

A Hospital-Based Assessment of the Biochemical Profile of Complications in Individuals Presenting with Acute Febrile Illness

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Abstract

Aim: Comparative examination of the biochemical profile of complications in individuals presenting with acute febrile illness.

Material and Methods: This hospital-based retrospective study was conducted in the Department of Medicine at JNKTMCH, Madhepura, Bihar, India for 12 months. Patients age more than 13 yrs. who presented with complaints of fever with complications admitted to emergency department or general wards ICU, and were ready to give consent are enrolled for study. Patients whose complaints and lab profile do not match with acute febrile illness were excluded, thorough details of history and results of a were taken and enter was made on standard sheet.

Results: Complication presentation was more of from lower and middle socio economic class (43% and 46%) ache (85.9%), headache (77.4%), vomiting (73.4%), abdominal pain (50%), high colored urine (34.2%), breathlessness (32.1%), and loose motion (25.1%) and altered Sensorium (8.8%). Most of patients were associated with generalized body ache 86.9% followed by headache (78.9%) and dyspnea (32%), some of the patients reported symptoms which were associated with high chances of complications like dark colored urine (P=0.00), loose stools (P=0.002), body rash (P=0.0036), dyspnea (P=0.002), seizures (P=0.019) and altered Sensorium (P=0.001). Shock (71.9%) followed by liver involvement (66.7%) were the commonest complication of dengue fever while derangement in hematological indices were (65 %) that CNS (29.4%) respiratory 15%, 1 it was renal failure (14.9%) were the main complication of malaria. Multi organ involvement of 3 or more commonest finding 119(43.75%) after that followed by 2 organs in 63(22.18%). In terms of outcomes Dengue had mortality was 12 (5.8 %), malaria 8(7.6%), enteric 2(5.6%), Hepatitis E 2(50%), hypovolemic or hemorrhagic shock and bleeding manifestation was main mortality causes in dengue, acute respiratory distress syndrome (ARDS) and acute kidney injury (AKI) in malaria fulminant hepatic failure and disseminated intravascular coagulopathy were the causes for mortality in hepatitis E.

Conclusion: This study presents a comparative analysis of the biochemical clinical profile of infectious diseases that occur after the monsoon and in early winter. It aims to enhance physicians' understanding of the complication profile and outcomes associated with these diseases. The findings of this study can play a significant role in reducing mortality and morbidity by facilitating early referral to a tertiary centre and prompt management of the disease and its potential complications.

Keywords: Biochemical, Acute febrile illness, ARDS

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Introduction

Acute febrile illnesses (AFI) represent a significant health challenge globally, especially in tropical and subtropical regions where they contribute to considerable morbidity and mortality. AFI can result from a variety of infectious agents, including bacteria, viruses, and parasites, each presenting with overlapping clinical symptoms that often complicate accurate diagnosis and effective management. [1]

Early identification and understanding of the biochemical profile of complications in patients with AFI are crucial for prompt and appropriate therapeutic interventions. The biochemical profile of patients with AFI encompasses a range of laboratory parameters that reflect the systemic impact of the infection and the body's response to it. These parameters include complete blood counts, liver

function tests, renal function tests, electrolytes, and inflammatory markers such as C-reactive protein (CRP) and procalcitonin. Variations in these biochemical markers can provide insights into the severity of the illness, the likelihood of complications, and the overall prognosis of the patient. [2] One of the most common complications associated with AFI is multi-organ dysfunction, which can manifest as hepatic, renal, haematological, and neurological impairments. For instance, elevated liver enzymes (transaminases) are often observed in severe cases of dengue fever, reflecting hepatic involvement. Similarly, renal impairment, as indicated by elevated serum creatinine and blood urea nitrogen (BUN), is frequently seen in severe malaria and leptospirosis cases. [3] Haematological abnormalities such as thrombocytopenia are also prevalent, particularly in viral infections like dengue, which can lead to severe bleeding complications and necessitate platelet transfusions. [4] Understanding the biochemical profile is essential not only for diagnosing the type and severity of AFI but also for predicting outcomes and tailoring patient management strategies. For instance, a high CRP level may indicate bacterial infection and guide the use of antibiotics, while elevated transaminases and bilirubin levels might necessitate monitoring for potential liver failure. In dengue fever, the degree of thrombocytopenia and haematocrit levels can help predict the risk of severe bleeding and guide fluid management. Furthermore, the presence of specific biochemical markers has been associated with worse outcomes in AFI patients. Elevated lactate levels, for instance, are indicative of tissue hypoperfusion and have been linked to higher mortality rates in septic patients. Similarly, high levels of procalcitonin have been correlated with severe bacterial infections and sepsis, providing a valuable prognostic tool for clinicians. [5,6]

