ORIGINAL RESEARCH PAPER

Volume-7 | Issue-5 | May-2018 | PRINT ISSN No 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

"CLINICO-PATHOLOGICAL PROFILE OF IN-HOSPITAL FEBRILE CHILDREN AT A REMOTE CENTRE IN NORTHERN INDIA"

Pediatrics

Dr Hardeep Kaur* MD, DNB Paediatrics * Corresponding author

Dr Gaurav Mahajan MD, DNB Medicine

Dr Himanth B E MBBS

ABSTRACT

Introduction : A vast majority of cases of fever in children are caused by infectious agents. Demographic and epidemiological profile of population under study can help us find out the predominant causes of fever in a particular region so that adequate preventive and curative measures can be adopted in time, to reduce the disease burden amongst vulnerable paediatric population.

Material and methods : This study was conducted at a remote location in northern India from July to September 2017. All children below 15 years admitted at this centre with febrile illness were enrolled in the study. Detailed clinical profile and lab results were noted and analysed to generate the results.

Results: There were a total of 91 admissions with fever and majority of them were male toddlers & preschool children. Of these 91 cases, 49% children were between 2-5 years of age. Acute gastroenteritis, URTI, viral fever and WARI were the most common discharge diagnosis. Majority cases were due to water borne diseases.

Conclusion: Poor hygiene and sanitation is the major cause of morbidity & disease burden in low socioeconomic groups at remote areas in northern India. Our study contributes to data generation in such less studied remote areas of this country.

KEYWORDS

Introduction

In Latin, the word 'febris' meaning fever related to 'fovere', that is to warm. Fever is the most common symptom that brings the child to a paediatrician. It is defined as rectal temperature ≥ 38ºC. Body temperature fluctuates in the range of 36.6 - 37.9 ºC and has diurnal variation with the highest point in early evening and lowest point in the morning. Body's thermostat is located in anterior hypothalamus which is responsible for maintaining core body temperature. Despite thermoregulatory control mediated by anterior hypothalamus, body temperature can rise up resulting in fever by 3 mechanisms- excess heat production, defective heat loss mechanism and pyrogens. The etiology of fever is divided into 4 main categories- infectious, inflammatory, neoplastic and miscellaneous and a vast majority of these cases of fever in children are caused by infectious agents. Increased susceptibility to infections during infancy has been associated with immature immune system and and lack of pre-existing immunological memory in newborns compared with adults[1.] Studies have proven that infants have reduced number of antigen presenting cells and they show reduced T-cell dependent antibody immune response as compared to adults[2.] Demographic and epidemiological profile of population under study can help us find out the predominant causes of fever in a particular region so that adequate preventive and curative measures can be adopted to reduce the disease burden amongst vulnerable paediatric population. We conducted one such study at a remote centre of northern India having the facility of in-hospital specialist paediatric care.

Material and methods

This was an observational study conducted at a remote tehsil in district Ajmer of Rajasthan, India. The period of study was from July 2017 to September 2017. All children admitted at this government health centre with febrile illness during this period were enrolled in the study after taking parental consent. The study was approved by hospital ethical committee. This hospital had the facility of providing round the clock in-hospital specialist paediatric and critical care.

Inclusion criteria-

Febrile children in the age group 0 to 15 years admitted to this hospital.

Exclusion criteria-

Outpatient children with fever
Children aged more than 15 years

Case definition- Cases were defined as under
Dengue: Clinical features of dengue, NS1Ag positivity and/or Dengue IgM positivity.

Malaria: Malaria parasite seen on thick/thin blood smear or Paracheck positivity.

Enteric Fever: Clinical features, blood/urine culture positive for Salmonella typhi a fourfold rise in widal titres.

Hepatitis: Clinical features, HBsAg/Anti HCV, IgM HAV/HEV positivity.

UTI: Clinical features, Urine culture positive

Fever Without Focus: No localising signs on clinical examination, positive sepsis screen like Raised TLC count, Blood culture positivity, CRP positive.

