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**Original Research Article**

# Clinical profile of fever in newborn and predictors of outcome

**Deepa Janakiraman, Karthikeyan Muthumani*, Sivaraman Thirumalaikumaraswamy**

Department of Pediatrics, Institute of Child Health and Hospital for Children, Egmore, Chennai, Tamil Nadu, India

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***Correspondence:**
Dr. Karthikeyan Muthumani,
E-mail: drmkich@gmail.com



## ABSTRACT

**Background:** Hyperpyrexia, in neonates is considered as a medical emergency. The aim of the present study was to evaluate complete clinical profile and relevant laboratory investigations in arriving at various etiologies of fever in neonates and to arrive at predictors of mortality among newborns presenting with fever symptoms.
**Methods:** This prospective study conducted in the Neonatology Department of Institute of Child Health and Hospital for Children during the period January 2015 to September 2015. A total of 100 neonates from Day 1 to Day 28 of life regardless of gestational age with fever were included in the study. Complete blood cell counts and blood cultures were obtained on all of the patients.
**Results:** Out of 100 neonates 87% were term new born. Lethargy was the major presenting complaint (48%) associated with fever. Respiratory distress was the most common clinical sign observed in febrile neonates (21%). 63 had a positive septic screening. 16 among those with positive septic screen had an organism grown in the culture. Staphylococcus aureus was the most common organism isolated in febrile neonates. Mortality was seen only in 6% of the neonates who had fever.
**Conclusions:** Children with fever are at higher risk of bacterial infections. They need immediate medical supervision for identification of exact etiology.

**Keywords:** Fever, New born, Sepsis

## INTRODUCTION

Fever in new born is an emergency sign of systemic infections mostly of bacterial infections.[1] The incidence of serious bacterial infections ranges from 4-28%.[2-4] The presenting symptoms are often indirect and clinically it is difficult in distinguishing serious bacterial infection from those occurring in non-infectious conditions, including every sign of neonatal distress.[5]

The common causes of fever during first days of life include cesarean section, high birth weight, breast feeding, dehydration fever and possibly early onset of sepsis due to bacterial infections which needs careful observation and immediate conservative and /or antibiotic treatment.[1,6]

The primary objective of the present study was to evaluate complete clinical profile and relevant laboratory investigations in arriving at various etiologies of fever in neonates and the secondary objective was to arrive at predictors of mortality among newborns presenting with fever symptoms.

## METHODS

This is a prospective descriptive study conducted in the Neonatology Department of Institute of Child Health and Hospital for Children during the period January 2015 to

September 2015. A total of 100 neonates from Day 1 to Day 28 of life regardless of gestational age with temperature more than or equal to 100.4*F were included in the study. Hyperpyrexia in neonates presenting with fever is defined as temperature more than or equal to 104 degree Fahrenheit. Written informed consent was obtained from the parents and Institution review board clearance was obtained.

***Sample size***

Sample size was calculated using previous year hospital records, the expected prevalence of fever in neonatal period was 5%, precision of 0.045 and confidence level of 95%, the minimum sample required for this study is 91 with consideration of 10% loss, the final sample size required for this study is 100 cases.

***Selection criteria***

Neonates who were found to have an axillary temperature greater than or equal to 100.4 degree Fahrenheit were included in the study. Neonates with major congenital malformations were excluded from the study even though they recorded more than 100.4 degree Fahrenheit.

Details such as gestational age, sex, birth weight, maternal age and parity, mode of delivery, laboratory data, medical treatment given to the baby were taken from the medical charts.

A detailed history was collected from the mother of the febrile neonates in the study group as to find whether they had seizures, lethargy or incessant cry or poor feeding, breathing difficulty, abdominal distension, vomiting or loose stools, decreased urine output and swelling in part of the body and were recorded in the proforma categorically as either yes or no. Mothers were also enquired to know if they had carried out any one of the bad child practices such as prelacteal feeds, administration of native medications, etc. which were prevalent in the locality. Antenatal records of all the mothers were checked for pre morbid illness, presence or absence of maternal fever during the period of labour was also recorded in the proforma.

