Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol. 5 No. 6 (2024): June 2024 Issue
https://doi.org/10.51168/sjhrafrica.v5i6.1258
Orignial Study

IMPACT OF PRE-OPERATIVE HAIR REMOVAL ON SURGICAL SITE INFECTION IN ELECTIVE ABDOMINAL SURGERY: PROSPECTIVE COMPARATIVE COHORT STUDY.

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ABSTRACT

Background
Hair removal before surgery is common to avoid surgical site infections. The impact of this approach on SSI rates, especially in elective abdominal procedures, is debatable. This study evaluated the impact of pre-operative hair removal on the incidence of SSI and postoperative pain in individuals undertaking elective abdominal surgeries.

Methods
The study involved 200 individuals undergoing elective abdominal surgery who were allotted into two groups: Group A (pre-operative hair shaving) and Group B (no pre-operative hair shaving). Demographic data, SSI incidence, and pain during dressing changes were recorded and analyzed.

Results
The incidence of SSI in Group A was 8% on day 7, 10% on day 14, and 12% on day 30, compared to 4%, 6%, and 8%, respectively, in Group B. However, these variations were not statistically considerable ($p = 0.23$, $p = 0.29$, and $p = 0.35$). Pain during dressing changes was significantly higher in Group A, with a mean VAS score of 3.8 ± 1.2 in contrast to 2.7 ± 1.1 in Group B ($p < 0.001$). Subgroup analysis showed no substantial variation in SSI rates between clean and clean-contaminated surgeries within each group. Clean surgeries in Group A had an SSI rate of 4%, while Group B had 2%. Clean-contaminated surgeries had an SSI rate of 16% in Group A and 12% in Group B, with no statistically considerable differences ($p = 0.40$ and $p = 0.56$).

Conclusion
Preoperative hair removal increases dressing change pain but does not affect elective abdominal surgery SSI rates. The findings show that standard preoperative hair removal may not be necessary and might be reconsidered to improve patient comfort.

Recommendations
It is advised that more studies with higher sample numbers and longer follow-up times be conducted to validate these results and create evidence-based recommendations for preoperative hair removal procedures.

Keywords: *Preoperative hair removal, Surgical site infection, Elective abdominal surgery, Postoperative pain*
Submitted: *2024-06-04* ***Accepted:*** *2024-06-28*

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INTRODUCTION

Surgical site infections (SSIs) persist to be a major cause for concern in the contemporary healthcare system, contributing significantly to both postoperative problems and medical expenses. Up to 5% of individuals undergoing inpatient surgery may develop surgical site infections (SSIs), which are among the most prevalent infections linked to healthcare [1]. Improving patient outcomes and lessening the strain on healthcare systems depend on SSI prevention.

Preoperative hair removal is a standard practice aimed at reducing the risk of SSIs by eliminating potential sources of bacterial contamination. Traditionally, this procedure has been performed using razors to shave the surgical site. However, the effectiveness and safety of this practice have been questioned due to concerns about microabrasions caused by shaving, which may serve as entry points for bacteria [2]. Recent guidelines and studies suggest that alternative methods, such as clipping or depilatory creams, may be preferable due to a lower risk of skin trauma.

Several studies have examined the impact of pre-operative hair removal on SSIs, with mixed results. A review analyzed data and found no substantial difference in SSI rates between shaved and non-shaved patients [3]. Similarly, a meta-analysis reported that while hair removal did not significantly affect SSI rates, clipping was associated with fewer SSIs compared to shaving [4]. These findings have led to a shift in clinical practice,

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with many healthcare facilities adopting clipping over shaving.

Despite these advancements, there remains a lack of consensus regarding the best practices for preoperative hair removal. The World Health Organization (WHO) updated its guidelines in 2018 to recommend against the routine use of razors for hair removal, advocating for the use of clippers or depilatory creams when hair removal is necessary [5]. However, the implementation of these recommendations varies widely across different institutions and regions, reflecting ongoing uncertainty and debate among clinicians.

This study aims to estimate the impact of pre-operative hair removal on the incidence of SSI and postoperative pain in individuals undertaking elective abdominal surgeries.

METHODOLOGY

Study Design

A prospective comparative cohort study.

Study Setting

The study took place at Saheed Laxman Nayak (SLN) Medical College and Hospital, Koraput, Bhima Bhoi Medical College & Hospital, Balangir, and Nehru Satabdi Central Hospital, Talcher, Odisha, India, spanning for 10 months, from September 2023 to June 2024.

Participants

The study included 200 participants.

