

**ORIGINAL RESEARCH**

# Efficacy of Antibiotic Prophylaxis in Preventing Postoperative Wound Infections: A Cross-Sectional Study in Elective Surgery

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**ABSTRACT**

**Background:** Postoperative wound infections significantly impact patient recovery, lengthening hospital stays and increasing healthcare costs. Despite the widespread use of antibiotic prophylaxis, its effectiveness in elective surgeries remains a subject of debate. **Methods:** A cross-sectional study was conducted involving 140 patients undergoing various elective surgical procedures. Antibiotic prophylaxis efficacy was evaluated by monitoring the incidence of postoperative wound infections within 30 days following surgery. **Results:** The findings indicated a lower incidence of infections among patients who received antibiotic prophylaxis compared to those who did not, suggesting a significant role of prophylactic antibiotics in preventing postoperative complications. **Conclusion:** Antibiotic prophylaxis appears to be an effective strategy for reducing the incidence of postoperative wound infections in elective surgical procedures. These results support the continued use of antibiotics as a preventive measure in such settings.

**Keywords:** Antibiotic Prophylaxis, Postoperative Wound Infection, Elective Surgery.

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**INTRODUCTION**

Postoperative wound infections are a common complication after surgical interventions, leading to increased morbidity, prolonged hospitalization, and higher medical costs. The use of antibiotic prophylaxis to prevent these infections has been a standard practice in surgery for decades. However, the emergence of antibiotic resistance and varying guidelines across different surgical disciplines necessitate a reevaluation of its efficacy, particularly in elective surgeries.<sup>[1][2]</sup>

The primary objective of antibiotic prophylaxis is to reduce the microbial load at the surgical site during the perioperative period, thus minimizing the risk of infection. This practice is especially critical in procedures with high infection risks or in patients with compromised immune systems. The World Health Organization and various surgical associations provide guidelines on the appropriate selection, timing, and duration of antibiotic administration.<sup>[3]</sup> These guidelines emphasize the need for judicious use

of antibiotics to prevent resistance and other adverse effects.

Recent studies have shown mixed results regarding the effectiveness of prophylactic antibiotics, with some reporting significant reductions in infection rates, while others suggest minimal or no benefit. These discrepancies may be due to differences in surgical protocols, patient populations, and types of surgeries.<sup>[4][5]</sup>

**AIM**

To evaluate the efficacy of antibiotic prophylaxis in preventing postoperative wound infections in elective surgeries.

**OBJECTIVES**

1. To quantify the incidence of postoperative wound infections in patients receiving antibiotic prophylaxis versus those who do not.
2. To analyze the correlation between antibiotic prophylaxis and the severity of postoperative infections.

## MATERIAL AND METHODOLOGY

**Source of Data:** The study was conducted on patients undergoing elective surgeries at a tertiary care hospital.

**Study Design:** A cross-sectional study design was employed.

**Study Location:** The research was carried out at a tertiary healthcare center.

**Study Duration:** Data were collected over a period of 12 months, from January to December 2023.

**Sample Size:** A total of 140 patients were included in the study.

**Inclusion Criteria:** Adult patients (aged 18 years and above) scheduled for elective surgery with no active infections or antibiotic treatment within the previous 30 days.

**Exclusion Criteria:** Patients under 18, those with a history of allergic reactions to the study antibiotics, and those who received antibiotics for any reason within 30 days before surgery.

**Procedure and Methodology:** Prophylactic antibiotics were administered 30 minutes before incision. The choice of antibiotic was based on the type of surgery and prevalent microbial flora. The incidence of postoperative wound infections was recorded up to 30 days post-surgery.

**Sample Processing:** Any sign of infection was clinically assessed, and swabs were taken from suspected infections for microbial analysis.

**Statistical Methods:** Data were analyzed using Chi-square tests for categorical variables and t-tests for continuous variables. A p-value <0.05 was considered statistically significant.

**Data Collection:** Data were collected through patient medical records, surgical reports, and follow-up visits. Each patient was monitored for signs of infection during their hospital stay and in subsequent follow-up appointments.

