

Study of Etiology, Clinical Characteristics, and Outcomes of Patients with Infective Endocarditis at Tertiary Care Center in Nepal: A Cross-sectional Study

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ABSTRACT

Introduction: Infective endocarditis is a life-threatening condition with rising incidence now days leading to a serious complications like heart failure, stroke and multiorgan dysfunction. *Staphylococcus aureus* has become a leading causative organism now days world-wide. Limited research in Nepal highlights the need to explore the epidemiology, clinical profiles, and outcomes of Infective endocarditis. This study addresses these gaps in a tertiary care setting.

Methods: This single-center, hospital-based cross-sectional study was conducted from April, 2022 to April, 2024 in the cardiology department of Manmohan Cardiothoracic Vascular and Transplant Center. A total of 39 patients aged 18 years and older, diagnosed with infective endocarditis based on modified Duke's criteria, were included. Data were analyzed using MS Excel and SPSS version 26.0, employing percentages, means, medians, and standard deviations.

Results: Among the 39 patients with infective endocarditis, 33 (84.61%) were male, with a mean age of 34±13.49 years. The mean hospital stay was 23.28±15.47 days. The culture isolated *Enterococcus* 3 (7.69%), *Staphylococcus* 3 (7.69%) and *Streptococcus* 1 (2.56%). The predisposing factors included rheumatic heart disease 17 (43.58%), IV drug user 12 (30.76%), and prosthetic valve 4 (10.25%). The complications seen were heart failure 8 (20.5%), septic shock 4 (10.25%) and AKI 4 (10.25%) with overall mortality of 9 (23.08%).

Conclusions: Infective endocarditis continues to impose a substantial clinical burden in Nepal, with high rates of complications and in-hospital mortality despite contemporary management..



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INTRODUCTION

Infective endocarditis (IE) is the infection of the heart valve, the endocardial surface, or the septum and accompanying systemic pathological process.¹ The overall morbidity of IE in developed countries ranges between 30 and 100 cases per million individuals annually with high mortality rates of 14–22% in-hospital and reaching 51% at 10 years despite advances in medical and surgical care. In recent decades, studies have reported a growing proportion of infective endocarditis cases caused by *Staphylococcus aureus*.^{2,3} This can be attributed to factors such as intravenous drug use, prosthetic valves, surgical procedures, and healthcare-associated infections. However, rheumatic heart disease (RHD) remains a key predisposing factor in developing countries.^{4,5}

Numerous studies have explored various aspects of infective endocarditis in developed countries. However, in Nepal, limited research are available.^{3,6} With advancements in diagnostic modalities, this study aims to provide contemporary data on the clinical characteristics, microbiological profile, complications, and in-hospital outcomes of infective endocarditis in a tertiary care center in Nepal, where recent prospective data remain limited.

METHODS

The study was a single centered hospital based cross-sectional study conducted from April 14, 2022 to April 13, 2024 among patients admitted in cardiology department of Manmohan cardiothoracic vascular and transplant center, Kathmandu,

Nepal. Ethical clearance was obtained from Institutional review committee (IRC) of Institute of Medicine (IOM) prior to study initiation (Reference number: 478080/81). Considering the relatively low incidence of infective endocarditis, we included all the patients of IE diagnosed during the study period that met our inclusion criteria.

The study included patients aged 18 years and above diagnosed with infective endocarditis meeting modified Duke's criteria for a definite diagnosis. Patients younger than 18 years were excluded because epidemiology, clinical picture and management of IE differs in pediatric population. A consecutive sampling technique was employed, whereby all eligible patients meeting the inclusion criteria during the study period were enrolled.

Written consent was taken from all the patients who fits the inclusion criteria prior to data collection. Demographic characteristics, predisposing factors, clinical manifestations, laboratory findings, echocardiographic findings and microbiological profile, were recorded using a structured proforma. Microbiological data were obtained from blood cultures performed as part of routine clinical care. Patients were followed throughout their hospital stay, and any complications occurring during hospitalization, including heart failure, sepsis, arrhythmias, thromboembolic events, and acute kidney injury, were documented. Clinical outcomes at discharge, including survival and in-hospital mortality, were also recorded. Data were organized in MS Excel and subsequently analyzed with Statistical Package for the Social Sciences (SPSS) version 26.0. Data were checked for completeness and consistency before analysis. Descriptive statistics were used to summarize the data. Categorical variables were presented as frequencies and percentages, whereas continuous variables were expressed as mean±standard deviation or median (interquartile range), as appropriate.

