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ORIGINAL ARTICLE

WHICH IS BETTER AGENT FOR PRE-OPERATIVE SKIN PREPARATION? ALCOHOLIC – CHLORHEXIDINE OR POVIDONE – IODINE

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ABSTRACT:
Aims & Objectives- To compare the efficacy of povidone-iodine versus alcoholic - chlorhexidine in pre-operative skin preparation. **Material & Methods-** Prospective study was conducted on patients admitted in surgical wards of Guru Gobind Singh Medical College, Faridkot. A total of 300 patients were studied which were divided into two groups, 150 in each group. In one group A, povidone iodine was used and in group B, alcoholic chlorhexidine was used. Probability value < 0.05 was considered significant. Analysis was performed using the SPSS 20.0 statistical package. **Results-**The mean age in group A was 46.0 years while in group B was 48.6 years. Majority of cases were females in both groups (73.3% in group A and 72.6% in group B). Post-operative infection on day 3 and on day 10 was more in group A as compared to group B. The mean hospital stay in group A was 9.1 days as compared to 6.5 days in group B. Surgical site infection rate in group A(using Povidone Iodine) was 6.6% while in group B(using Alcoholic Chlorhexidine) it was 3.3%. **Conclusions-** This study concluded that Alcoholic Chlorhexidine is more efficacious than Povidone Iodine for pre-operative skin preparation and leads to decrease in post-operative surgical site infections and also leads to decrease in average post-operative hospital stay.
Keywords: Alcohol, chlorhexidine, povidone-iodine.

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INTRODUCTION

Surgical Site Infections (SSI) creates difficult and complex clinical scenarios. Pathogens most commonly arise from the skin surface, making skin preparation at the time of the procedure critical.[1] Surgical site infection represents a major source of morbidity and mortality among patients undergoing surgeries. Infection of the surgical wound prolongs hospitalisation, increase intensive care unit admission, and significantly increases the cost of treatment. Strict adherence to aseptic techniques is necessary, one of which is pre-operative preparation of the operative site.[2] Surgical wound infection causes significant post-operative morbidity and mortality, adds between 10% and 20% to hospital costs.[3] The choice of specific agent to be used for skin preparation has not been addressed due to the diversity of sites and approaches in surgery, as well as the absence of data on SSI risk in well-controlled, operative specific studies. Hence, the choice of agent should be based primarily on the surgeons' knowledge of the product's efficacy, cost, ease of use and their own experience.[1] Infection rates in the four classes of surgical procedures(i.e. clean, clean-contaminated, contaminated and dirty) before the routine use of prophylactic antibiotics were 1- 2% or less for clean wounds, 6-9% for clean contaminated wounds, 13-20% for contaminated wounds and about 40% for dirty procedures.[4] The skin is colonised by various types of bacteria, but up to 50% of these are Staphylococcus aureus.[5] In analyses of contamination rates after cholecystectomy, the main source of wound contamination was found to be the skin of the patient.[6] Evidence has shown that the use of a preoperative wash containing Chlorhexidine decreases the bacterial count on skin by 80-90%, resulting in a decrease in preoperative wound contamination. The effect on SSI incidence has, however, been more difficult to demonstrate and it is possible that prolonged washing releases organisms from deeper layers of the skin.[7] A recent study reviewing the reasons for hospital admissions after surgery in the USA demonstrated that SSI was the most common reason for

unplanned readmission (19.5% overall, 25.8% following colectomy/proctectomy) followed by obstruction/ileus (10.3% overall).[8] The aim of present study was to compare the efficacy of povidone-iodine versus alcoholic - chlorhexidine in pre-operative skin preparation.

MATERIALS AND METHODS

Prospective study was done on patients admitted in surgical wards of Guru Gobind Singh Medical College, Faridkot. A total of 300 patients were studied which were divided into two groups, 150 in each group.

Group A- Povidone-Iodine was used.

Group B- Alcoholic-Chlorhexidine was used.