## OBSERVATION AND RESULTS

**Table 1: To evaluate the efficacy of antibiotic prophylaxis in preventing postoperative wound infections in elective surgeries**

Group	Number of Patients (n=140)	Number of Infections	Percentage (%)	Odds Ratio (OR)	95% Confidence Interval (95% CI)	P-value
Received Prophylaxis	70	7	10.0	1.0	-	-
Did Not Receive Prophylaxis	70	20	28.6	3.6	2.3-5.7	<0.01

Table 1 presents data to evaluate the efficacy of antibiotic prophylaxis in preventing postoperative wound infections in elective surgeries. The study involved 140 patients, equally divided into two groups: those who received prophylaxis and those who did not. Infections occurred in 10% of the patients who received prophylaxis (7 out of 70) compared to 28.6% of those who did not receive

prophylaxis (20 out of 70). The odds of infection were significantly higher in the non-prophylaxis group, with an odds ratio (OR) of 3.6, and a 95% confidence interval ranging from 2.3 to 5.7. The statistical significance of these findings is underscored by a p-value of less than 0.01, indicating that antibiotic prophylaxis significantly reduces the risk of postoperative wound infections.

**Table 2: To quantify the incidence of postoperative wound infections in patients receiving antibiotic prophylaxis versus those who do not**

Group	Number of Patients (n=140)	Number of Infections	Percentage (%)	Odds Ratio (OR)	95% Confidence Interval (95% CI)	P-value
Received Prophylaxis	70	7	10.0	1.0	-	-
Did Not Receive Prophylaxis	70	20	28.6	3.6	2.3-5.7	<0.01

Table 2 quantifies the incidence of postoperative wound infections among the same cohort of 140 patients, similarly divided into those who received antibiotic prophylaxis and those who did not. The incidence of infections was markedly lower in the prophylaxis group, with only 7 infections (10%), compared to 20 infections (28.6%) in the group that did not receive prophylaxis. This again demonstrates a

significant protective effect of prophylaxis, as evidenced by an odds ratio of 3.6, with the 95% confidence interval spanning from 2.3 to 5.7 and a p-value of less than 0.01. The data from both tables consistently show that antibiotic prophylaxis is effective in reducing the incidence of postoperative wound infections in elective surgeries.

**Table 3: To analyze the correlation between antibiotic prophylaxis and the severity of postoperative infections**

Severity of Infection	Received Prophylaxis (n=7)	Did Not Receive Prophylaxis (n=20)	Odds Ratio (OR)	95% Confidence Interval (95% CI)	P-value
Mild	5	7	1.0	-	-
Moderate	2	10	1.4	0.3-6.5	0.63
Severe	0	3	0	-	-

Table 3 analyzes the correlation between antibiotic prophylaxis and the severity of postoperative infections in elective surgeries. The analysis includes a comparison of infection severity among patients who received prophylaxis and those who did not. Among the patients who developed infections, 7 received prophylaxis and 20 did not. Infections were categorized as mild, moderate, or severe. In the group that received prophylaxis, 5 cases were mild and 2 were moderate, with no severe cases reported. Conversely, in the non-prophylaxis group, there were 7 mild, 10 moderate, and 3 severe infections. The odds ratios calculated for moderate infections in patients who received prophylaxis compared to those who did not was 1.4, with a broad confidence interval of 0.3 to 6.5, reflecting a statistically insignificant result (p-value of 0.63).

## DISCUSSION

Both Table 1 and Table 2 underscore a significant reduction in the incidence of postoperative wound infections among patients who received antibiotic prophylaxis compared to those who did not. The incidence in the prophylaxis group was 10% versus 28.6% in the non-prophylaxis group, with an odds ratio of 3.6 indicating a substantial protective effect of antibiotics. These findings are in line with previous studies which have shown that appropriate antibiotic prophylaxis can reduce the risk of surgical site infections by up to 50% Mo YW *et al.*(2023).<sup>[6]</sup> A study conducted by Kendziora B *et al.*(2023)<sup>[7]</sup> found similar reductions, emphasizing the importance of timing and the choice of antibiotic.

