

Original Article

# Impact of Prophylactic Antibiotics in Ischemic Stroke Patients on Reduction of Hospital Stay.

Muhammad Mehroon Razzaq<sup>1\*</sup>, Wahaj Ul Hassan Khan<sup>1</sup>, Maryam Hussain<sup>1</sup>, Qaiser Hayat<sup>1</sup>, Hafsa Waqar<sup>1</sup>, Saliha Wazir<sup>1</sup>

<sup>1</sup>Combined Military Hospital Peshawar

\*Corresponding Author: Muhammad Mehroon Razzaq; Medicine; Email: Moon.razzaq71@gmail.com

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## ABSTRACT

**Background:** Ischemic stroke is a leading cause of morbidity and mortality, with post-stroke infections significantly impacting patient outcomes. The use of prophylactic antibiotics to prevent these infections and reduce hospital stay durations has been a subject of debate in the medical community.

**Objective:** This study aims to evaluate the impact of prophylactic antibiotic administration on the length of hospital stays in ischemic stroke patients.

**Methods:** Conducted at the Combined Military Hospital, Peshawar, this randomized control trial involved 115 patients, divided into two groups. Group 1 (55 patients) received prophylactic ceftriaxone, while Group 2 (60 patients) did not receive antibiotics. Inclusion criteria were a Glasgow Coma Scale (GCS) score 13 and above, with no pre-existing conditions necessitating antibiotics or complications from the stroke. The primary outcome was the duration of hospital stay.

**Results:** Group 1 had an average hospital stay of 6.65 days (SD: 2.06 days), while Group 2 had an average of 6.81 days (SD: 1.98 days). The P value of 0.677 indicated no statistically significant difference in hospital stay durations between the groups. Both groups had similar age and GCS score distributions.

**Conclusion:** The administration of prophylactic antibiotics to ischemic stroke patients did not significantly reduce hospital stay durations. Given the risks associated with antibiotic resistance and side effects, a patient-specific approach to prophylactic antibiotic use is recommended. Future research should focus on identifying specific patient subgroups that may benefit from prophylactic antibiotics and optimal timing for their administration.

**Keywords:** Ischemic Stroke, Prophylactic Antibiotics, Hospital Stay, Randomized Control Trial, Stroke Management.

## INTRODUCTION

Stroke remains a leading cause of disability and mortality worldwide, with ischemic stroke accounting for approximately 85% of all cases (1). The management of ischemic stroke has evolved significantly over the years, shifting from merely supportive care to active interventions aimed at minimizing brain damage and improving patient outcomes (2, 3). One area of ongoing research in the management of stroke is the use of prophylactic antibiotics to prevent infections, which are common complications that can exacerbate patient outcomes (4).

Infections following ischemic stroke, particularly pneumonia and urinary tract infections, have been associated with prolonged hospital stays, increased morbidity, and higher mortality rates (5, 6). The vulnerability of stroke patients to infections is attributed to various factors, including immunosuppression, aspiration due to dysphagia, and prolonged immobilization (7). As such, the administration of prophylactic antibiotics has been considered a potentially beneficial strategy to reduce the incidence of post-stroke infections. However, the effectiveness and necessity of this approach remain subjects of debate within the medical community (8).

Recent studies have explored the role of antibiotics in stroke management, with mixed results (9). While some researchers advocate for their use in reducing infection rates, others warn of the potential risks, such as antibiotic resistance and alterations in gut microbiota (10). The current study conducted at the Combined Military Hospital, Peshawar, aims to contribute to this ongoing

discussion by specifically investigating the impact of prophylactic antibiotics on the reduction of hospital stay in ischemic stroke patients (10, 11).

This study focuses on a well-defined patient group with GCS (Glasgow Coma Scale) scores 13 and above, indicating a stable condition without severe impairment of consciousness (12). Patients included in the study have no pre-existing disease complications, no fever, no other indications for antibiotic use and normal levels of C-reactive protein (CRP). These criteria ensure that the observed effects can be confidently attributed to the intervention rather than confounding variables. The diagnosis of ischemic stroke in this research is rigorously established through CT scans and MRI, providing a clear and accurate identification of patient eligibility (13).

In the intervention group, patients were administered prophylactic ceftriaxone, a broad-spectrum antibiotic, at a dosage of 1g twice daily (BD) (14). The choice of ceftriaxone is grounded in its efficacy against a wide range of pathogens and its relatively favorable profile in terms of safety and tolerability (15). The control group, on the other hand, does not receive prophylactic antibiotics, providing a basis for comparison to assess the true impact of the intervention (16).

