection include pathogenic strain of *Candida* and *S. cerevisiae* which are widely spread in the environment (Gupta *et al.*, 2002).

Staphylococcus aureus and *Staphylococci epidermidis* are thought to account for most human wound infection both surgical and accidental are almost universally present on the human skin or in the nose (Nester *et al.*, 1998). They produce disease in almost every organ and tissue of the body especially in immunocompromised people such as those in hospital (Prescott *et al.*, 1999; Ganokar., et al., 2006). The eradication of this microorganisms is therefore necessary and to carry out this exercise the efficacy of disinfectants (hydrogen peroxide, hypo and Izal) were compared against clinical and non clinical microorganisms. This become necessary because some laboratories and hospital injection of the eradication or reduction of potential pathogens, needed an alternative and affordable sterlant for disinfection

II. MATERIALS AND METHODS

Isolates

Clinical Isolates of *S. aureus* *C. albicans* and am clinical Isolates of *S. cerevisiae* (from Palmwine) and *Lactobacillus Spp* (from yoghurt) were obtained, non clinical organisms were Isolated by culturing different dilution of palmwine and yoghurt into Demann Rogosa Shape (MRS) agar and sabourand dextrose agar (SDA) plates while clinical organism were Isolated by aseptically exposed plates of mannitol salt agar and macconkey agar indoors for 20 minutes. The plates were then incubated at 37°C for 24-48h. After incubation, different cultural characteristics were observed and taken for proper identification of the organism (Gupta *et al.*, 2002).

Preparation of Serial Dilution for Type Inoculum Sample

The preparation of inocula was carried out under axenic conditions. *S. Cerevisiae*, *C. albicans* and *S. aureus* cultures were independently obtained by 1ml of each sample was aseptically immersed into 9.0ml of distilled water and homogenized. The cultures were scraped off gently with heat sterile scapel and suspended in normal saline

Determination of minimum inhibitor concentration (mic)

Minimum inhibitory concentration of various concentration of disinfectants were obtained. Each concentration was assayed against the test organism was added into 1.0ml of each concentration of the disinfectant and incubated at 37°C for 24hr. After incubation the microbial efficacy was determined by examining the viability of cells after 24 hr period of contact with the different concentration of the disinfectant and lowest concentration of the disinfectant that inhibited any visible growth of the test organism was recorded as the minimum inhibitor concentration (Iheukwumere *et al.*, 2012).

III. RESULTS

The effect of the different conation of each disinfectant on the bacteria and fungal Isolates was evaluated by determing the number of cells surviving after overnight contact with the disinfectants in suspension solution. The diameter of zones of inhibition of the disinfectants hydrogen peroxide, hypo and Izal against the tested organisms are shown in (Table 1). The study revealed that hydrogen peroxide has the most active and exhibited pronounced activity against *Lactobacillus spp.*, followed by

S. aureus respectively. The potency of the disinfectants against the tested organisms was determined using phenol coefficient technique (Table 2). The study showed that hydrogen peroxide has the higher potency among the

tested disinfectant and the potency of the test disinfectants were more pronounced on bacteria mainly *lactobacillus*. Microbicidal activities of the disinfectants are more pronounced on bacteria than fungi.

Table 1: Inhibitory Activities of the Disinfectants against the Tested Organism (agar well diffusion method)

Inhibitory substance	S.aureus	Lactobacillus spp	C albicans	S. cerevisiae
Hypo (Sodium hypochlorite)	7.20	8.10	6.50	6.90
Hydrogen peroxide	7.90	8.40	6.80	6.90
Izal (Sulphonated cresol)	7.90	7.90	6.05	6.20

Table 2: The potency of the Disinfectants using Phenol Coefficients Method

Inhibitory substance	S.aureus	Lactobacillus spp	C albicans	S. cerevisiae
Hypo (Sodium hypochlorite)	0.78	0.71	0.80	0.80
Hydrogen peroxide	0.88	0.83	0.80	0.90
Izal (Sulphonated cresol)	0.78	0.63	0.80	0.80

IV. DISCUSSION

Microorganism are known to vary in their susceptibility to disinfectants. Also a number of commonly used disinfectants are known to relatively in effective against fungi (Gupta *et al*; 2001). The microbial activities of hydrogen peroxide, hypo (sodium hypochlorines) and Izal (Sulphonated cresol) which are widely used in the laboratories and hospitals employed in this study, shows that hydrogen peroxide concentration had been found to be most effective to denature protein thereby killing bacteria, because of its diffusion rate and transportation into cell organism. It evaporates at a slow rate and less harmful to handle. This is the reason why it is used in the laboratories for disinfection (Fraise.,1999;Carly *et al*; 2006).

The similarities in the activities of the disinfection at all dilution on the different microorganisms shows that Izal and hypo were not more microbicidal than hydrogen peroxide. Thus hydrogen peroxide disinfectant which contain high active ingredients can replace Izal and hypo without loss in the quality of activity.

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