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Risk Factors Associated with Empyema in Children Aged 6 Months to 12 Years: A Study from Western Gujarat

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Abstract: ***Background: Empyema thoracis is a major cause of morbidity in children. This study identifies risk factors associated with empyema in children aged 6 months to 12 years in Western Gujarat. Methods: A prospective observational study of 60 children diagnosed with empyema was conducted. Data included demographics, nutritional status, vaccination, anaemia, environmental exposures, and outcomes. Results: Malnutrition was seen in 81.7% of children, anaemia in 93.3% (moderate 43.3%, severe 21.7%). Most were un/partially vaccinated (71.7%). Irrational prior antibiotic use (28.7%) and maternal illiteracy were associated with longer hospital stay. Exposure to indoor air pollution (76.7%) was also significant. Children with malnutrition and delayed presentation had higher complication rates and prolonged stay. Conclusion: Malnutrition, incomplete vaccination, anaemia, indoor air pollution, and low maternal education are major risk factors for empyema. Strengthening immunization, improving nutrition, and early referral are crucial to reduce morbidity.***

Keywords: Paediatric Empyema, Malnutrition, Anaemia, Vaccination, Risk Factors

1. Introduction

Empyema thoracis, the accumulation of pus in the pleural space, remains a serious complication of bacterial pneumonia. Despite improved antibiotics and vaccines, it continues to be prevalent in India. Western Gujarat presents unique socioeconomic and environmental challenges influencing risk factors. This study aims to evaluate these risk factors in children aged 6 months to 12 years.

2. Materials and Methods

This prospective observational study was carried out at Shri M.P. Shah Medical College and G.G. Govt. Hospital, Jamnagar. A total of 60 children aged 6 months to 12 years with empyema were included. Exclusion criteria were congenital lung diseases, immunodeficiencies, and post-surgical empyema. Data on demographics, nutritional and vaccination status, anaemia, maternal education, indoor air pollution, prior antibiotic use, and clinical outcomes were collected. Statistical analysis was performed using chi-square tests, with $p<0.05$ considered significant.

3. Results

The following tables summarize the major findings from the study:

Table 1: Nutritional Status

Nutritional Status	Number (%)	Findings
Malnourished	49 (81.7%)	36.7% Grade III Empyema, 53.1% stay ≥21 days
Normal	11 (18.3%)	18.2% Grade III Empyema, 18.2% stay ≥21 days

Table 2: Anaemia Status

Anaemia Status	Number (%)
No Anaemia	4 (6.7%)
Mild Anaemia	17 (28.3%)
Moderate Anaemia	26 (43.3%)
Severe Anaemia	13 (21.7%)

Table 3: Vaccination Status

Vaccination Status	Number (%)
Fully Vaccinated	17 (28.3%)
Un/Partially Vaccinated	43 (71.7%)

Table 4: Maternal Education and Duration of Stay

Maternal Education	Number (%)	Children with ≥21 days stay
Illiterate	37 (61.7%)	18 (30.0%)
Primary	19 (31.7%)	8 (13.3%)
Upper Primary	4 (6.7%)	2 (3.3%)

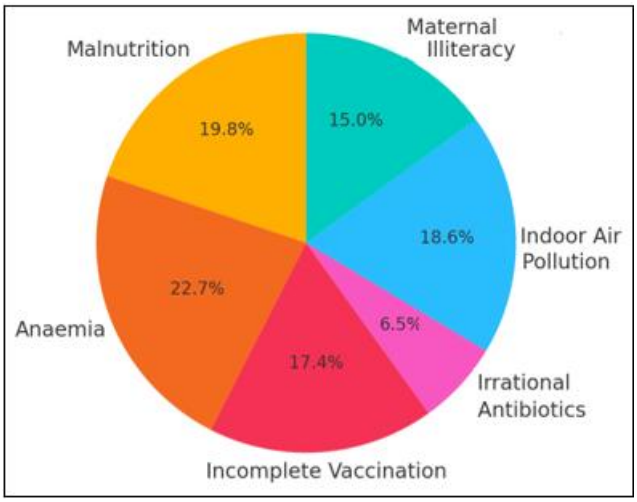

Figure 1: Risk Factors Associated with Empyema

4. Discussion

This study found that malnutrition, anaemia, incomplete vaccination, maternal illiteracy, and indoor air pollution were major risk factors for empyema. These findings align with previous Indian and global studies. Malnutrition compromises immunity and prolonged hospital stay, while vaccination gaps contribute to higher incidence. Maternal education and socioeconomic conditions strongly influence treatment-seeking behavior. Indoor air pollution from biomass fuels also emerged as a significant risk factor. Interventions should therefore focus on nutrition programs, universal immunization, maternal education, and early healthcare access.

5. Conclusion

Empyema in children is strongly associated with preventable risk factors such as malnutrition, anaemia, incomplete vaccination, low maternal education, and environmental exposures. Targeted preventive measures and timely referral can substantially reduce morbidity and improve outcomes.

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