RESULT

The total of 39 patients were included in the study, of whom 33 (84.61%) were male. The mean age of patients was 34±13.49 years. Regarding ethnicity, Brahmins constituted 16 (41.02%), Chhetris 1 (23.07%) and Janajatis 6 (15.38%). In terms of occupation, 14 (35.89%) patients were employed, 8 (20.51%) were involved in business, 7 (17.94%) were students, 5 (12.82%) were housewives, and 4 (10.25%) were dependents. Thirty-one (79.48%) were married, and 11 (28.20%) were illiterate (Table 1).

The predisposing factors for IE were rheumatic heart disease (RHD) in 17 (43.58%) patients, IV drug use 12 (30.76%), and prosthetic valve replacement 4 (10.25%) patients. Of the total patient, 16 (41.02%) had history of cardiovascular disease (CVD) and 16 (41.02%) reported a history of smoking (Table 2). The comorbidities like hypertension and diabetes mellitus was present among 5 (12.82%) and 2 (5.12%) of the patients respectively. The mean systolic blood pressure was 113.94±17.06 mmHg and diastolic pressure was 68.05±16.43 mmHg.

Overall, microorganisms were isolated in 7 (17.95%) patients. *Staphylococcus* species and *Enterococcus* species were each isolated in 3 (7.69%), while *Streptococcus* species was isolated in 1 (2.56%) patient.

Table 1. Socio-demographic data (N=39).

Variables	n(%)
Age in years (Mean±SD)	34±13.49
Sex	
Male	33(84.61)
Female	6(15.39)
Ethnicity	
Brahmin	16(41.02)
Chhetri	9(23.07)
Dalit	1(2.56)
Janajati	6(15.38)
Madhesi	3(7.69)
Others	4(10.25)
Religion	
Hindu	35(89.74)
Buddhist	4(10.26)
Occupation	
Business	8(20.51)
Housewife	5(12.82)
Job	14(35.89)
Dependent	4(10.25)
Student	7(17.94)
Others	1(2.56)
Marital status	
Married	31(79.48)
Unmarried	8(20.51)
Education	
Primary	14(35.89)
Secondary	11(28.20)
Bachelor	3(7.69)
Illiterate	11(28.20)

The clinical features were fever 35 (89.7%), shortness of breath 33 (84.6%), anemia 31 (79.48%) followed by heart murmur 30 (76.92%), anorexia 17 (43.58%), myalgia 12 (30.76%), and roth spots 2 (5.12%) (Table 3).

Table 2. Predisposing factor in IE patients (N=39).

Predisposing factor	n(%)
RHD	17(43.58)
Among RHD, Tricuspid valve repair	2(11.76)
IV drug abuse	12(30.76)
Non Rheumatic valvular lesion	6(15.38)
BAV(Bicuspid Aortic Valve)	2(33.33)
CKD(Chronic kidney Disease)	3(50)
Marfan syndrome	1(16.67)
Prosthetic valve	4(10.25)

Native valve endocarditis accounted for 35 (89.75%) cases, whereas prosthetic valve involvement was observed in 4 (10.25%) patients. Mitral valve endocarditis was seen occurring in 12 (30.77%) patients, aortic valve endocarditis in 11 (28.21%) and tricuspid valve endocarditis in 11 (28.21%) patients. One

patient (2.56%) developed pulmonary valve endocarditis during the postpartum period (Table 4).

Length of stay was 23.28 ± 15.47 days. Heart failure was seen occurring in 8 (20.51%) patients, and was observed with aortic valve endocarditis. Sepsis occurred in 4 (10.26%) patients and was seen in patients with mitral and tricuspid valve involvement. The overall in-hospital mortality rate was 9 (23.07%) (Table 5).

Table 3. Clinical characteristics of IE patients (N=39).

