Acute Febrile Illness In Pediatric Population: The Disease Spectrum And Outcome- Data From A Northern Rural Centre

Vikram Katodia[1], Anuradha Behl[2], Gauri Chauhan[3], A.K Bhardwaj[4]

Junior Resident[1], Assistant Professor[2,3], Professor And Head[4]

M.M Insitute Of Medical Sciences And Research, Mullana, Ambala, Haryana, India-133207

Corresponding Author: Anuradha Behl**,** Assistant Professor, M.M Insitute Of Medical Sciences And Research, Mullana, Ambala, Haryana, India-133207

Type of Publication: Original Research Paper

Conflicts of Interest: Nil

Abstract

Background: Acute febrile illness is most commonly seen disease that requires medical attention worldwide. Majority of children with febrile illness are being admitted to hospitals universally associated with mortality and morbidity. This study was thus planned to find out clinical profile and to identify common etiologies of febrile illnesses.

Aims & Objectives: To study the clinical profile of febrile illnesses requiring hospitalization caused by various etiologies. To study the pattern of clinical profile of febrile illnesses requiring hospitalization and to determine the common etiologies.

Materials & Methods: This study was conducted on 150 patients admitted in our hospital from 1 month to 18 years of age. The study was done in the Pediatric Intensive Care Unit of a Tertiary care hospital in a rural setting of North Haryana. Detailed history, physical examination, lab parameters, serological tests and necessary radiological investigations were carried out and recorded in a structural pro-forma. The pattern of clinical profile of febrile illnesses requiring hospitalization and the common etiologies responsible in this area were thoroughly studied.

Results: A total of 151 children were enrolled in this study between the age group of 1 month and 18 years. Majority of our cases belonged to the age group of 1 month to 4 years mainly having lower respiratory tract infections. There was male predominance seen in our study with a ratio of 1.69:1. In geographical distribution, maximum number of cases from Saharanpur (UP) belt, as our hospital is the nearest Tertiary Care Rural Medical Facility. All the patients admitted had raised Total Leucocyte Count on basic investigations (69.3%). Peripheral Blood film was not a reliable test in our study in cases of Malaria and other etiologies with Sepsis and final diagnosis was made on the bases of antigen based serological tests (88.8% positivity).

Conclusion: Admissions were maximum in the summer season (Mar-June). Malaria and LRTI were the two most prevalent diseases in our study. Total leukocyte count and serological tests are good indicators for diagnosis of fever. Common presenting symtoms of chills and cough along with fever favoured the common etiological agent of febrile patients in our study.

Introduction: Acute febrile illness (AFI) is most commonly seen disease which requires medical attention worldwide, defined by many symptoms such as abrupt

onset of fever, typically at least 38°C along with headache, chills or muscle and joint pains (1). The considered causes of this illness are both infectious and non-infectious, AFI usually follows infection by majority of pathogens for instance bacteria, viruses, fungi, and parasites. It remains one of the causes of morbidity and mortality, especially in young ones. It is commonly witnessed that the etiology of infectious causes of febrile illness varies geographically, seasonally, and by human immunodeficiency virus (HIV) prevalence and other co-morbidities, and because of multiple usage of vaccination against causative organisms, environmental changes and economic development (2). Majority of children with febrile illness are getting admitted to hospitals universally, associated with morbidity and mortality. This is attributed to low rates of immunization, untreated co-morbidities and delayed presentations in developing countries. The diagnosis, treatment, and prevention programs need to be based on a methodical evaluation of area specific etiologies, in order to target clinical work up and treatment knowledge of local prevalence of infections is important. In tropical countries, infectious diseases are leading causes of death and many of these are widely prevalent in or are unique to tropical and sub-tropical regions so have been termed as Tropical Infections. WHO affirms that the common infections namely; tuberculosis, malaria, diarrhea and pneumonia, cause 0.40- 1.05 million deaths per year in low socioeconomic countries. On the whole, under-five death rates has shown a 50% decline between years 1990- 2012 as per WHO-UNICEF report 2013, half of these deaths occur in 5 countries, India is one among them (3).

Materials And Methods: The present study was undertaken in Pediatric Intensive Care Unit (PICU) and Pediatric Wards in Department of Paediatrics at Maharishi Markandeswar Institute of Medical Sciences and Research (MMIMSR) Mullana, District Ambala (Haryana). It was a Prospective study done from September 2016 to February 2018 i.e. 18 months period with a minimum of 150 cases enrolled.