Material and Methods

This hospital-based retrospective study was conducted in the Department of Medicine at JNKTMCH, Madhepura, Bihar, India for 12 months. Patients age more than 13 yrs. who presented with complaints of fever with complications admitted to emergency department or general wards ICU, and were ready to give consent are enrolled for study. Patients whose complaints and lab profile do not match with acute fibril illness were excluded, thorough details of history Details of history and results of a were taken and enter was made on standard sheet. Base line investigations like complete hemogram hepatic and kidney function and specific test to make the diagnosis was to detect malarial parasites thin and thick films was performed, enzyme-linked immunosorbent assay Dengue NSI IGM and IgG test were done confirmed by ELISA, enteric fever blood culture

and rising titer of widal Hepatitis A/E: IgM Hepatitis A/E positive e with and other organism specific tests were done patients were followed up during stay in hospital for development of complication and outcomes were observed in terms of death Statistical analysis was done with SPSS Software (version 22.0, Chicago, USA). Mean (SD) or median (range) for the continuous variables and t-test or Mann-Whitney test was used to test the significance. Different category markers were observed in ratio and Chi-square test or Fisher was used to differentiate dichotomous observation. For all tests, a two-sided $P = 0.05$ or less was considered statistically significant.

Results

Number of patients who got admitted Was 275 out of 2764 total case presented, so estimated prevalence of complications studied was 30.02%. Among 275 cases enrolled 181 diagnosed with dengue, 45 with enteric fever 37 cases were of malaria and 4 as hepatitis E while cases studied 9 cases were attributed to mixed infection. Among cases Males were 189 (68.8%) were more commonly involved than females 86 (31.2%) patients with age 35 years or below 209 (76.4 %) ($P < 0.000$). Mean age of presentation was 28 years with SD of ± 12.51 for males and 31 years for females with SD of ± 14.21 . Complication presentation was more of from lower and middle socio economic class (43% and 46%) ache (85.9%), headache (77.4%), vomiting (73.4%), abdominal pain (50%), high colored urine (34.2%), breathlessness (32.1%), and loose motion (25.1%) and altered Sensorium (8.8%). Most of patients were associated with generalized body ache 86.9% followed by headache (78.9%) and dyspnea (32%), some of the patients reported symptoms which were associated with high chances of complications like dark colored urine ($P = 0.00$), loose stools ($P = 0.002$), body rash ($P = 0.0036$), dyspnea ($P = 0.002$), seizures ($P = 0.019$) and altered Sensorium ($P = 0.001$). (Table 1). Some signs like moderate ascites ($p: 0.0030$ pedal edema ($P = 0.001$), jaundice ($P = 0.0002$) and tachypnea ($P = 0.001$) were associated with poor outcome than other usual signs (Table 2). We studied lab reports (Table 3) that signifies as some cases of mild to moderate mild to moderate anemia was frequent but mostly had hemoglobin of > 12 gm% (44.1%). platelet counts were 70000mm³, and above usually while 20.4% patients had platelet count less than 10000. Serum liver transaminases was found elevated and some patients have degree of pre renal impairment Chi-square test was applied, and discovered complications That that had significant association associated were neurological involvement (CNS) in ($P = 0.027$), ARDS ($P = 0.037$), acute kidney injury ($P = 0.0003$) and shock ($P = 0.02$). And hematological ($p = 0.002$) while hepatology involvement was less significantly associated with complications (Table 4). Shock

(71.9%) followed by liver involvement (66.7%) were the commonest complication of dengue fever while derangement in hematological indices were (65 %) that CNS (29.4%) respiratory 15%, renal failure (14.9%) were the main complication of malaria. Multi organ involvement of 3 or more commonest finding 119(43.75%) after that followed by 2 organs in 63(22.18%). In terms of outcomes Dengue had mortality was 12 (5.8 %), malaria

8(7.6%), enteric 2(5.6%), Hepatitis E 2(50%), hypovolemic or hemorrhagic shock and bleeding manifestation was main mortality causes in dengue, acute respiratory distress syndrome (ARDS) and acute kidney injury (AKI) in malaria fulminant hepatic failure and disseminated intravascular coagulopathy were the causes for mortality in hepatitis E.

