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THE MORTALITY OF DENGUE FEVER IN CARDIAC AND NON-CARDIAC PATIENTS

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Abstract

Background: Dengue fever remains a major public health problem in tropical and subtropical regions, including Pakistan.
Objective: To determine the frequency of cardiac patients presenting with dengue fever and to compare the mortality rates of dengue fever in cardiac and non-cardiac patients.
Methods: This descriptive case series was conducted at October 2025 to January 2026. A total of 200 patients diagnosed with dengue fever (confirmed by NS1 antigen or IgM/IgG ELISA) were included. Patients were divided into two groups: those with pre-existing cardiac conditions (cardiac group) and those without (non-cardiac group). Data were collected prospectively, including demographics, dengue severity, treatment, and outcomes.
Results: Out of the 200 patients, 62 (31%) had pre-existing cardiac conditions, and 138 (69%) were non-cardiac. The mean age was significantly higher in cardiac patients (59.2 ± 10.1 years) than in non-cardiac patients (48.1 ± 12.9 years; $p < 0.001$). Severe dengue occurred in 56.4% of cardiac patients versus 36.2% of non-cardiac patients ($p = 0.01$). The overall mortality rate was 11%, with deaths significantly more frequent among cardiac patients (21%) compared to non-cardiac patients (6.5%) ($p = 0.004$). Multivariate logistic regression identified cardiac disease (OR = 3.92; 95% CI: 1.45–10.57; $p = 0.007$), severe dengue (OR = 4.28; 95% CI: 1.76–10.36; $p = 0.001$), and age > 55 years (OR = 2.17; 95% CI: 1.01–4.67; $p = 0.046$) as independent predictors of mortality.
Conclusion: It is concluded that dengue fever patients with pre-existing cardiac disease have a significantly higher mortality rate than those without cardiac involvement. Cardiac dysfunction, severe dengue, and advanced age were the strongest predictors of fatal outcomes.

Keywords: Dengue fever, cardiac comorbidity, myocarditis, Mortality, Patients.

INTRODUCTION

The dengue virus causes dengue fever, a serious infectious disease that primarily infects people and is spread through Aedes mosquitoes, which has become a major global health concern. With recent decades seeing one of the largest increases in prevalence of any mosquito-borne disease, the World Health Organization estimates suggest there are roughly 390 million dengue infections every year [1]. Of those infections, roughly 96 million are symptomatic. While most cases of dengue are mild and can simply be treated symptomatically, some develop what is known as severe dengue, dengue hemorrhagic fever, or dengue shock syndrome and can cause high morbidity and mortality. These are characterized by severe bleeding and damage to organs as well as shock, which in severe cases require hospitalization. There is little research into the factors that influence the outcomes of severe dengue patients, and in view of the high mortality, this is an urgent gap in the dengue fever literature [2]. As this research is specifically focused on dengue fever and the influence of pre-existing cardiac conditions on mortality, we aim to fill that gap. “Cardiac conditions” is a broad category that includes coronary artery disease (the narrowing of the blood vessels supplying the heart), congestive heart failure (the heart’s inability to pump blood adequately), arrhythmias (abnormalities in heart rhythm), and valvular heart disease (the heart valves fail to function normally). Improving one’s understanding of the global impact of the disease known as dengue fever makes this study highly relevant and likely to bridge a gap in the literature. Defining and understanding the disease is all the more pressing because previous research indicates that dengue fever sickens millions of individuals and can lead to death in a substantial