Acute gastroenteritis: Based on history and clinical examination. Bacterial diarrhoea suspects were subjected to sepsis screening.

WARI: Wheezing without any basal crepitation/signs of pneumonia.

Viral Fever: Based on clinical features and negative lab screening for other causes

After admission, the children were studied as per the symptoms and signs. Recording of clinical features and relevant lab investigations were made on data collection sheet. Routine baseline investigations included complete blood count, peripheral blood smear, serum electrolytes, liver function test, renal function test, C-reactive protein and urine analysis. Further investigations were as per symptomatology and clinical suspicion of the disease. For cases of malaria, thick and thin smears were studied apart from paracheck test to detect the antigen. For enteric fever, Widal titres as well as blood and urine cultures were studied. For patients with respiratory symptoms suggestive of possible pneumonia Chest X Ray, ABG and Spo2 monitoring was done. For suspicion of UTI, Urine and blood cultures were sent. For dengue suspects, Hb/PCV, Platelet counts, NS1Ag and dengue serology (IgM & IgG) was done. For Pyrexia of unknown origin, other rarer etiologies were thought of and accordingly required investigations were sent for. For example, ELISA /PCR for leptospira & throat swab for swine flu was done and sent to nearest government

medical college. Viral markers were sent for suspected hepatitis infection including IgM Hepatitis A and E. Outcome of the diseases was noted in the form of discharge, any complication or mortality. Data so generated was analysed statistically using SPSS version 21.

Results

There were a total of 91 admissions with fever during the period of the study. Age and sex distribution of the cases is as per figure 1 & 2 respectively. Main symptoms and signs are listed in table 1 & 2 respectively. Most of the cases were toddlers & preschool children, with a prevalence of 49.95% in this age group. Other significantly affected group was the age group of 6-10 years with disease prevalence of 29.67%. Children in < 2 years and 11 to 15 years of age groups were equally affected (approx 10%). Male children outnumbered female children in all age groups except in 6-10 years of age where disease prevalence was higher in female children. Majority of children had symptoms of fever (100%), headache (25.27%), running nose (34.06%), pain abdomen (35.16%), vomiting (36.26%) and cough (32.96%). Other less common symptoms were diarrhoea (21.97%), skin rash (13.18%), difficulty in breathing (13.18%), redness of eyes (25.27%), dysuria (7.69%) and facial puffiness (2.19%). The major signs encountered were dehydration (38.46%), tachypnoea (16.48%), wheeze (14.28%) and hepatomegaly (12.08%). Other less common signs were petechiae (9.89%), stridor (3.29%) and splenomegaly (3.29%).

Table-1 (Symptomatology of Cases)

SYMPTOMS	TOTAL NO OF PATIENTS (n = 91)
Fever	91(100%)
Headache	23 (25.27%)
Vomiting	33 (36.26%)
Diarrhoea	20 (21.97%)
Rash	12 (13.18%)
Pain abdomen	32 (35.16%)
Cough	30 (32.96%)
Difficulty in breathing	12 (13.18%)
Facial puffiness	2 (2.19%)
Redness of eyes	23 (25.27%)
Running nose	31(34.06%)
Dysuria	7 (7.69%)

Table 2- Signs associated with febrile illness

Signs	Total no of patients (n=91)
Hepatomegaly	11(12.08%)
Splenomegaly	3 (3.29%)
Petechiae	9 (9.89%)
Tachypnoea	15 (16.48%)
Dehydration	35 (38.46%)
Wheeze	13 (14.28%)
Stridor	3 (3.29%)
Seizures	4 (4.39%)
Anasarca	1(1.09%)