Clinical characteristics	n(%)
Fever	35(89.74)
Shortness of breath	33(84.61)
Anemia	31(79.48)
Heart murmur	30(76.92)
Anorexia	17(43.58)
Myalgia	12(30.76)
Neurologic manifestation	2(5.12)
Roth spots	2(5.12)
Embolic phenomenon	3(3.69)

Table 4. Vegetations in different valves (N=39).

Valves	n(%)
Mitral Valve	12(30.76)
Aortic Valve	11(28.20)
Tricuspid valve	11(28.20)
Prosthetic Valve	4(10.25)
Mitral	2(5.12)
Aortic	2(5.12)
Pulmonary valve	1(2.56)
Combined valves	4(10.25)
Mitral and Aortic	2(5.12)
Mitral and Tricuspid	1(2.56)
Aortic and Tricuspid	1(2.56)

Table 5. Complications and Outcome (N=39).

Particulars	n(%)
Outcomes	
Survived	30(76.92)
Dead	9(23.08)
Complications	
Septic Shock	4(10.25)
ADHF	8(20.51)
Arrhythmia	3(7.69)
Thromboembolic stroke	1(2.56)
Mycotic Aneurysm	1(2.56)
Acute Mesenteric Ischemia	1(2.56)
Pulmonary Infarct	1(2.56)
AKI(Acute Kidney Injury)	4(10.25)

DISCUSSION

This cross-sectional study was conducted over a two-year period at a single tertiary center to evaluate the etiology and in-hospital outcomes of IE among the Nepalese population. Males constituted majority of the patient compared to females in our study, which is consistent with previous studies of Nepal, India and Pakistan.^{3,6-9} The mean age of affected population in our study was 34 ± 13.49 years, which is similar to findings

reported by Bajracharya et al 2021 (41 years), Sherpa et al. 2016 (31 years).^{3,6} In contrast, Madhumitha et al. from India ($53 \text{ years} \pm 15 \text{ years}$) and Saleem et al from Pakistan ($49.17 \pm 18.55 \text{ years}$) reported in older population.^{8,9} Studies from western country have shown that incidence of IE is higher among older population of 5th to 6th decade of their life.^{10,11}

The culture positivity rate was 17.9% in our study, which is lower than that reported in previous studies from Nepal and other South Asian countries.^{6,8,9} Bajracharya et al reported a culture positivity rate of 53% while studies from developing countries reported rates ranging from 21 to 42%.^{3,8,9} In contrast, Western series have documented positive blood cultures in over 80% of infective endocarditis patients.^{11,12} The low culture yield observed in our study may be attributed to prior antibiotic exposure before referral to our tertiary care center. A substantial proportion of culture-negative patients had received antibiotics before hospital admission, a factor consistently associated with culture-negative infective endocarditis in previous studies.^{13,14} Our findings suggest that prior antibiotic therapy remains an important contributor to culture-negative infective endocarditis. Furthermore, advanced molecular diagnostic techniques such as polymerase chain reaction and next-generation sequencing may improve diagnostic yield in culture-negative cases, although their use remains limited in low- and middle-income countries.¹⁵ Among culture-positive cases, *Staphylococcus* and *Enterococcus* were most frequently isolated in our study, which is consistent with other studies of Nepal.^{6,8} Rheumatic heart disease was the most common predisposing condition in our study, followed by intravenous drug use, prosthetic valve replacement, and chronic kidney disease. These findings are consistent with previous studies from Nepal, where rheumatic heart disease remains leading risk factor for IE.⁶ In hospital based study of eastern Nepal involving 17 IE patients, RHD was the most common predisposing condition, whereas another study from the same region reported intravenous drug use as the predominant risk factor among 20 patients.^{3,6} The continued prominence of rheumatic heart disease in our cohort may explain the relatively younger age of affected patients, as rheumatic valvular disease often develops earlier in life. Chronic kidney disease was another important risk factor identified in our study, which is consistent with evidence showing that patients receiving renal replacement therapy, particularly hemodialysis through central venous catheters, are at increased risk of IE.¹⁶

The most common complications observed in this study were heart failure, sepsis and AKI. Bajracharya et al also reported acute renal failure and congestive heart failure as predominant complications. Sherpa et al reported 25% of patients, while a study from Pakistan reported acute kidney injury in nearly half of the study population. These differences may reflect variations in patient characteristics, disease severity at presentation, underlying comorbidities, and referral patterns.^{6,9}

