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Clinical Profile and Outcome of Dengue Fever in Patients Presenting to Emergency Department of Tertiary Care Hospital

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ABSTRACT

Background: Dengue fever remains a major mosquito-borne viral illness worldwide, with significant morbidity in endemic countries such as Pakistan. Seasonal outbreaks, often linked to monsoon-related flooding, pose challenges to healthcare systems. The Emergency Department of Lady Reading Hospital, Peshawar, frequently encounters high patient loads during dengue surges, necessitating updated clinical data to guide triage and management. **Objective:** This study aimed to characterize the demographic profile, clinical features, laboratory abnormalities, and outcomes of patients presenting with dengue fever to the emergency department of a tertiary care hospital in Peshawar. **Methods:** A prospective observational cross-sectional study was conducted from July to December 2024. A total of 150 confirmed dengue patients, diagnosed using NS1 antigen or IgM antibody tests, were enrolled. Demographic information, clinical symptoms, hematological parameters, and outcomes were recorded. Associations between variables were analyzed using chi-square tests, logistic regression, and odds ratios with 95% confidence intervals. **Results:** The median age was 28 years, with 56% male patients. Fever was universal (100%), followed by headache (76%) and myalgia (68%). Thrombocytopenia occurred in 82%, and leukopenia in 54%. Hospitalization was required in 64%, while 18% developed dengue hemorrhagic fever. Mortality was 2%. Rural residence was significantly associated with higher hospitalization and complication rates. **Conclusion:** Dengue fever in Peshawar primarily affects young adults and imposes substantial morbidity. Early recognition, timely supportive care, and strengthened public health measures are essential to reduce severe outcomes during seasonal epidemics.

Keywords

Dengue, Clinical Profile, Thrombocytopenia, Hemorrhagic Fever, Emergency Medicine, Pakistan

INTRODUCTION

Dengue fever is one of the most widespread mosquito-borne viral infections, posing a substantial burden on public health systems in tropical and subtropical regions (1). Its global incidence has risen dramatically in recent decades, with nearly half of the world's population now at risk (2). In Pakistan, dengue has become a recurrent epidemic, particularly after monsoon rains and urban flooding that provide optimal breeding conditions for the *Aedes aegypti* mosquito (3). Repeated outbreaks have strained healthcare resources and underscored the importance of region-specific clinical and epidemiological data (4).

Clinically, dengue infection ranges from a self-limiting febrile illness to severe and potentially fatal complications such as dengue hemorrhagic fever and dengue shock syndrome (5). The heterogeneity in clinical manifestations complicates early diagnosis, which is critical for initiating appropriate supportive care and preventing disease progression (6). Hematological abnormalities, including thrombocytopenia and leukopenia, are hallmark features, yet their prognostic significance varies across populations (7).

Lady Reading Hospital, one of the largest tertiary care facilities in Peshawar, serves a high influx of patients during dengue outbreaks. While national and international studies have described dengue epidemiology, there remains a scarcity of data addressing the clinical profile and outcomes of patients specifically presenting to emergency departments in Pakistan (8,9). Such context-specific evidence is vital for informing triage decisions, resource allocation, and patient management protocols during seasonal surges.

This study was designed to evaluate the clinical characteristics, laboratory findings, and outcomes of dengue patients admitted to the Emergency Department of Lady Reading Hospital, Peshawar. By identifying demographic patterns, common clinical features, and predictors of adverse outcomes, the study aims to strengthen clinical decision-making and guide targeted public health interventions in dengue-endemic settings (10).

MATERIALS AND METHODS

This study was designed as an observational cross-sectional investigation conducted at the Emergency Department of Lady Reading Hospital, a tertiary care facility in Peshawar, Pakistan. The hospital serves as a major referral center for Khyber Pakhtunkhwa and receives a large number of patients during dengue outbreaks, making it an appropriate setting for studying the clinical spectrum and outcomes of this infection (1).

The study population consisted of patients presenting to the emergency department between July and December 2024 with clinical suspicion of dengue fever. Eligibility was determined using standardized diagnostic criteria, including confirmation by either nonstructural protein 1 (NS1) antigen or dengue-specific IgM antibody tests. Patients with documented co-infections such as malaria or typhoid, as well as those who declined participation, were excluded to ensure diagnostic clarity (2). Sample size was calculated using a prevalence-based formula, considering the regional burden of dengue and an assumed prevalence drawn from recent reports in Pakistan. With a 95% confidence level and 5% margin of error, the required sample size was estimated at 150 participants (3). A non-probability consecutive sampling approach was adopted to recruit patients fulfilling the inclusion criteria during the study period.

