



A CLINICO-EPIDEMIOLOGICAL STUDY AND OUTCOME OF EMPYEMA THORACIS IN CHILDREN 2 MONTHS-12YRS IN A TERTIARY CARE HOSPITAL IN WEST BENGAL

Paediatric Medicine

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ABSTRACT

Hippocrates in 600 B.C. defined empyema thoracis as a collection of pus in the pleural cavity and advocated open drainage as its treatment. Empyema thoracis, a common condition in childhood has significant morbidity and mortality. Empyema thoracis constitutes approximately 5-10% of cases seen by pediatrician in India. Acute respiratory infections are the most common illness of childhood accounting 50% of all illness in under-fives and 30% in the 5-12 years age groups, largely involving the upper respiratory **Aims:** To study epidemiological trends, to understand clinical spectrum and to observe different outcome. **Materials and Methods:** The present study was an observational study. This Study was conducted from January 2021 to July 2022 at Malda Medical College and Hospital. 50 patients were included in this study. **Result:** We observed that, higher number of patients had Creamy Hazy Plural Fluid [42 (84.0%)] and it was statistically significant ($p < .00001$). ($Z=7.8393$) and more number of patients had Polymorphs, Histiocytes [25 (50.0%)] it was statistically significant ($p < .00001$) ($Z=5.4715$). **Conclusion:** We concluded that the epidemiological trends understood clinical spectrum and observe different outcome

KEYWORDS

Hippocrates, bacterial pneumonia, MRSA and Bronchopleural fistula

INTRODUCTION

Hippocrates in 600 B.C. defined empyema thoracis as a collection of pus in the pleural cavity and advocated open drainage as its treatment¹ Empyema thoracis, a common condition in childhood has significant morbidity and mortality. Empyema thoracis constitutes approximately 5-10% of cases seen by pediatrician in India² Acute respiratory infections are the most common illness of childhood accounting 50% of all illness in under-fives and 30% in the 5-12 years age groups, largely involving the upper respiratory. However, about 5% involve the lower respiratory tract resulting in serious diseases, especially the bacterial pneumonia.³

Empyema is accumulation of pus in pleural space. It is most often associated with pneumonia causes by streptococcus pneumoniae, although staphylococcus aureus is most common in developing nations and Asia, as well as in post-traumatic empyema. Over a decade, an increase in the incidence of empyema caused by MRSA has been noticed, with increased use of intrapleural streptokinase and higher no of surgical interventions.⁴

Common causative organisms of empyema are Streptococcus pneumoniae and Staphylococcus aureus, Escherichia coli, Haemophilus influenza and Klebsiella pneumonia, streptococcus pyogenes and uncommon causative organisms are Mycobacterium tuberculosis and cryptococcus neoformans. Immediately after infection proteinaceous fluid starts to fill the pleural cavity.⁵ The clinical manifestations of empyema are high grade fever with chills and rigors, cough, breathlessness, chest pain. Bronchopleural fistulas, pyopneumo thorax, purulent pericarditis, pulmonary abscess, osteomyelitis of ribs are the local complications of empyema. Non-invasive investigations to rule out empyema are X-ray chest, ultrasound chest, CT-chest, MRI, sonography and invasive procedures include thoracentesis, pleural biopsy, thoracoscopy. Pleural biopsy has great value in diagnosis of tuberculosis.⁵

The proper management of empyema thoracis in children continues to be a source of debate. It continues to have a high mortality rate 10-16%. Pleural effusion and empyema are known complications of bacterial pneumonia. Effusion occurs in at least 40% of bacterial pneumonia with up to 60% of effusions resulting in the formation of empyema in all age groups.⁶

Factors that predispose a patient to pulmonary infection and empyema are poor oral hygiene, periodontal disease, mental retardation, cardiac failure, sedative drug use, corticosteroid or immune suppressive therapy and aspiration syndromes.⁷

It occurs when the bacteria invade and propagate in the normally sterile pleural space. The American Thoracic Society has described 3 stages of empyema, namely exudative, fibrinopurulent and organized, more

or less based on the characteristics of the contents of the pleural cavity. Clinical features include fever with systemic toxicity and breathing difficulty. There is reduced movement of chest with respiration, dull percussion note, decreased air entry and reduced vocal resonance. X Ray film shows shift in the mediastinum with obliteration of costophrenic angle and varying degree of opacification. Pleural tap shows purulent material with leucocytes, high protein and low sugar. Antibiotics and tube thoracostomy is an effective method of treating pyogenic empyema thoracis in children in resource poor settings. Early initiation of management of ET with intercostal tube drainage is simple, safe effective even in complicated cases, and has less complication. In cases when chest tube drainage fails to satisfy, decortication with thoracotomy can be applied well with low mortality and morbidity rates. The American Thoracic Society has described three stages of empyema namely exudative, fibrinopurulent and organized. It is postulated that most appropriate therapy depends on stage of disease at presentation. In Management of empyema, there are two basic principles for management of empyema, one is to control the infection by choosing appropriate antibiotics, usual duration of antibiotic therapy is 3-6 weeks and other is to drain the accumulated pus from the pleural cavity.

