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# COMPARISON OF PRE-OPERATIVE SKIN PREPARATION USING CHLORHEXIDINE ALCOHOL AND POVIDONE IODINE TO PREVENT SURGICAL SITE INFECTIONS DURING CESAREAN SECTION

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**Abstract**

**Background:** Cesarean sections are among the most common obstetric procedures performed globally. The rate of cesarean section and its post-operative complications are also increasing.[2] One of the post-operative complications is surgical site infection. Preventing or reducing the incidence of SSI can improve patient outcomes. It is feasible to lower post-operative infections by employing skin antisepsis prior to surgery, which includes the use of chlorhexidine alcohol and povidone-iodine alcohol. **Objective:** To compare the efficacy of chlorhexidine alcohol versus povidone iodine alcohol for pre-operative skin preparation for prevention of surgical site infection in cesarean section. **Methods:** A comparative, cross-sectional study was conducted at Department of Obstetrics & Gynecology, KRL Hospital, Islamabad. From September 2025 to November 2025. Pregnant women between the ages of 18 and 45 who were booked for a cesarean section were included in the study. Patients with a skin infection at the operation site, those who had taken steroids for longer than two weeks in the preceding two months, women who are known diabetics, and those who were allergic to alcohol, povidone iodine, or chlorhexidine were excluded. The lottery approach was then used to divide the patients into two groups, A and B, each consisting of 47 cases. Patients in Group A received chlorhexidine alcohol, for pre-operative skin preparation during cesarean sections, while women in Group B received povidone iodine. A weekly follow-up was carried out for 30 days after discharge, or as soon as symptoms of a wound infection appeared. **Results:** The average age of the women in groups A and B was 27.77 ± 4.55 and 27.00 ± 5.63 years, respectively. The mean gestational age was 38.67 ± 1.04 weeks, with a range of 35 to 40 weeks. The mean parity was

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2.11 ± 1.04. The incidence of surgical site infection in patients having cesarean sections was 04 (8.51%) and 11 (23.40%) for chlorhexidine alcohol and povidone iodine, respectively (p-value = 0.049). **Conclusion:** This study shows that pre-operative skin preparation using chlorhexidine alcohol reduces SSI more effectively than povidone iodine.

**Keywords:** Caesarean Section, Surgical Site Infections (SSIs), Skin Preparation, Obstetrics.

## INTRODUCTION

Cesarean sections are among the most common obstetric procedures performed globally, and they are becoming more popular in both wealthy and developing nations [1]. Cesarean sections (CS) are the most common major surgical surgery performed on females, with an average rate of 18.6% worldwide. As anticipated, post-operative problems after CS are also increasing [2]. One of the post-operative complications is surgical site infection (SSI), which has a worldwide incidence of 3% to 15% [3].

One of the main causes of the financial strain on healthcare facilities is surgical site infections, which are post-operative infections that impact the skin, tissue, or organ. Even so, measures are attempted to lessen its occurrence, such as development and implication of infection control systems, improvising surgical techniques, using antibiotics both before and after surgery, and improving sterilizing processes [4].

Despite all of this, it continues to be one of the most prevalent hospital-acquired infections, extending hospital stays and increasing patient morbidity and mortality. A 3% mortality rate is linked to SSI [5].

Therefore, preventing or reducing the incidence of SSI can improve patient outcomes while also significantly reducing the cost burden on the health care system [6]. The skin is the primary source of microorganisms that cause surgical site infections.

It is feasible to lower post-operative infections by employing skin antisepsis prior to surgery, which includes the use of chlorhexidine alcohol and povidone-iodine alcohol. Povidone-iodine is a common topical solution for preventing SSI and falls into the broad-spectrum antiseptic category [7].

The group of antiseptics and antibacterial agents includes chlorhexidine alcohol too. It possesses both bactericidal and bacteriostatic properties either by stopping their growth or by killing them [8].

The irony is that the surgical site infections still happen even when preoperative preventive measures are used, therefore it is controversial to determine which of the aforementioned antiseptic solutions is the best option for preoperative skin preparation [9]. Regarding the most effective preoperative skin antiseptic solution and its concentration, there are differences between meta-analyses and existing international guidelines [10].

