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A STUDY ON THE PATTERNS AND OUTCOMES OF TROPICAL ACUTE FEBRILE ILLNESS AMONG UNDER-5 CHILDREN IN A SOUTHERN DISTRICT IN INDIA

Pediatrics

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ABSTRACT

Background: Febrile illness is a common illness encountered among pediatric patients. Acute undifferentiated febrile illness is defined as the presence of fever for more than 14 days without a localised source of infection. The prevalence of the AUFI was higher, especially in tropical and subtropical regions. And due to the non-specificity of the disease at the earlier times, many of the children were found to develop complications, and they were also found to get exposed to the unwanted empirical antibiotic. **Aim:** This study was planned to evaluate the patterns and outcomes of tropical acute febrile illness in children in a southern district of India. Methods: This prospective observational study was conducted in the department of paediatrics at a tertiary care centre in Puducherry, India. All children aged 2 months to 5 years admitted to the paediatric ward with fever for 5 to 15 days and no cause found were included in the study. After the initial assessment, all patients underwent detailed history and examination, followed by laboratory investigations. All the data had been entered into Microsoft Excel and analysed using SPSS software version 25. **Results :** A total of 190 children participated in the study. About 43.1% of the children were between 3 and 5 years old. Male patients (53.7%) outnumbered the female patients (46.3%). Dengue fever is the most common disease encountered among patients, accounting for 20%; followed by malaria (1.2%), and 10% had scrub typhus and leptospirosis. And a higher incidence of the disease had been noted between July and November. **Conclusion :** The study recommends a systematic approach and early treatment initiation in patients with the disease to prevent complications. With these strategies, the irrational use of antibiotics and antimalarials can be prevented.

KEYWORDS

Febrile Illness; Fever; Dengue; Anaemia; Thrombocytopenia

INTRODUCTION

Febrile illness is a common illness encountered among pediatric patients and is more commonly observed during the monsoon and post-monsoon seasons in tropical countries [1]. And the term acute undifferentiated febrile illness is defined as the presence of fever for more than 14 days without a localised defined source of infection. Patients with acute undifferentiated febrile illness often seek medical attention due to the presence of fever and other nonspecific symptoms [2]. The prevalence of the AUFI was higher, especially in tropical and subtropical regions, where warm, humid climates provide an ideal environment for the growth of many vectors, such as mosquitoes and ticks. The prevalence was higher in developing countries, such as India. The incidence of the disease is approximately 47.43 cases per 1,000 person-months [3].

The common causes of acute undifferentiated febrile illness were dengue, scrub typhus, malaria, chikungunya, enteric fever, and leptospirosis. Among the various causes of the disease, dengue is most commonly reported among the Indian population. The studies showed that serological testing plays an important role in diagnosing febrile illness in resource-limited settings. And in many developing countries, the availability of diagnostic facilities is limited, so the aetiology of acute undifferentiated febrile illnesses remains largely unknown [4]. And so the physician should diagnose the patient based on the patient's clinical features and symptoms, as well as the presence of circulating pathogens in the region. And many of the causes of the AUFI were found to be indistinguishable clinically. The choice of the empirical antibiotic mainly depends on the patient's etiological profile, which varies, and on region-specific factors [5].

And due to the non-specificity of the disease at the earlier times, many of the children were found to get exposed to the unwanted empirical antibiotic, which worsens the health status of the patient, and the undiagnosed disease also leads to the development of complications, which further worsen the morbidity of the patient and sometimes increase the mortality of the patients [6]. And till now, research on the clinical spectrum of acute undifferentiated febrile illness in India is limited. This study was planned to evaluate the patterns and outcomes of tropical acute febrile illness in children in a southern district of India.

MATERIALS AND METHODOLOGY

STUDY DESIGN

This prospective observational study was conducted among children aged less than 5 years at a tertiary care centre (Sri Lakshmi Naraya Institute of Medical Sciences) in Puducherry. The study was conducted for 18 months, from January 2025 to April 2026.

SAMPLING

The patients were selected using convenience sampling. Considering the prevalence of acute febrile illness in the Indian population was 14% [7], with an absolute margin of error of 5% and a confidence interval of 95%, the minimum sample size was calculated to be 186. For ease of calculation, the sample size was rounded off to 190.

INCLUSION AND EXCLUSION CRITERIA

All children aged 2 months to 5 years admitted to the paediatric ward with fever for 5 to 15 days and no cause found were included in the study. Children with fever for less than 5 days, fever for more than 15 days, and those with clear localising signs who were found to be critically ill and admitted to the intensive care unit were excluded from the study. Patients with haematological malignancies, autoimmune disorders, and immunosuppressed individuals were also excluded from the study.