AIMS AND OBJECTIVE

Specific Objectives

- To study epidemiological trends
- To understand clinical spectrum
- To observe different outcome

General Objectives

- Early diagnosis
- To differentiate it from other causes
- To reduce morbidity and mortality

MATERIALS AND METHODS

Study Site: Department of Malda Medical College and Hospital.

Study Population: Fifty (50) patients of Empyema thoracis, 2 months – 12 years either sex admitted during study period in Malda Medical College and Hospital.

Study Design: An observational study.

Period Of Study: 1 year January 2021 to July 2022

Selection Criteria

Inclusion Criteria

- Chest X-Ray suggestive of Empyema
- Confirmation after Diagnostic tap
- Parents/Attendants willing to provide written Informed Consent

Exclusion Criteria

- Expired within 24 hours of admission
- Conditions mimicking Empyema thoracis
- Empyema thoracis cases who went discharge against Medical Advice (LAMA).

RESULT AND DISCUSSION

The present study was an observational study. This Study was conducted from January 2021 to July 2022 at Malda Medical College and Hospital. 50 patients were included in this study.

Goyal V et al⁹ (2014) found that to evaluate the effectiveness of surgical intervention in managing empyema thoracis in children. The mean age of the study group was 5.44 years and 48.6% were male and 51.4% were female. The most common symptoms at admission were fever (90%), dyspnea (73%), cough (70%) and chest pain (23%).

In our study, out of 50 patients, most of the patients were <5 years of age [33 (66.0%)]. Rest of 17 (34.0%) patients were ≥5 years of age which was statistically significant ($p=.00138$). ($Z=3.2$). The mean Age of patients was $[4.5460\pm2.5748]$.

Kumar P et al¹² (2019) observed that Empyema thoracis is a common cause of hospitalization in children and its incidence is increasing worldwide. The median duration of hospital stay was 14 (11, 21) days which was prolonged in girl child ($p=0.01$), children from rural background ($p=0.04$), presented in emergency ($p=0.04$), required intensive care unit ($p=0.02$), chest tube insertion ($p=0.02$), positive bacterial culture ($p=0.05$) and with BPF ($p=0.006$).

Our study showed that, most of the patients were from rural area [48 (96.0%)] and it was statistically significant ($p<.00001$). ($Z=9.2$) and most of the patients were belong Middle Lower class [29 (58.0%)] but this was not statistically significant ($p=.1096$). ($Z=1.6$).

It was found that, most of the patients were Muslim [31 (62.0%)] which was statistically significant ($p=.0164$). ($Z=2.4$) and we also found that, more number of patients Left side were affected [30 (60.0%)] though it was statistically significant ($p=.0455$). ($Z=2$).

Angurana SK et al¹³ (2019) the purposes of this paper are to study clinicobacteriological profile, treatment modalities and outcome of pediatric empyema thoracis and to identify changes over a decade; Pleural fluid cultures were positive in 40% ($n=82$) cases from whom 87 isolates were obtained.

Goyal V et al⁹ (2014) found that to evaluate the effectiveness of surgical intervention in managing empyema thoracis in children. The most common symptoms at admission were fever (90%), dyspnea (73%), cough (70%) and chest pain (23%). Pleural fluid cultures were sterile in 60% of patients.

We observed that, higher number of patients had Creamy Hazy Plural Fluid [42 (84.0%)] and It was statistically significant ($p<.00001$). ($Z=7.8393$) and more number of patients had Polymorphs, Histiocytes [25 (50.0%)] it was statistically significant ($p<.00001$). ($Z=5.4715$).

Prasadh A et al¹¹ (2017) observed that empyema thoracis, an accumulation of pus in the pleural space is most often associated with pneumonia due to *Streptococcus pneumoniae*, although *Staphylococcus aureus* is most common in developing nations and in post-traumatic empyema. When the duration of illness is > 7 days prior to insertion of ICD tube chances are high that the empyema would have progressed beyond stage I and empyema is in stage II or III.

Sharma IK et al¹⁴ (2021) empyema thoracis in children continues to be a major problem with significant morbidity in developing countries despite recent advances in management. Pleural fluid culture was positive in 28.3%, with *Staphylococcus aureus* being the most common organism isolated. Intercostal drainage (ICD) tube was used in 93.3% of the patients and was successful in 80%. The average period of ICD tube placement was 9 ± 4.18 days while hospital stay was 21 ± 9.12 days.

We showed that, out of 50 patients only 1 patient had 2nd attempt of ICD which was statistically significant ($p<.00001$). ($Z=9.6$) and less number of patients had Streptokinase [15 (30.0%)] and it was also statistically significant ($p=.00006$). ($Z=4$).

Jha R et al¹⁵ (2022) observed that empyema thoracis is an accumulation of pus in the pleural space. The mortality rate in their study was 5.7% and the rest of the patients were successfully discharged and followed up. In our study, more number of patients were discharged [48 (96.0%)] and it was statistically significant ($p<.00001$). ($Z=9.2$).

