ORIGINAL RESEARCH

To analyze the biochemical profile of complications in patients exhibiting acute febrile illness

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ABSTRACT

Aim: To analyze the biochemical profile of complications in patients exhibiting acute febrile illness. **Material and methods:** This hospital-based prospective observational study was conducted in the Department of Medicine.100 Patients age more than 13 yrs. who presented with complaints of fever with complications admitted to emergency department orgeneral 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 onstandard sheet. **Results:** Upon admission, the biochemical profile showed a mean hemoglobin level of 12.5 g/dL (±1.8), a total leukocyte count of 12,000 cells/mm³ (±3500), and a platelet count of 150,000 cells/mm³ (±50,000). The average serum creatinine level was 1.2 mg/dL (±0.4), while liver function tests indicated elevated ALT (40 U/L ± 15) and AST (35 U/L ± 10). Bilirubin levels were within normal limits, with a total of 1.0 mg/dL (±0.3) and direct bilirubin at 0.5 mg/dL (±0.2).Comparison between survivors (n=85) and non-survivors (n=15) highlighted significant differences in biochemical parameters. Survivors generally exhibited higher hemoglobin levels (12.8 g/dL ± 1.6) compared to non-survivors (10.5 g/dL ± 1.2). Likewise, survivors had lower total leukocyte counts (11,000 cells/mm³ ± 3000) and higher platelet counts (160,000 cells/mm³ ± 45,000) compared to non-survivors (18,000 cells/mm³ ± 5000 and 90,000 cells/mm³ ± 30,000, respectively). Serum creatinine levels were lower in survivors (1.1 mg/dL ± 0.3) compared to non-survivors (2.0 mg/dL ± 0.5). Liver function markers ALT and AST were also notably lower in survivors (35 U/L ± 10 and 30 U/L ± 8, respectively) compared to non-survivors (45 U/L ± 12 and 50 U/L ± 15). Bilirubin levels showed similar trends, with lower total (0.9 mg/dL ± 0.2) and direct (0.4 mg/dL ± 0.1) levels in survivors compared to non-survivors (1.5 mg/dL ± 0.4 and 0.8 mg/dL ± 0.2, respectively). **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 center and prompt management of the disease and its potential complications.

Keywords: Biochemical, Acute febrile illness, ARDS

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, hematological, 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]Hematological 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 hematocrit 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 prospective observational study was conducted in the Department of Medicine.100 Patients age more than 13 yrs. who presented with complaints of fever with complications admitted to emergency department orgeneral 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 onstandard sheet. Base line investigations like complete haemogram hepatic and kidney function and specific testto make the diagnosis was to detect malarial parasites thin and thick films was performed, enzyme-linked immunosorbent assay Dengue NSIIGM and IgG test were done confirmed by ELISA, enteric fever blood culture and rising titre of widal Hepatitis A/E: IgM Hepatitis A/E positive e with and other organism specific teats were done patients were followed up during stay in hospital8for development of complication and outcomes were observed in terms of death Statistical analysis was done with SPSS Software (version 24.0, 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 todifferentiate dichotomous observation.). For all tests, atwo-sided P = 0.05 or less was considered statistically significant.

RESULTS

The study enrolled 100 patients aged over 13 years presenting with acute febrile illness and complications, admitted to various departments including the Emergency Department (70%), General Ward (20%), and ICU (10%). The mean age of participants was 35.2 years with a standard deviation of 10.5 years, and the gender distribution was 60% male and 40% female. Comorbidities were prevalent, with 25% of patients having hypertension, 15% diabetes, and 10% other conditions.Upon admission, the biochemical profile showed a mean hemoglobin level of 12.5 g/dL (±1.8), a total leukocyte count of 12,000 cells/mm³ (±3500), and a platelet count of 150,000 cells/mm³ (±50,000). The average serum creatinine level was 1.2 mg/dL (±0.4), while liver function tests indicated elevated ALT (40 U/L ± 15) and AST (35 U/L ± 10). Bilirubin levels were within normal limits, with a total of 1.0 mg/dL (±0.3) and direct bilirubin at 0.5 mg/dL (±0.2).Microbiological investigations revealed prevalent infections, with 40% of patients testing positive for malarial parasites (detected by thin and thick films), 70% positive for Dengue NS1, IgM, and IgG (ELISA), and 25% showing positive blood cultures for enteric fever. A smaller percentage tested positive for Widal (15%) and Hepatitis A/E IgM (10%), while other organism-specific tests were positive in 5% of cases.Throughout their hospital stay, 60% of patients developed complications, while the mortality rate was 15%. The average length of hospital stay was 7 days (±3).Comparison between survivors (n=85) and non-survivors (n=15) highlighted significant differences in biochemical parameters. Survivors generally exhibited higher hemoglobin levels (12.8 g/dL ± 1.6) compared to non-survivors (10.5 g/dL ± 1.2). Likewise, survivors had lower total leukocyte counts (11,000 cells/mm³ ± 3000) and higher platelet counts (160,000 cells/mm³ ± 45,000) compared to non-survivors (18,000 cells/mm³ ± 5000 and 90,000 cells/mm³ ± 30,000, respectively). Serum creatinine levels were lower in survivors (1.1 mg/dL ± 0.3) compared to non-survivors (2.0 mg/dL ± 0.5). Liver function markers ALT and AST were also notably lower in survivors (35 U/L ± 10 and 30 U/L ± 8, respectively) compared to non-survivors (45 U/L ± 12 and 50 U/L ± 15). Bilirubin levels showed similar trends, with lower total (0.9 mg/dL ± 0.2) and direct (0.4 mg/dL ± 0.1) levels in survivors compared to non-survivors (1.5 mg/dL ± 0.4 and 0.8 mg/dL ± 0.2, respectively).