The in-hospital mortality rate in our study was 23.1%. This is higher than the mortality reported by Bajracharya et al. (11.8%)

but comparable to the 25% mortality reported by Ali et al. from Pakistan.^{3,17} No mortality was reported in the study by Sherpa et al.; however, one patient was referred elsewhere and the final outcome was not documented. Differences in reported mortality rates between studies may be attributable to variations in patient demographics, underlying comorbid conditions, microbiological profiles, stage of disease at presentation, availability of healthcare resources, and methodological differences. Consequently, comparisons across studies should be made cautiously.

The present study contributes valuable contemporary data on the epidemiological characteristics, clinical presentation, microbiological spectrum, complications, and short-term outcomes of infective endocarditis in a tertiary care setting in Nepal.

The major limitations of our study include its relatively smaller sample size and single-center design, which may limit the generalizability of the findings. A larger multicenter study conducted over a longer duration would provide a more representative picture of infective endocarditis in Nepal. In addition, patients were followed only until hospital discharge, and long-term outcomes were not assessed. Consequently, the true burden of morbidity and mortality associated with infective endocarditis may have been underestimated. As this was a descriptive study, no analytical assessment of factors associated with mortality or adverse outcomes was performed. Furthermore, blood culture positivity was low in our cohort, likely influenced by prior antibiotic exposure before referral, which may have affected the accurate characterization of the microbiological profile. Hence, the findings of this study should be interpreted in light of these limitations.

CONCLUSION

Infective endocarditis remains an important cause of morbidity

and mortality among hospitalized patients in Nepal. In our study, most patients were middle-aged males and commonly had underlying predisposing conditions such as rheumatic heart disease, intravenous drug use, prosthetic valves, or chronic kidney disease. Heart failure, sepsis, and AKI were the most frequent complications. Despite treatment, substantial in-hospital mortality was observed.

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Conflict of Interest: None.

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REFERENCES

- Vandersluis YR, Suri S. Infective Endocarditis And Orthodontic Implications In Children: A Review Of The Literature. *Am J Orthod Dentofacial Orthop.* 2020 Jan;157(1):19–28. DOI: [10.1016/j.ajodo.2019.03.027](https://doi.org/10.1016/j.ajodo.2019.03.027)
- Damasco PV, Correal JCD, Cruz-Campos ACD, Wajsbrot BR, da Cunha RG, da Fonseca AG, et al. Epidemiological and Clinical Profile of Infective Endocarditis at a Brazilian Tertiary Care Center: An Eight-Year Prospective Study. *Rev Soc Bras Med Trop.* 2019;52. DOI: [10.1590/0037-8682-0375-2018](https://doi.org/10.1590/0037-8682-0375-2018)
- Bajracharya S, Khanal B, Siwakoti S, Singh RR, Sharma SK. Microbiological and Clinicoepidemiological Profile of a Series of Patients with Infective Endocarditis at a Center in Eastern Nepal. *Can J Infect Dis Med Microbiol.* 2021;2021(Iv). DOI: [10.1155/2021/9980465](https://doi.org/10.1155/2021/9980465)
- Ghosh S, Sahoo R, Nath RK, Duggal N, Gadpayle AK. A Study of Clinical, Microbiological, and Echocardiographic Profile of Patients of Infective Endocarditis. *Int Sch Res Not.* 2014;2014:340601. DOI: [10.1155/2014/340601](https://doi.org/10.1155/2014/340601)
- Gupta A, Gupta A, Kaul U, Varma A. Infective endocarditis in an Indian setup: Are We Entering the “Modern” Era? *Indian J Crit Care Med Peer-Rev Off Publ Indian Soc Crit Care Med.* 2013 May;17(3):140–7. DOI: [10.4103/0972-5229.117041](https://doi.org/10.4103/0972-5229.117041)
- Sherpa K, Shah P, Khatri Y, Jha S, Sharma S, Karki P. Clinical Profile and Outcome of Infective Endocarditis Patients Admitted in Tertiary Care Center in Eastern part of Nepal. *J Inst Med Nepal.* 2016;38(2 & 3):10–4. DOI: [10.59779/jiomnepal.853](https://doi.org/10.59779/jiomnepal.853)
- Ghimire M, Karki P, Khanal B, Acharya P, Sharma S, Pahari B. Clinicomicrobiological Profile of Infective Endocarditis in a Tertiary Care Center of Nepal. *J Coll Med Sci-Nepal.* 2013 Sept 23;8(4):34–41. DOI: [10.3126/jcmsn.v8i4.8698](https://doi.org/10.3126/jcmsn.v8i4.8698)
- Nambi PS, Ramakrishnan B, Gopalakrishnan R, Sathyamurthy. Profile of Infective Endocarditis: At a Tertiary Care Referral Centre. *J Assoc Physicians India.* 2018 June 1;66(6):60–5. Available from: <https://europepmc.org/article/med/31331138>
- Saleem MW, Amjad M, Ullah I, Jan RU, Khan MI, Israr U. Clinical Presentation, Microbiological Profile, and Management Challenges of Infective Endocarditis: A Retrospective Study from a High Volume Cardiac Centre in Pakistan. *Egypt Heart J.* 2025

