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Antibacterial Efficacy of Commercially Available Selected Alcohol-based Hand Sanitizers in Sri Lanka

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Background: Contaminated hands are the major mode of transmission of microorganisms from one person to another. Hand washing or hand rubbing is normally practised to remove microbes from the hands. If the hands are not visibly soiled, a handrub can be used as an effective substitute for handwashing. With the pandemic of COVID-19, a large number of different hand sanitizers were appeared at the market. The use of sub-standard hand sanitizers could give poor assurance leading to disease transmissions.

Objectives: To determine the antibacterial efficacy of five different commercially available Alcohol-Based Hand Sanitizers (ABHS) in Sri Lanka.

Methods: Samples of five different commercially available ABHSs, labelled as 'A', 'B', 'C', 'D' and 'E', and 70% in-house prepared alcohol solution were used for this study. Antibacterial activity of each sample was determined using three methods. The phenol coefficient was determined against *Staphylococcus aureus* (ATCC 25923) while the well diffusion method was used to evaluate the antibacterial activity of the products against *S. aureus* (ATCC 25923) and *Escherichia coli* (ATCC 25922). Activity indexes were calculated for each ABHSs in well diffusion method. Each ABHS was used to determine the reduction of colony counts in hands by hand hygiene with different hand sanitizers.

Results: Among the tested hand sanitizers, only the hand sanitizer 'A' exhibited a phenol coefficient of 2.86. Others had phenol coefficient less than one. Activity indices of hand sanitizers 'A' and 'E' were 2.75, 2.00 (against *S. aureus*) and 1.75, 1.44 (against *E. coli*), respectively. 'B' and 'C' had 0.98, 0.81 against *S. aureus* and 0.79, 0.75 against *E. coli*, respectively. Activity indices of 'D' had 0.00 against both organisms. All tested ABHSs and 70% in-house prepared alcohol solution significantly ($p < 0.05$) reduced the colony counts in hands as observed by the hand hygiene test.

Conclusions: Only the hand sanitizer 'A' was more efficient than the standard phenol solution. Only the sanitizers 'A' and 'E' had better activity indices when compared with in-house prepared 70% alcohol. Interestingly, all the tested ABHS were effective in significantly reducing the colony counts in hands.

Keywords: Alcohol-based hand sanitizers, Antibacterial activity, Hand rubbing, Sri Lanka