

Original Research Article

A comparative study between the efficacies of betadine scrub (10%) versus alcohol based hand rub in preoperative hand disinfection

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ABSTRACT

Background: Hand hygiene is a crucial measure for preventing healthcare-related infections. Surgical scrub is an important factor in the safety and success of a surgical operation. The aim of this study was to comparatively evaluate effectiveness of povidone iodine scrub (10%) and alcohol based hand rubs (Sterilium).

Methods: Single centre, double blinded, comparative study performed over a period of 6 months in MGM Medical College and hospital. Sampling was conducted, after the surgeons participating had used either technique for preoperative hand disinfection. Colonies were counted after 48 hours of aerobic incubation at 37°C. Positive cultures were identified and their frequencies were compared. Data were summarized using descriptive statistical methods. Comparison of counts between groups was performed using Chi square test.

Results: From the 100 obtained samples, there was higher number of positive growth in Sterilium as compared to povidone iodine scrub (14% versus 8%) though statistically not significant. *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Acinetobacter* was the most common organism isolated in both the groups.

Conclusions: Povidone-iodine is more efficacious than that of alcohol-based solutions in preoperative hand disinfection.

Keywords: Alcohol-based solutions, Hygiene, Povidone-iodine, Surgical scrub

INTRODUCTION

Healthcare-related infection is one of the most important causes of morbidity and mortality in hospitalized patients.^{1,2} The hands of healthcare workers are the main carriers of multidrug-resistant bacteria and nosocomial infections in hospitals, which if not disinfected properly, may lead to serious consequences.³ Healthcare-related infections are the direct cause of 80,000 deaths in the United States and 5,000 deaths in England every year.^{3,4}

Effective disinfection of surgeons' hands depends on multiple factors.⁵ Washing time and the type of solutions are the most important factors influencing proper disinfection.⁵ There are different types of solutions for

hand disinfection, including alcohol-based solutions containing rapid action hand rub and povidone-iodine. Comparative studies on the effectiveness of different disinfectants solutions have not yielded consistent results. To gain further insight into effectiveness of disinfecting solutions, in this study we compared the effectiveness of alcohol-based surgical antiseptic solutions with that of povidone-iodine.

METHODS

The effectiveness of alcohol based surgical scrub solutions containing rapid action hand rub in surgical disinfection (Sterilium) was compared with povidone-iodine (10% betadine scrub). 9 surgeons, seniors and

residents volunteered for inclusion in this study. None of the participants had a history of skin disease or skin wounds.

The two methods of disinfection were the following:

- Alcohol based hand rub (Sterilium). The solution is applied to hands for 1.5 min and then left to dry. Culture swabs were then taken from web spaces of hands
- Povidone Iodine scrub (10%). The hands were washed with 5ml of scrub and water twice for a duration of 5 min each and then left to dry. Culture swabs were then taken from web spaces of hands.

Samples were then collected by a person wearing sterile gloves and using sterile culture tubes. Sterile culture swabs were swabbed in all the web spaces of the hands of the surgeons for 1 min and then sealed in the container and sent to the department of Microbiology for culture. Swabs were inoculated on sterile blood agar plates and incubated for 48 hours at 37° C, a colony count was done at the end and results documented.

Statistical analysis

The results were tabulated and analysed. The paired sample t test statistical analysis was conducted using Microsoft excel 2010 and SPSS version 18. P values of less than 0.05 were considered significant.

RESULTS

Table 1 shows there was higher number of positive growth in Sterilium as compared to povidone iodine scrub (14% versus 8%) though statistically not significant.

Table 2 shows in povidone iodine scrub group, organism like *staphylococcus epidermidis* was observed in 2 (50%) and *Pseudomonas aeruginosa*, *Acinetobacter* in 1 each (25%) on growth samples while in Sterilium group, organism like *Staphylococcus epidermidis*, *Staphylococcus aureus*, *Acinetobacter* was observed in 2 each (28.57%) and *Pseudomonas aeruginosa* in 1 (14.29%) on growth samples.

Table 1: Culture result amongst different study group.

Culture result	Povidone iodine scrub		Sterilium	
	Frequency	Percentage	Frequency	Percentage
Growth present	4	8%	7	14%
No growth seen	46	92%	43	86%
Total	50	100	50	100

Table 2: Organism isolated amongst different study group.

Organism isolated	Povidone iodine scrub		Sterilium	
	Frequency	Percentage	Frequency	Percentage
<i>Acinetobacter</i>	1	25%	2	28.57%
<i>Pseudomonas aeruginosa</i>	1	25%	1	14.29%
<i>Staphylococcus aureus</i>	0	0 %	2	28.57%
<i>Staphylococcus epidermidis</i>	2	50%	2	28.57%
Total	4	100%	7	100%

DISCUSSION

Standard surgical scrub has been the main preoperative disinfection technique for many years. The introduction of alcohol-based solutions for disinfection has opened possibilities for more sophisticated and cost effective disinfecting techniques. Several other studies have shown the efficacy of the various agents in preoperative disinfection.

In our study, lowest proportion of positive culture was observed for the solution containing povidone-iodine

(8%) as compared to Sterilium (14%) though statistically not significant.

This findings correlate well with study conducted by Soleimanpour J et al in which povidone-iodine effectiveness was higher than that of alcohol-based solutions when used for surgical scrub. The effect of betadine antiseptic is longer lasting than that of alcohol-based solutions.⁶

On the contrary, Kareem SAMA et al observed alcohol-based hand rub significantly reduces the bacterial colony counts compared with standard surgical scrub.⁷

Kulkarni A et al observed no differences between 2% chlorhexidine and 10% povidone-iodine for skin disinfection in regard to costs, efficacy or side-effects.⁸

Staphylococcus epidermidis 2 (50%) was the most common organism isolated in povidone iodine scrub group, followed by *Pseudomonas aeruginosa*, *Acinetobacter* in 1 each (25%) while in Sterilium group, organism like *Staphylococcus epidermidis*, *Staphylococcus aureus*, *Acinetobacter* 2 each (28.57%) was the most common organism isolated followed by *Pseudomonas aeruginosa* in 1 (14.29%).

CONCLUSION

Povidone-iodine is more efficacious than that of alcohol-based solutions in preoperative hand disinfection.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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