Inclusion Criteria

1. All Children admitted in PICU and Pediatric ward were eligible for study.
2. All febrile children admitted with Axillary temperature more than 37.2^0 C or 99 ^{0} F or Oral temperature above 37.5^0 C or 99.5^0 F .

Exclusion Criteria

1. Children less than the age of one month.
2. Patients more than 18 years of age.
3. Cases in which parents refused to give consent.

Methods: General examination was done in detail and following parameters were noted-

- Vital parameters like temperature, pulse rate, respiratory rate, blood pressure and oxygen saturation
- Abnormalities like pallor, icterus, clubbing, cyanosis, lymphadenopathy and edema.
- Systemic examination was done in detail and abnormalities related to abdominal examination on percussion for various organomegaly. Other systems were also examined in detail and abnormalities noted. Presence of organomegaly was classified as per standard criteria.

Following laboratory investigations were also done in each case to assess the presence or absence of any complications:

- Complete Blood Count (Hemoglobin, TLC, DLC, Platelet count)
- Liver function Tests (SGOT, SGPT, Direct Bilirubin, Total Bilirubin)
- Renal function tests (Urea and Creatinine)

- Specific serological tests: Serological tests were performed in cases like Malaria, Enteric fever, Dengue fever and Scrub typhus.
- Culture and sensitivity of urine, blood or any other fluid specimen collected.
- CSF study: Lumbar puncture was performed in patients with suspected CSF infections under all extreme aseptic conditions and were immediately sent to the hospital lab to obtain results.
- Other tests: Tests like CBNAAT, Pleural Tap etc. were also performed
- Radiological investigation: CXR, USG and MRI as per requirement and the reporting was done by radiologist.

Statistical testing was conducted with the statistical package for the social science system SPSS VERSION 20, Microsoft excel. Continuous variables were presented as mean (Standard Deviation) or median if the data was unevenly distributed. Categorical variables were expressed as frequencies and percentages. The comparison of normally distributed continuous variables between the groups was performed using ANOVA. While for qualitative data and nominal categorical data between the groups were compared using Chi-squared test. For all statistical tests, a p values less than 0.05 were considered as significant and p value less than 0.001 were considered as highly significant.
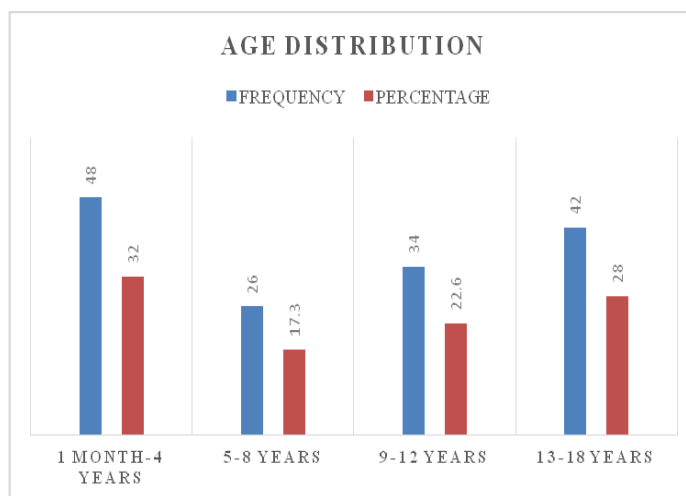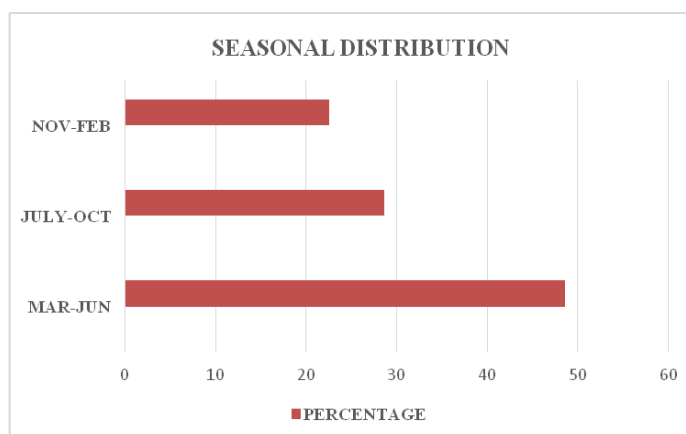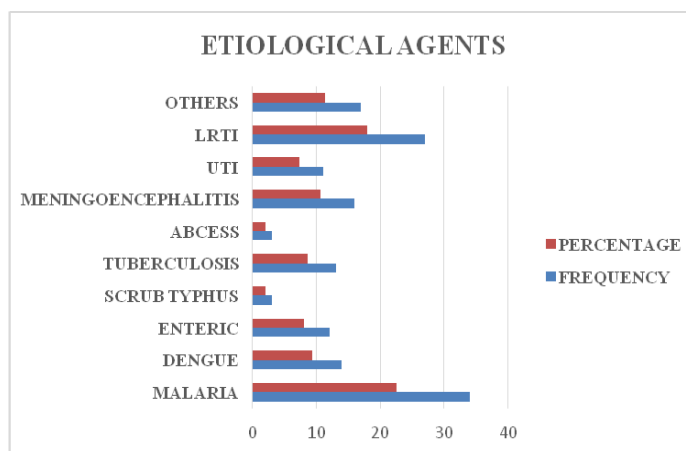