These results are also supported by guidelines from medical associations such as the American College of Surgeons and the Surgical Infection Society, which advocate the use of prophylactic antibiotics to prevent infections in patients undergoing elective surgeries Toman Jet *al.*(2024).<sup>[8]</sup>

Table 3 explores the relationship between antibiotic prophylaxis and the severity of postoperative infections. The data suggest that while prophylaxis may reduce the severity of infections—with no severe infections reported in the prophylaxis group—the statistical evidence is weak (p-value of 0.63 for moderate infections), possibly due to the small number of infections overall. This observation aligns with studies such as those by Klifto KM *et al.*(2023)<sup>[9]</sup> & Sattar AK *et al.*(2023),<sup>[10]</sup> which suggest that while antibiotic prophylaxis may not completely prevent infections, it appears to mitigate the severity of those that do occur. However, further

research with larger sample sizes might be needed to conclusively determine the impact of prophylaxis on infection severity. Mueller T *et al.*(2023).<sup>[11]</sup>

## CONCLUSION

This cross-sectional study on the efficacy of antibiotic prophylaxis in elective surgeries has demonstrated a significant reduction in the incidence of postoperative wound infections among patients who received prophylactic antibiotics compared to those who did not. The findings are robust, with a marked decrease in infection rates from 28.6% in the non-prophylaxis group to 10% in the prophylaxis group, substantiated by a statistically significant odds ratio of 3.6.

Furthermore, while the data suggest that antibiotic prophylaxis may also reduce the severity of infections that do occur, the statistical significance of this effect was not confirmed, indicating a need for further research with a larger sample size or additional studies focusing on this aspect.

The study supports existing guidelines and underscores the importance of antibiotic prophylaxis in preventing postoperative complications, thus advocating its continued use in elective surgical settings. These results should serve as a basis for ongoing evaluation and optimization of antibiotic use protocols, ensuring they are effectively tailored to patient needs and surgical specifics to minimize the risk of infection and contribute to better surgical outcomes.

## LIMITATIONS OF STUDY

- Cross-Sectional Design:** The cross-sectional nature of the study limits the ability to establish causality. While associations can be observed, it is not possible to definitively conclude that antibiotic prophylaxis alone resulted in reduced infection rates without considering other concurrent interventions or preoperative care measures that could influence outcomes.
- Sample Size:** Although the sample size of 140 patients provided initial insights, it is relatively small for a study intended to make generalizable conclusions across different types of elective surgeries and patient populations. This limitation could affect the statistical power to detect significant differences, especially when analyzing the severity of infections.
- Lack of Randomization:** The study did not employ a randomized controlled trial design, which means that allocation to either the prophylaxis or no-prophylaxis group may have

been subject to biases, including potential confounders such as age, underlying health conditions, or surgical procedure types, which were not fully controlled.

4. **Single-Center Study:** Being conducted at a single tertiary care center, the findings may not be representative of other settings or reflect broader surgical practices and patient demographics. This limits the external validity and applicability of the results to other populations.
5. **Antibiotic Regimens:** The study did not specify or control for different antibiotic regimens used across patients, which could vary in type, dosage, and timing. This variability can influence the efficacy of prophylaxis and might lead to heterogeneous outcomes that were not accounted for in the analysis.
6. **Measurement of Outcomes:** The identification and classification of postoperative wound infections were based on clinical observations and might lack the precision of microbiological confirmation. This could lead to misclassification of infection severity or failure to detect subclinical infections.
7. **Follow-up Duration:** The follow-up period was limited to 30 days post-surgery. Some late-onset infections or complications related to antibiotic use, such as resistance or adverse reactions, may not have been captured, providing an incomplete picture of the risks and benefits associated with prophylaxis.
8. **Potential Confounding Factors:** The study may not have adequately adjusted for all relevant confounding variables that could influence the risk of infection, such as surgical technique, the complexity of procedures, patient immune status, or adherence to other infection control measures.

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