The primary outcome of interest in this study was the reduction in hospital stay, which serves as a surrogate marker for improved patient outcomes and reduced healthcare costs. A shorter hospital stay often indicates a lower incidence of complications, faster recovery, and efficient use of healthcare resources. By examining this outcome, the study aims to provide concrete evidence on the benefits, or lack of prophylactic antibiotic use in ischemic stroke patients (17).

The results of this study hold the potential to influence clinical practice guidelines and stroke management protocols. If prophylactic antibiotics are found to significantly reduce hospital stays without causing adverse effects, they could become a standard part of stroke management. Conversely, if the study demonstrates minimal or no benefit, it could discourage the unnecessary use of antibiotics and contribute to the global effort to combat antibiotic resistance. This research thus stands at the forefront of advancing stroke care and offers valuable insights into optimizing patient outcomes in one of the most challenging domains of medical practice.

## MATERIAL AND METHODS

The methodology of this study was designed to evaluate the impact of prophylactic antibiotics on reducing hospital stay in patients with ischemic stroke (18). Conducted at the Combined Military Hospital, Peshawar, the study adopted a randomized control trial design.

Patient selection was based on strict inclusion criteria: individuals with a Glasgow Coma Scale (GCS) score 13 and above, indicative of stable consciousness levels, and no significant medical complications were chosen. Exclusion criteria were comprehensive, including the presence of fever, any pre-existing condition necessitating antibiotic use, abnormal C-reactive protein (CRP) levels, or any stroke-related complications. Eligibility was determined through a detailed clinical evaluation, supplemented by diagnostic imaging techniques, including CT scans and MRI, to confirm the diagnosis of ischemic stroke.

Participants were randomly assigned to one of two groups. Group 1, the intervention group, received prophylactic antibiotics, specifically ceftriaxone at a dose of 1 gram administered twice daily. Ceftriaxone was chosen for its broad-spectrum coverage and safety profile. Group 2, serving as the control group, did not receive any prophylactic antibiotics. The administration of any other medications or interventions was conducted according to standard stroke care protocols and was consistent across both groups to ensure comparability.

The primary outcome of interest was the duration of hospital stay, measured from the day of admission to the day of discharge. This metric was chosen as it reflects not only the direct impact of the intervention on patient health but also its broader implications on healthcare resource utilization.

Throughout the study, ethical guidelines were strictly adhered to. Informed consent was obtained from all participants or their legal guardians. The study design ensured patient confidentiality and compliance with local and international ethical standards for clinical research. The trial was approved from Ethical Review board of CPSP Karachi.

## RESULTS

In the study evaluating the impact of prophylactic antibiotics on ischemic stroke patients, Group 1, which received prophylactic antibiotics, consisted of 55 patients, with 63.6% males (35 patients) and 36.4% females (20 patients). Group 2, not receiving prophylactic antibiotics, had 60 patients, comprising 65% males (39 patients) and 35% females (21 patients). Overall, the study

encompassed 115 patients, with a gender distribution of 64.3% male (74 patients) and 35.6% female (41 patients), indicating a higher proportion of male participants in both groups and the total cohort.

Table 1: Gender Distribution of Patients in a Study on the Effect of Prophylactic Antibiotics in Ischemic Stroke

		Gender		Total
		Male	Female	
Group	Group 1 (Prophylactic Antibiotic)	35 (63.6%)	20 (36.4%)	55
	Group 2 (No Prophylactic Antibiotic)	39 (65%)	21 (35%)	60
Total		74 (64.3%)	41 (35.6%)	115

Group 1, which was administered prophylactic antibiotics, presents with an average patient age of 70.87 years, and standard deviation (SD) of 11.10 years, indicating a moderate variation in age among these patients. Additionally, this group exhibits a mean Glasgow Coma Scale (GCS) score of 14.05, with a standard deviation of 0.69, suggesting a relatively consistent level of consciousness across the group. In contrast, Group 2, which did not receive prophylactic antibiotics, showed a slightly higher average age of 71.33 years (SD: 10.28 years), implying a somewhat narrower age range compared to Group 1. Their mean GCS score stands at 14.16, with a standard deviation of 0.78, indicating a similar level of consciousness variability as observed in Group 1 but with a marginally higher average score. The combined data for the total sample encompassed an overall mean age of 71.11 years with a standard deviation of 10.64 years, reflecting the age distribution of the entire cohort. The mean GCS score for the total group was 14.10, with a standard deviation of 0.74, portraying a general overview of the consciousness level among all the patients in the study.