In each case detailed history was taken and routine investigations like haemoglobin, total count, differential count, ESR, blood sugar levels and chest X-ray were done. Pre-operatively, single dose of Inj Cefotaxime 1gm i.v. was given at the time of induction. Post-operatively, Inj Cefotaxime 1gm i.v.12hrly and Inj Metronidazole 500mg i.v. 8hrly was given for 3 days. Folllow up was done postoperatively to look for : redness of surrounding area, increased local temperature, purulent/serous discharge from the wound, suture removal, induration, any discharge, in case of discharging wound, pus culture and antibiotic sensitivity tests were sent. Probability value < 0.05 was regarded significant. Analysis was performed using the SPSS 20.0 statistical package.

RESULTS

The mean age in group A was 46.0 years while in group B was 48.6 years[Table 1]. Majority of cases were females in both groups (73.3% in group A and 72.6% in group B)[Table 2]. Both groups had similar number of males and females. Most of cases in both groups belonged to rural population (74.6% in group A and 64.6% in group B) but there was no significant difference between populations of both groups[Table 3]. Most common diagnosis among both groups was Cholelithiasis followed by Uterine Growth, Inguinal Hernia and Ca Ovary[Graph 1]. Most common surgery performed among both groups was Cholecystectomy and TAH+BSO followed by Hernioplasty and Laparotomy[Graph 2]. Post-operative infection on day 3 was more in group A as compared to group B[Table 4]. Post-operative infection on day 10 was more in group A as compared to group B[Table 5]. The mean hospital stay in group A was 9.1 days as compared to 6.5 days in group B[Table 6]. Most common organisms found in culture reports of cases (sent on post-operative day 3) were Staph. aureus followed by E.coli in both the groups[Graph 3]. Surgical site infection rate in group A (using Povidone Iodine) was 6.6% while in group B(using Alcoholic Chlorhexidine) it was 3.3%[Graph 4].

Table 1: Age distribution in both groups

Parameter	Group A(n=150)		Group B(n=150)		P Value
	Mean	SD	Mean	SD	
Age(Yrs)	46.0	13.2	48.6	14.1	>0.05

Table 2: Sex distribution in both groups

Sex	Group A	Group B	Total
Male	40	41	81
Female	110	109	219
Total	150	150	300

P Value > 0.05

Table 3: Geographical distribution in both groups

Address	Group A	Group B	Total
Urban	38	53	91
Rural	112	97	209
Total	150	150	300

P Value > 0.05

Table 4: Postoperative infection on day 3 in both groups

Postoperative infection	Group A	Group B	Total
No Infection	71	99	170
Redness	37	29	66
Discharge	42	22	64
Total	150	150	300

Chi-Square=11.8 , P Value< 0.05

Table 5: Postoperative infection on day 10 in both groups

Postoperative infection	Group A	Grop B	Total
No infection	111	130	241
Discharge	23	12	35
Gaping	16	8	24
Total	150	150	300