Therefore, by comparing the two antiseptic treatments, the goal of this study is to determine which one is most effective in lowering SSIs during cesarean sections.

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The more effective treatment can then be used to prepare the skin of patients undergoing cesarean sections, thereby enhancing patient outcomes by reducing the risk of surgical site infections.

## METHODOLOGY

This comparative, cross-sectional study was carried out by the Department of Gynecology and Obstetrics at KRL Hospital in Islamabad (Pakistan) between September 2025 and 5th November 2025. The hospital's ethical review committee approved the study before it started.

The sample was chosen by consecutive non-probability sampling. 80% power of test and 95% confidence interval was used to calculate a total sample size of 94 pregnant women (47 in each group), accounting for the estimated 34.0% and 12.0% effectiveness of povidone iodine alcohol and chlorhexidine alcohol, respectively [11].

Pregnant women between the ages of 18 and 45 who were in the appropriate gestational week for a cesarean section met the study's inclusion requirements. Patients with a skin infection at the operation site, those who had taken steroids for longer than two weeks in the preceding two months, women who are known diabetics and those who were allergic to alcohol, povidone iodine, or chlorhexidine were not included. Participants in the study were also informed about having follow-up till 30 days following surgery at the time of informed consent.

These patients were then split into two groups, A and B, with 47 patients in each group, using the lottery method. For pre-operative skin preparation during cesarean sections, patients in Group A got chlorhexidine alcohol, which was composed of 2% chlorhexidine gluconate combined with 70% isopropyl alcohol, whereas women in Group B received povidone iodine. All patients underwent a thorough history, obstetric and general physical examination, complete blood count, and pertinent biochemical testing prior to surgery. Along with the patients' demographic information, data was recorded on a proforma.

Patients in both groups got intravenous antibiotics i.e., ceftriaxone 1g before skin incision. Following surgery, the patient's vital signs were monitored, wound dressings were removed after 24 hours in both groups, and the surgical site was inspected for infection-related symptoms at least once every day for the first three days of the patient's hospital stay. Following discharge, a weekly follow-up was conducted for 30 days or as soon as wound infection symptoms appeared.

On follow up, clinical signs, such as redness, discharge, dehiscence and cellulitis were recorded. For objective assessment and diagnosis of surgical site infection, Southampton wound scoring system was used. Score of ‘0’ and ‘1’ indicated normal healing and score of ‘2-5’ indicated surgical site infection.[23] Microbiological samples from the infected skin area and relevant blood tests were sent for sensitivity and culture in individuals who developed surgical site infections.

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SPSS version 25 was then used to enter and evaluate the data. Mean ±SD and range were utilized to analyze numerical data, such as age, parity, gestational age and body mass index.

However, information pertaining to categorical characteristics, such as diabetes history and treatment effectiveness, was displayed as frequency and percentage. In order to compare the two groups' efficacy, the Chi-Square test was used, and a p-value of less than 0.05 was considered statistically significant.

## RESULTS

The study participants ranged in age from 20 to 45, with a mean age of 27.59 ± 5.29 years. The average age of the women in groups A and B was 27.77 ± 4.55 and 27.00 ± 5.63 years, respectively. According to Table I, the majority of the patients, 73 (77.66%), were in the 20–30 age range.

The mean gestational age was 38.67 ± 1.04 weeks, with a range of 35 to 40 weeks. The mean gestational age in groups A and B was 38.54 ± 1.04 weeks and 38.79 ± 1.04 weeks, respectively.

According to Table II, the mean parity was 2.11 ± 1.04. Table III displays the distribution of patients by type of cesarean section.

According to Figure I, the incidence of surgical site infection in patients having cesarean sections was 04 (8.51%) and 11 (23.40%) for chlorhexidine alcohol and povidone iodine, respectively (p-value = 0.049).

