pISSN 2349-3283 | eISSN 2349-3291

## **Original Research Article**

DOI: http://dx.doi.org/10.18203/2349-3291.ijcp20190073

# A study of etiology, clinical profile and outcome in children aged 1-12 years presenting with fever of 1-3 weeks duration in a tertiary hospital

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**Received:** 31 December 2018 **Accepted:** 11 January 2019

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#### **ABSTRACT**

**Background:** The objective of the study was to find out the etiology, associated signs and symptoms of fever of 1-3 weeks in the age group of 1-12 years and their outcome following treatment in a tertiary care hospital.

**Methods:** This was an observational prospective study conducted at Institute of child health and hospital for children, Egmore, Chennai during the period from January 2011 to October 2012. A total of 621 children aged 1-12 years with 1-3 weeks of fever were included in the study. Demographic, clinical and diagnostic data were collected and analyzed for each patient and outcome was assessed for different types of febrile illness.

**Results:** Out of 621 patients enrolled in the study, enteric fever was diagnosed in majority cases followed by respiratory tract infection, urinary tract infection in 102 (16.4%), leptospirosis in 78 (12.6%), malaria in 60(9.7%), dengue fever in 8 (7.7%) rickettsia infection in 36 (5.8%), tuberculosis in 24 (3.9%), CNS infection in 18 (2.9%), viral hepatitis in12 (1.9%), malignancy in 5(0.8%), connective tissue disorder in 4 (0.6%), localized infection in 2 (0.3%) cases. The incidence was unknown in 10 patients (1.6%). Fever and vomiting were the common symptom seen in all the patients. Mortality was observed 18 (2.94%) cases.

**Conclusions:** The similarity of illness and complexity in etiological conditions demonstrates the complications of diagnosis and treatment of fevers. The present study findings provided rationale information for development of guidelines necessary for treatment and thereby reducing the mortality rate in children of age 1-12 years with incidence of febrile illness.

Keywords: Aetiology, Children aged 1-12 years, Clinical characteristics, Fever, Outcome

## INTRODUCTION

Fever occurs when various infectious and non-infectious processes interact with the host defense mechanism.<sup>1</sup> In a child, its cause can vary from minor brief illness to life threatening infections, malignant or auto immune diseases. Fever is a common manifestation of various infectious diseases which have wide range of severity. Febrile illnesses in the normal host include bacterial diseases (otitis media, pharyngitis) that respond to appropriate antibiotic and supportive therapy, are not life

threatening. Severe bacterial diseases if untreated have a significant morbidity and mortality. Such diseases include sepsis, pyogenic meningitis, bacterial pneumonia, osteoarticular infection and pyelonephritis. Many febrile episodes are self-limited infections, noticed with minimal signs and symptoms; but require a careful history and physical examination sometimes laboratory tests are needed to diagnose the cause.<sup>2</sup>

Fevers in children are categorized into fevers of short duration with localizing signs for which diagnosis can be established by clinical history, physical examination with (or) without laboratory test; fever without localizing signs for which the history and physical examination do not suggest a diagnosis, but laboratory test might establish etiology and fever of unknown origin with history of fever more than one week with no apparent diagnosis, one week after investigation begun either in the inpatient (or) outpatient setting.<sup>3</sup>

Most fevers of benign nature usually subside in the first week of illness. Fever persisting for more than seven days has to be given serious consideration.<sup>4</sup> In tertiary care hospitals, most of the children are admitted with fever of 1 to 3 weeks duration, and they share many common clinical features, and these features are manifested in various types of diseases and require thorough clinical evaluation and laboratory investigations to find out the exact etiology that will help in better management of similar cases in future. Hence the present study was done to find out the etiology of fever of 1-3 weeks in the age group of 1-12 years and their outcome following treatment.

#### **METHODS**

The present prospective observational study was done at Institute of child health and hospital for children, Egmore, Chennai during the period from January 2011 to October 2012.

#### Inclusion criteria

 After getting approval from institutional ethics committee and consent form from the parents the study included 621 children aged 1-12 years with 1-3 weeks of fever admitted during the study period.

#### Exclusion criteria

 Children with pre-existing chronic diseases like RHD, malignancy, immunodeficiency children who get discharged against medical advice were excluded from the study.