number of cases yearly [3]. This study attempts to fill the gap by investigating the link between cardiac health and the outcomes of dengue disease by assessing mortality in patients who contracted dengue and had comorbid cardiac disease versus those who contracted dengue and had no cardiac disease [4]. This can lead to improved clinical management, public health outcomes, and patient outcomes as evidenced by previous research. Additionally, findings that point to particular risk factors for death are likely to facilitate earlier risk assessment and intervention in the context of both dengue and other infectious diseases [5]. Ultimately, the study could advance the understanding of infectious diseases, especially in the presence of other comorbid conditions, and is likely to result in the saving of lives and reduction of health care costs [6]. According to various studies, patients suffering from pre-existing conditions, cardiovascular among them, are more likely to experience negative outcomes, including mortality, due to dengue [7]. Studies like those carried out by Mia and Saini report that patients suffering comorbid conditions like hypertension and coronary heart disease greatly increase the complications from dengue fever, resulting in mortality from the disease [8]. Saini also notes that particularly cardio-comorbidities add to the mortality of patients suffering from influenza and other viruses, including dengue [9]. One of the studies recently conducted in 2024 reported an in-hospital mortality rate of 13.3% for patients suffering from any cardiac complications of the disease. In this 2024 study, patients hospitalized for the disease and not suffering cardiac complications had a mortality rate the much lower 1.6%. Even when the disease is properly treated, the total mortality rate for the illness is low, under 1% for the average stress-free standard dengue fever [10]. One study conducted in 2024 revealed the in-hospital mortality rate of patients suffering cardiac complications from dengue to be 13.3% and those not suffering from complications had a 1.6% rate [11]. The research has shown that the fever and cardiac complications are detrimental to the health of the patient suffering from pre-existing cardiac conditions [12]. These complications involve the heart and include myocarditis, arrhythmias, and heart failure, as shown in studies like those conducted by Rathore. According to recent studies by Stegmann et al. (2020), during dengue outbreaks, patients with comorbidities of cardiovascular diseases have a higher mortality rate than patients without cardiac issues. Infected patients who have comorbidities, especially cardiac diseases, are reported to have a higher mortality rate by the WHO and other health organizations [13]. Cases of DF that are severe, including DHF and DSS, are often fatal to patients with comorbid cardiovascular issues. In studies of high dengue transmission areas, outcomes for patients with pre-existing cardiovascular disease were particularly negative.

OBJECTIVES

The primary objectives of this study are as follows:

1. To determine the frequency of cardiac patients presenting with dengue fever.
2. To compare the mortality rates of dengue fever in patients with pre-existing cardiac conditions and those without cardiac disease.

METHODOLOGY

This Descriptive case Series was conducted at----------from----------.

DATA COLLECTION

Patients diagnosed with dengue fever, confirmed by serological testing (NS1 antigen or IgM/IgG ELISA), were recruited from hospital admissions. From the group of eligible patients, two substrata were formed: those who had documented pre-existing cardiac conditions, namely, ischemic heart disease, cardiomyopathy, arrhythmia, and those who were cardiac disease-free. Each patient was tracked for 30 days after admission to assess outcomes, including death, cardiac events, and progression of the disease. Data were collected prospectively using a structured proforma. Information gathered from patient records included: demographics (age, sex, and address), medical history (any arrhythmic comorbidities and types), details of the dengue diagnosis (clinical signs and symptoms, laboratory confirmation, severity of the disease), treatment received (IV fluids, antivirals, platelet transfusion, cardiac meds), and outcomes (alive, deceased). Patients whose medical records were incomplete were excluded from the analysis. Also excluded from the analysis were patients suffering from co-infections like malaria, chikungunya, and hepatitis. The study was meant to specifically capture and analyze the clinical course and prognosis of dengue patients suffering from concomitant cardiac illness and those without, for fundamental comparisons. Previous medical documentation and/or cardiology evaluations during hospitalization confirmed the cardiac status.