Figure 2

Figure 3
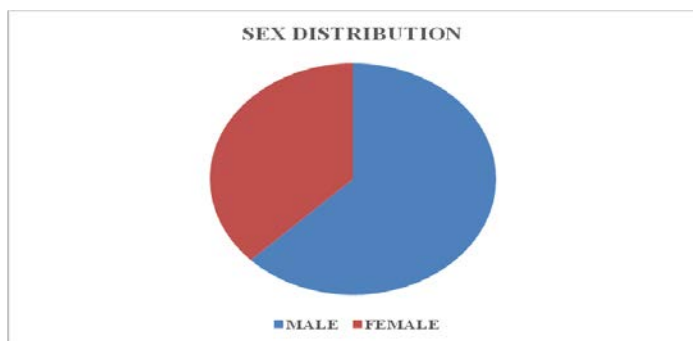

Figure 4

Figure 1

	TLC COUNT			LFT		KFT	
	<4000	**4000-10000**	**>10,000**	**NORMAL**	**DERRANGED**	**NORMAL**	**DERRANGED**
CNS INFECTIONS							
MENINGO-ENCEPHALITIS	0	0	16	12	4	15	1
RESPIRATORY INFECTIONS							
LRTI	0	6	21	25	2	27	0
GI INFECTIONS							
ENTERIC FEVER	0	0	12	10	2	11	1
OTHER	0	0	5	5	0	4	1
URINARY INFECTIONS	0	3	8	8	3	10	1
BACTERIAL INFECTIONS							
SCRUB TYPHUS	0	2	1	3	0	3	0
ABSCESSES	0		3	2	1	2	1
TUBERCULOSIS	2	3	8	11	2	13	0
VIRAL INFECTIONS							
DENGUE FEVER	1	0	13	13	1	14	0
OTHER	0	2	6	6	2	8	0
PARASITIC INFECTIONS							
MALARIA	4	22	8	33	1	33	1
OTHER	0	1	2	3	0	3	0
AUTO IMMUNE DISORDERS	0	0	1	1	0	1	0
Total	**7 (4.6%)**	**39 (26%)**	**104 (69.3%)**	**132 (88%)**	**18 (12%)**	**144 (96%)**	**6 (4%)**

TABLE 1: Highlighting the laboratory investigations of the febrile patients.