Complete evaluation of the patient was done which includes patient's history, clinical examination and necessary investigations, etiology and follow up findings and they were entered in the data entry form.

History pertaining to respiratory, cardio-vascular, gastro-intestinal and central nervous system, development and immunization was recorded. Past history of infections contact with tuberculosis, family history and history of travel was noted. Detailed general and systemic examination findings were recorded.

Initial investigations recorded were total blood count, Hb, peripheral smear, smear for malaria parasite (MP), Mantoux and urine microscopic examination for the presence of pus cells, rapid diagnostic test (RDT) for

malarial parasite, urine culture and blood cultures. Blood was sent for MSAT for leptospirossis. Sputum was examined for gram stain and AFB using Ziehl Neelson technique. Complete CSF analysis was done for patients with convulsions (or) altered sensorium or with signs of meningeal irritation.

Further investigations included chest X-ray, ECG, echocardiography, CT scan, liver function test (LFT), renal function test (RFT) and serological analysis including blood Widal, Dengue Ns1Ag detection/IgM Elisa and Scrub typhus IgM Elisa which were done as per clinical discretion. USG abdomen was done for all the children.

Treatment details relating to antimicrobial use was recorded. The peak temperature and duration of hospital stay were noted. Outcome after treatment in each category of diagnosis was recorded.

#### Statistical analysis

All the values were entered in Microsoft excel and presented in number and percentages.

#### **RESULTS**

A total of 612 patients after meeting the requirements of inclusion criteria were included in the study. Table 1 presents the demographic characteristics of the patients. Majority of the patients (39.1%) belongs to 1-5 years of age.

Male children were 374 (60.2%) and females were 247 (39.8%). In most of the children (83.3%) fever lasted for 1-2 weeks. 315 (50.7%) children received treatment outside other than this hospital. About 489 (78.7%) were immunized for age.

Table 1: Demographic and clinical characteristics of study population.

Variables	Frequency (n)	Percentage
Age group (in years)		
1-5	243	39.1
6-9	232	37.4
10-12	145	23.5
Sex		
Male	374	60.2
Female	247	39.8
<b>Duration of fever (in w</b>		
1-2	517	83.3
2-3	104	16.7
Treated outside		
Yes	315	50.7
No	306	49.3
Immunization status		
Yes	489	78.7
No	132	21.3

Table 2 presents the diagnostic findings of the study population after a varied number of investigations. The most common diagnosis noticed was typhoid fever (n=114; 18.4%) followed by respiratory tract infections (n=108; 17.4%), urinary tract infections (n=102; 16.4%). Fevers were still undiagnosed in 10 cases (1.6%).

Table 2: Distribution of children by etiological pattern.

Type of fever	Male	<b>%</b>	Female	%	Total	%
Enteric/typhoid fever	60	16.0	54	21.9	114	18.4
Respiratory infection (RTI)	88	23.5	20	8.1	108	17.4
Urinary tract infection (UTI)	54	14.4	48	19.4	102	16.4
Leptospirosis	48	12.8	30	12.1	78	12.6
Malaria	42	11.2	18	7.3	60	9.7
Dengue	24	6.4	24	9.7	48	7.7
Rickettsial infection	20	5.3	16	6.5	36	5.8
Tuberculosis	18	4.8	6	2.4	24	3.9
CNS infection	4	1.1	14	5.7	18	2.9
Viral hepatitis	6	1.6	6	2.4	12	1.9
Malignancy	2	0.5	3	1.2	5	0.8
Connective tissue disorders	2	0.5	2	0.8	4	0.6
Localised infections	1	0.3	1	0.4	2	0.3
Fever of undetermined origin	5	1.3	5	2.0	10	1.6
Total	374	100	247	100	621	100