- Nov 10;77(1):103. DOI: [10.1186/s43044-025-00699-z](https://doi.org/10.1186/s43044-025-00699-z)
10. Armiñanzas C, Fariñas-Alvarez C, Zarauza J, Muñoz P, González Ramallo V, Martínez Sellés M, et al. Role of Age and Comorbidities in Mortality of Patients with Infective Endocarditis. *Eur J Intern Med.* 2019 June;64:63–71. DOI: [10.1016/j.ijcard.2003.10.043](https://doi.org/10.1016/j.ijcard.2003.10.043)
11. Hill EE, Herijgers P, Claus P, Vanderschueren S, Herregods MC, Peetermans WE. Infective Endocarditis: Changing Epidemiology and Predictors of 6-month Mortality: A Prospective Cohort Study. *Eur Heart J.* 2006 June 7;28(2):196–203. DOI: [10.1093/eurheartj/ehl427](https://doi.org/10.1093/eurheartj/ehl427)
12. Tornos P, Iung B, Permanyer-Miralda G, Baron G, Delahaye F, Gohlke-Bärwolf C, et al. Infective Endocarditis in Europe: Lessons from the Euro Heart Survey. 2005 May 1. DOI: [10.1136/hrt.2003.032128](https://doi.org/10.1136/hrt.2003.032128)
13. Tariq M, Siddiqui BK, Jadoon A, Alam M, Khan SA, Atiq M, et al. Clinical Profile and Outcome of infective Endocarditis at the Aga Khan University Hospital. *Int J Collab Res Intern Med Public Health.* 2009 Jan 1;1(3):84–99. Available from: https://ecommons.aku.edu/pakistan_fhs_mc_med_intern_med/22/
14. Garg N, Kandpal B, Garg N, Tewari S, Kapoor A, Goel P, et al. Characteristics of Infective Endocarditis in a Developing Country-clinical Profile and Outcome in 192 Indian patients, 1992–2001. *Int J Cardiol.* 2005 Feb 15;98(2):253–60. DOI: [10.1016/j.ijcard.2003.10.043](https://doi.org/10.1016/j.ijcard.2003.10.043)
15. 2023 ESC Guidelines for the Management of Endocarditis | European Heart Journal | Oxford Academic. Available from: <https://www.academia.edu/download/105808591/chad193.pdf>
16. Chaudry MS, Carlson N, Gislason GH, Kamper AL, Rix M, Fowler VG, et al. Risk of Infective Endocarditis in Patients with End Stage Renal Disease. *Clin J Am Soc Nephrol.* 2017 Nov;12(11):1814–22. DOI: [10.2215/CJN.02320317](https://doi.org/10.2215/CJN.02320317)
17. Ali SS, Qureshi IA, Ayaz A, Arshad A, Farhad A, Jamil B, et al. Etiology, Clinical Characteristics, and Outcome of Infective Endocarditis: 10-year Experience from a Tertiary Care Center in Pakistan. *Monaldi Arch Chest Di.* 2022 Mar 28. DOI: [10.4081/monaldi.2022.2212](https://doi.org/10.4081/monaldi.2022.2212)