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Original Research Article

Predictors of Mortality in Acute Febrile Illness: A Prospective Observational Study at a Tertiary Care Center in South Gujarat

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Abstract

Background: Acute febrile illness (AFI) is a major public health problem in tropical regions such as South Gujarat, India, contributing to significant morbidity and mortality due to diverse viral, bacterial, and parasitic etiologies. Early identification of mortality predictors is essential, especially in resource-limited tertiary care settings. Although studies from other parts of India report factors like low Glasgow Coma Scale, renal dysfunction, and undiagnosed illness, regional data from South Gujarat are scarce. This prospective observational study evaluated clinical, laboratory, and etiological predictors of mortality in AFI patients over one year.

Material and Methods: Conducted over a year, this study enrolled 300 adult patients (aged ≥18 years) presenting with fever >38°C lasting 3-14 days without an obvious focus of infection. Ethical approval was obtained from the institutional review board, and informed consent was secured. Patients with known chronic illnesses exacerbating fever or those refusing participation were excluded. Data collection included demographics, clinical history, physical examination, routine blood tests, serological assays for dengue, malaria, scrub typhus, leptospirosis, and enteric fever, plus imaging and cultures as needed. Statistical analysis used SPSS software; univariate comparisons employed chi-square and t-tests, while multivariate logistic regression identified independent predictors ($p<0.05$ significant).

Results: Of 300 patients, 176 (58.7%) were male, mean age 42.3 ± 15.6 years. Common etiologies: dengue (32.3%), scrub typhus (28.7%), malaria (12.0%), bacterial sepsis (8.3%), leptospirosis (4.7%), enteric fever (3.3%), undiagnosed (10.7%). Mortality rate was 8.0% (24 deaths). Non-survivors had significantly lower GCS (mean 8.2 vs. 13.4, $p<0.001$), higher creatinine (2.8 vs. 1.1 mg/dL, $p<0.001$), and more frequent shock (45.8% vs. 12.3%, $p<0.001$). Multivariate analysis revealed independent predictors: GCS <9 (OR 4.2, 95% CI 2.1-8.4), elevated creatinine >2 mg/dL (OR 3.1, 95% CI 1.5-6.3), age >60 years (OR 2.8, 95% CI 1.3-5.9), and undiagnosed etiology (OR 5.6, 95% CI 2.7-11.4).

Conclusion: This study underscores GCS score, renal impairment, advanced age, and diagnostic uncertainty as critical mortality predictors in AFI, emphasizing the need for rapid assessment and empirical therapy in endemic areas.

Keywords: Acute Febrile Illness, Mortality Predictors, Dengue, Scrub Typhus, Glasgow Coma Scale, South Gujarat.

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Introduction

Acute febrile illness (AFI) encompasses a broad spectrum of infections prevalent in tropical climates, often leading to severe outcomes if not managed promptly. In regions like South Gujarat, seasonal variations and vector-borne diseases exacerbate the burden on healthcare systems. Studies from North India, such as one by Sharma et al. (2023), have shown shifting etiological patterns in acute febrile encephalopathy, with tubercular meningitis and viral causes dominating, while South Indian research by Abhilash et al. (2016) highlighted scrub typhus and dengue as primary culprits in undifferentiated fevers. These investigations reveal mortality rates ranging from

3% to 28%, influenced by delayed diagnosis and organ dysfunction. Understanding local predictors is essential for tailoring interventions. [1,2] The clinical presentation of AFI varies widely, from mild self-limiting symptoms to multi-organ failure, complicating early risk stratification. [3] Laboratory markers like elevated creatinine and altered mental status have been linked to poor prognosis in dengue-focused studies from North India (Singh et al., 2025) [4], where mortality climbed to 11% in severe cases. Internationally, Tanzanian cohorts (Crump et al., 2018) identified respiratory distress and low oxygen saturation as key factors in febrile adults, with HIV co-infection amplifying risks. Such global insights underscore the need for region-specific data to bridge gaps in predictive models.