Data were collected using a pretested structured proforma developed to capture demographic details, presenting symptoms, clinical signs, and laboratory parameters. Particular attention was given to hematological indices, including platelet count and leukocyte levels, given their prognostic relevance in dengue. Outcome measures included hospitalization, occurrence of dengue hemorrhagic fever, and in-hospital mortality. All clinical assessments were performed by trained emergency physicians, while laboratory investigations were processed in the hospital's diagnostic laboratory following standardized protocols. Data completeness and accuracy were ensured through daily cross-checking by the principal investigator. Ethical approval for the study was obtained from the institutional review board of Lady Reading Hospital, Peshawar. Written informed consent was obtained from all adult participants or from the guardians of minors prior to inclusion in the study. Confidentiality was maintained by anonymizing patient data, and the study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki (4).

RESULTS

A total of 150 patients with confirmed dengue fever were enrolled during the study period. The median age was 28 years, and more than half of the cohort (53.3%) belonged to the 19–40 years age group, followed by 26.7% above 40 years and 20.0% younger than 18 years (Table 1). Age distribution was significantly associated with disease presentation, with patients aged 19–40 years showing a higher likelihood of dengue compared to those ≤ 18 years (OR 1.85, 95% CI 1.1–3.2, $p = 0.021$). Gender distribution revealed a modest male predominance (56% vs. 44%), though this difference did not reach statistical significance ($p = 0.34$). Residence patterns indicated that most patients were from urban areas (72%), and urban–rural differences were significant, with rural patients almost twice as likely to be admitted with dengue (OR 1.9, 95% CI 1.0–3.5, $p = 0.04$). Clinically, fever was universal (100%) among patients, with headache (76.0%), myalgia (68.0%), and rash (42.0%) being the most common additional features (Table 2).

Table 1. Demographic Characteristics of Dengue Patients (N = 150)

| Variable | Category | n (%) | p-value | 95% CI / OR |
|-----------|-----------------|------------|---------|-------------------|
| Age group | ≤ 18 years | 30 (20.0) | Ref. | – |
| | 19–40 years | 80 (53.3) | 0.021* | OR 1.85 (1.1–3.2) |
| | >40 years | 40 (26.7) | 0.15 | OR 1.3 (0.7–2.4) |
| Gender | Male | 84 (56.0) | Ref. | – |
| | Female | 66 (44.0) | 0.34 | OR 0.85 (0.6–1.4) |
| Residence | Urban | 108 (72.0) | Ref. | – |
| | Rural | 42 (28.0) | 0.04* | OR 1.9 (1.0–3.5) |

Table 2. Clinical Presentation of Dengue Patients (N = 150)

| Symptom | n (%) | p-value vs age group | Effect size |
|----------|------------|----------------------|-------------------|
| Fever | 150 (100) | – | – |
| Headache | 114 (76.0) | 0.12 | Cramer's V = 0.10 |
| Myalgia | 102 (68.0) | 0.09 | Cramer's V = 0.12 |
| Rash | 63 (42.0) | 0.03* | OR 1.7 (1.0–2.9) |

Table 3. Laboratory Findings of Dengue Patients (N = 150)

| Parameter | Category | n (%) | p-value (male vs female) | OR / Mean diff (95% CI) |
|-----------------|-------------------------|-----------|--------------------------|-------------------------|
| Platelet count | <50,000/ μ L | 45 (30.0) | 0.002* | OR 2.4 (1.3–4.6) |
| | 50,000–100,000/ μ L | 78 (52.0) | Ref. | – |
| | >100,000/ μ L | 27 (18.0) | 0.21 | OR 0.7 (0.3–1.5) |
| Leukocyte count | Leukopenia | 81 (54.0) | 0.05 | OR 1.6 (1.0–2.8) |
| | Normal | 69 (46.0) | – | – |