DATA COLLECTION

After obtaining approval from the Institute Ethics Committee and informed written consent, patients with fever admitted to the pediatric ward who met the inclusion criteria were included in the study. All patients underwent a detailed history and physical examination. Followed by the routine baseline investigation, including complete blood count, serum electrolytes, liver function tests, and renal function tests, had been performed. In all patients, a thin blood smear had been performed to detect the presence of the malaria parasite. A single blood culture was obtained from all patients in an aerobic medium. And all the tests had been done after the 7th day of fever onset.

DATA ANALYSIS

Data entry was conducted using Epi-Data software, and analysis was performed using Statistical Package for the Social Sciences (SPSS) version 25 (IBM Corp., Armonk, NY, USA).

ETHICAL APPROVAL

The study procedure was approved by the Internal Human Ethics Committee of Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry, under reference number 7/SLIMS/IEC/0820.

RESULTS

A total of 190 children participated in the study. and 43.1% of the children were between 3 and 5 years, followed by 35.3% were between 1 and 2 years. And 53.7% of the children who participated in the study were found ot be males, and 32.1% of the patients were in class V socio-economic status and higher socio-economic status, class I, only 7.4% of the patients were present and more than half of the patients, 57.9%, were from the rural areas, as in Table 1.

Table 1: Sociodemographic details of the study participants (n=190)

Variable	Frequency (n)	Percentage (%)
Age		
2 months -1 year	41	21.6
1 -2 years	67	35.3
3-5 years	82	43.1
Gender		
Male	102	53.7
Female	88	46.3
Socio-economic status		
Class I	14	7.4
Class II	29	15.3
Class III	37	19.5
Class IV	49	25.8
Class V	61	32.1
Locality		
Rural	110	57.9
Urban	80	42.1

On exploring the distribution of patients by aetiology, the study found that dengue fever accounted for 20% of cases, scrub typhus and leptospirosis (10%), enteric fever (5.8%), and 3.7% of the cases were malaria. On clinical examination, pallor was noted in 24.7%, splenomegaly in 11.6%, and hepatomegaly in 7.4%; 10% of patients had rash, and 4.7% had icterus, as shown in Table 2. And the distribution of diseases by season, the study found that most occurred between July and November, as shown in Figure 1.

In exploring various laboratory parameters related to dengue fever, our study noted significant differences in haemoglobin levels, WBC counts, and platelet counts among patients. Among the malaria patients, only a significant difference in haemoglobin levels was noted. Among the scrub typhus patients, significant differences were observed in haemoglobin levels and platelet counts. And in patients with enteric fever, all three parameters, such as the haemoglobin level, WBC and the platelet count, had shown a significant difference. Among the leptospirosis patients, the study noted a significant difference in haemoglobin levels alone (Table 3).

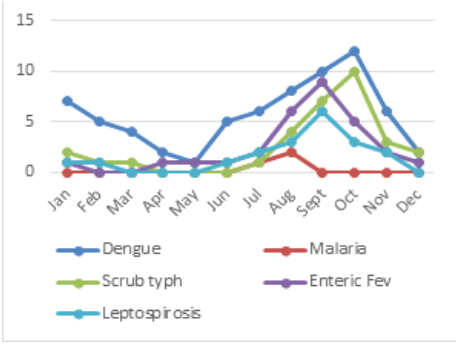
Table 2: Distribution of the patients based on the aetiology and clinical examination of the patients

Variable	Frequency (n)	Percentage (%)
Etiology		
Dengue fever	38	20
Malaria	7	3.7
Scrub typhus	19	10
Enteric fever	11	5.8
Leptospirosis	19	10
Undifferentiated illness	80	42.1
Clinical Examination		
Pallor	47	24.7
Splenomegaly	22	11.6
Hepatomegaly	14	7.4
Rashes	19	10
Icterus	9	4.7
NAD	79	41.6

Table 3: Evaluation of the laboratory parameters with respect to the diseases

Parameters	Hb (gm/dl)	p-value	TLC (103/uL)	p-value	Platelet count (lacs/mcL)	p-value
Dengue fever						
Present	11.7 + 1.82	<0.001	3.8 + 1.44	<0.001	1.6 +1.51	<0.001
Absent	9.5 + 1.51		8.6 +1.78		3.9 + 1.63	
Malaria						
Present	7.8 + 0.91	<0.001	8.89 + 1.34	0.685	2.21 + 1.36	0.648
Absent	11.5 + 1.21		8.79 + 1.44		2.11 + 1.23	
Scrub typhus						
Present	10.8 + 1.11	<0.001	7.89 + 2.11	0.104	1.09 + 1.26	<0.001
Absent	9.6 + 1.22		7.23 + 2.05		2.56 + 1.31	
Enteric fever						
Present	9.5 + 1.11	<0.001	5.55 + 1.36	<0.001	2.33 + 1.56	0.001
Absent	11.5 + 1.35		8.61 + 1.56		3.33 + 1.43	
Leptospirosis						
Present	9.6 + 1.31	<0.001	7.71 + 1.11	0.733	1.69 + 1.44	0.174
Absent	10.9 + 1.22		7.61 + 1.22		2.27 + 1.79	