This study justifies a focused examination in South Gujarat, where agricultural and monsoon-driven exposures heighten AFI incidence, yet prospective data on mortality predictors remains sparse. By analyzing a cohort over one year, we aim to identify actionable clinical and lab indicators, potentially reducing mortality through enhanced triage protocols at tertiary centers. This could inform guidelines, improving outcomes in similar underserved areas.

Material and Methods

This prospective observational study was conducted at a tertiary care center in South Gujarat, India, spanning over a year. We enrolled consecutive adult patients presenting to the medicine department with acute fever. General information included detailed history, vital signs monitoring, and baseline investigations.

Ethical considerations were paramount; approval was granted by the Institutional Ethics Committee, adhering to Helsinki Declaration principles. Written informed consent was obtained from patients or next-of-kin if altered sensorium precluded it. Confidentiality was maintained, and no interventions beyond standard care were imposed.

Inclusion criteria encompassed patients aged 18 years or older with documented fever >38°C for 3-14 days, without localized infection signs like pneumonia or urinary tract infection.

Exclusion criteria involved those with chronic febrile conditions (e.g., tuberculosis flare-ups), immunosuppressive therapy, pregnancy, or refusal to participate. This ensured a homogeneous cohort focused on undifferentiated AFI, minimizing confounding from pre-existing biases.

Data collection utilized structured proformas for demographics, symptoms, comorbidities, and outcomes. Laboratory analyses included complete blood count, renal/liver function tests, serological ELISAs for common pathogens, and blood cultures. Statistical analysis employed SPSS version 26; descriptive statistics summarized variables, while chi-square tests compared categorical data between survivors and non-survivors.

Independent t-tests assessed continuous variables. Multivariate logistic regression identified mortality predictors, with odds ratios (OR) and 95% confidence intervals (CI) reported; $p<0.05$ denoted significance.

Results

Among the 300 enrolled patients, the overall mortality was 8.0% (n=24), with most deaths occurring within the first week of admission due to multi-organ failure. The cohort was predominantly male (58.7%), with a mean age of 42.3 years (SD 15.6). Common symptoms included myalgia (72%), headache (58%), and vomiting (41%), while 22% presented with altered sensorium. Laboratory findings revealed thrombocytopenia in 45% and elevated liver enzymes in 38%. Etiological diagnosis was achieved in 89.3% of cases, with vector-borne illnesses dominating during monsoon months. Non-survivors were older (mean age 58.4 vs. 40.8 years, $p<0.001$), more likely to have comorbidities like diabetes (37.5% vs. 14.1%, $p=0.004$), and exhibited severe signs such as shock (45.8% vs. 12.3%, $p<0.001$) and respiratory distress (50.0% vs. 18.1%, $p<0.001$). Mean GCS was markedly lower in non-survivors (8.2 vs. 13.4, $p<0.001$), and they had higher creatinine levels (2.8 vs. 1.1 mg/dL, $p<0.001$). Undiagnosed cases had the highest mortality (25.0%).

Table 1: Demographic Characteristics of Survivors and Non-Survivors

Parameter	Survivors (n=276)	Non-Survivors (n=24)	p-value
Age (mean ± SD, years)	40.8 ± 14.9	58.4 ± 12.7	<0.001
Male (%)	160 (58.0)	16 (66.7)	0.412
Rural residence (%)	192 (69.6)	18 (75.0)	0.589
Comorbidities (DM/HTN, %)	39 (14.1)	9 (37.5)	0.004

Table 2: Etiological Distribution

Etiology	n (%)
Dengue	97 (32.3)
Scrub typhus	86 (28.7)
Malaria	36 (12.0)
Bacterial sepsis	25 (8.3)
Leptospirosis	14 (4.7)
Enteric fever	10 (3.3)
Undiagnosed	32 (10.7)
Total	**300 (100)**

Table 3: Clinical and Laboratory Parameters in Survivors vs. Non-Survivors

Parameter	Survivors (n=276)	Non-Survivors (n=24)	p-value
GCS score (mean ± SD)	13.4 ± 2.1	8.2 ± 3.4	<0.001
Shock (%)	34 (12.3)	11 (45.8)	<0.001
Respiratory distress (%)	50 (18.1)	12 (50.0)	<0.001
Creatinine (mean ± SD, mg/dL)	1.1 ± 0.6	2.8 ± 1.2	<0.001
Platelet count (mean ± SD, /mm³)	112,000 ± 65,000	78,000 ± 42,000	0.012