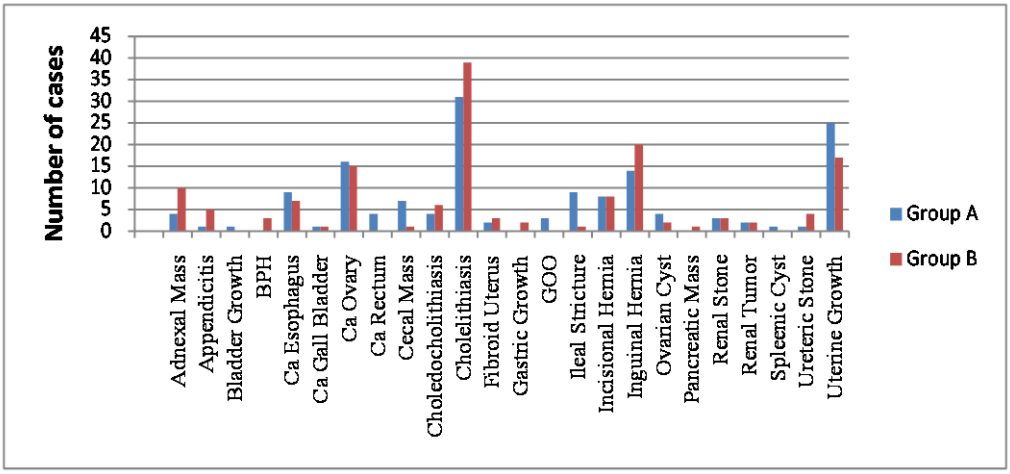
Chi-Square=7.6, P Value< 0.05

Table 6: Hospital stay in both groups

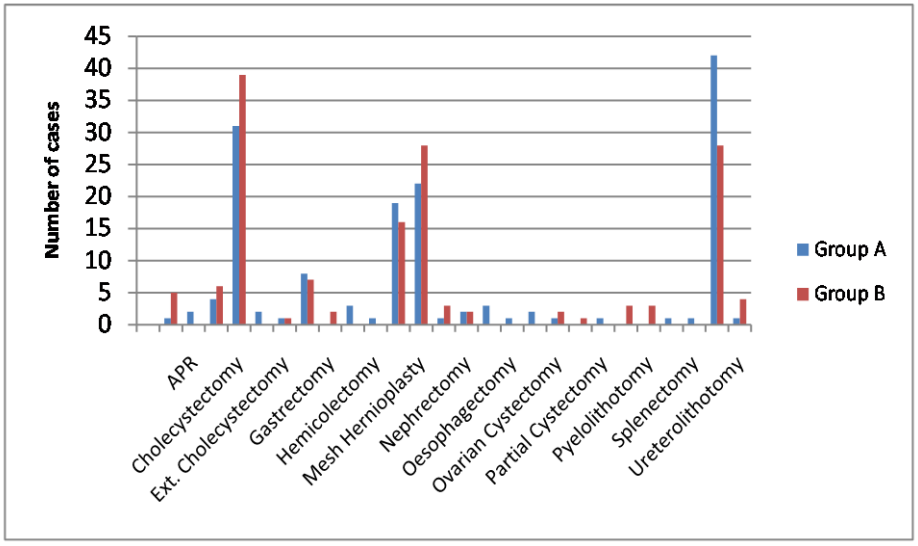
Parameter	Group A(n=150)		Group B(n=150)	
	Mean	SD	Mean	SD
Hospital Stay(days)	9.1	4.5	6.5	3.4

P Value< 0.0

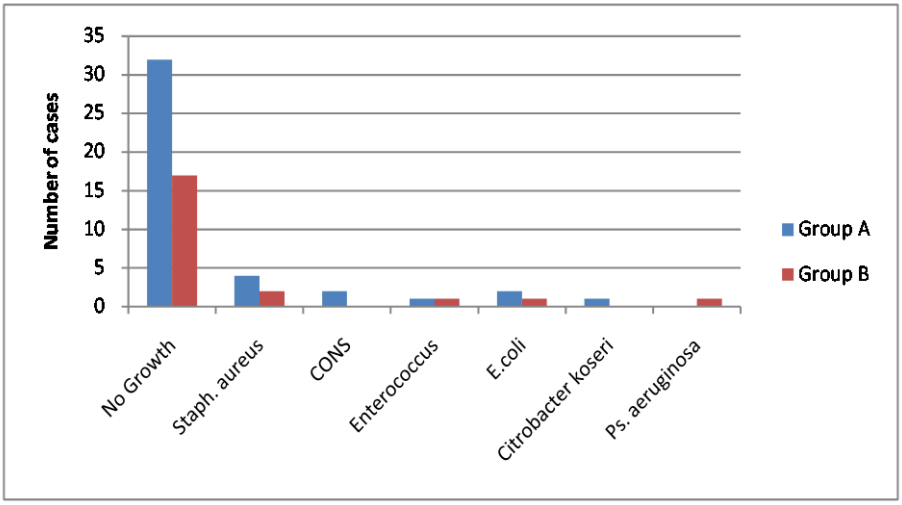
Graph 1: Diagnosis of cases in both groups