History of previous hospitalization of the neonates, administration of any intravenous antibiotics prior to this admission were recorded.

All febrile neonates were carefully examined to find, whether they had pallor, jaundice, respiratory distress, shock, clinical signs of dehydration, hepatosplenomegaly and ascites or third space fluid collection. All neonates who recorded a temperature more than or equal to 100.4 degree Fahrenheit were admitted in the newborn unit. Initially investigations like total count, differential count, haemoglobin, packed cell volume, platelets, C-reactive protein, blood culture, peripheral smear were done to rule out sepsis.

Analysis of blood samples for electrolytes such as sodium and potassium, liver function tests and renal function tests were done. Urine samples were collected and sent for urine culture. Chest X-ray was taken in all febrile neonates and interpreted as either normal or abnormal.

Additional investigations were done in febrile neonates in the unit as and when needed as per the hospital policy. Lumbar puncture was done in those febrile neonates who were symptomatic or in those who had positive blood culture. Cultures were also sent from CSF and pus aspirated from swellings. Serology for dengue was sent in suspected cases. Scrub typhus serology was sent for cases with hepatosplenomegaly after ruling out sepsis and TORCH. TORCH infection was ruled out by doing a serology study. Ultrasound done in selected cases was recorded as either normal or abnormal.

Details of administered medicines, requirement of ventilation, transfusions, peritoneal dialysis and other procedures such as incision and drainage and capsulotomy and their durations were also recorded in the proforma. Duration of hospital stay; final diagnosis and outcome of the study was recorded. Final outcome in this study was defined as either discharge or death.

***Statistical analysis***

All data were entered in a Microsoft excel sheet and was imported to SPSS software. All analyses were performed using SPSS software (Statistical Package for Social Sciences) version 20.0.

Descriptive statistics was done for all data and were reported in terms of frequency mean values and percentages. The non-parametric test of Mann Whitney U test was performed to find out the statistical difference in the parameters in febrile neonates between those who survived and who died.

Receiver operating characteristics (ROC) curve was performed for the continuous parameters that gained significance in the non-parametric test of Mann Whitney U test. ROC analysis was done to find a cut off level and hence to predict the mortality in febrile neonates.

Categorical variables were analysed between two major groups of febrile neonates with Chi-Square Test. Wherever the sample size was less categorical variables were analysed between the two groups using Fisher Exact Test. The mean of continuous variables between the two groups was compared using Independent t test.

## RESULTS

100 neonates were enrolled in the study group who had an axillary temperature of more than or equal to 100.4 degree Fahrenheit. Among a total of 100 cases, 60 were males and 40 were females. Term neonates comprised about 87% of the study population, 13% of the febrile

neonates were preterm. 80% of the febrile neonates had a weight above 2.5Kg, only 1% had a weight below 1500 g. The remaining 19% were low birth weight. 69% of the newborns who had fever were born through normal vaginal delivery. 21%, 8% and 2% of febrile neonates were born through elective caesarean section, emergency caesarean section and forceps delivery respectively (Table 1).

**Table 1: Demographic characteristics of the febrile neonates.**

| Characteristics | No. of patients (n=100) |
|---|---|
| **Gestational age** | |
| Preterm | 13 |
| Term | 87 |
| **Sex** | |
| Male | 60 |
| Female | 40 |
| **Birth weight** | |
| >2.5kg | 80 |
| Low birth weight | 19 |
| Very low birth weight | 1 |
| **Mode of delivery** | |
| Normal | 69 |
| Cesarean | 8 |
| Elective cesarean | 21 |
| Instrumental | 2 |

Among the neonates who presented with fever, 19% had previous hospital admissions, 17 of them received antibiotics prior to this admission. Only 8% of the mothers had received antibiotics prior to delivery. 4% of mothers had a history of fever and only 2% of the mothers of febrile neonates had a history of prolonged rupture of membranes more than 18 hours. Twelve percent of the febrile neonates' mothers had followed bad child rearing practices as given in Figure 1.