Table 2: Demographic and Clinical Characteristics of Ischemic Stroke Patients in a Study on the Impact of Prophylactic Antibiotics

Group	Mean Age (years)	SD of Age (years)	Mean GCS	SD of GCS
Total	71.11	10.64	14.10	0.74
Group 1 (Prophylactic Antibiotic)	70.87	11.10	14.05	0.69
Group 2 (No Prophylactic Antibiotic)	71.33	10.28	14.16	0.78

In the study focused on the impact of prophylactic antibiotics on reducing hospital stays for ischemic stroke patients, Group 1, which received prophylactic antibiotics, had an average hospital stay of 6.65 days with a standard deviation of 2.06 days. Group 2, not receiving prophylactic antibiotics, had a marginally higher average hospital stay of 6.81 days with a standard deviation of 1.98 days. The P value of 0.677 indicated no statistically significant difference between the two groups in terms of the duration of hospital stays. This suggested that the use of prophylactic antibiotics did not significantly affect the length of hospitalization for these patients.

Table 3: Hospital Stay Duration in Ischemic Stroke Patients with and without Prophylactic Antibiotics

Group	Mean Hospital Stay (days)	SD of Hospital Stay (days)	P value
Group 1 (Prophylactic Antibiotic)	6.65	2.06	0.677
Group 2 (No Prophylactic Antibiotic)	6.81	1.98	

## DISCUSSION

The current study, focusing on the impact of prophylactic antibiotics in ischemic stroke patients on the reduction of hospital stay, presented intriguing findings (1). It involved 115 patients, with a predominant male representation in both the antibiotic-administered Group 1 (63.6% male) and the non-antibiotic Group 2 (65% male). The age and Glasgow Coma Scale (GCS) scores of the patients were similar across both groups, with Group 1 showing a slightly lower GCS average. Notably, the average hospital stay for patients in Group 1 was 6.65 days, compared to 6.81 days in Group 2, with a non-significant P value of 0.677, suggesting that prophylactic antibiotics did not significantly affect hospital stay durations.

Comparing these findings with previous research reveals both similarities and contrasts. A study by Yan-Guo Xi et al. reported that prophylactic antibiotics did not significantly reduce the risk of infection in stroke patients, mirroring our findings regarding hospital stay duration (19). This similarity suggests a consistent lack of substantial benefits from prophylactic antibiotic use in certain clinical outcomes for stroke patients.

However, another study by Willeke F Westendorp found that early antibiotic administration in stroke patients could lead to a slight reduction in hospital stay, contrasting with our study's findings (20). This discrepancy could be attributed to differences in patient

populations, antibiotic regimens, or study designs. It highlighted the need for a more nuanced understanding of the role antibiotics play in stroke management, considering factors like timing, patient demographics, and stroke severity. Further, our study's demographic data aligned with the findings of Pendlebury et al. (2019) in "The Lancet Neurology," which also reported a higher prevalence of males in stroke studies (21). This consistency underscored the importance of considering gender differences in stroke research and treatment.

In terms of clinical characteristics, our study's observation of similar GCS scores across groups supported the findings of a study by Brown et al. (2022) in "Stroke," where GCS scores were not significantly influenced by antibiotic use (22). This suggested that while antibiotics might have a role in infection prevention, their impact on neurological status, as measured by GCS, is limited (23). On the other hand, a notable contrast was found when compared with the study by Kalra et al. (2005) in "The Journal of Infection," which suggested a significant reduction in hospital stay with antibiotic prophylaxis (24). This difference might be explained by varying study methodologies or patient selection criteria, indicating that the impact of antibiotics on hospital stay might be context-dependent.

Our study contributed to the ongoing discourse on the use of prophylactic antibiotics in ischemic stroke management (17, 25). While it corroborated some previous findings, particularly regarding clinical outcomes like hospital stay duration and GCS scores, it also presented contrasts that warrant further investigation. These discrepancies underlined the complexity of stroke management and the need for personalized treatment strategies. Future research should be aimed to clarify these differences and explore the underlying mechanisms to optimize care for ischemic stroke patients (26).

## CONCLUSION

This study indicated that prophylactic antibiotics did not significantly reduce hospital stay lengths in ischemic stroke patients. Considering the potential risks of antibiotic resistance and side effects, it's recommended that clinicians use a patient-specific approach when deciding on prophylactic antibiotic use. Further research should be focused on identifying patient subgroups that might benefit from such treatment and exploring the optimal timing for administration. Clinicians should base their decisions on the latest research and individual patient assessments, balancing the benefits against the risks of antibiotic use.

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