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

Variables <sup>¥</sup>	Typhoid fever (n=114)	UTI (n=102)	Leptospirosis (n=78)	Dengue (n=48)	Rickettsial infection (n=36)
Fever	114 (100)	102 (100%)	78 (100%)	48 (100 %)	36 (100%)
Vomiting	70 (61%)	42 (41.1%)	27 (34.6%)	22 (45.8%)	15 (41.6%)
Loose stools	34 (29%)	38 (37.2%)	-	-	-
Headache	45 (39%)	-	45 (57.6%)	20 (41.6%)	-
Hepatomegaly	56 (49%)	-	31 (39.7%)	-	-
Splenomegaly	32 (28%)	-	-	-	-
Hepatosplenomegaly	28 (24%)	-	-	-	-
Respiratory signs	38 (33%)	-	-	-	-
Encephalopathy	4 (3.5%)	-	-	-	-
GI bleed	2 (1.7%)	-	-	-	-
Abdominal pain	-	44 (43.1%)	-	28 (58.3%)	18 (50%)
Dysuria	-	58 (56.8%)	-	-	-
Burning micturition	-	62 (60.7%)	-	-	-
Jaundice	-	-	4 (5.1%)	-	-
Conjunctival suffusion	-	-	29 (37.1%)	-	-
Bleeding manifestations	-	-	5 (6.4%)	18 (37.5%)	20 (55.5%)
Oliguria	-	-	-	8 (16.6%)	-
Shock	-	-	-	8 (16.6%)	-
Seizures	-	-	-	5 (10.4%)	-
Abdominal distension	-	-	-	-	12 (33.3%)
Eschar	-	-	-	-	15 (41.6%)

Table 3 describes the signs and symptoms observed in different types of clinical condition. Fever and vomiting were the common symptom seen in all the patients. Other symptoms specifically noticed in UTI were abdominal pain (43.1%), dysuria (56.8%) and burning micturition

(60.7%). Jaundice and conjunctival suffusion was noted in 5.1% and 37.1% cases diagnosed with leptospirosis respectively. Specific symptoms observed in dengue cases were oliguria (16.6%), shock (16.6%) and seizures (10.4%). Abdominal distension in 12 (33.3%) cases was

noted along with abdominal pain (50%) and eschar (41.6%) in rickettsia fever patients.

As shown in Table 4, Out of 315 cases, majority cases that undergone treatment outside initially were related to RTIs (n=78), followed by typhoid fever (n=54), malaria (n=42), dengue (n=24) and CNS infection (n=17). Of them majority of the children were under the age group of 1-5 years.

As shown in the Table 5, all the patients treated for fevers of RTI, TB, CNS infection were survived (100%). Among patients with typhoid fever (n=114), 108 were survived and 6 were died. All the 6 were under the age group of 1-5 years. After treatment of 48 patients with dengue only 42 were survived and most of the patients (n=30), belongs to 1-5 years. Among 36 patients with rickettsia 30 patients were survived and 6 of them were died that belongs to age group of 5-9 years.

Table 4: Distribution of children treated outside in different types of fever at different age groups.

Age group (in years)	Typhoid fever (n=54)	RTI (n=78)	Malaria (n=42)	Dengue (n=24)	CNS infection (n=17)
1-5	24 (66.7%)	43 (64.2%)	18 (60.0%)	18 (50.0%)	8 (88.9%)
6-9	18 (60.0%)	28 (82.4%)	18 (75.0%)	6 (100.0%)	5 (100.0%)
10-12	12 (25.0%)	7 (100.0%)	6 (100.0%)	0 (0.0%)	4 (100.0%)

Table 5: Distribution of outcome among children after treatment in different types of fever at different age groups.

Age group	Typhoid fo	Typhoid fever (n=114)		Dengue (n=48)		TB (n=24)	CNS infection (n=18)	Rickettsial infection (n=36)	
(in years)	Survived (n=108)	Expire d (n=6)	Survived (n=108)	Survived (n=42)	Expire d (n=6)	Survived (n=24)	Survived (n=18)	Survived (n=30)	Expired (n=6)
1-5	30 (83.3%)	6 (16.7%)	67 (100.0%)	30 (83.3%)	6 (16.7%)	6 (100.0%)	9 (100.0%)	6 (100.0%)	0 (100.0%)
6-9	30 (100.0%)	0 (0.0%)	34 (100.0%)	6 (100.0%)	0 (.0%)	12 (100.0%)	5 (100.0%)	24 (80.0%)	6 (20.0%)
10-12	48 (100.0%)	0 (0.0%)	7 (100.0%)	6 (100.0%)	0 (.0%)	6 (100.0%)	4 (100.0%)	0 (0.0%)	0 (0.0%)