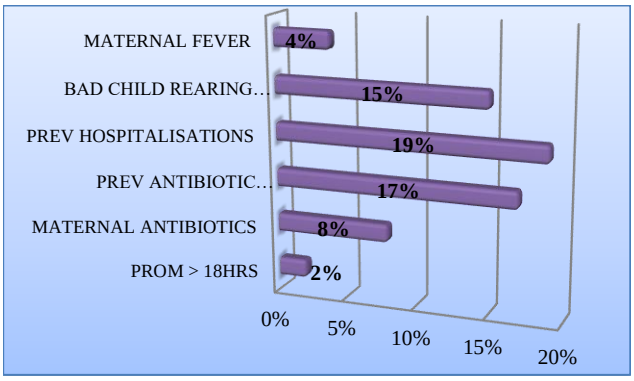


**Figure 1: Factors influencing fever in neonates.**

Lethargy was the major presenting complaint associated with fever in newborn babies, accounting for 48%, followed by breathlessness with 32%. Decreased urine output and abdominal distension was one of the presenting complaints in 19% and 17% respectively. 10% of febrile neonates had either vomiting or loose stools. Swelling and seizures were found equally in 8% of the febrile neonates (Figure 2).

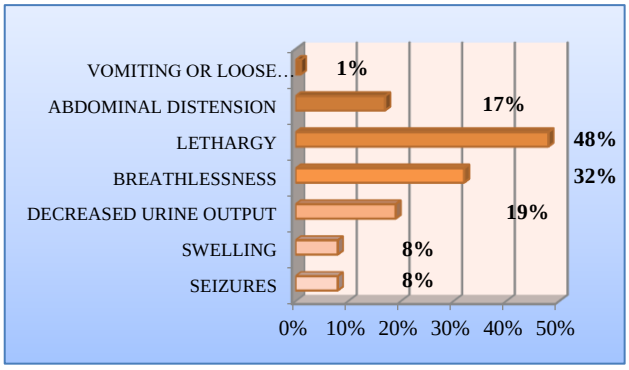


**Figure 2: Presenting history in febrile neonates.**

Figure 3 presents the clinical signs of the febrile neonates. Respiratory distress was the most common clinical sign observed in febrile neonates (21%). The next common clinical sign was dehydration (17%). Hepatosplenomegaly was found in 8% of febrile neonates. 8 were found to have jaundice. Shock was present in 8% of febrile neonates. Pallor was noted in 6% of febrile neonates and 2% of the febrile neonates had ascites.

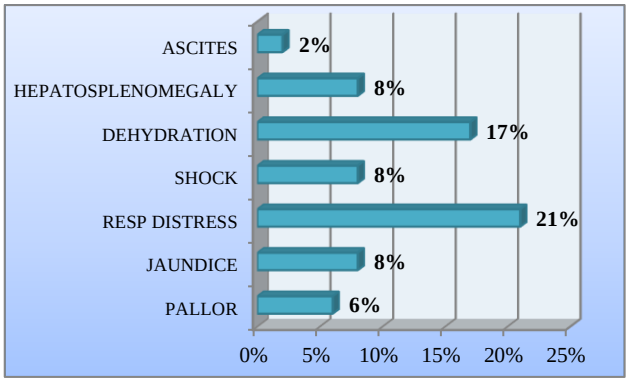


**Figure 3: Clinical signs in febrile neonates.**

Table 2 presents the laboratory investigations. 62 percent of the febrile neonates had a total count between 5000-15000 cells/mm$^3$. 9% had a count less than 5000 cells/mm$^3$. Around 29 children had a count more than 15000 cells/mm$^3$. Platelet count was normal in 79% of febrile neonates. 21% of febrile neonates were found to have thrombocytopenia. Among them, mild, moderate and severe thrombocytopenia was found in 5%, 4% and 12% of febrile neonates respectively. Only one febrile neonate had polycythemia, remaining 99 children had a haematocrit less than 65%. Out of 100 febrile neonates, 30 of them had hypernatremia and 8 children had hyponatremia. Rest 62% of these febrile neonates had normal sodium levels. Only 5% of febrile neonates had hyperkalemia with potassium of above 6 mEq/L. In the study population, 28% of the febrile neonates had an

