

Research Article**Efficacy of Povidone Iodine and 2% Chlorhexadine Gluconate Scrubs In Preventing Post-Operative Wound Infections in Pakistan**

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ABSTRACT

Objective: Comparison of Povidone Iodine & Chlorhexadine Gluconate scrubs in preventing postoperative infections in Hospital acquired surgeries.

Methodology: For Research Randomized control trial was conducted at Rawal Institute of Health Sciences (RIHS) Islamabad, a tertiary care hospital having a large catchment area in Islamabad. Two departments' i.e. General surgery and department of Gynae&Obs who shared the surgical work participated in this study. The duration of trial was from May 2016 to December 2016. Complete details including preoperative antibiotics, their socioeconomic status and nature of surgeries being done on patients are filled by Surgeon doctor on the Performa given by Researchers. A total of 114 patients included in study were divided in two groups, and the disinfectant 10% povidone iodine for group I and 2% chlorhexadine gluconate for group II. The patients were selected randomly for both groups. The patients were observed and postoperatively followed on weekly basis for a month to observe any sign of surgical site infection (SSI).

Results: Out of total 114 patients from two departments, 57 patients were in each group I & II. In group, I six (6) patients (10.5%) developed infection, while in group II only 1 patient (1.7%) got infected ($p < 0.005$). The pathogens seen were *Strep pyogenes*, *E coli*, *Pseudomonas* and *Staphylococcus aureus*.

Conclusion: Results of Chlorhexadine Gluconate has better control over infections postoperatively as compared to Povidone Iodine which has low efficacy in prevention of surgical site infections (SSI).

Keywords: Preoperative surgical Disinfectants, Chlorhexadine Gluconate, Povidone Iodine, prevention of surgical site infections.

INTRODUCTION

Surgical site infections (SSI) always remain a concern for clean contaminated surgical procedures. As asepsis is a surgeon's, so different skin antiseptics are in use to basic requirement for any kind of surgery, various achieve better results. However, evidences are limited precautions and techniques has been adopted by the that which one is better for various common clean or surgeons to avoid the surgical site infections (SSI). The control of infection or to keep it at a minimal level has a benefit to the patients and reduces the burden on hospital resources ^{1, 2} All the

Preoperative measures are necessary for the control of epidermal infections and Postoperative wound infections (SSI). As the choice of disinfectants depends on the surgeon, so the knowledge of disinfectants and their mode of action is essential. The number of available solutions in the market are limited and the most commonly used agent in different institutions is iodophor containing solution (povidone iodine). The other recently used agent is Chlorhexadine Gluconate. The povidone iodine has both bacteriostatic and bactericidal activity. It is

proven that iodinesolution is much beneficial against bacterial infection and also helps to control skin infections caused by viruses and fungi. Chlorhexidine is cationic biguanide and it destroys the outer bacterial cell wall and change the structure of the cell wall which diminishes the oxygen supply to the bacteria and it ultimately causes death of the bacteria. Chlorhexidine is much better disinfectant as compared to povidone which helps in controlling infections. Its molecules has strong bonding with the skin bacteria which make it more strong antiseptic solution, also it has strong destroying effect on both gram positive and negative bacterial cell wall. Results of these agents are verified on trials in different laboratories but all have different results and opinions. The Research was done on comparison of these two agents as which one has better results in controlling infections and as an antiseptic or bacteriostatic in Surgery Department of Hamdard University Hospital, Karachi.

METHODOLOGY

The current randomized control trial was conducted during May 2016 to December 2016 in departments of General Surgery in Hamdard University Hospital. This is a teaching Hospital in private sector, located Saddar Karachi, having a thick population of multiple housing societies and villages in the surroundings. This hospital also provides care to the patients referred from Interior Sindh mainly Hyderabad. Exclusion criteria for this study was that, patients having co-morbid conditions like diabetes, infection near the site of surgery and unwilling patients were excluded from the trial. Proper and authentic permission was taken from the dean of the Hamdard University Hospital, Karachi.

Sample size was calculated by using WHO recommended formula. Total number of 114 patients were included from both the departments. The number of patients from Gynae department was 90 and that of surgery department was 24. SPSS software was used and data collection form was filled by the researchers which include the patient's data, socioeconomic status, operative

procedures and their outcomes and medicines given to them with their follow up.

The Randomized control method was used in which random patients were selected and two groups of patients were made in the surgery department and during their surgical procedures both agents povidone 10% and 2% Chlorhexidine Gluconate was used as an antiseptic and preoperative painting of the patients with these agents. After 3 minutes of painting by these agents' Surgical incision was given and done with their surgical procedures. After surgery all the patients were observed on daily basis for the signs in skin infections until their discharge from the Hospital. Patients were advised for their follow up on weekly basis.

. Centre for Disease Control (CDC, USA) definition for SSIs was applied to identify the infected patients which states that

“ now the procedure of checking whether its surgical incise infection or not we follow up the patient for 1 month and if from the sight of incision there is redness, pain, high grade fever, lymph node palpable and pussy discharge within 30 days of operation it may be skin infection caused by bacteria of skin during surgery procedure. If found send their samples in microbiology laboratory to know the variety of bacteria but if no infection occur within 1 month it is infection free. During our study 5 patients were found with discharge and infection and their samples were sent for culture and sensitivity.

