Section: Pediatrics

Original Research Article

CLINICAL, RADIOLOGICAL AND BACTERIOLOGICAL STUDY OF SEVERE PNEUMONIA IN CHILDREN OF 1-MONTH TO 5-YEARS AT TERTIARY CARE HOSPITAL.

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ABSTRACT

Background: Respiratory tract infections are the most common human illnesses. They causes substantial morbidity and mortality in young children. Acute respiratory infection (ARI) is the major cause of death in children under 5 years in developing countries. **Aims & Objectives:** To study the clinical, radiological and bacteriological profile of severe pneumonia in children of 1 month to 5 years of age group; To study and identify the risk factors associated with severe pneumonia; To correlate clinical findings with radiological findings in the study sample.

Materials and Methods: This is a hospital-based prospective observational study conducted in king George hospital, Visakhapatnam over period of August 2021 to June 2022.100 Children with clinical manifestations of ARI were enrolled in the study.

Results: Fever (95%), fast breathing (95%), and cough (93%) are the most common presenting symptoms. Chest retractions (100%), tachypnea (95%), and crepitation's (85%) are the common presenting signs. Lack of exclusive breastfeeding for 6 months, inadequate immunisation, severe anaemia and severe malnutrition were reported to be the major risk factors for severe pneumonia. Radiological diagnosis of bronchopneumonia was made in 63% of cases; lobar pneumonia in 22% and pneumonia with its complications were seen in 5% of cases. Routine haematological investigations and blood cultures do not give much information about the etiology of pneumonia.

Conclusion: The study finally concluded that, among risk factors studied, lack of exclusive breast feeding for 6 months, inadequate immunisation, severe anaemia and severe malnutrition were reported to be the major risk factors for severe pneumonia. On investigations, most of them (66%) had neutrophilia, and 91% had elevated CRP. Routine haematological investigations and blood cultures do not give much information about the etiology of pneumonia.

Keywords: Breast Feeding, Severe Anaemia, Neutrophilia, Pneumonia.

INTRODUCTION

Respiratory tract infections are the most common human illnesses. They causes substantial morbidity and mortality in young children. Acute respiratory infection (ARI) is the major cause of death in children under 5 years in developing countries. An estimated 4 million people die due to pneumonia worldwide every year. Most of the ARI deaths in under five children are mainly due to acute lower respiratory tract infections (ALRTIs), Among which most common is pneumonia. Modernisation, industrialisation and urbanisation are currently facing

the problem of increasing ARI morbidity and mortality.[1-5]

A child's future health depends on the prevention, diagnosis, treatment, and management of ALRTIs. It is well-established that simple clinical signs such as rapid breathing and chest in drawing are useful in diagnosing pneumonia in children. The use of these clinical signs in the early detection and treatment of children with pneumonia by health professionals forms the basis of the World Health Organisations (WHO) case management strategy to control mortality and morbidity.[6-10]

Socio-environmental factors act as major barriers to ARI prevention. Primary measures to reduce deaths from pneumonia include promoting adequate nutrition, exclusive breast feeding for 6 months, reduction of indoor and outdoor air pollution, and immunization against measles and diptheria and pertussis can effectively reduce the deaths from ARI.

MATERIAL AND METHODS

This is a hospital-based prospective observational study conducted in king George hospital, Visakhapatnam over a period of 1 year from August 2021 to June 2022. 100 Children with clinical manifestations of ARI were enrolled in the study.

Inclusion Criteria

Children with clinical features of severe pneumonia (according to WHO ARI criteria) from the age of 1 month to 5 years.

- Informants accepting the terms of consent.

Exclusion Criteria

- Children with congenital anomalies of the heart and lungs.
- Anatomical defects like cleft lip and cleft palate.
- Children with immune deficiencies

Methodology

100 children in the age group of 1 month to 5 years who meet the inclusion criteria were enrolled in the study. The study was approved by the institutional ethics committee. Written informed consent was taken from parents/caregivers of the children. The-data was enrolled in a predesigned proforma. Details of the child's age, sex, socio-economic status, family size,h/o of exclusive breastfeeding, and immunisation status were noted. History of present illness like duration of fever, cough, coryza, expiratory distress, feeding difficulties etc, was recorded and anthropometry was taken. Detailed physical examination was done & the children were classified as having severe or very severe pneumonia according to WHO criteria. Investigations like hemogram, ESR, CRP, Chest X-ray, and blood culture were done for all cases.