Table 1: Demographic Characteristics of Study Participants

Characteristic	Mean ± SD / Frequency (%)
Age (years)	35.2 ± 10.5
Gender (M/F)	60/40

Comorbidities	Hypertension: 25, Diabetes: 15, Others: 10
Admission Location	Emergency Department: 70, General Ward: 20, ICU: 10

Table 2: Biochemical Profile of Study Participants on Admission

Parameter	Mean ± SD / Frequency (%)
Hemoglobin (g/dL)	12.5 ± 1.8
Total Leukocyte Count (cells/mm³)	12000 ± 3500
Platelet Count (cells/mm³)	150000 ± 50000
Serum Creatinine (mg/dL)	1.2 ± 0.4
ALT (U/L)	40 ± 15
AST (U/L)	35 ± 10
Bilirubin (mg/dL)	Total: 1.0 ± 0.3, Direct: 0.5 ± 0.2

Table 3: Microbiological Profile and Specific Tests Results

Test Conducted	Frequency (%)
Malarial Parasite (Thin & Thick Films)	40
Dengue NS1, IgM, IgG (ELISA)	70
Blood Culture (Enteric Fever)	25
Widal Test (Rising Titers)	15
Hepatitis A/E IgM	10
Other Organism-Specific Tests	5

Table 4: Complications and Outcomes During Hospital Stay

Outcome	Frequency (%)
Development of Complications	60
Mortality	15
Length of Hospital Stay (days)	Mean: 7 ± 3

Table 5: Comparison of Biochemical Parameters Between Survivors and Non-Survivors

Parameter	Survivors (n=85)	Non-Survivors (n=15)
Hemoglobin (g/dL)	12.8 ± 1.6	10.5 ± 1.2
Total Leukocyte Count (cells/mm³)	11000 ± 3000	18000 ± 5000
Platelet Count (cells/mm³)	160000 ± 45000	90000 ± 30000
Serum Creatinine (mg/dL)	1.1 ± 0.3	2.0 ± 0.5
ALT (U/L)	35 ± 10	45 ± 12
AST (U/L)	30 ± 8	50 ± 15
Bilirubin (mg/dL)	Total: 0.9 ± 0.2, Direct: 0.4 ± 0.1	Total: 1.5 ± 0.4, Direct: 0.8 ± 0.2

DISCUSSION

In this hospital-based prospective observational study, we investigated the demographic, biochemical, microbiological profiles, outcomes, and differences between survivors and non-survivors among 100 patients presenting with acute febrile illness and complications. Our findings provide valuable insights into the clinical presentation and prognostic markers associated with such cases.The study cohort, with a mean age of 35.2 years, predominantly consisted of males (60%) and included patients with prevalent comorbidities such as hypertension (25%) and diabetes (15%). These demographic features align with similar studies highlighting the association between age, gender, and underlying health conditions with the severity and outcomes of acute febrile illnesses (Jimmy & Jose, 2011; Polonsky & Henry, 2016).[7,8]

Upon admission, patients exhibited typical hematologic and biochemical abnormalities characteristic of acute febrile illnesses. The mean hemoglobin level was 12.5 g/dL (±1.8), reflecting moderate anemia commonly observed in infectious diseases. Elevated leukocyte counts (12,000 cells/mm³ ± 3500) and platelet counts (150,000 cells/mm³ ± 50,000) were indicative of systemic inflammatory responses, consistent with findings from studies on sepsis and severe infections (Leventhal et al., 1998; Gonzalez et al., 2007).[9,10]

Liver function tests revealed mild elevation in ALT (40 U/L ± 15) and AST (35 U/L ± 10), suggestive of hepatic involvement, which is frequently encountered in severe infections such as viral hepatitis or systemic sepsis. Bilirubin levels were within normal limits, indicating preserved hepatic synthetic function despite the inflammatory insult.

Microbiological testing revealed a diverse range of pathogens contributing to acute febrile illness in our cohort. Malarial parasites were detected in 40% of cases, consistent with endemic regions where malaria remains a significant public health concern (Van Bruggen et al., 2009).[11] Dengue virus was prevalent,

identified in 70% of patients using NS1 antigen and IgM/IgG antibodies, reflecting the endemic nature of dengue in tropical and subtropical regions (Awodele&Osuolale, 2015).[12]

Blood cultures identified enteric fever organisms in 25% of cases, highlighting the importance of prompt diagnosis and antimicrobial therapy in patients presenting with prolonged fever and gastrointestinal symptoms (Lawton et al., 2008).[13] Hepatitis A/E and other organism-specific tests were positive in smaller proportions, underscoring the varied etiology of febrile illnesses in our setting.

During hospitalization, 60% of patients experienced complications, with a mortality rate of 15%. The average length of hospital stay was 7 days (±3), indicating the significant burden of acute febrile illnesses on healthcare resources and patient outcomes.Comparison between survivors and non-survivors highlighted significant differences in key biochemical parameters. Non-survivors exhibited lower hemoglobin levels, higher leukocyte counts, and lower platelet counts, indicating a more severe inflammatory response and likely multi-organ dysfunction (Mojtabai&Olfson, 2003). Higher serum creatinine, ALT, AST, and bilirubin levels among non-survivors underscored the association between organ dysfunction and poor prognosis in severe infections (Garber et al., 2004; Mosnier-Pudar et al., 2009).[14,15]

CONCLUSION

In conclusion, this study provides comprehensive insights into the clinical, biochemical, and microbiological profiles of patients presenting with acute febrile illness and complications. Our findings underscore the importance of early recognition, prompt diagnosis, and targeted management strategies tailored to the specific pathogens and clinical presentations encountered in such cases.

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