Table 1: Demographics and Clinical Presentation

Demographics	Number of Patients (%)
Total Cases Presented	2764
Total Cases Admitted	275(30.02%)
Diagnosed with Dengue	181 (65.8%)
Diagnosed with Enteric Fever	45 (16.4%)
Diagnosed with Malaria	37 (13.5%)
Diagnosed with Hepatitis E	4 (1.5%)
Mixed Infections	9 (3.3%)
Males	189 (68.8%)
Females	86 (31.2%)
Age ≤ 35 years	209 (76.4%)
Mean Age (Males)	28 ± 12.51 years
Mean Age (Females)	31 ± 14.21 years
Lower Socioeconomic Class	118 (43%)
Middle Socioeconomic Class	126 (46%)

Table 2: Symptoms Associated with Complications

Symptom	Number of Patients (%)
Generalized Body Ache	239 (86.9%)
Headache	217 (78.9%)
Vomiting	202 (73.4%)
Abdominal Pain	137 (50%)
High Colored Urine	94 (34.2%)
Breathlessness	88 (32%)
Loose Stools	69 (25.1%)
Altered Sensorium	24 (8.8%)

Table 3: Laboratory Findings

Laboratory Parameter	Percentage of Patients
Hemoglobin > 12 gm%	44.1%
Platelet Count > 70,000/mm ³	20.4%
Elevated Serum Transaminases	-
Pre-Renal Impairment	-

Table 4: Significant Complications

Complication	P-Value
Neurological Involvement (CNS)	0.027
ARDS	0.037
Acute Kidney Injury (AKI)	0.0003
Shock	0.02
Hematological Complications	0.002
Hepatological Complications	

Table 5: Mortality and Outcomes by Disease

Disease	Number of Patients	Mortality Rate (%)	Common Causes of Mortality
Dengue	12	5.8%	Hypovolemic/Haemorrhagic Shock, Bleeding Manifestation
Malaria	8	7.6%	ARDS, AKI
Enteric Fever	2	5.6%	-
Hepatitis E	2	50%	Fulminant Hepatic Failure, Disseminated Intravascular Coagulopathy

Discussion

This was a observational study conducted to discover the bio chemical and clinical profile of complication of acute febrile illness. total of 1012 patients of acute infectious causes were admitted during this period out of which 275 patients had some complication. these patients got selected and enrolled for study patients were divided further on age group basis as less than 35, 35 to 54 and 55 yrs and male (68.8%) below 35 years presents as the biggest proportion among cases with total 65% (120) of dengue, 32(78.4%) of enteric, and 31 (72.4%) of malaria cases. Abhilash KP also did the same results *et al* where male cases were predominating was seen in enteric (86.5% male while 12.4 % in females), while in malaria (84.6% male to that of females 15.2%), Also in dengue (there was 57.1% males while. 43.2%) most of the case were younger than 40 yrs. [4] Mittal G *et al* (65.2%) studied that most of acute infectious undifferentiated illness were males. [5] probable explanations may be higher exposure to mosquito and disease transmission. [6,7] There is increase in number of infectious illness and the trend remain progresses in early winters., dengue (66.9%) and malaria (25%) and enteric fever were predominated in post monsoon and early winters. Our study reports similar results to those found in other tropic countries of developing countries. [9] In fact, nearly half of the global burden of dengue is borne by the Southeast Asian countries of India, Indonesia, Myanmar, and Thailand. [10] The majority of the cases of dengue, malaria enteric fever were reported during the monsoon and pre winter seasons, in relation with the reported outline of disease progression. [5,11] However, we found no significant seasonal variation in Hepatitis E and. In relation to our study, an increased incidence of enteric fever during the monsoon season was found by Sharma *et al* and Mallakar in Assam, India and Owaies *et al* in Pakistan. [12,13] Clinically, these common febrile illnesses were not only presented with pyrexia but difficulty in breathing, pain abdomen, loose stools, skin rash, hemoptysis,, generalized body ache and Icterus were commonly presenting complaints.¹⁴ Blood investigation featured that their hemoglobin level decreased below normal while CBC came out to be normal in most of the patients, and 67% of the patients had

thrombocytopenia with platelet count lower than 85,000 mm³. These patients have mild to moderate renal impairment mostly pre renal indices with derangement of hepatic function showing average SGOT and SGPT levels ranging between 300 and 175. [14,15] Many times there was presence of more than one serological test occurs positive like enteric and dengue fever., mostly due to cross reactivity or mixed infection seen in 9(3.9%) of cases out of total.

