



## MICROBIOLOGICAL PROFILE OF ACUTE UNDIFFERENTIATED FEBRILE ILLNESS IN PAEDIATRIC AGE GROUP IN TERTIARY CARE HOSPITAL

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**ABSTRACT** **Background:** Infectious agent, when enters in the host results in febrile illness. This may lead to increase in morbidity or even mortality in undiagnosed or untreated cases. **Objectives:** To know the etiological agents responsible for Acute Undifferentiated Febrile Illness in pediatric age group by serological test & to study epidemiological pattern in diagnosed AUFI cases. **Materials & Methods:** The present cross-sectional study was conducted in department of Microbiology during period from January 2020 to June 2021. Serum samples were tested as per test/tests advised by pediatricians. **Results:** Dengue was most common etiological cause and fever, bodyache, headache were most common clinical features. More of dengue cases were seen in the month of September, October and November. While typhoid cases were more in the month of January and February. There were 10 cases seen in the month of February. Weil felix cases were more in the month of August. **Conclusion:** Predominant cause of AUFI in our area was dengue, typhoid followed by rickettsial fever, Scrub typhus and Chikungunya on the basis of serological tests both RDT and ELISA. If proper protocol was used for AUFI cases, it helps in the proper use of antibiotics as well as investigations. This reduces cost and resistance to antibiotics.

**KEYWORDS :** Microbiological profile, Acute undifferentiated febrile illness, Pediatric age

### INTRODUCTION:

Fever is one of the most common presenting symptoms of pediatric illnesses. Fever in children below the age of five years signifies the systemic inflammation, typically in response to a viral, bacterial, parasitic, or less commonly, a noninfectious etiology. Patient's age and geographic settings can help us to direct the appropriate diagnostic approach and treatment, if local epidemiology is well understood.<sup>1</sup>

There is need to prioritize signs and symptoms of AUFI for effective management. Several studies confirm the observation that most of the acute undifferentiated febrile illness in children was of presumed viral etiology and require little more than supportive therapy. Hence the most important issue for the primary physicians is to focus on the fever etiology and to rule out serious diseases.<sup>2</sup>

Reliable laboratory-confirmed diagnosis of acute febrile illness requires a positive bacteriological/virological test such as culture results and PCR; serological confirmation of pathogen-specific antibodies (immunoglobulin (Ig)M or a four-fold rise in IgG) can also support such assessments.<sup>3</sup>

The study was carried out to know the etiological agents responsible for Acute Undifferentiated Febrile illness in pediatric age group in this region by different available resources. It would be helpful in early diagnosis, treatment and to lessen the mortality in AUFI in pediatric age group and after diagnosis is achieved by different serological tests available in our serology laboratory we would be able to come to a final diagnosis in most of the cases. Which would be helpful for us to know the epidemiological pattern of Acute Undifferentiated Febrile illness in pediatric age group to take the control measures

### MATERIALS & METHODS:

The present cross-sectional study was conducted in department of Microbiology at Government Medical College & Hospital, Aurangabad a tertiary care teaching hospital. The study protocol was approved by the institutional ethics committee and informed consent for using the patient sample and data was taken.

Blood sample from clinically suspected cases of acute febrile illness in pediatric age group fulfilling inclusion criteria, during the study period received in Microbiology Laboratory during the study period from January 2020 to June 2021.

All pediatric patients less than 12 years of age presenting with an acute febrile illness lasting between 3 and 14 days with no evident focus of infection following initial clinical evaluation were included in the

study while Patients with chronic illness, autoimmune disorders, bone marrow hyperplasia, malignancies, on immunosuppressant drugs, fever with definite source of infection like urinary tract infections; pneumonia, tuberculosis, and refusal to give informed consent were excluded from the study. By Convenient sampling method total 722 patients were included fulfilling inclusion criteria during Jan 2020 to June 2021.

Detailed history about patients were taken in proforma after consent of the parents of study subjects. 5-7 ml blood was collected in sterile plain tube under all aseptic precautions. Blood was collected in plain tube centrifuged at 3000g for 10 minutes and serum separated and stored for serological tests. The serum was separated from the clot as early as possible to avoid hemolysis of RBC. All serological examinations and further processing of these collected samples was then carried out. The samples were subjected to testing for following tests and these serological tests were performed as per Pediatricians advice based on the clinical picture.