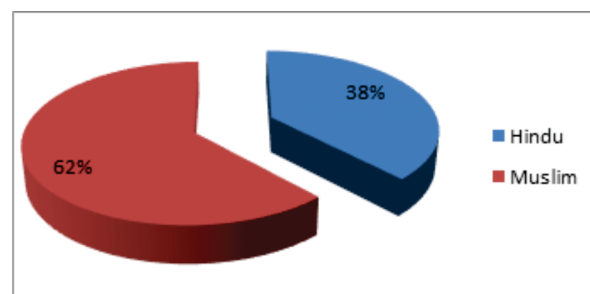
We found that, the mean Fever of patients was $[10.7800\pm3.7104]$, Cough and Cold $[7.6800\pm2.4448]$ and Resp Distress $[3.4200\pm1.6793]$. Ahmed AE et al⁸ (2010) observed that empyema thoracis is associated with high mortality ranging between 6% to 24%. A guideline statement on the management of PPE in children has been published by the BTS. It recommends the use of antibiotics in all patients with PPE in addition to either video-assisted thoracoscopic surgery (VATS) or tube thoracostomy and intrapleural fibrinolysis.

Ramireddy K et al¹⁰ (2016) pediatric empyema thoracis is a complication of bacterial pneumonia, prevalence of empyema is predominant inspite of advent newer antibiotics still resulting in significant morbidity and mortality which attributes to the poverty, ignorance, illiteracy, and poor compliance to therapy.

Our study showed that, the mean Weight (Kg) of patients was $[15.4800\pm5.5226]$, MUAC $[14.2800\pm1.3746]$, HB% $[9.8360\pm.9568]$, TLC $[20960.0000\pm6700.4721]$, Platelet Count $[2.1560\pm.9157]$, Cell Count/CUMM $[207079.2000\pm155063.1400]$, Protein (gm/dl) $[5.2020\pm1.1478]$, Sugar mg/dl $[4.9340\pm2.7934]$, ICD Duration $[10.1000\pm1.6933]$ and Antibiotics for Days $[13.5800\pm1.179]$

Table: Distribution of Religion

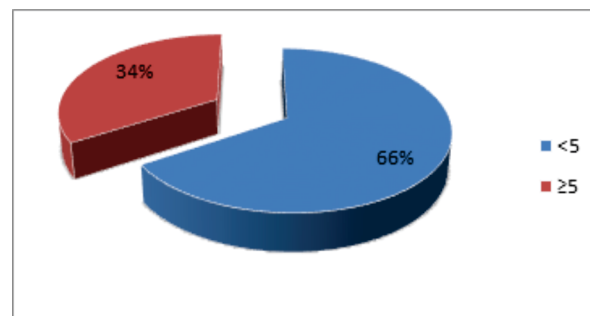
Religion	Frequency	Percent
Hindu	19	38.0%
Muslim	31	62.0%
Total	50	100.0%



In our study, 19 (38.0%) patients were Hindu and 31 (62.0%) patients were Muslim. The value of z is 2.4. The value of p is .0164. The result is significant at $p<.05$.

Table: Distribution of Age in years

Age in years	Frequency	Percent
<5	33	66.0%
≥5	17	34.0%
Total	50	100.0%



In our study, 33 (66.0%) patients were <5 years of age and 17 (34.0%) patients were ≥5 years of age.

The value of z is 3.2. The value of p is .00138. The result is significant at $p<.05$.

CONCLUSION

- In our study, out of 50 patients, most of the patients were <5 years of age. This was statistically significant. The mean Age of patients was $[4.5460\pm2.5748]$.
- We found that, boy population was higher than the girl population which was statistically significant. Boy: girl ratio was 2.12:1.
- Our study showed that, most of the patients were from rural area and it was statistically significant and most of the patients were

- belong Middle Lower class but this was not statistically significant.
- It was found that, most of the patients were Muslim which was statistically significant and we also found that, more number of patients Left side were affected though it was statistically significant.
 - We observed that, higher number of patients had Creamy Hazy Plural Fluid and it was statistically significant and more number of patients had Polymorphs, Histiocytes it was statistically significant.
 - We showed that, out of 50 patients only 1 patient had 2nd attempt of ICD which was statistically significant and less number of patients had Streptokinase and it was also statistically significant.
 - In our study, more number of patients were discharged and it was statistically significant.
 - We found that, the mean Fever of patients was $[10.7800 \pm 3.7104]$, Cough and Cold $[7.6800 \pm 2.4448]$ and Resp Distress $[3.4200 \pm 1.6793]$.

Our study showed that, the mean Weight (Kg) of patients was $[15.4800 \pm 5.5226]$, MUAC $[14.2800 \pm 1.3746]$, HB% $[9.8360 \pm 0.9568]$, TLC $[20960.0000 \pm 6700.4721]$, Platelet Count $[2.1560 \pm 0.9157]$, Cell Count/CUMM $[207079.2000 \pm 155063.1400]$, Protein (gm/dl) $[5.2020 \pm 1.1478]$, Sugar mg/dl $[4.9340 \pm 2.7934]$, ICD Duration $[10.1000 \pm 1.6933]$ and Antibiotics for Days $[13.5800 \pm 1.179]$

We concluded that the epidemiological trends understood clinical spectrum and observe different outcome.

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