Conclusion

This study provides of comparative analysis of bio chemical clinical profile of the infectious diseases occur post monsoon and early winter will help physician to have better knowledge of complication profile and their outcome, so it will provide a significant role in reducing mortality and morbid by early referral to a tertiary center and prompt management of disease and impending complications.

References

1. Bansal H, Kumar V, Mehta R. Diagnostic comparison of biochemical profile in patients with Covid-19, dengue and Acute Febrile illness: Implications for patient management. *Clin Epidemiol Glob Health*. 2021 Oct-Dec; 12:100844. doi: 10.1016/j.cegh.2021.100844. Epub 2021 Aug 3. PMID: 34368504; PMCID: PMC8330144.
2. Verma SK, Gupta KK, Arya RK, Kumar V, Reddy DH, Chaudhary SC, Sonkar SK, Kumar S, Verma N, Sharma D. Clinical and biochemical profile of scrub typhus patients at a tertiary care hospital in Northern India. *J Family Med Prim Care*. 2021 Mar;10(3):1459-1465. doi: 10.4103/jfmpe.jfmpe_1162_20. Epub 2021 Apr 8. PMID: 34041194; PMCID: PMC8140274.
3. Ferede, G., Tiruneh, M., Abate, E. *et al*. A study of clinical, hematological, and biochemical profiles of patients with dengue viral infections in Northwest Ethiopia: implications for patient management. *BMC Infect Dis* **18**, 616 (2018). <https://doi.org/10.1186/s12879-018-3557-z>.
4. Abhilash KP *et al*. Acute undifferentiated febrile illness in patients presenting to a Tertiary Care Hospital in South India: clinical spectrum and outcome. *J Glob Infect Dis*

- 2016; 8:147-154.
5. Mittal G, Ahmad S, Agarwal RK, Dhar M, Mittal M, Sharma S. Etiologies of Acute Undifferentiated Febrile illness in Adult Patients - an Experience from a Tertiary Care Hospital in Northern India. *J Clin Diagn Res* 2015; 9:DC22-4.
 6. Chrispal A, Boorugu H, Gopinath KG, Chandy S, Prakash JA, Thomas EM, *et al.* Acute undifferentiated febrile illness in adult hospitalized patients: The disease spectrum and diagnostic predictors - An experience from a tertiary care hospital in South India. *Trop Doct* 2010; 40:230-4.
 7. Suttinont C, Losuwanaluk K, Niwattayakul K, Hoontrakul S, Intaranongpai W, Silpasakorn S, *et al.* Causes of acute, undifferentiated, febrile illness in rural Thailand: Results of a prospective observational study. *Ann Trop Med Parasitol* 2006; 100:363-70.
 8. Manock SR, Jacobsen KH, de Bravo NB, Russell KL, Negrete M, Olson JG, *et al.* Etiology of acute undifferentiated febrile illness in the Amazon basin of Ecuador. *Am J Trop Med Hyg* 2009; 81:146-51.
 9. Murdoch DR, Woods CW, Zimmerman MD, Dull PM, Belbase RH, Keenan AJ, *et al.* The etiology of febrile illness in adults presenting to Patan hospital in Kathmandu, Nepal. *Am J Trop Med Hyg* 2004; 70:670- 5?.
 10. Shepard DS, Undurraga EA, Halasa YA. Economic and disease burden of dengue in Southeast Asia. *PLoS Negl Trop Dis* 2013; 7:e2055.
 11. Kothari VM, Karnad DR, Bichile LS. Tropical Infections in the ICU. *J Assoc Physicians India* 2006; 54:291Y298.
 12. Sharma J, Malakar M. Distribution of typhoid fever in different rural and urban areas of Lakhimpur district of Assam. *Int J Res Dev Health* 2013; 1:109-14.
 13. Owais A, Sultana S, Zaman U, Rizvi A, Zaidi AK. Incidence of typhoid bacteremia in infants and young children in southern coastal Pakistan. *Pediatr Infect Dis J* 2010; 29:1035-9.
 14. Niwattayakul K, Homvijitkul J, Niwattayakul S, *et al.* Hypotension, renal failure, and pulmonary complications in leptospirosis. *Ren Fail* 2002; 24:297Y305.
 15. Mehta KS, Halankar AR, Makwana PD, *et al.* Severe acute renal failure in malaria. *J Postgrad Med* 2001; 47:24Y610.