1. Dengue rapid NS1, IgM, IgG test, 2. Dengue IgM ELISA, 3. Chikungunya IgM ELISA, 4. Leptospira rapid IgG, IgM test, 5. Leptospira IgM ELISA, 6. Widal slide test, 7. Weil Felix card test, 8. Rapid Malaria (RDTs, microscopy), 9. Scrub Typhus (Rapid & ELISA), 10. Brucella (Standard Agglutination Test)

Serum samples of those patients who were satisfying case definition criteria, as per clinician's advice were collected in respective wards in plain tubes under all aseptic precautions and detailed history was taken and sample were received in Serology section of department of Microbiology. of respective pediatric samples. Samples were centrifuged at 3000g for 10 minutes and serum separated.

Serum samples were tested as per test/tests advised by pediatricians. Some patients were advised for more than one test. So those samples were tested for multiple tests as per pediatrician's advice.

Data was collected and compiled using Microsoft Excel 2013 and then analyzed using SPSS 23.0 version and Open Epi Software Version 2.3 by calculating frequency, percentage and cross-tabulations between various parameters. The means and standard deviations (SD) were calculated for the continuous variables, while ratios and proportions were calculated for the categorical variables. Difference of proportions between qualitative variables were tested using chi-square test or Fisher exact test as applicable. Percentage, odds ratio and 95% confidence interval were estimated, wherever necessary. For comparison between the two means of quantitative data, student's t-test applied. A brief interpretation was included in the results below

every table and summarized at the end.

**RESULTS**

**Table no. 1: Distribution of study subject according to age group and disease**

Age group (Yrs.)	Dengue	Widal	Weil Felix	Chikungunya	Scrub typhus	Blood culture	Undiagnosed	Total
≤1	11	04	02	01	1	6	95	120
2 to 5	75	46	20	06	08	31	125	311
6 to 12	73	29	13	03	06	25	142	291
Total	159	79	35	10	15	62	362	722

The mean age group in this study was 6.41 years. Out of 159 Dengue positive patient's maximum were between age group 2 to 5 yrs. (33) followed by 6 to 12, 10 patients less than or equal to 1, 9 patients were from age group between 13 to 28 yrs. In all diseases maximum number of patients were age group between 2 to 18yrs.

**Table No. 2: Gender and Disease**

Gender	Dengue	Widal	Weil Felix	chikungunya	Scrub typhus	Blood culture	Undiagnosed	Total
Male	97	46	23	6	8	38	240	458
Female	62	33	12	4	07	24	122	264
Total	159	79	35	10	15	62	362	722

In this study it was found that in all disease's male patients' more than female patients.

**Table no. 3: Distribution of patients according to cases of AFI**

Cases	Frequency	Percentage (%)
Dengue	159	22.02
Widal	79	10.94
Weil Felix	35	4.85
Chikungunya	10	1.38
Scrub Typhus	15	2.08
Blood culture	62	8.59
Undiagnosed	362	50.14
Total	722	100

Out of 722 patients in our study total 159 patients of AFI (22.02%) were Dengue positive which was diagnosed by rapid kit and NS1 and IgM ELISA. Dengue was showing highest number and percentage among total of 722 pediatric patients of febrile illness. Total of Widal test there were 79 pediatric patients showing widal positive done by slide test and rapid kit of IgM & IgG. 35 (4.85%) Weil Felix, 15 (2.08%) Scrub typhus, 10 (1.38%) Chikungunya. 362 were undiagnosed (50.14%).