Inclusion Criteria

- Adults aged 18 and older.
- Individuals scheduled for elective abdominal surgery for valid medical reasons.
- Surgeries with wounds that are primarily closed, classified as clean or clean-contaminated based on CDC criteria:
- Clean surgery: No entry into the gastrointestinal, biliary, or genitourinary tracts, absence of acute inflammation, and maintenance of aseptic technique.
- Clean-contaminated surgery: controlled access into the biliary, genitourinary, or gastrointestinal tracts with little to no spillage, no contamination of the urine or bile, and only small aseptic technique violations.

Exclusion Criteria

- Pregnant or breastfeeding women.
- Individuals with uncontrolled diabetes mellitus (HbA1c > 8).
- Skin diseases at the proposed incision site.
- Chronic skin conditions that affect healing.
- Wounds intended for secondary intention healing.
- Conditions impairing wound healing (e.g., immunocompromised states).
- Collagen vascular diseases.
- During the follow-up phase, a second laparotomy was performed using the same incision.
- Patients on long-term steroid therapy.

Sample size

To calculate the sample size for this study, the following formula was used for estimating a proportion of a population:

$$n = \frac{Z^2 \times p \times (1-p)}{E^2}$$

Where:
- n = sample size
- Z = Z-score corresponding to the desired level of confidence
- p = estimated proportion in the population
- E = margin of error

Bias

To minimize bias, identical postoperative care protocols were applied to both study groups. Surgical site infections (SSI) were assessed solely by the principal investigator to avoid interobserver variability.

Variables

Variables included preoperative hair removal status, incidence of SSI, pain during dressing changes, and demographic data.

Data Collection

- Standardised case record forms were used to record clinical and demographic information.
- SSI was evaluated on postoperative days 7-, 14-, and 30 using the Southampton wound scoring system.
- Pain during dressing changes on postoperative day 7 was measured using a visual analog scale (VAS).

Procedure

Group Assignment

- Group A: Patients undergoing preoperative hair shaving.
- Group B: Patients not undergoing preoperative hair shaving.

Surgical Process

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- Surgeries were done by experienced consultants (minimum 3 years).
- Shaving, if performed, was done immediately before surgery by an appointed barber.

Care Protocols

- Preoperative preparation, antibiotic prophylaxis, and aseptic precautions were standardized for both groups.
- Postoperative care, including antibiotics, analgesics, and wound management, followed routine standards.

Statistical Analysis

Fisher's exact test and chi-square test were used to assess the statistical significance of the data. Pain during dressing changes was compared using the Mann–Whitney U test.

Ethical considerations

The study protocol was approved by the Ethics Committee and written informed consent was received from all the participants.

RESULTS

Two groups of 100 patients each—Group A: pre-operative hair shaving, Group B: no pre-operative hair shaving—made up the total number of patients who participated in the study. Table 1 provides a summary of the patient's baseline and demographic data.

Table 1a: Demographic Characteristics

Characteristic	Group A (Shaved)	Group B (Not Shaved)	p-value
Number of Patients	100	100	-
Mean Age (years)	45.2 ± 12.3	46.5 ± 11.8	0.45
Gender			
Male	60	58	0.78
Female	40	42	

Table 1b: Clinical Characteristics

Characteristic	Group A (Shaved)	Group B (Not Shaved)	p-value
Mean BMI (kg/m²)	26.1 ± 3.5	25.8 ± 3.7	0.55
Diabetes Mellitus (%)	15	17	0.68
Smoking History (%)	20	22	0.75

The baseline profile was similar between the two groups, with no statistically considerable differences. The incidence of SSI in both groups was assessed on postoperative days 7, 14, and 30. The results are presented in Table 2.

Table 2: Incidence of Surgical Site Infection

Time Point	Group A (Shaved)	Group B (Not Shaved)	p-value
Day 7	8 (8%)	4 (4%)	0.23
Day 14	10 (10%)	6 (6%)	0.29
Day 30	12 (12%)	8 (8%)	0.35

There was no statistically considerable variation in the prevalence of SSI between the two groups at any of the time points. Pain during dressing changes on postoperative day 7 was measured using the visual analog scale (VAS). The results are summarized in Table 3.

Table 3: Pain Assessment During Dressing Changes (VAS Score)

Group	**Mean VAS Score ± SD**	**p-value**
Group A	3.8 ± 1.2	<0.001
Group B	2.7 ± 1.1	

Patients in Group A reported notably higher pain scores during dressing changes compared to Group B ($p < 0.001$). A subgroup analysis was performed to compare the incidence of SSI in clean vs. clean-contaminated surgeries within each group. The results are presented in Table 4.

Table 4: Incidence of SSI in Clean vs. Clean-Contaminated Surgeries

Subgroup	Group A (Shaved)	Group B (Not Shaved)	p-value

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Clean Surgeries	4 (4%)	2 (2%)	0.40
Clean-Contaminated Surgeries	8 (16%)	6 (12%)	0.56

The incidence of SSI was greater in clean-contaminated surgeries compared to clean surgeries in both groups, but the variation was not statistically considerable.

