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Clinical Profile and Etiology of Children Presenting with Prolonged Fever

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ABSTRACT

Background: *Prolonged fever in children, defined as ≥7 days of unexplained fever, presents a diagnostic challenge due to diverse infectious and non-infectious causes. Early identification of etiology is essential for targeted management and improved outcomes.*

Aim of the study: *To evaluate the clinical profile, underlying etiologies, and outcomes of children presenting with prolonged fever in a tertiary pediatric center.*

Methods: *A prospective observational study was conducted on 140 children aged 1–12 years with fever ≥7 days. Demographic data, clinical features, laboratory investigations, and imaging findings were recorded. Etiology was established using a stepwise diagnostic approach, and outcomes were documented. Data were analyzed using SPSS version 26.0.*

Result: *The majority of children were aged 5–10 years (42.86%) with male predominance (57.14%). Fever lasted 1–2 weeks in 83.57%. Infectious causes predominated: enteric fever (18.57%), respiratory infections (17.14%), and urinary tract infections (16.43%). Leptospirosis, malaria, dengue, and rickettsial infections accounted for 35.00% collectively. Non-infectious causes, including malignancy and connective tissue disorders, were rare (<1% each). Recovery exceeded 80% across all hospital stay durations; overall mortality was 3.57%.*

Conclusion: *Prolonged fever in children is mainly driven by infectious etiologies, with variable clinical manifestations. Stepwise diagnostic evaluation enables timely identification, guiding appropriate management and achieving high recovery rates with low mortality.*

Keywords: *Prolonged fever, Pediatric infections, Typhoid fever, Urinary tract infection, Etiology.*

I. INTRODUCTION

Prolonged fever in children commonly refers to a documented body temperature ≥38.0 °C lasting for more than 7–14 days without an established diagnosis after initial clinical evaluation, and it represents a diagnostic challenge due to its wide infectious and non-infectious etiologies [1]. At the global level, infectious causes account for approximately 50–70% of prolonged fever cases in children, with common etiologies including tuberculosis, enteric fever, viral infections, and connective tissue disorders, while 10–20% remain undiagnosed even after extensive evaluation [2]. In the context of Bangladesh, a large majority of children presenting with prolonged fever are due to infectious causes (around 73–80%), with enteric fever (42%), rickettsial infections (21–31%), urinary tract infections (10–15%), and pneumonia contributing substantially to the burden of prolonged febrile illness in pediatric patients [3,4]. Prolonged fever in children, fever persisting beyond the typical acute phase, is most frequently caused by infectious diseases, with bacterial, viral, and rickettsial infections accounting for a large proportion of cases [5]. Non-infectious inflammatory and autoimmune disorders, including systemic lupus erythematosus (SLE), systemic onset juvenile idiopathic arthritis, and other collagen vascular diseases, are increasingly considered as important causes of prolonged fever, with studies reporting collagen vascular conditions in approximately 16.7%–30.9% of cases, depending on population and diagnostic criteria used [6]. The diagnostic workup for prolonged fever in children includes a stepwise and systematic approach in order to identify underlying causes efficiently [7]. Baseline investigations typically consider complete blood count, inflammatory markers such as ESR, CRP, urinalysis, blood and urine cultures, and chest imaging to screen for common infectious sources [7, 8]. When initial tests do not provide a cause, second-line diagnostics for instance targeted microbiological assays, polymerase chain reaction (PCR) testing, and imaging modalities such as ultrasound, CT are guided by evolving clinical clues [8]. In children presenting with prolonged fever, infectious diseases remain the most common cause, accounting for roughly half of cases, while non-infectious conditions including inflammatory, autoimmune, and neoplastic disorders also contribute significantly. This diverse etiological

spectrum highlights the complexity of diagnosis and underscores the importance of a structured, stepwise evaluation combining clinical assessment, laboratory testing, and targeted imaging to guide timely and accurate management [9]. Though there are notable disadvantages as well as challenges associated with comprehensive prolonged fever evaluation. Extensive investigations often involve advanced imaging and multiple serological tests, which contribute to high health care costs, particularly in resource-limited settings; in one tertiary care study, diagnostic procedures were identified as the main driver of elevated costs for pyrexia of unknown origin management [10]. This study aimed to assess the clinical profile, underlying etiologies and diagnostic outcomes of children presenting with prolonged fever at tertiary pediatric centers, with a focus on identifying the relative contributions of infectious and non-infectious causes, evaluating the effectiveness of stepwise diagnostic approaches, and highlighting challenges in management, resource utilization and timely diagnosis.

