Effect Of Virkon Disinfectant Brand Of Potassium Monoperoxysulphate On Multiply-Resistant, Hospital-Acquired Clinical Isolates.

F.T. Ogunsola, T.L. Ogunsanya and O.O. Oduyebo
Department of Medical Microbiology and Parasitology, College of Medicine, University of Lagos, PMB 12003, Lagos

Correspondence: F.T. Ogunsola

SUMMARY

In the Nigerian market are many brands of disinfectants with varying efficacy against bacteria, fungi and viruses. Recently Virkon brand of Potassium monoperoxysulphate (Antec, UK), was introduced. The Kelsey-Sykes test was carried out to determine the efficacy of Virkon against standard bacterial strains and hospital-acquired clinical bacterial isolates (Pseudomonas aeruginosa, Methicillin-resistant Staphylococcus aureus, Candida spp., High-level gentamicin resistant Enterococcus faecalis, Multi-resistant Escherichia coli, and Klebsiella pneumoniae ) at the contact times of 5min, 10min, 15min, 20min. The effect of organic matter and 7-day storage on pre-diluted disinfectant was also determined. Virkon prevented the growth of all the organisms tested even after storage for 7-days. Its activity was not affected by organic matter. Virkon is very effective against Candida spp., gram-positive and gram-negative bacteria.

Key words: Disinfectant, Multiply-resistant bacteria, Hospital-acquired.

INTRODUCTION

Disinfection describes a process that leads to the elimination of most or all pathogenic organisms except endospores from an inanimate object. The efficacy of a disinfectant is affected by the organic and inorganic load, the type and level of microbial contamination, the dilution factor of the disinfectant, the contact time with the object, the type of object, prior cleaning of the object, pH, and temperature of the disinfection process and length of storage after dilution. Various categories of disinfectants exist with different activities against Gram-positive and Gram-negative bacteria, mycobacteria, fungi and enveloped and non-enveloped viruses. Some like glutaraldehyde may achieve sterilization after prolonged contact times. The choice of disinfectant to use is determined by the degree of risk of infection. On this basis Spaulding described three categories: Critical, Semicritical and noncritical items, which have been adopted by the Centers for Disease Control and Prevention (CDC) and the Association for Professionals in Infection Control and Epidemiology. All critical items must be sterilised because they are used in sterile areas while semicritical items (those that come in contact with mucous membranes or skin that is not intact) require high level disinfection.

Recently, Virkon (Antec International England) an oxidising agent (Potassium monoperoxysulphate) marketed in the form of a pink powder was introduced into the Nigerian market. The manufacturer have claimed that the disinfectant is stable and effective for at least 7 days after dilution, which would be an improvement on most disinfectants which need to be diluted and used within 24h to prevent the growth of organisms like Pseudomonas aeruginosa in the disinfectant. Its disinfectant activity against hospital-acquired bacteria and Candida spp. was studied under conditions that are obtainable in most hospitals in Nigeria.

MATERIALS AND METHODS

Organisms tested

Fifteen organisms were tested. The organisms were chosen because they are often hospital acquired and some like Pseudomonas aeruginosa and Klebsiella pneumoniae grow in diluted disinfectants. Two Multi-resistant hospital-acquired isolate of Pseudomonas aeruginosa, K pneumoniae and E. coli, Methicillin resistant S. aureus, and High level gentamicin resistant Enterococcus faecalis. Standard strains were also tested, E. faecalis, ATCC 29212, Staphylococcus aureus, ATCC 29213, E.coli, ATCC 25922, Candida spp.

Disinfectant

"Virkon" disinfectant powder, batch No 8531, to expire July 2001 was used. The disinfectant was diluted in 10g aliquots for the tests. To obtain a 1:200 dilution as specified by the manufacturer, 10g of virkon disinfectant powder was added to 1 litre of sterile distilled water to give a pink solution.

Qualitative suspension test

To determine the bactericidal activity of the disinfectants, the Kelsey - Sykes suspension test was carried out. Organisms were grown in tryptose soy broth and incubated overnight at 37°C in air. A suspension of the organisms was made with normal saline and the
Effect Of Virkon Disinfectant Brand Of Potassium Monoperoxysulphate On Multiply-Resistant, Hospital-Acquired Clinical Isolates.

1ml of the organism suspension was added to 9.0ml of the disinfectant at 1:200 dilution reaction mixture for the contact times of 5min, 10min, 15min and 20min. After the appropriate contact time, 1ml of the reaction mixture was transferred to 5ml of tryptcase soy broth + Tween 80 (3%/w/v) to inactivate the disinfectant. After 1hr, 1ml of the inactivated reaction mixture was transferred to the surface of a tryptcase soy agar plate and incubated in air at 37°C for 48hrs.

Effect of Organic Matter

The test was then repeated for each organism after the addition of brewers yeast (9%/w/v) to the reaction mixture so as to determine the effect of organic material on the activity of the disinfectant as would occur in a normal hospital setting. The whole process was repeated for each organism at both 1:200 and 1:100 dilution.

Effect of storage

The diluted Virkon disinfectant was left on the table in a screw cap bottle for 7 days after which all the tests were repeated to determine the effect of long storage on the activity of the disinfectant.

Results

At the dilutions 1:100 and 1:200 as recommended by the manufacturer, even in the presence of organic matter, Virkon prevented the growth of all the organisms tested. There was no growth even when the tests were repeated on the disinfectant at 7 days post-dilution. The water and disinfectant controls showed no growth throughout the study while the organism control showed that viable organisms were inoculated into the reaction mixtures.

Discussion

The results suggest that at the recommended dilutions, Virkon is effective against the usual hospital pathogens- S. aureus (even MRSA), E. coli, Ps. aeruginosa, K pneumoniae E faecalis and Candida spp. This activity was not affected even in the presence of organic material suggesting that the presence of blood and other body fluids will not significantly affect the disinfectant activity of Virkon. It was also found that when diluted with sterile water there was no significant loss of activity 7 days after dilution since no organism grew in the disinfectant after this long period of storage. A previous study on Virkon, showed that despite its good antibacterial effect it had poor activity against the enteroviruses and mycobacterium tuberculosis and cannot be used for critical items.

The good results obtained after storage, suggests that there is a wider margin of safety than with other disinfectants but Virkon, like all other disinfectants, should be used up within 24h of dilution for disinfecting semicritical items. This is because in many hospitals in Nigeria, ordinary tap water, which may contain bacterial spores, is used for diluting disinfectants. However for the purpose of environmental sanitation and noncritical items, it would appear that stored, diluted Virkon can be used for up to 7 days.

Acknowledgement

We will like to thank Micro-mega Nigeria Ltd. for providing the Virkon used in the study and Mrs. R. O. Oyendre who prepared all the media and reagents used.

References