Table 4: Multivariate Logistic Regression for Independent Predictors of Mortality

Predictor	Odds Ratio (95% CI)	p-value
GCS <9	4.2 (2.1–8.4)	<0.001
Creatinine >2 mg/dL	3.1 (1.5–6.3)	0.002
Age >60 years	2.8 (1.3–5.9)	0.009
Undiagnosed etiology	5.6 (2.7–11.4)	<0.001

Discussion

Acute febrile illness in South Gujarat mirrors patterns seen in tropical India, with high etiological diversity and moderate mortality, underscoring the value of prospective monitoring at tertiary levels. Our findings align with broader trends where vector-borne diseases prevail, but highlight regional nuances like elevated scrub typhus rates, possibly due to agricultural exposures. [5,6]

In our cohort, low GCS emerged as a strong predictor, consistent with Sharma et al.'s (2023) North Indian study on acute febrile encephalopathy, where GCS ≤7 predicted 51.7% mortality versus 17.3% in survivors (p=0.001). Internationally, Crump et al. (2018) in Tanzania reported GCS <15 associating with fatal outcomes in febrile adults (p<0.05), emphasizing altered consciousness as a universal red flag. Our OR of 4.2 for GCS <9 reinforces this, suggesting early neurological assessment could avert progression to encephalopathy. [7,8]

Elevated creatinine >2 mg/dL independently predicted mortality (OR 3.1), echoing Singh et al.'s (2025) dengue-focused analysis in North India, where creatinine hikes raised odds by 44.9% per unit. Abhilash et al. (2016) in South India noted renal involvement in 31% of scrub typhus cases, linking it to higher inotrope needs and 4.6% mortality. A Tanzanian cohort (Huson et al., 2018) similarly tied renal dysfunction to qSOFA scores ≥2 and 6.2% 28-day mortality, indicating hydration and monitoring as pivotal in preventing acute kidney injury. [9,10]

Advanced age >60 years carried an OR of 2.8, paralleling geriatric fever studies where comorbidities amplify risks. In India, a Central Indian pediatric AFE study (Jain et al., 2025) found age-related vulnerabilities, though focused on children; internationally, yellow fever cohorts in Brazil (Escosteguy et al., 2019) showed elderly patients with ORs around 3 for death, attributed to reduced immunity. Our data suggests age-stratified protocols to prioritize seniors. Undiagnosed etiology posed the highest risk (OR 5.6), akin to Sharma et al.'s undiagnosed cases with p=0.002 for mortality.

Abhilash et al. reported 17.4% undetermined AFI with 3.3% overall death, but higher in unresolved groups. Tanzanian research (Crump et al.) highlighted diagnostic gaps in resource-limited settings, where indeterminate syndromes tied to HIV and neurologic features, urging advanced diagnostics like PCR. [11,12]

Comorbidities like diabetes influenced outcomes, as in our 37.5% non-survivors versus 14.1% survivors (p=0.004). North Indian dengue data (Singh et al.) linked comorbidities to elevated ferritin and 11.4% mortality, while international SFTS studies (China, Li et al., 2025) noted diabetes worsening lactate dehydrogenase levels and fatality. Integrating comorbidity screening could refine risk models. [13]

Limitations include the single-center design, potentially limiting generalizability, and reliance on serological tests which may miss early infections. Future multicenter studies could validate these predictors.

Conclusion

In conclusion, this study from South Gujarat illuminates key mortality predictors in acute febrile illness, offering practical guidance for clinicians in similar tropical settings.

Low GCS scores signal neurological compromise, demanding immediate supportive care to mitigate encephalopathy risks. Elevated creatinine highlights the criticality of renal monitoring, as dehydration and sepsis often cascade into failure without prompt fluids. Advanced age underscores vulnerability, suggesting tailored approaches for elderly patients with comorbidities. Undiagnosed cases pose the gravest threat, emphasizing the urgency of comprehensive diagnostics. Overall, these findings advocate for integrated triage tools incorporating clinical and lab markers to enhance survival.

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