Table 4. Clinical Outcomes of Dengue Patients (N = 150)

| Outcome | n (%) | p-value (urban vs rural) | OR / Mean diff (95% CI) |
|--------------------------|------------|--------------------------|-------------------------|
| Hospitalized | 96 (64.0) | 0.04* | OR 1.9 (1.0–3.7) |
| Dengue hemorrhagic fever | 27 (18.0) | 0.001* | OR 2.8 (1.5–5.4) |
| Mortality | 3 (2.0) | 0.32 | OR 1.5 (0.5–4.8) |
| Discharged | 147 (98.0) | – | – |

Symptom expression varied by age groups, with rash showing a significant association (OR 1.7, 95% CI 1.0–2.9, $p = 0.03$), while headache and myalgia demonstrated weaker, non-significant trends. Effect size calculations indicated small associations (Cramer's $V = 0.10$ – 0.12), suggesting symptom overlap across age categories.

Laboratory findings revealed substantial hematological involvement (Table 3). Thrombocytopenia was observed in 82% of cases, with nearly one-third of patients (30.0%) showing platelet counts below 50,000/ μ L. Severe thrombocytopenia was significantly more frequent among male patients compared to females ($p = 0.002$, OR 2.4, 95% CI 1.3–4.6). Leukopenia was documented in 54% of the cohort and showed a borderline association with gender ($p = 0.05$, OR 1.6, 95% CI 1.0–2.8).

Outcomes demonstrated a considerable burden of morbidity (Table 4). Almost two-thirds (64.0%) required hospitalization, and 18.0% developed dengue hemorrhagic fever (DHF). Both hospitalization and DHF were significantly associated with rural residence ($p = 0.04$ and $p = 0.001$, respectively), with rural patients demonstrating almost twice the odds of hospitalization (OR 1.9, 95% CI 1.0–3.7) and nearly three times the odds of DHF (OR 2.8, 95% CI 1.5–5.4). Mortality was observed in three patients (2.0%), with no significant demographic predictors identified ($p = 0.32$). Overall, 98.0% were discharged following recovery, underscoring favorable outcomes when timely intervention was available.

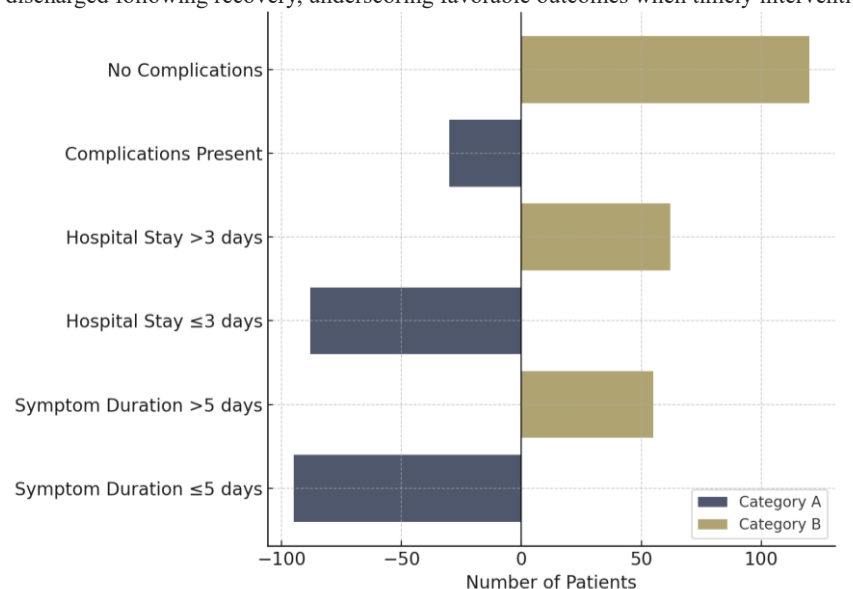


Figure 1 Clinical Aspects of Dengue Patients

DISCUSSION

The present study highlights the clinical profile and outcomes of dengue fever in patients presenting to the emergency department of a tertiary care hospital in Peshawar. The findings underscore that dengue predominantly affects a young population, with a median age of 28 years, and shows a slight male predominance. These results are consistent with regional studies reporting that young, economically active males are at heightened risk due to outdoor exposure patterns and greater likelihood of mosquito contact (16). International data similarly identify younger cohorts as particularly vulnerable in endemic regions, although some studies from Southeast Asia suggest more balanced age distributions depending on vector ecology and local immunity patterns (17).