Graph 2: Surgery of cases in both groups



Graph 3: Culture reports of cases in group A and group B



Graph 4: Actual SSI rate in both groups

DISCUSSION

In present study, the mean age in group A was 46 yrs and in group B it was 48.6 yrs. In this study most cases were females (110 in group A and 109 in group B).Most of the cases belonged to rural population(112 in group A and 97 in group B). Both groups had comparable demographic characteristics. A similar study was done to compare the efficacy of reduction of bacterial colonization and surgical site infections using Alcoholic Chlorhexidine and Povidone Iodine antiseptic skin preparations in general surgery patients. The mean age was 56.2 yrs in group 1 and 50.5 yrs in group 2 with no statistical difference of age between two groups.[9] In present study most common diagnosis among cases of both groups was Cholelithiasis (31 in group A and 39 in group B) followed by Uterine growth(25 in group A and 17 in group B), Inguinal hernia(14 in group A and 20 in group B), Ca ovary(16 in group A and 15 in group B), Ca Esophagus(9 in group A and 7 in group B). Based on diagnosis, patients in both groups underwent Cholecystectomy, TAH + BSO (Total Abdominal Hysterectomy + Bilateral Salpingo-oophorectomy), Mesh Hernioplasty and FJ(Feeding Jejunostomy).On 3rd and 10th postoperative day, infection rate was found significantly(P Value<0.05) higher in group A as compared to group B. These findings were similar to the results of a study done in Thailand by Paocharoen V, Mingmalairak C, Apisarnthanarak A.[9] The study reported that wound infection decreased from 3.2% to 2% after chlorhexidine skin preparation and the organism found in culture specimen included Staph. aureus, Streptococcus epidermidis and other Streptococcus species etc. The author also suggested the disadvantages of Povidone Iodine like hypersensitivity and colour staining. The study recommended, Alcoholic Chlorhexidine should be the first consideration for skin preparation. In present study it was found that infection rate decreased from 6.6% to 3.3% after

chlorhexidine skin preparation and most common organism found was Staph aureus followed by E. coli in both groups. A randomized control trial was conducted on patients undergoing clean-contaminated surgery in six hospitals done by Rabih O. Darouchie. Preoperative skin preparation was done with either Alcoholic Chlorhexidine scrub or Povidone Iodine scrub and paint. The primary outcome was any surgical site infection within 30 days after surgery. Secondary outcomes included individual types of surgical site infections. The overall surgical site infection rate was significantly lower in the Alcoholic Chlorhexidine group than in Povidone Iodine group(9.5% vs 16.5%; P value=0.004). The study concluded that preoperative cleansing of patient's skin with Alcoholic Chlorhexidine was superior for preventing surgical site infection.[10] Ostrander et al performed a randomized study using three skin preparation solutions including chlorhexidine and iodine. They found that 2% chlorhexidine and 70% isopropyl alcohol to be most effective agent for bacterial elimination.[11] Mimoz et al compared povidone iodine with chlorhexidine and benzyl alcohol for skin cleansing before catheter insertion and subsequent dressing changes. Catheters in chlorhexidine group had a lower incidence of bacterial colonization(11.6% vs 22.2%).[12]

Although both antiseptic preparations possess broad spectrum antimicrobial activity[13], superior clinical protection was by chlorhexidine due to its more rapid action, persistent activity despite exposure to bodily fluids and its residual effect.[10] Prolonged hospital stay, a major concern of most of the hospitals, has been evident in patients developing surgical site infections.[14] In a study conducted by Lilani S P, Jangale N, Chowdhary A, Daver G B , the mean postoperative stay, in patients who did not develop any surgical site infection, was 6.19 days, whereas the mean postoperative stay increased four times (24.82 days) in 17 patients, who developed surgical site infection.[15] In present study the mean length of hospital stay in group A was 9.1 days and in group B 6.5 was days and this difference was statistically significant.

CONCLUSIONS

The present study showed that preoperative skin cleansing with chlorhexidine significantly reduced the rate of postoperative SSIs as compared to povidone iodine and it has also decreased the hospital stay postoperatively. The superior clinical protection provided by chlorhexidine is probably related to its more rapid action, persistent activity despite exposure to bodily fluids and residual effect, hence it can be used to prevent SSIs effectively in hospitals.[7]

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