Statistical Analysis

Data entry was done in Microsoft EXCEL and the final statistical analysis was done with the use of SPSS (Statistical Package for Social Sciences) software version21.0

RESULTS

For statistical significance, a P value less than 0.05 was considered significant.

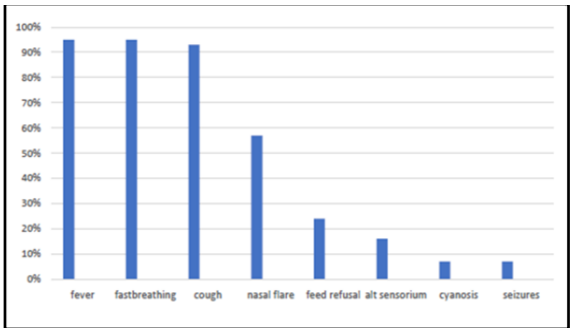

Figure 1: Clinical profile of pneumonia

Table 1: Clinical profile of pneumonia

SYMPTOMS	FREQUENCY	%
FEVER	95	95%
FAST BREATHING	95	95%
COUGH	93	93%
NASAL FLARE	57	57%
FEED REFUSAL	24	24%
ALT.SENSORIUM	16	16%
CYANOSIS	7	7%
SEIZURES	7	7%

Table 2: Showing various signs in penumonia

SIGNS	NUMBER	PERCENTAGE
Chest indrawing	100	100%
Tachypnea	95	95%
Crepitations	85	85%
Abnormal breath sounds	45	45%
Ronchi	40	40%
Wheeze	25	25%

Table 3: Exclusive breast feeding

EBF	SEVERE PNEUMONIA	VERY SEVERE PNEUMONIA
YES	74 (88.4%)	7(43.7%)
NO	10(11.9%)	9(56.2%)

P VALUE-0.0001 which is statistically significant.

Table 4: Immunization

IMMUNISATION	SEVERE TYPE OF PNEUMONIA	VERY SEVERE TYPE OF PNEUMONIA
COMPLETE	60(71.4%)	2(12.5%)
PARTIAL	16(19%)	13(81%)
UNIMMUNISED	8(9.5%)	1(6%)

Table 5: Overcrowding Vs Pneumonia

OVERCROWDING	SEVERE TYPE PNEUMONIA	VERY SEVERE TYPE OF PNEUMONIA
YES	50 (59.5%)	11(68.8%)
NO	34(40.4%)	5(31.2%)

Table 6: Anaemia in children with pneumonia

	Severe pneumonia	Very severe pneumonia
Mild anemia	19 (22.6%)	1 (6.2%)
Moderate anemia	55(65.4%)	12(75%)
Severe anemia	10 (11.9%)	3 (18.7%)

P VALUE ---0.291 which is not statistically significant.

All children admitted with pneumonia had anaemia (100%).

Table 7: Weight/Height

Weight/height	Severe disease	Very severe disease
Median	17 (20.2%)	1(6.25%)
-1to-2S.D	50 (59.5%)	3 (18.75%)
-2to-3S.D	15(17.85%)	3 (18.75%)
<-3 S.D.	2(2.3%)	9(56.25%)

Table 8: Leukocyte Count

LEUCOCYTE COUNT	SEVERE DISEASE	VERY SEVERE DISEASE
NEUTROPHILIA (66)	56(66.6%)	10(62.5%)
NEUTROPENIA (21)	17 (20.2%)	4(25%)
NORMAL (13)	11(13%))	2(12.5%)

Table 9: CRP and Severity

CRP	Severe pneumonia	Very severe pneumonia
Positive	75 (89.2%)	14 (87.5%)
Negative	9 (10.7%)	2 (12.5%)

Table 10: Radiological findings of pneumonia

NORMAL	15	15%
LOBAR PNEUMONIA	22	22%
BRONCHOPNEUMONIA	63	63%
PNEUMONIA AND ITS COMPLICATIONS	5	5%

DISCUSSION

Pneumonia is the leading cause of mortality among under-5children contributing to 15% of deaths all over the world. In developing countries, more than 95% of cases of pneumonia occurring in children below five years of age are mainly due to the high prevalence of under nutrition, under coverage of immunization, lack of breast feeding etc.

WHO data indicates that acute respiratory infections are the second most common cause (most common being acute diarrhoea disease) of disability adjusted life years lost around the world. WHO ARI control programme reduced the mortality due to respiratory illness from 1.7 million deaths in 2015 to 0.9 million deaths in 2019.[11-13]

In this study, the most common symptoms with which children presented were fever (95%)and fast breathing (95%) followed by cough (93%) and feed refusal (24%) was noted. Chest in drawing was present in100%of cases.