**Table no. 4: Distribution of patients according to symptoms**

Symptoms	Frequency	Percentage (%)
Fever	722	100.00
Chills	419	58.11
Joint Pain	418	57.91
Abdominal Pain	450	62.32
Malaise	541	74.94
Body ache	490	67.93
Headache	500	69.33
Rash	26	03.60
Eye Pain	238	46.89
Nasal Congestion	111	15.43
Vomiting	217	30.06
Hepatomegaly	26	03.60

**Table No. 5: Month Wise Distribution Of Acute Febrile Cases**

Month	Dengue	Widal	Weil Felix	Chikungunya	Scrub typhus	Blood culture	Undiagnosed	Total
January 2020-21	15	17	2	3	2	6	37	82
February 2020-21	6	10	0	2	0	4	38	60
March 2020-21	6	10	5	0	2	4	40	67
April 2020-21	7	9	6	0	6	6	39	73
May 2020-21	3	4	5	0	0	5	24	41

June 2020-21	11	8	4	4	2	5	21	55
July 2020	10	4	3	0	0	4	29	50
August 2020	13	5	6	0	0	5	35	64
September 2020	27	0	0	0	0	6	27	60
October 2020	21	8	1	0	0	5	22	57
November 2020	29	2	0	1	1	6	24	63
December 2020	11	2	3	0	2	6	26	50
Total	159	79	35	10	15	62	362	722

(\*Duration of study were Jan 2020 to June 2021)

In our study we have calculated that distribution of patients according to symptoms that maximum number of patients were having fever 722(100.00%) and the chief complaints of most of the patients was also fever followed by Malaise 541(74.94%), headache was seen in 500 (69.33%), Body ache in 490(67.93%), Abdominal Pain in 450 (62.32%), Chills 419 (58.11%), Joint pain 418 (57.91%), Eye pain 238(46.89%), vomiting 217 (30.06%), nasal congestion 111 (15.43%), Rash was seen in 26 (3.60%).Hepatomegaly was rare finding which was seen in only in 26 out of 722 patients and the percentage calculated was 3.60.

In our study we had calculated month wise distribution of patients. More of dengue cases were seen in the month of August, September, October, November. While typhoid cases were more in the month of February. There were 13 cases seen in the month of February. Similarly, Weil Felix cases were more in the month of January. Chikungunya cases were more in the month of May, August and September. In the month of January, we have recorded three scrub typhus positive cases done by rapid test and ELISA. In the month of March, May and June there was only one positive case of scrub typhus noted in each month. It was also observed that cases were decreased in July, August, September.

**Table no. 6: Distribution of patients according to Area of residence**

Area of residence	Frequency	Percentage (%)
Urban	476	65.93
Rural	246	34.07
Total	722	100.00

Study shows that out of 722patients 476 (65.93%) were from urban area and 246(34.07%) from rural area.

**Table No.7: Different isolates found in Blood culture:**

Bacterial isolates	Percentage (%)
Total isolates	62
Gram positive Bacteria	24(38.70%)
Staphylococcus aureus	14(22.58%)
Enterococcus sp	5(8.06%)
Streptococcus sp	3(4.83%)
Coagulase negative staphylococcus	2(3.22%)
Gram negative bacteria (Enterobacteriaceae)	31(50%)
Klebsiella pneumoniae	13(20.96%)
Escherichia coli	11(17.74%)
Proteus mirabilis	5(8.06%)
Enterobacter sp	2(3.22%)
Non fermenters	7(11.29%)
Pseudomonas aeruginosa	4(6.45%)
Acinetobacter baumannii	3(4.83%)

Total 223 blood samples of pediatric patients having fever came for blood culture, out of these 161 samples were sterile. Remaining 62 blood samples of pediatric patients came positive for blood culture. Out of these 62 samples, 24 blood samples were showing gram positive bacteria and remaining 31 were gram negative bacteria and 7 were non fermenters. In our study total 722 patients were enrolled in the study. Out of which there were 66 patients were below one year of age in whom fever was chief complain and the percentage for same was 9.14 which is the lowest percentage of pediatric patients falling in this age group having fever. Similarly, between two years to five years there

were 306 patients, the percentage calculated was 42.38, which covers the greater part of our study and most of the cases in this population group was having fever and diagnosed for dengue.

## DISCUSSION

In this study a total of 722 cases who presented with acute febrile illness for a period of eighteen months were evaluated. Microbiological tests with good sensitivity and specificity targeting the common causative agents of acute febrile illness in tropical countries like Dengue, Typhoid, Malaria, Leptospirosis, Rickettsial infections were performed for all these patients.