abnormal renal function test. Thirteen among the 100 febrile neonates in the study had abnormal liver function test. C-reactive protein was negative in 56% and positive in 44% of febrile neonates. Cultures from either blood or pus were found to be positive in 16% of the children. 12% had a positive blood culture. Among them *Staphylococcus aureus* was the most common organism isolated. One who had a positive blood culture had a fungal growth in the culture with fungal ball in the heart. Other 4% had positive cultures from the pus or the aspirated material. Chest X-ray was found to be abnormal in 31% of newborns with fever. 16 neonates had an abnormality in the ultrasound. Out of 20 children, to whom serology was done for persistent fever with hepatosplenomegaly, 4 children had positive serologies, one for scrub typhus, one for dengue, and the other 2 for TORCH (Toxoplasmosis Rubella Cytomegalovirus Herpesvirus) panel.

**Table 2: Laboratory investigations.**

| Parameters | Values | Percentage |
|---|---|---|
| Total count (cells/mm$^3$) | 5000-15000 | 62 |
| | <5000 | 9 |
| | >15000 | 29 |
| Platelets (cells/mm$^{3)}$ | >1.5 lakh | 79 |
| | 1-1.5 lakh | 5 |
| | 50000-1 lakh | 4 |
| | <50000 | 12 |
| Haematocrit (%) | ≤ 65 | 99 |
| | >65 | 1 |
| Sodium (mEq/l) | 135-145 | 62 |
| | > 145 | 30 |
| | <130 | 8 |
| Potassium (mEq/l) | >6 | 5 |
| | <6 | 95 |
| Renal functional tests | Normal | 72 |
| | Abnormal | 28 |
| Liver functional tests | Normal | 87 |
| | Abnormal | 13 |
| C-reactive protein | Negative | 56 |
| | Positive | 44 |
| Blood culture | Negative | 88 |
| | Positive | 12 |
| Other cultures | Absent | 96 |
| | Present | 4 |
| Chest X-ray | Normal | 69 |
| | Abnormal | 31 |
| USG | Abnormal | 16 |
| Serology | Positive | 4 |

Figure 4 illustrates the measures taken for management of fever in neonates. Ionotropes like dopamine, dobutamine and adrenaline were given for 16% of the febrile neonates. 14% of the children were mechanically ventilated and managed during the course of the hospital stay. Antibiotics were administered to 68% of the febrile neonates and rests of them were managed conservatively. Transfusion was given to 16 neonates. Only six children received anti-epileptic medications for control of seizures. Surgical procedures were carried out in six children in the form of incision and drainage, aspiration and capsulotomy for abscess and septic arthritis respectively.

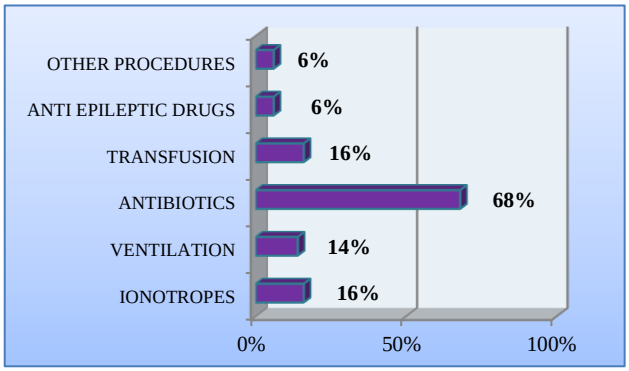


**Figure 4: Interventions in febrile neonates.**

Table 3 shows the distribution and range of parameters in neonatal fever. The mean day of onset of fever in the study population was 9.9 days of life. The average day of life at which the febrile neonates got admitted to the hospital was 11.82 days. The highest temperature recorded in the newborns who presented with fever ranged from 100.5º F to 105.7º F. The average was 101.47º F. The minimum duration of fever in the newborns was 12 hours. The maximum duration of fever in these neonates was 9 days. The average duration of fever in the neonatal period was 3.06 days. The shortest duration of stay in the hospital for fever in the neonatal period in this study was 1 day. The longest duration of stay in the hospital for fever in neonates was 30 days. The average duration of stay in the hospital by febrile neonates was 8.64 days.