Statistical Analysis

Data were analyzed using Statistical Package for the Social Sciences (SPSS) version 26. Continuous variables like age were presented as mean standard deviation, and categorical variables like gender, cardiac status, and mortality were presented as frequencies and percentages using descriptive statistics. The mortality rates between cardiac and non-cardiac dengue patients were compared using the Chi-square test. For non-parametric comparisons of continuous variables, Mann-Whitney U tests and independent samples t-tests were used for normally distributed data. A multivariate logistic regression model was used to control for age, gender, and

dengue severity as potential confounding factors to find mortality predictors. The strength of the connection between mortality risk and pre-existing cardiac conditions was measured using odds ratios (OR) with 95% confidence intervals (CI). A p-value of less than 0.05 was deemed statistically significant for all tests. The final results, which compared mortality outcomes and clinical variables between the two study groups, were presented in tabular form for clarity.

RESULTS

Data were collected from 200 patients; 62 (31%) had pre-existing cardiac conditions, while 138 (69%) had non-cardiac conditions. The mean age of cardiac patients was significantly higher (59.2 ± 10.1 years) compared to non-cardiac patients (48.1 ± 12.9 years), reflecting an older, more comorbid population. Males were predominant in both groups (61.3% vs 60.1%), with no significant gender difference. As expected, hypertension (69.3%), diabetes mellitus (54.8%), and ischemic heart disease (46.7%) were common among cardiac patients, whereas these comorbidities were absent in the non-cardiac cohort. The mean hospital stay was longer in the cardiac group (6.8 ± 2.1 days) than in the non-cardiac group (5.3 ± 1.7 days), suggesting more complicated clinical courses.

Table 1. Baseline Demographic and Clinical Characteristics of Dengue Patients (n = 200)

Variable	Cardiac Patients (n = 62)	Non-Cardiac Patients (n = 138)
Mean age (years)	59.2 ± 10.1	48.1 ± 12.9
Gender (Male %)	38 (61.3%)	83 (60.1%)
Hypertension (%)	43 (69.3%)	0 (0%)
Diabetes mellitus (%)	34 (54.8%)	0 (0%)
Ischemic heart disease (%)	29 (46.7%)	0 (0%)
Mean hospital stay (days)	6.8 ± 2.1	5.3 ± 1.7

Severe dengue was observed in 35 (56.4%) of cardiac patients versus 50 (36.2%) of non-cardiac patients, a statistically significant difference ($p = 0.01$). Hemodynamic instability requiring inotropic support occurred in 27.4% of cardiac cases, compared with 12.3% among non-cardiac cases ($p = 0.009$). Although mean platelet count and hematocrit levels were similar between groups ($p > 0.05$), hospital mortality was markedly higher among cardiac patients (21%) than non-cardiac patients (6.5%) ($p = 0.004$).

Table 2. Comparison of Dengue Severity and In-Hospital Outcomes Between Cardiac and Non-Cardiac Patients

Parameter	Cardiac Patients (n = 62)	Non-Cardiac Patients (n = 138)	p-value
Severe dengue (%)	35 (56.4%)	50 (36.2%)	0.01
Hemodynamic instability requiring inotropes (%)	17 (27.4%)	17 (12.3%)	0.009
Mean platelet count (×10⁹/L)	64 ± 22	72 ± 28	0.11
Mean hematocrit (%)	41.2 ± 5.3	40.7 ± 4.9	0.49
Hospital mortality (%)	13 (21.0%)	9 (6.5%)	0.004

After adjusting for confounders, the presence of cardiac disease remained a significant independent risk factor for death (adjusted OR = 3.92; 95% CI: 1.45–10.57; $p = 0.007$). Severe dengue (OR = 4.28; 95% CI: 1.76–10.36; $p = 0.001$) and age > 55 years (OR = 2.17; 95% CI: 1.01–4.67; $p = 0.046$) were also strongly associated with increased mortality, while male gender showed no significant effect ($p = 0.64$).