Figure 1: Distribution of the diseases based on the seasonal variation



DISCUSSION

Fever in children is a common concern among parents, and its presence is also a major cause of recurrent visits to the paediatric and emergency departments in the hospital. Acute undifferentiated febrile illnesses are among the common diseases encountered in children and adults. And the clinical assessment of the fever among the children is found ot be entirely different from that of the adult patients. And in recent times, the incidence of the infection has been decreasing due to the regular use of the conjugate vaccine, so the fever is a major cause of patients' laboratory investigations and hospitalisation. In the majority of cases, the fever resolves on its own or develops other symptoms that lead to diagnosis within the first seven days. Still, in some cases, there is a risk of developing a life-threatening infection. In assessing the acute medical condition, it is paramount to determine the severity of the disease and to initiate appropriate, timely management.

In our study, the most common disease encountered was dengue fever, accounting for 20% of cases, followed by malaria (12.1%) and undifferentiated illness (42.1%). The study by Prabha S et al. [8] showed that the most common diagnosis was scrub typhus, accounting for 55.9% of patients, followed by enteric fever and dengue, each noted in 11% of patients. The study by Kashinkunti MD et al. [3] also shows that scrub typhoid is the most common disease encountered among the study participants, accounting for 33% of patients, followed by dengue, which accounted for 25%. Enteric fever is noted in 14% of patients.

Dengue fever is most commonly observed between August and October. And the study by Morales IU et al. [9] reported that dengue is more common during the monsoon and rainy seasons, findings that correspond to our study results. In our study, malaria and scrub typhus were also more commonly reported between August and November. And the study by Gautam R et al. [10] showed that scrub typhus is more commonly observed between July and September. And the study by Kumar v et al. [11] showed that malaria is more commonly observed during the rainy season due to increased breeding sites. The anopheles mosquito breeds in stagnant water, which is common during heavy rainfall, and high humidity creates an ideal breeding ground. Enteric fever had a year-round distribution but was more common between

July and September, and leptospirosis was also more common between July and October—the study by Saad NJ et al. [12] showed that the peak incidence of enteric fever occurred between August and September. Leptospirosis is more commonly seen between July and October. [13].

Our study showed that patients with dengue had anaemia, leukopenia, and thrombocytopenia. The study also noted a significant difference between patients with and without dengue fever. The study by Villanueva EA et al. [9] also shows that dengue fever leads to pancytopenia. And this is because the dengue virus infects bone marrow cells, suppresses platelet production, and triggers antibodies that further destroy platelets and red blood cells. Our study showed that malaria patients had significantly lower haemoglobin levels than control patients. And the study by White NJ et al. [14] also shows that malaria infection leads to the development of anaemia. This is because malaria infection can cause haemolysis of infected and uninfected erythrocytes and dyserythropoiesis in the bone marrow, leading to anaemia. Our study also showed that patients with scrub typhus had significant reductions in haemoglobin and platelet counts. The study by Mittal C et al. [10] also shows that patients with scrub typhus had a significant reduction in haemoglobin and platelet counts.

In our study, children with enteric fever showed a significant reduction in haemoglobin, WBC count, and platelet count. The study by Subhan M et al. [11] also shows that patients with enteric fever are more prone to develop anaemia and thrombocytopenia. And in the study, about 61.3% of the patients had developed anaemia, and thrombocytopenia was noted in 40% of the patients. But the study by Mittal C et al. [15] didn't show any significant reduction in blood indices among patients with enteric fever. Our study showed a significant reduction in haemoglobin levels among patients affected by leptospirosis—the study by Furlanello T et al. [16] Studies have shown that leptospirosis can lead to anaemia, and its pathogenesis is multifactorial, involving direct erythrocyte destruction, an immune-mediated response, or toxin-induced membrane damage.

CONCLUSION

Acute undifferentiated febrile illnesses are among the important diseases that require proper diagnosis and treatment to prevent complications. And in many developing countries, the major cause of mortality is found to be due to the delayed diagnosis and delayed initiation of treatment. And so, the study recommends a systematic approach and early treatment initiation in patients with the disease to prevent complications. With these strategies, the irrational use of antibiotics and antimalarials can be prevented.

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