II. METHODOLOGY & MATERIALS

The present prospective observational study was conducted at the Department of Pediatric Infectious Diseases, Bangladesh Shishu Hospital and Institute, Dhaka, Bangladesh from July 2024 to June 2025. The study aimed to evaluate the clinical profile and etiological spectrum of children presenting with prolonged fever. A total of 140 children fulfilling the inclusion criteria were included in the study.

Inclusion Criteria:

- Children aged 1–12 years
- Fever of ≥7 days duration
- Children admitted for evaluation of prolonged fever

Exclusion Criteria:

- Children with pre-existing chronic diseases such as rheumatic heart disease, malignancy, immunodeficiency disorders.
- Those who were discharged against medical advice.

Ethical Considerations

The study was approved by the Institutional Ethics Committee. Written informed consent was obtained from the parents or legal guardians of all participating children. Confidentiality of patient data was strictly maintained throughout the study.

Data Collection

After obtaining written informed consent from parents or legal guardians, data were collected using a pre-designed structured proforma. Information regarding demographic details (age and gender), duration and pattern of fever, associated signs and symptoms, and clinical examination findings was recorded for all enrolled children. Each patient underwent a thorough general physical and systemic examination, with special attention to clinical features suggestive of infectious etiologies such as hepatosplenomegaly, lymphadenopathy, rash, bleeding manifestations, and neurological involvement. Baseline laboratory investigations including complete blood count, peripheral smear, C-reactive protein and/or erythrocyte sedimentation rate, liver and renal function tests, and blood and urine cultures were performed in all cases. Further diagnostic investigations were undertaken based on clinical suspicion and included Widal test or blood culture for enteric fever, urine culture for urinary tract infection, dengue serology (NS1 antigen/IgM), Leptospira IgM ELISA, malarial smear or rapid antigen test, and scrub typhus IgM ELISA. Chest X-ray, Mantoux test, and GeneXpert were performed in suspected cases of tuberculosis, while cerebrospinal fluid analysis was carried out in children presenting with seizures, altered sensorium, or signs of meningeal irritation. The final etiological diagnosis was established based on a combination of clinical findings, laboratory results, and imaging studies wherever applicable. Details regarding the duration of hospital stay and final outcome, categorized as recovered, referred, or death, were also documented.

Statistical Analysis

All data were entered into Microsoft Excel and analyzed using SPSS version 26.0. Results were expressed as frequencies and percentages, and presented in tabular form.

III. RESULT

The majority of patients belonged to the 5–10 year age group (42.86%), followed by 1–5 years (33.57%) and 10–12 years (23.57%). There was a male predominance, with males constituting 57.14% of the study population. Most children presented with a fever duration of 1–2 weeks (83.57%), and16.43% had fever lasting 3–4 weeks. More than half of the patients required hospitalization for 8–14 days (51.43%). Intermittent fever was the most common pattern observed (42.14%), after continuous (35.71%) and remittent fever (22.14%) (Table 1). Enteric (typhoid) fever was the most common cause of prolonged fever, accounting for 18.57% of cases, followed by respiratory tract infections (17.14%) and urinary tract infections (16.43%). Leptospirosis (12.86%), malaria (9.29%), and dengue (7.86%) were other frequent etiologies. Less common causes

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included rickettsial infections (5.71%), tuberculosis (3.57%), CNS infections (2.86%), and viral hepatitis (2.14%). Malignancy, connective tissue disorders, and localized infections were rare, each contributing 0.71% of cases (Table 2). Fever was universally present across all etiological groups. Typhoid fever commonly presented with vomiting (61.54%), hepatomegaly (50.0%), headache (38.46%), and respiratory signs (30.77%), with occasional complications such as encephalopathy and gastrointestinal bleeding. Children with UTI frequently had urinary symptoms, including burning micturition (60.87%), dysuria (56.52%), abdominal pain (43.48%), and vomiting (43.48%) (Table 3). Leptospirosis was characterized by headache (55.56%), conjunctival suffusion (38.89%), hepatomegaly (38.89%), and occasional jaundice or bleeding manifestations. Dengue commonly presented with abdominal pain (54.55%), headache (45.45%), vomiting (45.45%), and bleeding manifestations (36.36%), with a few cases complicated by shock, oliguria, or seizures. Rickettsial infections were notable for bleeding manifestations (50.0%), abdominal pain (50.0%), eschar (37.50%), and abdominal distension (37.50%), highlighting distinct clinical profiles across different etiologies (Table 3). Recovery rates were highest among those hospitalized for 11–14 days (86.11%), after those with stays longer than 14 days (85.71%) and 7–10 days (82.98%). Referral rates ranged from 9.52% to 12.50%, being highest in the 11–14-day group. Mortality was low overall, with the highest proportion of deaths observed in children hospitalized for 7–10 days (6.38%), whereas deaths were least frequent in the 11–14-day group (1.39%) (Table 4).