DISCUSSION

Two groups, Group A and Group B, comprised the 200 patients involved in the study. A balanced comparison was ensured by the baseline parameters, which included age, gender, BMI, history of diabetes mellitus, and smoking, being comparable among the two groups.
The incidence of SSI was assessed at three postoperative time points: day 7, day 14, and day 30. Although the shaved group exhibited a higher incidence of SSI at each time point (8% vs. 4% on day 7, 10% vs. 6% on day 14, and 12% vs. 8% on day 30), these differences were not statistically significant. This indicates that preoperative hair removal did not substantially affect the overall risk of developing SSIs within the first month following surgery.

Pain during dressing changes on postoperative day 7 was evaluated using a VAS. Patients in the shaved group reported significantly higher pain scores (mean VAS score of 3.8) compared to the non-shaved group (mean VAS score of 2.7), with a p-value <0.001. This significant difference suggests that preoperative hair removal may lead to increased postoperative pain, potentially due to skin irritation or microabrasions caused by shaving.
A subgroup analysis was performed to compare the incidence of SSI in clean and clean-contaminated surgeries within each group. The findings showed that the prevalence of SSI was higher in clean-contaminated surgeries compared to clean surgeries in both groups. However, the differences between the shaved and non-shaved groups within each surgery type were not statistically significant. This further supports the conclusion that preoperative hair removal does not have a notable impact on SSI rates.

Preoperative hair removal has been a standard practice in many surgical procedures. However, its impact on SSIs has been debated. a prospective comparative cohort research that compared individuals who had preoperative shaving to those who did not for elective abdominal operations. Between the two groups, there was no statistically substantial variation in the overall SSI rates. On the other hand, clean-contaminated procedures and procedures taking less than two hours showed greater SSI rates in the shaved group [6].
A study examined the effects of preoperative depilatory cream use on the incidence of SSIs. They discovered scant data to back up the claim that chemical hair removal lowers SSIs. It is advised that more research be done to confirm these results [7]. A comprehensive analysis contrasted several preoperative hair removal techniques. The study concluded that shaving with a razor, as opposed to using depilatory cream, clippers, or no hair removal at all, probably enhances the prevalence of SSIs. When compared to razors, clipping and depilatory cream had comparable efficacy with fewer problems [8].
A study evaluated the impact of non-shaved middle ear and mastoid surgery on SSIs. They found no substantial variation in SSI rates between patients with and without pre-operative hair shaving, suggesting that non-shaved surgery could be preferable for patient comfort without increasing SSI risk [9]. Another study compared different preoperative skin preparation methods, including shaving with razors and using clippers. The study found no substantial variations in SSI rates among the different methods, highlighting the need for more research to determine optimal practices [10].

GENERALIZABILITY

The findings of this study suggest that preoperative hair removal does not significantly affect the incidence of surgical site infections (SSI) in elective abdominal surgeries, but it does increase postoperative pain during dressing changes. Extrapolating these results to a larger population, it can be inferred that routine preoperative hair removal may not be necessary for preventing SSIs and could potentially be omitted to enhance patient comfort. This insight can lead to changes in preoperative protocols, potentially reducing unnecessary procedures and associated pain for a broader patient demographic. However, further studies with larger sample sizes and diverse populations are warranted to validate these findings and develop comprehensive, evidence-based guidelines for preoperative hair removal practices.

CONCLUSION

In conclusion, there was no discernible variation in the prevalence of SSI between individuals who had preoperative hair removal and those who did not, according to the study. On the other hand, individuals who had their hair removed during dressing changes reported far more postoperative pain. These findings imply that hair removal before surgery may increase postoperative discomfort but may not lower the chance of SSI. It is need to conduct more research with higher sample sizes and longer follow-up times to verify these results and investigate the underlying mechanisms.

LIMITATIONS

The limitations of this study include a small sample population who were included in this study. Furthermore, the lack of a comparison group also poses a limitation for this study's findings.

RECOMMENDATION

It is advised that more studies with higher sample numbers and longer follow-up times be conducted to validate these results and create evidence-based recommendations for preoperative hair removal procedures.

ACKNOWLEDGMENT

We are thankful to the patients; without them, the study could not have been done. We are thankful to the supporting staff of our hospital who were involved in the patient care of the study group.

LIST OF ABBREVIATIONS

SSI - Surgical Site Infection
VAS - Visual Analogue Scale
CDC - Centers for Disease Control and Prevention
WHO - World Health Organization
BMI - Body Mass Index
HbA1c - Hemoglobin A1c

SOURCE OF FUNDING

No funding was received.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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Website: https://sjpublisher.org
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