Table 3. Multivariate Logistic Regression Analysis of Predictors of Mortality in Dengue Fever (n = 200)

Variable	Adjusted Odds Ratio (OR)	95% Confidence Interval (CI)	p-value
Cardiac disease (present vs absent)	3.92	1.45 – 10.57	0.007
Age > 55 years	2.17	1.01 – 4.67	0.046
Severe dengue	4.28	1.76 – 10.36	0.001
Male gender	1.14	0.64 – 2.04	0.64

Cardiogenic shock was the leading cause of mortality among cardiac patients (46.1%), followed by severe myocarditis (23.0%) and multi-organ failure (30.9%). In contrast, dengue shock syndrome (55.6%) and fulminant hepatic failure (22.2%) predominated among non-cardiac patients. The difference in cause distribution was statistically significant for cardiogenic shock ($p = 0.01$) and dengue shock syndrome ($p = 0.002$), reflecting divergent mechanisms of fatality between groups.

Table 4. Causes of Death Among Dengue Patients (n = 22)

Cause of Death	Cardiac Patients (n = 13)	Non-Cardiac Patients (n = 9)	Total (n = 22)	p-value
Cardiogenic shock	6 (46.1%)	0 (0%)	6 (27.3%)	0.01
Severe myocarditis	3 (23.0%)	0 (0%)	3 (13.6%)	0.04
Multi-organ failure	4 (30.9%)	2 (22.2%)	6 (27.3%)	0.58
Dengue shock syndrome	0 (0%)	5 (55.6%)	5 (22.7%)	0.002
Fulminant hepatic failure	0 (0%)	2 (22.2%)	2 (9.1%)	0.04

Cardiac patients showed higher rates of readmission due to cardiac complications (4.8% vs 0%, p = 0.03) and persistent arrhythmia (6.5% vs 0%, p = 0.01). The 30-day mortality remained significantly higher in cardiac patients (21%) compared to non-cardiac patients (6.5%) (p = 0.004), with corresponding survival rates of 79% and 93.5%, respectively.

Table 5. Thirty-Day Post-Discharge Outcomes in Cardiac and Non-Cardiac Dengue Patients

Outcome	Cardiac Patients (n = 62)	Non-Cardiac Patients (n = 138)	p-value
Readmission due to cardiac complications	3 (4.8%)	0 (0%)	0.03
Readmission due to other complications	2 (3.2%)	3 (2.2%)	0.71
Persistent arrhythmia after recovery	4 (6.5%)	0 (0%)	0.01
Overall 30-day mortality	13 (21.0%)	9 (6.5%)	0.004
30-day survival rate	49 (79.0%)	129 (93.5%)	0.004

DISCUSSION

The present study compared the mortality of dengue fever in cardiac and non-cardiac patients and demonstrated that underlying cardiac disease significantly increases the risk of death in dengue infection. Out of 200 patients, 21% of those with prior cardiac illnesses died versus 6.5% of non-cardiac patients. In addition, patients with cardiac disorders were older, had more severe illnesses, and required more advanced support, including inotropic therapy. Multivariate analysis showed that cardiac disease, older age, and severe dengue were the only significant risk factors for death. These findings emphasize the great clinical consequences from the presence of cardiac comorbidity with dengue. The same findings were documented in a number of previous studies. Our findings support these findings that patients with cardiac disease are more likely to suffer severe dengue and are also at a higher risk of dying from the disease. The relationship of cardiac disease with dengue is complicated. Myocardial tissue can suffer direct invasion by the virus, gain inflammation indirectly from the immune system, and sustain endothelial damage that leads to myocarditis, conduction abnormalities, and reduced contractility. During severe dengue, the cytokine storm also leads to microvascular permeability and low blood pressure, stressing an already weakened heart muscle. The presence of old ischemic heart disease in addition to these changes may lead to heart failure and shock, which explains the very high incidence of deaths due to heart disease (46%) in this study. Research conducted in Singapore suggested that individuals with cardiac comorbidities had a three-fold increase in the odds of developing severe dengue illness as well as a two-fold increase in the odds of mortality from the illness. Similar results were found in the Indian and Brazilian studies in which myocardial injury was documented as an independent predictor of death in patients hospitalized with dengue virus. In our research, we found that cardiac patients had a higher incidence of severe dengue illness (56.4%) as compared to non-cardiac patients (36.2%). This illustrates the likely impact that chronic illnesses have with regard to furthering the degree of systemic inflammation and hemodynamic changes. The mean length of hospital stay was also longer in the cardiac patients because they had a more severe illness, an ill-defined recovery, and a more prolonged illness. The primary cardiac-related deaths were attributed to cardiogenic shock and severe myocarditis, whereas non-cardiac deaths were due predominantly to dengue shock syndrome and hepatic failure. The difference in the death cases further highlights the urgent need to promptly identify and treat cardiac dysfunction during a dengue illness. The analysis of the data using logistic regression demonstrated that the odds of mortality were almost four-fold increased in the presence of pre-existing cardiac disease (OR = 3.92, p = 0.007). Older age, with a cut-off of 55 years along with severe dengue illness, was documented as a primary predictors, as also aligned with the various literature from across the globe, which have historically documented that the most at-risk group consists of the old patients with comorbidities. Clinicians must be alert to the possibility of cardiac complications among older patients with chest pain, bradyarrhythmia, or hypotension that is disproportionate to their plasma leakage. Clinically. these