Parameters	Malaria (N=34)	Dengue Fever (N=14)	Enteric Fever (N=12)	Scrub Typhus (N=3)	Tuber-Culosis (N=13)	Abscesses (N=3)	Meningo-1encephalitis (N=16)	Uti (N=11)	Lrti (N=27)	Total
FEVER	34 (100%)	14 (100%)	12 (100 %)	3 (100%)	13 (100%)	3 (100%)	16 (100%)	11 (100%)	27 (100%)	133 (100%)
CHILLS & RIGOR	31 (91.17%)	0	0	0	0	1 (33.3%)	0	4 (36.3%)	0	35 (26.3%)
ABDOMINAL PAIN	6 (17.6%)	2 (14.2%)	9 (75%)	0	5 (38.4%)	2 (66.6%)	2 (12.5%)	9 (81.9%)	0	35 (26.3%)
BLEEDING	0	1 (7.1%)	0	0	0	0	0	0	0	1(0.6%)
LYMPHADENO PATHY	0	0	0	0	7 (53.8%)	0	0	0	0	7 (4.6%)
ICTERUS	8 (23.5%)	0	0	0	0	0	0	0	0	8 (5.3%)
SPLENOMEGA LY	22 (64.7%)	0	2 (16.6%)	0	0	0	0	0	0	24 (16%)
HEPATOMEGA LY	14 (41.1%)	3 (21.4%)	1 (8.3%)	1 (33.3%)	2 (15.3%)	1 (33.3 %)	3 (18.7%)	0	0	25 (16.6%)
RASH	0	11 (78.5%)	0	2 (66.6%)	0	0	0	0	0	13 (8.6%)
VOMITING	5 (14.7%)	1 (7.1%)	4 (33.3%)	0	2 (15.3%)	0	4 (25%)	0	0	16 (10.6%)
NECK RIGIDITY	0	0	0	0	0	0	15 (93.75%)	0	0	15 (10%)
HEADACHE	0	0	0	1 (33.3%)	4 (30.7%)	0	12 (75%)	0	10 (37%)	27 (18%)
SEIZURES	0	0	0	0	0	0	4 (25%)	0	0	4 (2.6%)
POLYURIA	0	0	0	0	0	0	0	9 (81.8%)	0	9 (6%)
OLIGURIA	0	11 (78.5%)	0	0	0	0	0	0	0	11 (7.3%)
TACHYPNEA		2 (14.7%)	0	0	0	0	0	0	11 (40.7%)	13 (8.6%)
COUGH	8 (23.5%)	3 (21.4%)	0	0	8 (61.5%)	0			27 (100%)	46 (30.6%)

TABLE 2: Clinical signs and symptoms in different etiologies.

Results

The present study enrolled 150 patients from September 2016 to February 2018. All patients enrolled met the desired inclusion criteria. There were 94(62.6%) male patients and 56(37.3%) female patients. The age distribution of these febrile patients showed that majorly the patients were from 1 month to 4 years of age group (48;32%) followed by 13-18 years (42;28%). 9-12 years (34;22.6%) and 5-8 years (26;17.3%). **[Figure 1** and **Figure 2]**

Assessing the seasonal and geographical variation; the significant finding was seen in the months of March to June i.e. 48.6% with p value of< 0.001 compared to months of rainy season (July-Oct) and winters (Nov-Feb) of 28.6% and 22.6% respectively [Figure 3]. Geographical pattern showed no significant finding.

Malaria (22.6%), LRTI (18%), Meningoencephalitis (10.6%), Dengue fever (9.3%), Tuberculosis (8.6%), Enteric fever (8%), UTI (7.3%), Scrub Typhus and local abscess (2%) were diagnosed infections and in 11.3%

cases diagnosis could not be established. Malaria was the most common infection encountered and was majorly seen in the months of March-June (19; 55.8%). Second most common infection seen was LRTI, mainly in the months of winters (Nov- Feb) i.e. 16; 59.2% [**Figure 4].**

The most common symptom found in these patients was cough (30.6%) followed by chills and rigor (26.3%), abdominal pain (26.3%), headache (18%), vomiting (10.6%), tachypnoea (8.6%), rash (8.6%), seizures (2.6%), oliguria (7.3%), polyuria (6%) and bleeding (0.6%). Clinical findings commonly found were hepatomegaly (16.6%), splenomegaly (16%), icterus (5.3%), lymphadenopathy (4.6%) and neck rigidity (10%) [**Table 1].**

Laboratory investigations showed Total Leukocyte Count of <4000 in 4.6% and >10,000 in 69.3 % (p<0.001). The evidence of hepatic dysfunction was seen in 12% and kidney injury was in 4% of total AFI patients. Specific serological tests done for confirmed diagnosis of Malaria, Enteric fever, Dengue fever and Scrub typhus were positive in 88.8% (56/63) patients, indicating them to be a good laboratory markers [**Table 2].**

Discussion

The present study done on paediatric patients with febrile episode in the northern region of the country showed Malaria as the most common infection. The region and seasonal variation favouring the same. Other tropical infections like Dengue, Enteric fever and Scrub Typhus were also seen. The lack of awareness of such infections and missed specific serological tests may be the reason of their underreporting. Previous studies also showed heavy burden of tropical infections in northern and southern parts of the country (4-6). Respiratory illness (LRTI) was the 2nd most common infective aetiology owing to the

probable reason of poor socioeconomic strata, improper hygiene and inadequate vaccine coverage.