**Table 3: Distribution and range of parameters in neonatal fever.**

| Parameters | Values |
|---|---|
| Mean day of onset of fever | 9.9 days |
| Day of admission into the hospital | 11.82 days |
| Average body temperature | 101.47º F |
| Average duration of fever | 3.06 days |
| Average duration of stay in the hospital | 8.64 days |

Table 4 presents the range of blood parameters in neonatal fever. The mean WBC count was 12687 cells/mm$^3$, polymorphs was 51.36%, haemoglobin was 13.8 g/dl, haematocrit 41.53%, platelet count 2,51,465 cells/mm$^3$, sodium 142.3 mEq/l, urea was 44.08 mg/dl and creatinine was 0.77 mg/dl.

Figure 5 depicts the causes of fever in neonates. Sepsis was the most common cause noticed among febrile neonates. Sepsis screen was positive in 63% of the neonates who had fever, followed by dehydration in 36%, and environmental hyperthermia in one child.

**Table 4: Range of blood parameters in febrile neonates.**

| Blood parameters | Range of values | Mean values |
|---|---|---|
| WBC count (cells/mm$^3$) | Min- 12,000; Max-60,500 | 12,687 |
| Polymorphs (%) | Min-15; Max-94 | 51.36 |
| Hemoglobin (g/dl) | Min-3.9; Max-21.6 | 13.8 |
| Haematocrit (%) | Min-11.7; Max-64.8 | 41.53 |
| Platelets (cells/mm$^3$) | Min- 6,500; Max-5,80,000 | 2,51,465 |
| Sodium (mEq/l) | Min-126; Max-190 | 142.3 |
| Urea (mg/dl) | Min-14; Max-480 | 44.08 |
| Creatinine | Min-0.4; Max-5 | 0.77 |

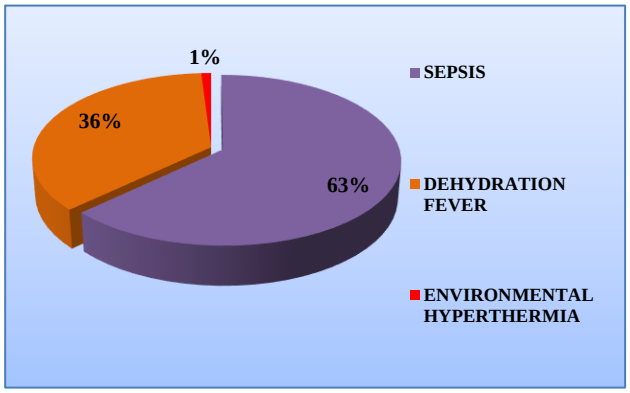


**Figure 5: Causes of fever in neonates.**

Table 5 shows the causes of sepsis in febrile neonates. Out of 63 neonates who had a positive septic screening, 16 children had culture proven sepsis and 47 were entitled the diagnosis of probable sepsis.

**Table 5: Causes of sepsis in febrile neonates.**

| Diagnosis | No. of cases | % |
|---|---|---|
| Sepsis in culture positive cases | N=16 | |
| Abscess | 1 | 6.3 |
| Septic arthritis | 2 | 12.5 |
| Pneumonia + sbi | 1 | 6.3 |
| Bacteremia | 11 | 68.8 |
| Fungal sepsis | 1 | 6.3 |
| Sepsis in culture negative cases | N=47 | |
| Abscess | 2 | 4.2 |
| Septic ileus | 1 | 2.1 |
| Septic arthritis | 2 | 4.3 |
| Meningitis | 2 | 4.3 |
| EOS | 3 | 6.4 |
| LOS | 10 | 21.3 |
| Pneumonia | 10 | 21.3 |
| Probable sepsis | 11 | 23.4 |
| Umblical sepsis | 2 | 4.3 |
| Cellulitis | 2 | 4.3 |
| Dengue | 1 | 2.1 |
| Scrub | 1 | 2.1 |

It was observed that bacteremia without any focus of sepsis accounted for most of the culture positive sepsis in febrile neonates 11 (68.8%), followed by septic arthritis in 2 (12.5%). 12 out of 16 positive cultures *Staphylococcus aureus* was the most common organism isolated in febrile neonates.