**Table 1: Distribution of age groups (n=94)**

| Age (years) | Group A (n=47) | | Group B (n=47) | | Total (n=94) | |
|---|---|---|---|---|---|---|
| | No. of patients | %Age | No. of patients | %Age | No. of patients | %Age |
| **20-30** | 37 | 78.72 | 36 | 76.60 | 73 | 77.66 |
| **31-45** | 10 | 21.28 | 11 | 23.40 | 21 | 22.34 |
| **Mean ± SD** | **27.77 ± 4.55** | | **27.00 ± 5.63** | | **27.59 ± 5.29** | |

**Table 3: Distribution of parity**

| Parity | Group A (n=47) | | Group B (n=47) | | Total (n=94) | |
|---|---|---|---|---|---|---|
| | No. of patients | %Age | No. of patients | %Age | No. of patients | %Age |
| **0-2** | 36 | 76.60 | 35 | 74.47 | 71 | 75.53 |
| **>2** | 11 | 23.40 | 12 | 25.53 | 23 | 24.47 |
| **Mean ± SD** | **2.09 ± 1.04** | | **2.21 ± 1.04** | | **2.11 ± 1.04** | |

**Table 4: Distribution of patients according to type of CS**

| Type | Group A (n=47) | | Group B (n=47) | | Total (n=94) | |
|---|---|---|---|---|---|---|
| | No. of patients | %Age | No. of patients | %Age | No. of patients | %Age |
| **Emergency** | 27 | 57.45 | 26 | 55.32 | 53 | 56.38 |
| **Elective** | 20 | 42.55 | 21 | 44.68 | 41 | 43.62 |

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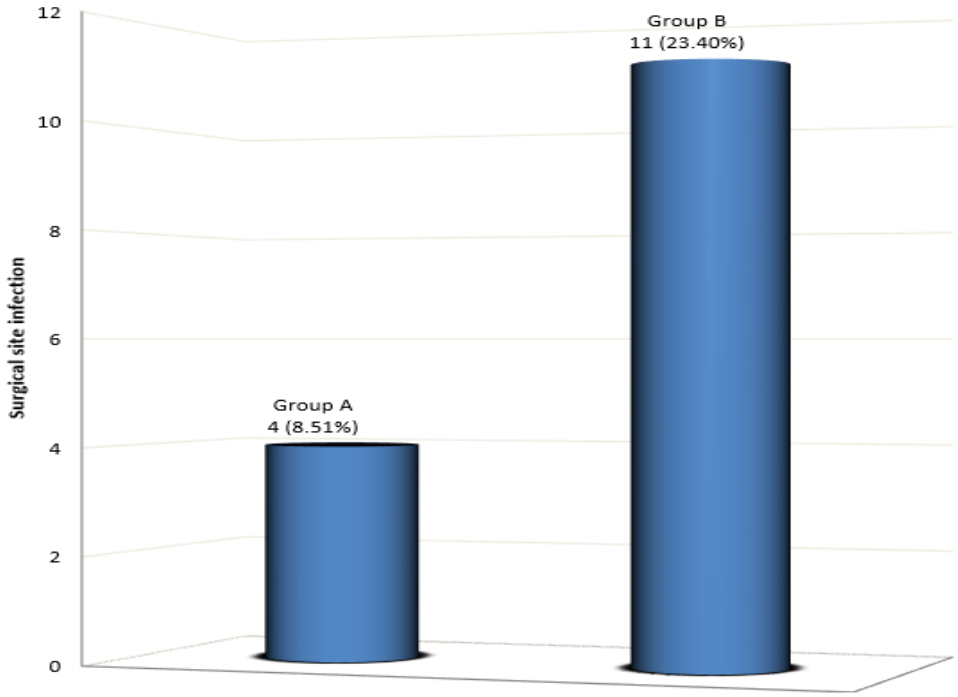


**Figure 1: Comparison of pre-operative skin preparation using chlorhexidine alcohol and povidone iodine alcohol to prevent surgical site infections during cesarean sections.**

- **P-value = 0.049 which is statistically significant**

## DISCUSSION

Numerous researchers have examined the effectiveness of various techniques and materials in lowering the incidence of surgical site infections. The majority of research is conducted in general surgery, with a small number of studies examining the potential of chlorhexidine to lower surgical site infections during gynecological and cesarean sections [12]. A chemical antiseptic with bacteriostatic and bactericidal qualities is chlorhexidine. Although both solutions have broad-spectrum germicidal effects, the question of which is superior has long been the subject of investigation [13],[14]. Because of its rapid and consistent action, chlorhexidine-alcohol is suggested as a useful protective agent [15]. Health care workers also favor it because it is less expensive and safer [16].