#### DISCUSSION

In present study, the profile of fever of one to three weeks duration in children aged 1 to 12 years admitted at children's ward, institute of child health and hospital for children Egmore was studied. The study population included 621 children. The present study demonstrated high frequency of enteric fever (18.4%) among study population. This finding was in accordance with Biswal et al.<sup>5</sup>

The common symptoms associated with febrile illness was not only fever but it was associated with other signs and symptoms which include vomiting loose stools, breathlessness, headache, gastro intestinal bleeding and complication like hepatosplenomegaly. This was in similar to the findings of Sharma et al and Owais et al in Pakistan.<sup>6,7</sup> After eneteric fever, RTIs was the most common cause in infants and young children in present study (n=108; 17.4%). Chantada et al in their study of 113 children with prolonged fever noted that RTIs was the cause of fever in 42 children (36.2%).<sup>8</sup> Out of 612 children, UTIs was observed as the other cause of prolonged fever in present study (n=102 16.4%). Present

findings are similar to the study of de Santana et al In his study, out of 254 patients UTIs was seen in 18 (7.1%) cases.<sup>9</sup>

In present series, leptospirosis was diagnosed in 78 children (12.6%) with fever. Cruz et al in 1994 studied 188 children with prolonged fever, 23 children (12.2%) had serological evidence of leptospirosis. The most frequent signs and symptoms were fever (100%), myalgia (69.5%), head ache (52.1%), vomiting (34.1%).10 In present study, of 78 children with leptospirosis, fever was seen in 100%, myalgia 34 (43.5%), headache 45 (57.6%), and vomiting in 27 (34.6%) cases.

In present study malaria was seen in 60 children (9.7%) and tuberculosis was the cause of fever 24 children (3.9%). In a similar study by Chantada et al.<sup>8</sup> Dengue fever was diagnosed in 48 (7.7%) children with hemorrhagic manifestations in 18 (37.5%) children and thrombocytopenia in 11 children. This was similar to the study of Srivastava et al.<sup>11</sup>

Rickettsial infection was diagnosed in 36 children (5.7%) with fever with eschar in 15 (41.6%) and 6 children

developed myocarditis, as a complication of rickettsial infection. In a similar study done by Premaratna et al, among 31 children scrub typhus was diagnosed in 19 patients. 17 out of 19 children had eschar. 12

In present study, malignancy was noted in 0.8% of patients with fever and leukemia was the found to be the commonest cause (n=4). Connective tissue disordres were seen in 4 children (0.6%) in present study. Similarly, Dechovitz et al3 noted 6 children (4%) among 155 children had connective tissue disorders. Malignancy and connective tissue Disorders were noted less commonly in present study compared to other studies.

In the present study, the cause of fever could not be determined in 10 patients (1.6%). This was in accordance with the observations of Chantada et al.<sup>8</sup> In his study, out of 113 children with fever more than 2 weeks no cause was noticed in 22 (19.46%) children.

Overall mortality observed in present study was 2.94% (n=18) with typhoid fever in 6 cases, dengue in 6 cases under the age of 1-5 years and with rickettsia in 6 cases among the children 6-9 years. This was in contrast to the observations of Salagre in which mortality was seen in 26 (9.6%) out of 276 cases with leptospirosis 15(57.7%) being responsible for more than half of deaths.

#### **CONCLUSION**

To conclude, enteric fever, respiratory and urinary tract infections contributed to nearly 50% of children 1-12 years of age admitted with fever for 1 to 3 weeks duration. Since leptospirosis, rickettsia and dengue fever have a similar spectrum of symptoms and signs and significant number reaching tertiary institutions are partially treated outside, diagnosing the condition becomes much more difficult. Hence the present study findings of febrile illness will be of more useful in the development of rational guidelines for infectious fevers and will be helpful to physicians to intervene or to refer patients to tertiary care centers before worsening of the clinical condition of the patient so as to decrease the mortality rate.

Funding: No funding sources Conflict of interest: None declared

Ethical approval: The study was approved by the

Institutional Ethics Committee

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Cite this article as: Devarajulu K, Velusamy P. A study of etiology, clinical profile and outcome in children aged 1-12 years presenting with fever of 1-3 weeks duration in a tertiary hospital. Int J Contemp Pediatr 2019;6:569-73.