Table 1: Baseline characteristics of the study population (n=140)

Variables	Frequency (n)	Percentage (%)
Age group (years)		
1-5	47	33.57
5-10	60	42.86
10-12	33	23.57
Gender		
Males	80	57.14
Females	60	42.86
Duration of fever (weeks)		
1-2	117	83.57
3-4	23	16.43
Duration of hospital stay (days)		
1–7	47	33.57
8–14	72	51.43
>14	21	15.00
Pattern of fever		
Continuous	50	35.71
Intermittent	59	42.14
Remittent	31	22.14

Table 2: Distribution of children by etiological pattern (n=140)

Type of fever	Frequency (n)	Percentage (%)
Enteric/typhoid fever	26	18.57
Respiratory infection (RTI)	24	17.14
Urinary tract infection (UTI)	23	16.43
Leptospirosis	18	12.86
Malaria	13	9.29
Dengue	11	7.86
Rickettsial infection	8	5.71
Tuberculosis	5	3.57
CNS infection	4	2.86
Viral hepatitis	3	2.14
Malignancy	1	0.71
Connective tissue disorders	1	0.71
Localised infections	1	0.71
Fever of undetermined origin	2	1.43

Table 3: Distribution of signs and symptoms in different clinical patterns

Variables	Typhoid fever (n=26)	UTI (n=23)	Leptospirosis (n=18)	Dengue (n=11)	Rickettsial infection (n=8)
	n (%)	n (%)	n (%)	n (%)	n (%)
Fever	26 (100.0)	32 (100)	18 (100.0)	11 (100.0)	8 (100.0)
Vomiting	16 (61.54)	10 (43.48)	6 (33.33)	5 (45.45)	3 (37.50)

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Loose stools	7 (26.92)	8 (34.78)	-	-	-
Headache	10 (38.46)	-	10 (55.56)	5 (45.45)	-
Hepatomegaly	13 (50.0)	-	7 (38.89)	-	-
Splenomegaly	7 (26.92)	-	-	-	-
Hepatosplenomegaly	6 (23.08)	-	-	-	-
Respiratory signs	8 (30.77)	-	-	-	-
Encephalopathy	1 (3.85)	-	-	-	-
GI bleed	1 (3.85)	-	-	-	-
Abdominal pain	-	10 (43.48)	-	6 (54.55)	4 (50.0)
Dysuria	-	13 (56.52)	-	-	-
Burning micturition	-	14 (60.87)	-	-	-
Jaundice	-	-	1 (5.56)	-	-
Conjunctival suffusion	-	-	7 (38.89)	-	-
Bleeding manifestations	-	-	1 (5.56)	4 (36.36)	4 (50.0)
Oliguria	-	-	-	2 (18.18)	-
Shock	-	-	-	2 (18.18)	-
Seizures	-	-	-	1 (9.09)	-
Abdominal distension	-	-	-	-	3 (37.50)
Eschar	-	-	-	-	3 (37.50)

Table 4: Duration of hospital stay and outcome of study population (n=140)

Duration of hospital stay (days)	Recovered, n (%)	Referred, n (%)	Death, n (%)
7–10	39 (82.98)	5 (10.64)	3 (6.38)
11–14	62 (86.11)	9 (12.50)	1 (1.39)
>14	18 (85.71)	2 (9.52)	1 (4.76)