Tachypnoea has been approved to be a sensitive and specific indicator of the presence of pneumonia. Also, the traditional, method of making a clinical diagnosis of pneumonia has been recognition by the auscultatory signs, particularly crepitations.[14-17]

In the present study, tachypnea (95%) and chest retractions (100%) were the important signs for making a clinical diagnosis of Severe pneumonia. Crepitations (85%), ronchi (40%) and abnormal breath sounds (45%)were the other signs.

As auscultatory signs are subjective and may be missed on routine examination, Simple clinical signs, such as tachypnea and chest retractions can be used by healthcare workers for early identification of severe disease and timely referral to health care centers.[18-20]

In this study, risk factors for severe and very severe pneumonia were studied. It was shown that inadequate immunization for age, lack of exclusive breastfeeding for 6 months, presence of anemia and presence of protein energy malnutrition were significant risk factors for severe pneumonia.

In the present study, out of 16 cases of very severe pneumonia, 43.7% (7 cases) were exclusively breastfed and the remaining 56.2% (9 cases) were not exclusively breastfed. This was statistically significant with P-value of 0.0001. There is a significant association between the lack of exclusive breast feeding and the risk of very severe pneumonia.[19]

In this study out of 16 cases of very severe Pnemonia, 81%(13) were partially immunized, 12.5% (2) were fully immunized, and 6%(1) are not immunized. P value—0.00001 which is statistically significant.

There is a significant association between lack of immunization and very severe pneumonia. children who are fully immunized are less likely to get the very severe disease compared to children who are unimmunized or partially immunized.

Of the 84 severe pneumonia cases in this study, 59.5% (50cases) had overcrowding and 68.8% (11 cases) of very severe pneumonia had overcrowding. The current study found overcrowding as a risk factor for severe pneumonia but not found any statistically significant correlation (Pvalue-0.488).

In the present study, out of 84 cases of severe pneumonia,22.6% (19) had mild anemia, 65.4% (55) had moderate anemia and 11.9% (10) had severe anemia.

Out of 16 cases of very severe pneumonia, 6.2% (1) had mild anemia, 75% (12) had moderate anemia, and 18.7% (3) had severe anemia. But there is no statistically significant correlation between anemia and the severity of pneumonia in the present study with P-value of 0.[29]

In the current study, out of 84 cases of severe pneumonia, 17(20.2%) had median weight for height, 59.5% (50) had mild wasting, 17.85% (15) had moderate wasting and 2.3% (2) had severe wasting.In 16 cases of very severe pneumonia ,6.25%(1) had normal weight for height, 18.75% (3) had mild wasting,18.75% had moderate wasting and 56.25%(9)had severe wasting. Routine investigations like white blood cell count (WBC), and differential count (DC) help differentiate bacterial from viral pneumonia.

In this study, out of 84 children with severe disease, 66.6% (56cases) had neutrophilia, 20.2% (17 cases) had neutropenia and13 %(11 cases) had normal neutrophil count. Out of16 cases of very severe pneumonia, 62.5% (10 cases) had neutrophilia, 25% (4 cases) had neutropenia and 12.5% (2 cases) had normal neutrophil count. It is observed that while most of the severe and very severe pneumonia children had neutrophilia but some had neutropenia.

In the present study, among 84 severe pneumonia cases, 89.2% (75) had positive CRP values and the remaining 10.7%9(9) had negative CRP values.

Among 16 cases of very severe pneumonia, 87.5% (14) had positive CRP and the remaining 12.5% (2) had negative CRP value. P value is 0.83 which is not statistically significant. The reason could be the small sample size and the presence of more viral pneumonias.

The etiology of bacterial pneumonia in children is best obtained through blood cultures, however, the sensitivity of this method is some what lower. In the present study, we did not find any positive blood cultures, one of the reasons could be the early administration of antibiotics.

Although clinical symptoms and signs are helpful indicators of the presence of disease as well as etiology, the radiological investigation is often used to confirm a clinical diagnosis and to help sort out whether or not antibiotics or a more extensive workups necessary.[10,11]

In the present study, out of 100 cases, the most common radiologic finding is bronchopneumonia (63%), next being lobar-pneumonia (22%), mainly involving the right upper lobe. 15%had normal chest X-ray. Pneumonia with its complications (pleural

effusion, empyema, and pneumothorax) is seen in 5%of cases.