Male children were twice more affected than female children. This can be due to their exposure to pathogen because of more outdoor activities. Similar pattern ascribed by Mittal G et al (7). The months of March till June were found to be most vulnerable months for febrile illnesses. Malaria was seen till the rainy season till October. For mosquitoes to breed and survive, monsoons are the best time. The upsurge of febrile illness in total during the summer months may be due to poor hygiene and more contamination of surrounding food and water sources.

In our study we found bacterial infections affecting a good percentage of febrile patients; similar to study by Abrahamsen et al (8) presenting bacterial infection (38%) as the most common etiological agent of fever. The most significant symptoms were cough (30.6%) and chills and abdominal pain (26.3%) shown by our febrile patients with majority clinical finding of hepatomegaly and splenomegaly i.e. 16% & 16.6% respectively. Both the parameters favoured. Malaria as the commonest etiological agent of fever in our study.

Blood investigations play an important role for diagnosis of fever specially the specific serological tests for tropical infections. Leucocytosis (TLC> 10,000) was a prominent indicator of febrile illness in our study (69.3%) [p<0.001]. Similar reported by BS Kalal et al (9) in their study on 103 cases. Liver and Kidney dysfunction were not significantly reported unlike in studies by Anurag Christpal et al (10) showed significant number of deranged LFT in cases of dengue and malaria. Serological tests for tropical infections are done for confirmation and our study showed a successful response to these with

94.1% positivity in cases of Malaria, 66.6% in Enteric fever and 100% in Dengue.

As a tertiary hospital, the advancement in investigating tools and physicians knowledge have led to results highlighted although there could be miss on the various other viral aetiologies due to high expenditure on their diagnostic costing ; not affordable by the patients.

Conclusion: Tropical infections are the major burden. Also the respiratory infections both bacterial and viral affect large paediatric population every year. Active fever surveillance and laboratory confirmation are necessary to define the aetiologies of febrile illness prevailing in the community to further pen down the measures for prevention of these illnesses.

Limitation: The study needs to expand the population coverage i.e. both paediatric and adult population to provide more evidence based information about the prevalence of aetiologies of febrile illnesses in tropical country like ours.

References

1. Farrar J HP, Junghanss T, Kang G, Lalloo D, White NJ. Manson's Tropical Diseases. 22nd Edition ed. London, UK: Saunders; 2009 page 782

2. Abrahamsen SK, Haugen CN, Rupali P, Mathai D, Langeland N et al. Fever in the tropics: Aetiology and case fatality – a prospective observational study in a tertiary care hospital in South India. BMC Infect Dis. 2013;30(13):355

3. Gur H, Aviram R, Or J, Sidi Y: Unexplained fever in the ED: analysis of 139 patients. Am J Emerg Med 2003, 21(3):230–5.

4. Joshi R, Colford JM, Reingold A. Nonmalarial acute undifferentiated fever in a rural hospital in central India – Diagnostic uncertainity and overtreatment with anti malarial agents. Am J Trop Med Hyg. 2008;78(3):393-99.

5. Thangarasu S, Natarajan P. A protocol for emergency department management of acute undifferentiated febrile illness in India. Int Journal of Emer Med. 2011;4:57.

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 Doctor.2010;40(4):230-34. [6] Singh R, Singh SP, Ahmad N. A Study of Aetiological Pattern in an Epidemic.

7. Mittal G, Ahmad S, Aggarwal R.K, Mittal M, Sharma S. Aetiologies of Acute Undifferentiated Febrile Illness in Adult Patients-an experience from a tertiary care Hospital. Journal of Clinical and Diagnostic Research. 2015 Dec, Vol-9(12): DC22-DC24

8. Abrahamsen SK, Haugen CN, Rupali P, Mathai D, Langeland N, Eide GE, et al. Fever in the tropics: aetiology and case fatality – a prospective

observational study in a tertiary care hospital in south India. BMC Infectious Diseases. 2013;13:355

9. Kalal B S, Puranik P, Nagaraj S, Rego S, Shet A- Scrub typhus and spotted fever among hospitalised children in South India: Clinical profile and serological epidemiology. Indian J Med Microbiol 2016;34:293-8

10. Chrispal A, Boorugu H, Gopinath KG, Chandy S, Prakash JA 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(4):230–4.