Table 4-Laboratory Investigations

1. Hb%	N (%)
3-6.9 gm%	4 (4.35)
7-9.9 gm%	12 (13.1)
10-12 gm%	55 (60.4)
>12 gm%	20 (21.9)
2. Platelet Count	N (%)
60,000-80,000	2 (2.19)
>80,000-99,000	30 (32.97)
100,000-199,000	57 (62.67)
>200,000	10 (10.98)
3. CRP	N (%)
Positive	20 (21.97%)
4. LFT	Average Range
SGOT(AST)	59.87 (20-2389)
SGPT(ALT)	56.90 (25-2229)
5.TLC Count	N (%)
< 5000	4 (4.39%)
5,000-10,000	57 (62.63%)
11,000-15,000	19 (20.87%)
>15,000	8 (8.79%)
6.Renal function test	Average Range
Urea	35.87 (25-45)
Serum creatinine	1.24 (0.50-15.60)

Table 3: Final Diagnosis

Final Diagnosis	Total cases (n=91)
Benign Tertian Malaria	4 (4.39%)
Acute Gastroenteritis	16 (17.58%)
Febrile seizures	4 (4.39%)
Enteric fever	7 (7.69%)
Acute Laryngo-tracheobronchitis	3 (3.29%)
Urinary tract infection	5 (5.49%)
Wheeze associated respiratory tract Infection	12 (13.18%)
Viral fever	12 (13.18%)
URTI	14 (15.38%)
Hepatitis A	2 (2.19%)
Pyrexia of unknown origin	4 (4.39%)
Acute tonsillitis	1 (1.09%)
Periorbital cellulitis	4 (4.39%)
Dengue without warning signs	1 (1.09%)
Subacute intestinal obstruction	1 (1.09%)
Steroid resistant nephrotic syndrome	1 (1.09%)

Figure 1: Age distribution of study groups

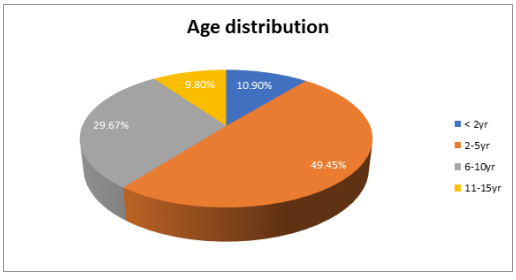
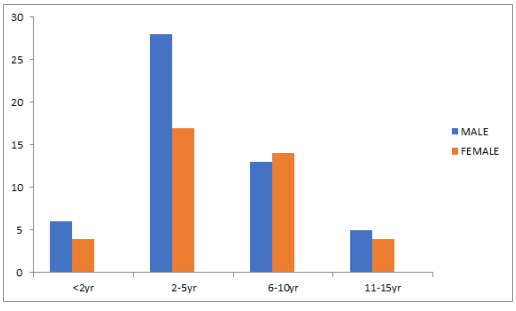


Figure-2 (Sex distribution of study groups)



Lab parameters

Most children were found to have mild to moderate anaemia (as per age related WHO cut off of haemoglobin range) with 60% children having Hb levels between 10-12 gm/dl and 13% having Hb in range of 7 - 9.9 gm/dl. 4.35% children had haemoglobin level in range of 3 - 6.9 gm/dl. Most of the children had platelet count in range of 1,00,000 to 1,99,000 / cmm (57%). Only 2% children had platelet count between 60,000-80,000/cmm and 10% had platelet count more than 2,00,000/cmm. About one fifth of children with fever had positive CRP test. Average SGOT & SGPT values were 59.8 and 56.7 IU/l. Average Urea and Creatinine was 35.87 & 1.24 mg/dl respectively. Most children with fever had TLC count in the range of 5000-10,000/cmm (62.63%). Only 4% children had leucopenia with TLC count < 5000/cmm. Leucocytosis was found in 20% children with average TLC 11000-15000 while 8% children had TLC > 15000/cmm.