IV. DISCUSSION

Children presenting with prolonged fever demonstrate heterogeneous clinical profiles, encompassing a broad range of etiological categories such as infectious diseases, connective tissue or inflammatory disorders, malignancies, and other miscellaneous conditions. This prospective study assessed the clinical spectrum, underlying etiologies, and outcomes of pediatric patients presenting with prolonged fever in a tertiary care hospital. Prolonged fever in children continues to pose a significant diagnostic challenge, particularly in low- and middle-income countries, where infectious and non-infectious causes coexist in varying proportions. In the present study, children aged 5–10 years constituted the largest group (43.02%), followed by those aged 1–5 years (33.72%) and 10–12 years (23.25%). This age distribution is consistent with observations reported by Sumathisri et al., who similarly documented a higher prevalence of prolonged fever among school-aged children [11]. Regarding duration of fever, 83.57% of children presented within 1–2 weeks, while only 16.43% had fever beyond 2 weeks. The majority of fever durations being 1–2 weeks aligns with Badreddine et al. where most hospitalized children with prolonged fever had symptoms under 2 weeks at presentation [12]. In contrast, Prior Indian observations confirm that prolonged fever often translates to intermediate hospitalization durations (7–14 days) to complete diagnostic evaluation and targeted treatments [13]. In terms of fever pattern, our study had Continuous (35.71%), Intermittent (42.14%), and Remittent (22.14%) presentations. A study found by Srivastava et al. that there were step-ladder (remittent) patterns and intermittent rises, similar to what is observed here [14]. In our study, infections dominated the etiological spectrum of prolonged fever with enteric/typhoid fever (18.57%), respiratory infections (17.14%), urinary tract infections (16.43%), leptospirosis (12.86%), malaria (9.29%), dengue (7.86%), and rickettsial infections (5.71%). A minority of cases had tuberculosis (3.57%), CNS infections (2.86%), viral hepatitis (2.14%), malignancy (0.71%), connective tissue disorders (0.71%), localized infections (0.71%), and fever of undetermined origin (1.43%). The predominance of infectious causes is in agreement with multiple pediatric prolonged fever studies from low- and middle-income settings. Sanadhya et al. reported that infections constituted 85.5% of prolonged fever causes, with tuberculosis and enteric fever as frequent contributors, reflecting similar overarching trends [13]. Comparatively, a study found that there were hospitalized neonates and children, infections accounted for approximately 80.00% of febrile cases,

while non-infectious causes comprised 20.00%, emphasizing systematic, age-specific diagnostic evaluation for accurate management [15]. In contrast, Sanadhya et al. similarly recognized pneumonia and RTIs among prolonged fever etiologies, albeit at slightly different proportions, reflecting the heterogeneous presentation of infectious causes across demographic study [13]. Malaria and dengue constituted nearly 17.00% collectively in our data, similarly noted in earlier pediatric fever analyses, although the exact proportions vary regionally depending on vector disease prevalence and vector control measures [16]. Interestingly, non-infectious causes constituted a small fraction in our population (malignancy, connective tissue disorders each <1%), which is dissimilar to developed world FUO studies where neoplasms and autoimmune diseases often constitute a greater share of etiologies [17]. We found clinical manifestations across major etiologies typhoid fever, UTI, leptospirosis, dengue, and rickettsial infections. Fever was universal across all groups (100.0%). Such consistency is expected and similar to historical descriptions of febrile infectious diseases in children [18]. Gastrointestinal and systemic symptoms varied among conditions. Vomiting was present in 61.5% of typhoid cases, which is consistent with enteric fever clinical descriptions where vomiting and anorexia are common, though some earlier cohorts reported variable prevalence [18]. Leptospirosis in our study had notable headache (55.6%) and conjunctival suffusion (38.90%), a hallmark of leptospiral disease frequently reported in a clinical observational [19]. In the dengue group, bleeding manifestations and shock were seen in portions (36.36% and 18.18% respectively); these align broadly with clinical descriptions of dengue hemorrhagic fever in children, which classically includes bleeding and hemodynamic instability [19]. In this study, among children hospitalized for 7–10 days, 82.98% recovered, 10.64% were referred, and 6.38% died. For those admitted 11–14 days, recovery was slightly higher at 86.11%, with referral and death rates of 12.50% and 1.39% respectively. Children with stays beyond 14 days showed 85.71% recovery, 9.52% referral, and 4.76% mortality. These findings examine that recovery rates exceeded 80% across all duration groups, and mortality remained relatively low even as duration of stay increased. Similarly, a study presented that fever resolution rates by day 7 are high (around 89.7%), with in-hospital fatality ratios approximately 5.90% in more severe [20]. Basu et al. found in oppositely that while many patients had short stays (≤5 days), the mortality rate was around 3.0%, somewhat lower than the 6.40% observed in our 7–10 day group [21].

Limitations of the study: The study's findings do not capture region-wide pediatric fever patterns, as certain infections like scrub typhus and leptospirosis peaked seasonally but the study period was limited. Diagnostic constraints prevented extensive molecular testing for atypical pathogens. Rare non-infectious causes, including early-stage autoimmune diseases or malignancies, may have been missed due to low prevalence and limited follow-up.

V. CONCLUSION AND RECOMMENDATIONS

Prolonged fever in children is predominantly caused by infectious etiologies, with enteric fever, respiratory, and urinary tract infections being the most common. Clinical presentations vary with etiology, but fever remains universal. Recovery rates are high with low mortality. Stepwise diagnostic evaluation aids timely identification and management of both infectious and non-infectious causes.

Recommendations:
Early, systematic assessment of prolonged fever is crucial. Strengthening diagnostic facilities, promoting infection control, and enhancing awareness among clinicians can improve outcomes and reduce unnecessary investigations.

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