



Evaluation of bactericidal effect of three antiseptics on bacteria isolated from wounds

• **Objective:** Antiseptics are widely used in wound management to prevent or treat wound infections due to their proven wound healing properties regardless of their cytotoxicity. The objective of this study was to determine the bactericidal effects of three antiseptics on pathogens known to cause wound infections.

• **Method:** The study was carried out at a tertiary care hospital and a university microbiology laboratory in Sri Lanka in 2013. The three acids (acetic acid, ascorbic acid and boric acid) in increasing concentration (0.5%, 0.75% and 1%) were tested against bacterial suspensions equivalent to 0.5 McFarland standard. The Bacteria isolates used were isolated from wound and standard strains of *Staphylococcus aureus*, *Escherichia coli* and *Pseudomonas aeruginosa*.

• **Results:** There were 33 (68.8%) Coliforms, 10 (20.8%) *Pseudomonas* species, and 5 (10.4%) strains of *Staphylococcus aureus*. Acetic acid at concentration of 0.5% inhibited growth of 37 (77%) and 42 (87.5%) of tested isolates when exposed for 30 and 60 minutes, respectively. However 100% inhibition was achieved at four hours. At a concentration of 0.75%, 40 (83.3%) and 44 (91.7%) were inhibited when exposed for 30 and 60 minutes, respectively, with 100% inhibition at 4 hours. At concentration of 1%, 46 (95.8%) inhibition was seen at 30 minutes and 100% inhibition at 60 minutes.

Ascorbic acid, at 0.5% and 0.75 % concentrations, inhibited growth of 45(93.7%) and 47(97.9%) of isolates respectively when exposed for 30 minutes. At these two concentrations, 100% inhibition was achieved when exposed for one hour. At 1% concentration, 100% inhibition was achieved at 30 minutes. Boric acid did not show bactericidal effect at concentrations of 0.5%, 0.75 % and 1%. *Pseudomonas* species were inhibited at 30 minutes by 0.5% acetic acid. Bactericidal effect against all the standard strains was seen with three acids at each concentration tested from 30 minutes onwards

• **Conclusion:** Ascorbic acid was bactericidal for all organisms tested within the shortest exposure time at the lowest concentration compared to other two acids. Despite promising bactericidal effects, further studies warrant, as ongoing debates on toxicity of acids on tissue epithelialisation. Application of antiseptics for a shorter duration could overcome this problem without losing bactericidal activity.

• **Declaration of interest:** The authors have no conflict of interest and no funding was received for this study.

bactericidal effect; antiseptics; wound care; ascorbic acid; acetic acid; boric acid; wound healing

Microbial pathogens have several different mechanisms to delay wound healing, such as persistent production of inflammatory mediators, metabolic wastes, and toxins. Furthermore, they maintain the activated state of neutrophils, which produce catalytic enzymes and free oxygen radicals. Hence antiseptic therapy plays a role in control of wound infection. They are also effective against bacteria, fungi, viruses, protozoa, and even prions.^{1,2} There is increasing evidence suggesting that healing of chronic ulcers is inhibited by bacterial infection, and reduction in bacterial numbers can reduce inflammation and enhance healing.³ Various acids have been used on chronic wounds with a view of reducing the bacterial load infecting or colonising the wound.⁴⁻⁶ Povidone iodine, chlorhexidine, alco-

hol, acetate, hydrogen peroxide, boric acid, silver nitrate, silver sulfadiazine, and sodium hypochlorite are widely used in wound management currently.

While the application of various acids has proven to be helpful in wound healing, regardless of their cytotoxic nature, it is unclear whether the beneficial effect is due to pH or chemical composition. The aim of this study was to assess the bactericidal effect of three antiseptics on stored isolates in the department of Microbiology, Colombo South Teaching Hospital, Sri Lanka. These isolates consisted of commonly encountered pathogenic bacteria causing wound infections.

Methodology

This study was carried out at Colombo South Teaching Hospital and Department of Microbiology, Uni-

D.U.A Kumara,¹
Diploma in nursing,
nursing officer;

S.S.N. Fernando,²
MBBS, Diploma in Medical
Microbiology, PhD,
Professor in Microbiology;

J. Kottahachchi,² MBBS,
Diploma in Medical
Microbiology, MD in
Medical Microbiology,
Senior lecturer and
Consultant Microbiologist;

D.M.B.T. Dissanayake,²
MBBS, Diploma in Medical
Microbiology, MD in
Medical Microbiology,
Senior lecturer and
Consultant Microbiologist;

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