The final diagnosis of febrile children is listed in table 3.
Most children admitted with fever had Acute Gastroenteritis (16%), URTI (15%), Viral fever (13%) and Wheeze associated respiratory tract illness (13%). Other common etiologies were Enteric fever (7%), UTI (5%) and Hepatitis A (2%). The prevalence of vector borne diseases was very less with Malaria found only in 4% and dengue in

1% cases. All patients admitted at this centre were discharged and did not have any major complications. Average length of hospital stay was 3.5 days and there was no case fatality.

Discussion

This was an observational study performed at a remote peripheral centre over a period of 3 months with the aim to study clinical-pathological profile of uncomplicated febrile hospitalised cases. We admitted a total of 91 children during the period of study. Children were divided into 4 age groups - <2yr, 2-5yr, 6-10yr and 11-15yr. Febrile illness had a prevalence of 49% in 2-5yr of age & 29% in 6-10 yrs of age. This is attributable to significant and recurrent exposure to infectious agents at school and in the environment. Children younger than 2 years are protected by breast feeding and a relatively safe stay at home. They are less exposed to infectious agents compared to school aged children. Children > 10 years of age are also at lesser risk of developing disease after exposure to infectious agent. This is mainly attributed to development of natural body defences following subclinical infection. A so-called honeymoon period of childhood infectious diseases has been recognized in which morbidity and mortality from a range of infections, including tuberculosis, influenza, poliomyelitis, mumps, measles, chickenpox, and Epstein-Barr virus infection, follow a U-shaped curve, with maximum disease rates in the first 1–2 years, increasing again only in later childhood, adolescence, and adulthood[3]. Though infancy period may have maximum incidence of infection but the incidence of disease is low in this age group[4]. This is consistent with the findings of our study.

Overall, febrile illness had higher prevalence in male children than female as suggested in other studies too[5,6]. Females are able to fight pathogens and mount a better immune response as compared to males.[7] Out of 91 patients, majority had headache, vomiting, pain abdomen, cough and running nose as associated symptoms in addition to fever. On clinical examination, most children had signs of dehydration and signs of respiratory distress in the form of tachypnoea & wheeze. Sizeable number of children had hepatomegaly (11%) but splenomegaly was less common. The most commonly affected systems in our study were GI and respiratory systems.

Based on clinical and lab profile, various etiologies of fever are mentioned in table 3. Most of the febrile episodes were due to infectious etiologies including acute gastroenteritis, URTI, viral fever and WARI. Water borne diseases were more prevalent compared to vector borne diseases. Only four cases of benign tertian malaria and one case of dengue fever was admitted during the period of study despite the peak season of vector borne disease. Higher incidence of wheezing episodes indicate higher prevalence of allergies in this region. This may be attributable to the geographical location of the place which is bounded by thick vegetation and wild flora. No cause of fever could be ascertained in a total of four cases. These were labelled as pyrexia of unknown origin. Many cases of fever are difficult to be diagnosed clinically[8,9,10] and even with good lab support let alone in its absence. Laboratory services may be limited or absent especially in low-resource settings[11]. Consequently, clinicians frequently lack information about the local epidemiology of causes of severe febrile illnesses. Similarly, disease control programmes lack data to set priorities for prevention. We conducted this study with this insight to collect data about the disease profile and etiological agents of febrile illnesses in children and hence provide a future vision at steps to manage and prevent these cases.

Conclusion

In remote areas of Northern India, water borne diseases still continue to be of much higher incidence & prevalence compared to other infectious etiologies. Vector borne diseases were found to be of low prevalence. Amongst non-infectious causes, airway involvement in the form of WARI outnumbered other causes.

A robust contemporary picture of treatable and preventable infectious causes of febrile illness is urgently needed to improve patient outcomes. Better awareness of water borne diseases and water sanitation can significantly reduce the disease burden as well as morbidity and mortality related to these illnesses.

Conflict of interest-

All authors have none to declare.

Acknowledgements- None

This paper is not based on any past research project and the study has not been funded by any individual, society or any organization. The study has been approved by ethical committee of the hospital. Prior permission and consent of parents/guardians were taken.

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