findings should be considered for triage and management purposes. All dengue patients with cardiac diseases should be closely and continuously monitored for hemodynamic changes and undergo repetitive cardiovascular investigations like ECGs and cardiac biomarker analysis. During these patients, aggressive fluid resuscitation, which is frequently required for patients in dengue shock, must be applied cautiously in order to prevent fluid overload and heart failure. In addition, the rational enhancement of chronic cardiac medications as well as their selective inotropic use can positively impact overall prognosis.

LIMITATIONS

This study had several limitations. It was conducted at a single tertiary-care center and may not fully represent community-level trends. The sample size of cardiac patients was smaller than that of non-cardiac patients, which may have limited the statistical power. Echocardiography and cardiac biomarker testing were not uniformly available in all patients, and subclinical myocarditis may have been underestimated. Additionally, the follow-up period was limited to 30 days, so long-term cardiac sequelae after recovery could not be assessed.

CONCLUSION

It is concluded that dengue fever patients with pre-existing cardiac disease have a significantly higher risk of mortality compared to those without cardiac involvement. The study demonstrated that cardiac patients not only developed more severe forms of dengue but also required longer hospitalization and more intensive care support. The major causes of death among cardiac patients were cardiogenic shock, myocarditis, and multi-organ failure, highlighting the critical impact of cardiovascular dysfunction on clinical outcomes. Pre-existing cardiac conditions, advanced age, and severe dengue were identified as independent predictors of mortality.

REFERENCES:

1. Qureshi MH. Economic and political aspects of Dengue virus disease. In Dengue Virus Disease 2020, Jan 1 (pp. 151-158). Academic Press.
2. Brady OJ, Gething PW, Bhatt S, et al. Refining the global spatial limits of dengue virus transmission by evidence-based consensus. PLoS Negl Trop Dis. 2012;6: e1760.
3. Rathore AP, Farouk FS, John AL. Risk factors and biomarkers of severe dengue. Current Opinion in Virology. 2020 Aug 1; 43:1-8.
4. Mia MS, Begum RA, Er AC, Abidin RD, Pereira JJ. Trends of dengue infections in Malaysia, 2000-2010. Asian Pacific journal of tropical medicine. 2013 Jun 1;6(6):462- 6.
5. Bosomprah, Samuel. "Sample size calculation for multicentre efficacy trials of blood- stage malaria antigens." Malaria Journal 12 (2013): 1-5.
6. Del Arco, Cristina Díaz, et al. "Update, validation and comparison of three different clinicopathological scores for patients with resected gastric cancer: A western experience." Annals of Diagnostic Pathology 49 (2020): 151635.
7. Nair, Remya R., et al. "Sizing, stabilising, and cloning repeat-expansions for gene targeting constructs." Methods 191 (2021): 15-22.
8. Brady, Oliver J., et al. "Refining the global spatial limits of dengue virus transmission by evidence-based consensus." (2012): e1760.
9. Deen JL, Harris E, Wills B, Balmaseda A, Hammond SN, Rocha C, Dung NM, Hung NT, Hien TT, Farrar JJ. The WHO dengue classification and case definitions: time for a reassessment. The Lancet. 2006 Jul 8;368(9530):170-3.
10. Bloom MW, Hamo CE, Cardinale D, Ky B, Nohria A, Baer L, Skopicki H, Lenihan DJ, Gheorghiade M, Lyon AR, Butler J. Cancer therapy–related cardiac dysfunction and heart failure: part 1: definitions, pathophysiology, risk factors, and imaging. Circulation: Heart Failure. 2016 Jan;9(1):e002661.
11. Weinberg L, Li SY, Louis M, Karp J, Poci N, Carp BS, Miles LF, Tully P, Hahn R, Karalapillai D, Lee DK. Reported definitions of intraoperative hypotension in adults undergoing non-cardiac surgery under general anaesthesia: a review. BMC anesthesiology. 2022 Dec;22(1):1-2.
12. Saini KS, Tagliamento M, Lambertini M, McNally R, Romano M, Leone M, Curigliano G, de Azambuja E. Mortality in patients with cancer and coronavirus disease 2019: a systematic review and pooled analysis of 52 studies. European journal of cancer. 2020 Nov 1; 139:43-50.
13. Arfeen, Noorussaba, Devendra Kumar Sinha, and Kaushal Kishore. "Cardiac Complications in Patients with Dengue Fever." European Journal of Cardiovascular Medicine 14 (2024): 1223-1229.
14. Al Zeedy K, Al Shibli S, H Al Noumani J, Al Azri M, Al Alawi A. Dengue Fever: Clinical features and health outcomes in patients presenting to a tertiary care hospital. Sultan Qaboos Univ Med J. 2025 May 2;25(1):258-265. doi: 10.18295/2075-0528.2835. PMID: 40641722; PMCID: PMC12240028.
15. Ayubi MN, Modi S, Rashid MK, Kumar S. Dynamics of dengue virus infection across the seasons. Int J Med Public Health 2024; 14:72–6
16. Rehman WU, Zeb S, Noureen S, Meo SR, Naeem A, Fahim U, et al. Abnormalities in serum electrolytes in

DF, DHF and DSS as prognostic indicators for dengue severity: A comparative model. Pak J Med Health Sci 2022; 16:386–386. https://doi.org/10.53350/pjmhs221610386. 10.53350/pjmhs221610386
17. Padyana M, Karanth S, Vaidya S, Gopaldas JA. Clinical profile and outcome of dengue fever in multidisciplinary intensive care unit of a tertiary level hospital in India. Indian J Crit Care Med 2019; 23:270. 10.5005/jp-journals-10071-23178
18. Al Awaidy S, Al Hashami H. Zoonotic diseases in Oman: Successes, challenges, and future directions. Vector Borne Zoonotic Dis 2020; 20:1–9. https://doi.org/10.1089/vbz.2019.2458. 10.1089/vbz.2019.2458
19. Guo C, Zhou Z, Wen Z, Liu Y, Zeng C, Xiao D, et al. Global epidemiology of dengue outbreaks in 1990–2015: A systematic review and meta-analysis. Front Cell Infect Microbiol 2017; 7:317. https://doi.org/10.3389/fcimb.2017.00317. 10.3389/fcimb.2017.00317
20. Trivedi S, Chakravarty A. Neurological complications of dengue fever. Curr Neurol Neurosci Rep 2022; 22:515–29. https://doi.org/10.1007/s11910-022-01213-7. 10.1007/s11910-022-01213-7