*E. coli*, *Klebseilla* and fungal infection accounted for the rest. Amikacin was found to be the antibiotic for which most the organisms was sensitive n=13/16 (81.25%). In our study pneumonia, late onset sepsis and clinical sepsis accounted for most of the causes of culture negative sepsis in febrile neonates.

Outcome of the study was presented in Figure 6. Out of the total 100 neonates with fever, 94 children were discharged and mortality was seen in 6% of the neonates.

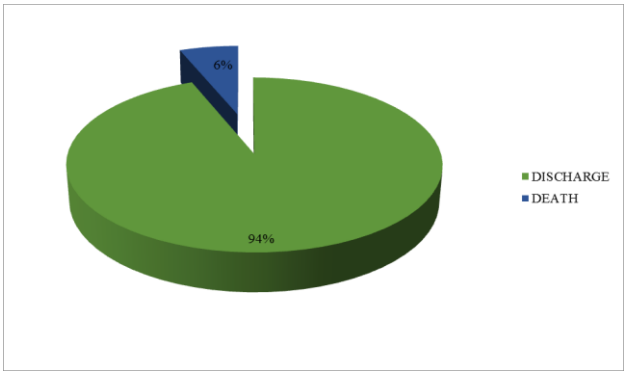


**Figure 6: Outcome of the study.**

Table 6 presents the values of Mann-Whitney U test performed for the following parameters in febrile neonates between those who survived and who died.

A statistically significant difference was found when the non-parametric test of Mann Whitney was performed to find the difference in polymorphs, hemoglobin, haematocrit and platelets between discharge and death group.

ROC analysis was done to find a cut off level and hence to predict the mortality in febrile neonates as given in Table 7.

By doing a ROC curve analysis, it was observed that febrile neonates who had a platelet count of less than 185000 cells/mm$^3$, PCV of less than 38.85%, haemoglobin of less than 12.95 g/dL and polymorphs of greater than 65.5%, were having high chances of mortality.

Table 8 presents the comparison of parameters between dehydration fever and sepsis. It was observed that the mean day of onset of fever, mean duration of hospital stay, mean haemoglobin, packed cell volume in febrile neonates with dehydration fever was significantly lower compared to febrile neonates with sepsis (p=0.00). It was

also observed that the mean sodium levels in febrile neonates with dehydration fever was significantly higher compared to febrile neonates with sepsis (p=0.00).

**Table 6: Difference in the parameters in febrile neonates between those who survived and who died.**

| Parameters | Status of the patient | Median | Interquartile range | P value |
|---|---|---|---|---|
| Polymorphs (%) | Death | 66.5 | 64.75-76 | 0.04 |
| | Discharge | 49 | 38-63 | |
| Hemoglobin (g/dl) | Death | 11.95 | 10.25-13.55 | 0.044 |
| | Discharge | 14.15 | 12.30-15.92 | |
| Hematocrit (%) | Death | 35.85 | 30.75-40.65 | 0.04 |
| | Discharge | 42.45 | 36.90-47.78 | |
| Platelets (cells/mm$^3$) | Death | 112500 | 31000-212500 | 0.022 |
| | Discharge | 244000 | 149000-360000 | |

**Table 7: ROC analysis of various blood parameters.**

| Parameters | Area | Std. Error[a] | Asymptotic sig[b] | Asymptotic 95% confidence interval | |
|---|---|---|---|---|---|
| | | | | lower bound | upper bound |
| Platelets | 0.779 | 0.071 | 0.022 | 0.639 | 0.919 |
| Packed cell volume | 0.746 | 0.077 | 0.044 | 0.596 | 0.896 |
| Hemoglobin | 0.746 | 0.077 | 0.044 | 0.596 | 0.896 |
| Polymorphs | 0.855 | 0.043 | 0.004 | 0.770 | 0.939 |