Chlorhexidine, alcohol, and povidone iodine caused surgical site infections in patients having cesarean sections in the current study at rates of 04 (8.51%) and 11 (23.40%), respectively (p-value = 0.049). This study's results are comparable to those of another that found a statistically significant difference between the two groups. It was statistically significant (p-value = 0.08) that the SSI rate for the 10%

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povidone-iodine treatment was 10.4% as opposed to 3.07% for the 2% chlorhexidine protocol [12]. Additionally, as indicated by p-value = 0.0058, the povidone-iodine protocol group saw considerably more emergency visits following cesarean section than the chlorhexidine protocol group, with 9.2% and 3.07%, respectively [12].

A study evaluating the effectiveness of povidone-iodine and chlorhexidine-alcohol as preoperative antiseptic skin preparations for SSI prevention after cesarean section was conducted by Luwang et al. For the study, 311 women who had CS were enlisted. To check for SSI, patients were randomly assigned to two groups and monitored for 30 days after surgery. The povidone–iodine group has an 8.6% SSI rate, while the chlorhexidine–alcohol group has a 5.4% incidence [2]. Despite the lack of claimed significance, the results are comparable to the current findings.

When it comes to preventing surgical site infections, a systematic review and meta-analysis conducted by Bai et al. found that chlorhexidine appears to be more efficient than povidone-iodine in lowering the overall rate of surgical site infections [17]. Another meta-analysis by Jalalzadeh et al. shows that all types of chlorhexidine in alcohol concentrations, but especially 2·0–2·5% chlorhexidine in alcohol, are effective for preventing SSIs in patients undergoing surgery when compared to iodine [18].

Twenty papers that examined the impact of povidone-iodine and chlorhexidine on the incidence of SSI were included in another meta-analysis. The findings show that chlorhexidine is more successful in preventing SSIs than povidone-iodine. Although chlorhexidine had a stronger preventative effect than povidone-iodine, the difference was not statistically significant, according to SSI [5]. Thirteen independently randomized controlled trials (RCTs) totaling 6938 women who had cesarean sections were included in a Cochrane review. This review showed that women who had their skin prepped with chlorhexidine may have a slightly lower risk of surgical site infection than those who had povidone iodine. The authors recommended more high-quality trials to support these findings [19].

325 women who had C-sections participated in a prospective observational cohort study at the University Clinical Center of Kosovo. For 30 days following surgery, each woman was monitored. This study's high risk of SSIs following C-sections emphasizes the significance of infection control, particularly regarding surgical site infections [20]. These results and the current study are rather similar [21].

**The study's Strength:** Few local studies have been conducted on the effectiveness of antiseptic solutions in preventing surgical site infections, particularly in obstetric and gynecological patients. In order to decrease surgical site infections following cesarean sections in Pakistani women, this study suggests an effective pre-operative skin preparation antiseptic solution. Since cesarean sections are among the most prevalent surgical procedures performed on women

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nowadays, fewer SSIs can enhance patient outcomes and satisfaction while also lessening the financial burden that these procedures create.

**Limitations:** There is only a limited sample size and the study is only carried out in one location. In order to validate the aforementioned findings and create evidence-based local guidelines for pre-operative skin preparation that lower the risk of surgical site infections, multicentric studies with bigger sample sizes are crucial.

## CONCLUSION

The statistically significant findings of this study demonstrate that pre-operative skin preparation with chlorhexidine alcohol is more efficient than povidone iodine in reducing surgical site infections.

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