In our study mean age of patient was 6.42yrs with maximum number of patients were in between age group 2 to 12 yrs. It was observed that male patients are more than female. The study by **Shamikumar R P, et al<sup>1</sup>** in their study mentioned that males were commonly affected with large number, Total of 97 cases of acute febrile illness of which detectable cases were 69 are males compared to females with 28 detectable cases. **Abraham et al,<sup>5</sup>** 2015 had documented men preponderance.

In our study it was observed that commonest cause of AFI was Dengue (31.86%) followed by typhoid fever (15.83%), Rickettsial fever (7.01%), Scrub Typhus (3.00%), Chikungunya (2.02%). Other causes of acute febrile illness of our study include viral infections, bacterial infections and undetectable causes. The study by **R. Vidhya Rani et al<sup>6</sup>** in their study mentioned that the commonest cause of acute febrile illness was Dengue in 54 cases (27%). Other causes detected were Typhoid in 6cases (3%), Malaria in 4cases (2%) and Rickettsial infections in 2cases (1%). **Yogeeshha et al<sup>7</sup>** (2014) in had a similar observation in their study in South India on acute febrile illness where most patients had Dengue, Malaria, Leptospirosis, typhoid. **Neelu sree et al<sup>8</sup>** (2015) had also reported Dengue, Malaria, Scrub typhus and Leptospirosis in their study.

In this study maximum number of patients were having fever 499 (100.00%) followed by Malaise 374 (74.94%), headache 346 (69.33%), Body ache 339 (67.93%), Abd. Pain 311 (62.32%), Chills 290 (58.11%), Joint pain 289 (57.91%), Eye pain 234 (46.89%), vomiting 150 (30.06%), nasal congestion 77 (15.43%), Rash 18 (3.60%). The study by **Subbarayudu Boda<sup>9</sup>** observed that Common complaints associated with febrile illness were non-specific and include myalgia, arthralgia, headache, nausea, vomiting, diarrhea, malaise, and rash etc. Many clinical manifestations of malaria, dengue, enteric fever and scrub typhus may closely mimic each other. The study by **N. Arvind et al<sup>10</sup>** mentioned that the most common symptoms reported by enrolled patients included headache (93.1%), malaise (89.4%), joint pain (80%), chills (73.7%).

In this study it was observed that Dengue fever cases was on peak in month of March and in month of July only 1 case was detected. Typhoid fever cases were on peak in month of February and not a single case reported in August and October. For other diseases we could not able to conclude opinion as only 1 or 2 cases reported in a month through the year. The study by **R. Vidhya Rani et al<sup>6</sup>** in their study mentioned that many cases were reported in December and January which is the monsoon and post monsoon period in Tamilnadu. Our study results were similar to study by **R. Vidhya Rani et al<sup>6</sup>** Jhansi Charles et al., (2015) and Priyadarshini Shanmugam et al., (2016) had shown peak incidence of cases during rainy and post monsoon seasons in their study. The general public have to be educated and awareness should be created on good hygienic practices, vector control measures and protective measures. Another study by **Subbarayudu Boda<sup>9</sup>** mentioned that seasonal variations for malaria and dengue, the maximum number of seropositive cases were recorded in the post monsoon period. Such seasonal variations have been reported in Arora et al study.<sup>16</sup> Ecological and climate factors influence the seasonal prevalence of both the mosquitos, *A. aegypti* and *Anopheles*, and *A. aegypti* larval indices are also high during the monsoon and post monsoon period.<sup>17</sup> The study by **N. Arvind et al<sup>10</sup>** mentioned that AFI occurred most commonly during rainy and autumn seasons accounting for 77.5% cases. The stagnant water as a result of rains compounded by poor drainage system in most of the areas in developing countries becomes a breeding ground for the mosquitoes helping them to transmit the diseases. Seasonal upsurge in fever is also a well-known documentation in previous studies.<sup>11,12</sup>

## CONCLUSION

This study clearly revealed that predominant cause of AFI in our area

was dengue, typhoid followed by rickettsial fever, Scrub typhus and Chikungunya on the basis of serological tests both RDT and ELISA. It is also revealed from present study that if proper protocol was used for AFI cases, it helps in the proper use of antibiotics as well as investigations. This reduces cost and resistance to antibiotics.

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