**Table 8: Comparison of different parameters between dehydration fever and sepsis and their statistical values.**

| Parameters | Diagnosis | N | Mean | Std. Deviation | Std. Error mean | t-value | P values |
|---|---|---|---|---|---|---|---|
| Duration of hospital stay | Dehydration fever | 36 | 3.92 | 2.612 | 0.435 | -6.60 | 0.00 |
| | Sepsis | 63 | 11.41 | 6.507 | 0.82 | | |
| Day of onset | Dehydration fever | 36 | 5.17 | 6.327 | 1.054 | -4.31 | 0.00 |
| | Sepsis | 63 | 12.43 | 8.906 | 1.122 | | |
| Duration of fever | Dehydration fever | 36 | 2.14 | 1.313 | 0.219 | -4.13 | 0.00 |
| | Sepsis | 63 | 3.6 | 1.88 | 0.237 | | |
| Total count | Dehydration fever | 36 | 11816.67 | 8941.253 | 1490.209 | -0.86 | 0.39 |
| | Sepsis | 63 | 13168.25 | 6530.594 | 822.777 | | |
| Polymorph | Dehydration fever | 36 | 51.69 | 14.256 | 2.376 | 0.10 | 0.92 |
| | Sepsis | 63 | 51.35 | 18.653 | 2.35 | | |
| Hemoglobin | Dehydration fever | 36 | 15.022222 | 2.214512 | 0.3690853 | 3.21 | 0.00 |
| | Sepsis | 63 | 13.180952 | 3.0039145 | 0.3784577 | | |
| Packed cell volume | Dehydration fever | 36 | 45.066667 | 6.6435361 | 1.107256 | 3.21 | 0.00 |
| | Sepsis | 63 | 39.542857 | 9.0117435 | 1.135373 | | |
| Platelets | Dehydration fever | 36 | 246513.89 | 122128.123 | 20354.687 | -0.12 | 0.90 |
| | Sepsis | 63 | 250349.21 | 166225.571 | 20942.454 | | |
| Sodium | Dehydration fever | 36 | 147.19 | 9.841 | 1.64 | 3.66 | 0.00 |
| | Sepsis | 63 | 139.56 | 10.066 | 1.268 | | |
| Potassium | Dehydration fever | 36 | 4.647 | 0.5725 | 0.0954 | -1.86 | 0.07 |
| | Sepsis | 63 | 4.86 | 0.5339 | 0.0673 | | |
| Urea | Dehydration fever | 36 | 55.89 | 79.184 | 13.197 | 1.36 | 0.18 |
| | Sepsis | 63 | 37.78 | 52.721 | 6.642 | | |
| Creatinine | Dehydration fever | 36 | 0.794444 | 0.5008247 | 0.0834708 | 0.28 | 0.78 |
| | Sepsis | 63 | 0.75873 | 0.6788593 | 0.0855282 | | |

Chi square test or Fisher exact t test was done to find the statistical significant difference in the categorical parameters between the groups of febrile neonates with sepsis and dehydration fever and found a significant difference between them (p<0.05) as given in Table 9.

From the variables that attained significance from the univariate analysis, six variables were further subjected to multivariate analysis as given in Table 10.

Through internal adjustments was made among these variables, it was found that breathlessness, abdominal distension and CRP were the variables most significantly associated with higher chance of having sepsis in febrile neonates.

## DISCUSSION

Fever in neonates may occur due to secretion of pyretic inflammatory cytokines which raises the hypothalamic temperature, as well lead to elevated body temperature.[7,8] Non-infectious conditions being associated with fever in new born includes dehydration, breast-feeding, high birthweight, and cesarean section.[9] Overall rates of temperature symptoms in EOS negative infants were very low, making these symptoms a highly specific diagnostic tool in the diagnosis of bacterial infection.[10]

**Table 9: Statistical significance of parameters in predicting sepsis.**

| Parameters | P value | 95% CI |
|---|---|---|
| Previous antibiotics to babies | 0.006 | 1.379 - 86.729 |
| Previous hospital admission | 0.003 | 1.642 - 101.907 |
| Breathlessness | 0.000 | 3.41 - 69.91 |
| Lethargy | 0.001 | 1.84 - 11.3 |
| Abdominal distension | 0.003 | 1.50 - 94.15 |
| Respiratory distress | 0.000 | 6.01 - 362.29 |
| CRP | 0.000 | 3.446 - 29.453 |
| Transfusion | 0.005 | 1.339 - 84.317 |