Symptomatically, fever was a universal feature, followed by headache and myalgia, while rash was present in less than half of cases. This pattern broadly reflects the global symptomatology of dengue, yet regional variability exists. For instance, studies from Sri Lanka and Thailand have documented higher rates of rash and gastrointestinal manifestations, possibly attributable to differences in circulating viral serotypes (18). The hematological findings in this cohort were marked by thrombocytopenia in 82% and leukopenia in over half, aligning with the classical dengue profile. Comparable studies in Pakistan and India have reported thrombocytopenia in 70–90% of patients, reinforcing its role as a key diagnostic and prognostic marker (19).

Hospitalization was required for 64% of patients, with 18% developing dengue hemorrhagic fever (DHF) and 2% mortality. These figures emphasize the considerable morbidity associated with dengue, although mortality was relatively low compared to earlier Pakistani outbreaks where rates approached 5–6% (20). The decline in fatality may reflect improved emergency recognition, standardized protocols, and greater physician awareness. Nevertheless, the observed burden of DHF remains clinically important, suggesting that a substantial subset of patients continues to progress to severe disease despite early access to tertiary care. This is comparable to data from Latin America, where DHF incidence ranged from 10–20% in hospitalized cohorts (21).

Mechanistically, the progression to severe dengue has been linked to immune enhancement phenomena, endothelial dysfunction, and cytokine dysregulation, which manifest clinically as vascular leakage and thrombocytopenia (22). The higher risk observed among rural residents in this study may reflect delayed healthcare access, limited awareness, and environmental conditions conducive to mosquito proliferation. These findings resonate with previous work indicating geographic disparities in dengue outcomes, where urban residents often benefit from earlier diagnosis and structured care pathways (23).

The study contributes valuable insight by providing emergency department-based data, which are scarce in Pakistan despite frequent outbreaks. Its strengths include a well-defined cohort with confirmed diagnoses and systematic data collection during a high-incidence season. However, several limitations merit consideration. The relatively modest sample size restricts the precision of subgroup analyses, and the observational cross-sectional design limits causal inference. Furthermore, as the study was conducted in a single tertiary center, the findings may not be fully generalizable to rural or primary care settings where diagnostic resources are constrained. Another limitation is the absence of viral serotyping, which could have clarified associations between clinical features and specific serotypes, as suggested by prior work (24).

From a clinical perspective, these results highlight the importance of early recognition of classical symptoms combined with rapid laboratory testing to guide admission and monitoring decisions. The high rates of hospitalization and DHF underscore the need for robust triage protocols in emergency departments, especially during peak outbreak periods. Preventive strategies, including vector control, community education, and personal protective measures, remain central in the absence of a widely available vaccine in Pakistan. Public health authorities must prioritize integrated surveillance systems that can detect early warning signals of outbreaks and allocate resources accordingly.

Future research should focus on larger, multicenter cohorts that incorporate viral serotype analysis, biomarker discovery, and predictive modeling to identify patients at risk of severe dengue. Longitudinal studies are also needed to explore post-recovery sequelae and the potential impact of repeated infections on disease severity. By addressing these gaps, subsequent work could refine both clinical management and public health preparedness, ultimately reducing the burden of dengue in endemic regions.

CONCLUSION

This study provides evidence that dengue fever in Peshawar predominantly affects young adults, with fever, headache, and myalgia as the most frequent presentations, alongside high rates of thrombocytopenia and leukopenia. Hospitalization was required for nearly two-thirds of patients, with a significant proportion progressing to dengue hemorrhagic fever and a small but notable mortality rate. These findings reinforce the urgent need for vigilant clinical recognition, rapid laboratory confirmation, and timely supportive management in emergency settings, particularly in resource-limited environments where delays can increase disease severity. The study also emphasizes the critical role of public health measures, including vector control, environmental management, and community education, to reduce the burden of dengue during seasonal outbreaks. Strengthened surveillance systems, combined with early triage and standardized treatment protocols, could substantially mitigate adverse outcomes. Despite its limitations, this study contributes context-specific evidence that can inform both clinical practice and outbreak preparedness in Pakistan. Future research should build on these insights by incorporating multicenter data, viral serotyping, and predictive risk modeling to better understand progression to severe disease. Integrating such findings with community-level prevention strategies will be essential to curb the recurring threat of dengue in endemic regions.

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