RESULTS

A total 114 patients participated in the study from both departments of Surgery and Gynae & Obs. The age of the patients included in this study was between 17 – 71 years. The mean age was 40 yrs. The patients were divided in two groups, Group I Povidone Iodine (Control) and Group II Chlorhexidine Gluconate (Test). Antiseptic agent was allocated randomly, and patients were strictly followed for one month on weekly basis. Overall 7 (6.1%) patients developed SSI. Out of 90 patients from Gynae

department, 5 (5.5%) patients were infected. Group I Povidone Iodine (control) were 4(8.8%) patients, while Group II ChlorehexadineGluconate(test) was 1 (2.2%). Patients from surgery department (24), only 2 patients from group I (Povidone Iodine) were infected (8.3%), none of the patients from group II (ChlorehexadineGluconate) was infected. (Table-1). Culture and sensitivity was done for all the infected cases i.e. 7 cases. No bacterial growth was seen in 2 cases. Pseudomonaeruginosa, Streptococcus pyogen

Staphylococcus aureus and Escherchia Coli were the pathogens detected from the other 5 cases. The culture and sensitivity patten shown in (Table-1). No adverse effect of redness and pain were found postoperatively in any patient with the antiseptic agents used. Antibiotic prophylaxis and surgical wound class is shown in (Table-1). In this study, patients treated with chlorehexadinegluconate were having lower risk of surgical site infection (P value<0.005) than the patients treated with povidone iodine group.

Table I: Antibiotic Prophylaxis

Antibiotic	Povidone Iodine(Group 1)	Chlorehexadine(Group II)
None	0	0
Cefotaxim	9	10
Velosef	3	2
Cefotaxim	2	1
Ceftriaxone+Flagyle	45	45
Surgical Wound Class		
Clean cases	5 (55.5%)	4 (44.4%)
Clean contaminated cases	52 (49.5%)	53 (50.4%)

DISCUSSION

Since 1955 Povidine is being used widely for the antiseptic purpose globally preoperatively. But it failed to control surgical site infections completely. The other agent in use in recent years is ChlorehexadineGluconate with its increased efficacy as an antiseptic and disinfectant. To evaluate the efficacy of this comparatively new product (Chlorehexadine Gluconate) the control trial was conducted on clean and clean contaminated surgeries for prevention of surgical site infections. Different trials have tested the effect of these agents. Literature review has different reports on the efficacy of these agents. In some studies Chlorehexadine was found operative antiseptics with Chlorehexadine versus Povidone Iodine has low results as compared to chlorehexadine.¹ Similar results were shown in a study the CHLORE HEXADINE GLUCONATE has better results than povidine. (9.5% vs 16.1 p= 0.004), subsequent analysis of studies shows that CHLORE HEXADINE GLUCONATE helps in better control of infections rather than povidone and has more stronger bacteriostatic effect on the cell wall of bacteria although has significantly lower risk of skin infection.

In our study, povidone iodine group of 57 patients total, 6 (10.5%) patients got infected. No significant relationship with increasing age of the patients was found. In Chlorehexadine group of 57 patients total only 1 (1.7%) got infected. These results are comparable to some other studies which proved chlorehexadinegluconate better than povidone iodine.¹⁷ as a surface disinfectant. Pathogens detected in our infected cases were Ps. aeruginosa, E. coli, StreptoPyogens and Staph.aureus. The diversity in

¹ It was reported while choosing any drug; however, this is not so much bacteria and surgical site infections. burden on the patient, so we did not study the cost- that the patients having hernia surgery, both povidone effective analysis for both groups. The strength of our Iodine and Chlorehexadine has similar reduction in skin study was its design, because there are limited studies bacterial colony counts and infection rate (9.5% vs. 7.0%)

organisms is due to different types of surgical procedures facing different floras.¹⁸ Culture and sensitivity pattern is shown in (Table - II).

Table II: Culture and Sensitivity Pattern of Infected Cases

No of Infected cases:	7 patients
No Growth seen in:	2 patients
Pathogens seen in:	5 patients
Pathogens Seen	Sensitivity Pattern
a. Pseudomonas aeruginosa	Meropenem, Amikacin, Ofloxacin Polymexine B
b .Staphlococusaureus	Vancomycin, Fucidic acid and Chloramphenicol
c. E. Coli	Polymexin B, Amikacin
d. Streptococuspypoens	Clindamycin, Doxycycline and clotrimazole

superior to Povidone Iodine as skin surface antiseptics.^{6,7,8} but in our study, we did not find any difference in both. Several other studies claim that both agents are equally⁹, or, having no difference.¹⁰ A prospective study the groups.¹³ We may need more detailed study to find good. out the effect of these factors. Cost should be considered observed the impact of Povidone Iodine on residual

The old age and obesity has some relation with infection, gluconate. The limitation of this study was convenient sample size and lack of diversity in patient’s due to its single center study results. Further studies need to compare the efficacy of these antiseptics in larger number of patients of different surgical specialties with clinically relevant conditions.

CONCLUSION

Our randomized control trail showed that the use of ChlorehexadineGluconate as skin surface antiseptic for clean and clean contaminated general surgical and gynaecological procedures has lower risk of surgical site infection than with the use of provide on iodine.

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