**Table 10: Multivariate analysis of parameters in predicting sepsis.**

| Variables | BETA | SE | Significance | 95% C.I. | |
|---|---|---|---|---|---|
| | | | | Lower | Upper |
| Previous antibiotics to babies | 0.025 | 1.34 | 0.985 | 0.074 | 14.181 |
| Previous hospital admission | -1.657 | 1.327 | 0.212 | 0.014 | 2.569 |
| Breathlessness | -2.293 | 0.87 | 0.008 | 0.018 | 0.555 |
| Lethargy | -0.597 | 0.642 | 0.353 | 0.156 | 1.939 |
| Abdominal distension | -2.512 | 1.183 | 0.034 | 0.008 | 0.825 |
| CRP | -1.91 | 0.658 | 0.004 | 0.041 | 0.538 |

In this study, in most of the infants (48%) lethargy is the major symptom observed. It was noted that fever in term newborns were due to bacterial infection while in preterm newborns it was due to hypothermia.23 In our study majority (87%) were term newborns and sepsis was the most common cause of fever in neonates accounting for 63%. Similar observations were made by Maayan-Metzger et al and Voora et al.[1,9]

Neonatal dehydration was noted as the one of the potential cause of fever in neonates in their early day of life. This might be due to malnutrition in breast-fed infants, hypernatremia and high urea levels.[11] In our study, after sepsis, dehydration was the subsequent cause of fever (39%) in infants. Hypernatremia was seen in 30% of children.

Philip and Hewitt evaluated the laboratory factors that correlates with serious bacterial infection and found that combined white blood cell and neutrophil count serves as the best indicator of serious bacterial infection.[12] In our study, 62% of the febrile neonates had a total count between 5000-15000 cells/mm$^3$ and around 29 children had a count more than 15000 cells/mm$^3$. Platelet count of less than 185000 cells/mm3 or haematocrit of less than 38.85% or polymorph of greater than 65.5% or haemoglobin of less than 12.95 g/dL in febrile neonates predicted a high chance of mortality.

In a study done by Bonadio et al on febrile infants aged zero to eight weeks, it was found that 12% of febrile neonates had a culture positive sepsis.[13] But in our study, it was observed that 16% of febrile neonates had a culture positive sepsis. Among them *Staphylococcus aureus* was the most common organism isolated. Similar observation was made by Byington et al in which *Staphylococcus aureus* was the most common gram-positive pathogen, in 8% of blood cultures of infants that responsible for serious bacterial infections (SBI). Amikacin was found to be the antibiotic for which most the organisms was sensitive n=13/16 (81.25%).[14]

In a study done by Brown et al found that WBC count had only modest discriminatory power in identifying febrile neonates with bacterial infection.[15] In our study also, it was found that neither total count nor percentage of polymorph had a discriminatory power to differentiate between febrile neonates suffering from sepsis and dehydration fever.

A study was done by Bressan et al to predict SBI in well appearing febrile neonates by means of laboratory

markers by. It was found that laboratory markers could predict SBI with greater accuracy if done after 12 hours of fever duration. Our study also disclosed the fact that C-reactive protein had gained a significant difference in the positivity rates in neonates with sepsis and dehydration fever. But, there was no significant difference among both groups in term of total count or polymorph.

## CONCLUSION

The results of our study conclude that sepsis was the most common cause of fever in term neonates. *Staphylococcus aureus* was the most common organism isolated in culture positive sepsis in febrile neonates. They were found to be sensitive to amikacin. Appropriate antibiotic therapy helped in reducing the infection and fever. In significantly lower risk cases conservative treatment was adopted. From multivariate analysis, it was found that breathlessness, abdominal distension and CRP were the variables most significantly associated with the diagnosis of sepsis in febrile neonates. Hyperpyrexia necessitates medical intervention for SBI.

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