CONCLUSION

In the present study concluded that, The risk of severe pneumonia is higher in children who were neither immunised nor partially immunized for their age. In this study,81% were exclusively breastfed, 19% were not exclusively breastfed, and the disease severity is more in children who were not exclusively breast fed. Among risk factors studied, lack of exclusive breast feeding for 6 months, inadequate immunization, severe anaemia and severe malnutrition were reported to be the major risk factors for severe pneumonia. On investigations, most of them (66%) had neutrophilia, and 91% had elevated CRP. Routine haematological investigations and blood cultures do not give much information about the etiology of pneumonia.

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REFERENCES

1. ParkK.Acuter espiratory infections. In: Park's text book of preventive and social medicine, 20thed.Jabalapur:M/s Banarasidas Bhanot publishers;2009. P.151-9.
2. World Health Organization programme for the control of acute respiratory infections. Acute Respiratory Infections in children:Case Management in small hospitals in developing countries.A manual for doctors and other senior health workers, Geneva: WHO; 2004.
3. World Health Organization programme for the control of acute Respiratory infections. Technical bases for the WHO recommendations on the management of pneumonia in children at first-level health facilities. Geneva:WHO;1995.
4. JadavjiT,LawB,LebelMH,KennedyWA,GoldR,WangEEL.Practicalguidefor diagnosis and of pediatric pnuemonia. CanMedAssocJ 1997; 156(Suppl):S703-11.
5. KabraSK,VermaIC.Acute lower respiratory tract infection;The forgotten pandemic.1999; 66:873-5.
6. David M.leRoux&Heather. Community-acquired pneumonia in children —a changing spectrum of diseaseJ.Zar, PediatrRadiol(2017)47:1392–1398
7. Ki WookYun ,MD,Ph Detal. Community-Acquired Pneumoniain Children:Myths and Facts. American Journalof Perinatology2019;36(supplS2):S54–S57.
8. Pediatr Infect Dis J. 2021 Jan;40(1):32-38. Diagnosis of Community-acquired Pneumonia in Hospitalized Children: A Multicenter Experience in BoliviaBannister LH, Berry MM, CollinsP, DysonM,DussekJE, FergusonMWJeditors:Gray'sAnatomy38thed.USA:ChurchillLivingstone;1995,p1653-62.
9. Balachandran A, Somu N, Gowrishankar NC, Vijayshekharan D,SubramanyamL:Pneumonia in children.In:Essential of paediatricpulmonology.Chennai:Pediatric pulmonology foundation of India;2008p149-77.
10. Mishra S, Kumar H, Anand VK, Patwari AK, Sharma D. ARI control programme: result in hospitalized children. JTropPediatr1993; 39:288-92.
11. Gupta D, MishraS, Chaturvedi P.Fast breathing in the diagnosis of pneumonia-areassessment.1996;42:196-9J Tropical disease
12. Drummond P, Clark J, Wheeler J, Galloway A, Freeman R, CantA. Community-acquired pneumonia-aprospectiveUKstudy.ArchDisChild2000; 83:408-12.
13. Hamid M,Qazi SA, Khan MA. Clinical, nutritional and radiological features of pneumonia. JPak MedAssoc 1996; 46: 95-
14. Heaton P, Arthu rK. The utility of chest radiography in the follow-up of pneumonia. NZMedJ1998; 111:315-7.
15. Zukin DD, HoffmanJR,ClevelandRH,KushnerDC,HermanTE. Correlation of pulmonary signs and symptoms with chest radiographs in the pediatric age group. Annals of Emergency Medicine 1986; 15:792-6.
16. World Health Organization programme for the control of acute respiratory infections. Acute Respiratory Infections in children: Case Management in small hospitals in developing countries. A manual for doctors and other seniorhealth workers, Geneva: WHO; 2004.
17. World Health Organization programme for the control of acute Respiratory infections. Technical bases for the WHO recommendations on the management of pneumonia in children at first level health facilities. Geneva: WHO; 1995.
18. KirkwoodBR,GoveS, RogersS,Lob LevytJ, ArthurP,CampbellH.Potential interventions for the prevention of childhood pneumoniainDeveloping countries: asystematic review. Bulletin WHO1995; 73:793-8.
19. Correa A Gand Strake JR. Bacterialpneumonia. Disorderofthe respiratorytractinchildren.6thed.Philadelphia:W.B.Saunders; 1998:p485-02.