

A Hospital Based Study to Evaluate the Pattern of Lower Respiratory Tract Infections in Children Below 12 Years of Age: An Observational Study

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Conflict of interest: Nil

Abstract

Aim: This study was conducted to know the incidence of different types of LRTIs and the common causative organisms.

Methods: Routine investigations were carried out on 305 hospitalized children over 12 months and with special investigations like X-ray chest, USG chest, blood culture, pleural fluid analysis, tuberculin skin test, and CBNAAT for tuberculosis.

Results: A total of 198 cases were selected for this study. The minimum hospital stay was 3 days, and the maximum was 21 days. The incidence of LRTI in children was maximum (51.0%) in 1 – 4 years age and Protein-energy malnutrition (PEM) was detected in 75.5% children. Mantoux test was positive in 20.7%.

Conclusion: Maximum incidence of LRTIs were detected between the age group of 1 – 4 years, malnutrition was an associated factor.

Keywords: Mantoux test, LRTI, PEM

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Introduction

Acute lower respiratory tract infection is the leading cause of mortality and one of the common causes of morbidity in children under-five years of age. Respiratory infections are heterogeneous and complex group of diseases caused by wide range of pathogens-virus, bacteria or fungi. Lower respiratory tract includes the trachea, bronchi, bronchioles and alveoli.

Pneumonia killed 9,20,136 children under 5 in 2015, accounting for 16% of all deaths of children under 5-year old.[1] WHO estimated the burden of RTIs in 2010, estimates four and half million deaths due to RTIs among children every year. In India, 1.2million deaths have reported among children due to RTI among 5.9 million deaths globally. [2]

Among under-fives, ARI cause specific mortality in 20-25%. On this basis, one million deaths among under-fives in our Country are due to ARI and most of these occur in infants [3]. Cause specific mortality due to ARI is 10 to 50 times higher in developing countries than developed countries [4]. In our country, 14.3% of deaths during infancy and 15.9% of deaths between 1-5 years of age are due to ARI [5]. In India, pneumonias are estimated to be responsible for 75% of ARI deaths. [5]

LRTI is not a single disease entity, but a group of infections with different etiology, risk factors, pathogenesis, clinical presentations, and outcomes. The etiology, epidemiology, and symptomatology vary with age, gender, risk factors, season, place, and type of population. These LRTI are affected by socio-demographic and Socio-cultural factors, which are modifiable by simple interventional measures. [6]

In pediatric patients, respiratory infections can be life threatening if not treated. The incidence of acute respiratory infection is high in developing countries than in developed countries. [7] The higher incidence is attributed crowding, HIV burden, low birth weight and the lack of pneumococcal and measles immunization. [8, 9, 10, 11] Also zinc and vitamin A deficiency, poor maternal education, and living in polluted areas are the other contributing factors. Though etiology is often undetermined in a clinical situation, the most common agents causing pneumonia in children are *Streptococcus pneumoniae*, *Haemophilus influenzae* and to some extent *Staphylococcus aureus*. Bronchiolitis is also a leading cause of mortality in children. RSV is implicated in most of the cases. The other viruses include parainfluenza virus 1, 2 and 3, adenovirus and influenza virus.

Respiratory infections are major concern in children and adolescents. Frequent chest

infections are not only economic burden to parents, it also adds to missing school days. This study was conducted to know the incidence of different types of LRTIs and the common causative organisms.

Materials and Methods:

Study was conducted in Darbhanga Medical College & Hospital, Darbhanga, Bihar, India. For 1 year.

Inclusion criteria:

Children admitted with the symptoms of fever, cough, breathlessness, wheeze, stridor, chest pain were included.

Exclusion criteria:

Neonates less than 1 month of age, those who were not submitted informed written consent were excluded.

Methodology:

History and clinical examination on the admission of each child was recorded. In history, symptoms like cough, breathlessness, fever and pain in the chest, history of repeated RTIs, history of skin infection, or any infective lesions over the body asked. Past and family history carefully recorded with more emphasis on the history of contact with tuberculosis. History of immunization regarding

BCG, polio, pentavalent, and measles/MR, special vaccines recorded. A thorough clinical examination of the systems was carried with more emphasis on the respiratory system. Signs like cyanosis, clubbing, lymphadenopathy, pallor, and any infective foci over the body made the appearance of new signs and symptoms carefully recorded.

Routine investigations such as Hb%, total, differential leukocyte count and ESR were carried out in the laboratory immediately after an admission. Special investigations like lumbar puncture and ECG done wherever necessary, x-ray chest done in all the 100 cases after admission. Chest X ray

was repeated in some of the cases after clinical deterioration and compared with an X ray was taken at admission, Mantoux (TST) was done to all. Throat swab, sputum (if productive) for acid-fast bacilli (AFB), culture sensitivity and gram stain were done. In non-productive cough and in infants who do not bring out the sputum gastric aspiration was done and stained for AFB and sent for CBNAAT.

Results:

The incidence of LRTI in children was maximum (51.0%) between 1 – 4 years. Followed by <1 year (21.1%), 5 – 8 years (15.6%) and 9 – 12 years (12.1%) (Table 1)

Gender wise, 56.5% were male members and the male female ratio was 1.3. (Table 2)

Grade wise, PEM I was maximum (43.9%) followed by PEM II (15.6%), PEM III (10.1%) and PEM IV (5.5%) (Table 3). Out of a total of 198 cases, 20.7% positive Mantoux test. In these, 27 had immunized with BCG vaccination during infancy (Table 4).

Out of 20 cases of straw-colored fluid, 4 cases yielded growth, and others are sterile. Out of four cultures, positives organisms grown are 1 case was *Klebsiella pneumoniae*, and 3 case of streptococci.

Klebsiella species, *Staphylococcus aureus* was isolated in 8 each members respectively, *Streptococcus* in 5 and Coagulase negative staphylococcus in all isolations.

Table 1: Age wise distribution of the study members.

Age in years	Number	Percentage
<1	42	21.1
1 – 4	101	51.0
5 – 8	31	15.6
9 – 12	24	12.1
Total	198	100

Table 2: Gender wise distribution of study members.

Gender	Number	Percentage
Female	86	43.4
Male	112	56.5
Total	198	100

Table 3: Association of Protein-energy malnutrition (PEM) in the study team.

Grading of PEM	Number	Percentage
Normal	49	21.2
PEM-I	87	43.9
PEM-II	31	15.6
PEM-III	20	10.1

PEM-IV	11	5.5
Total	198	100

Table 4: TST/Mantoux test results in the study members

Result	Number	Percentage
Positive	41	20.7
Negative	157	79.2

Discussion:

Childhood respiratory infections are of major concern in developing countries. The incidence of respiratory infection in our study was 17.5%. Another study done by Paramesh et al reported 12.85% incidence in their study. [12] Various factors contribute to incidence like age group selection for a study, seasonal variation and presence of risk factors in a community. There was slight male predominance observed in our study. The study done by Udaya et al which includes children less than 18 years also showed male predominance. [13] Other study done by Savitha et al, Yosif et al, and Broor et al also showed male predominance in their study. The higher incidence in boys is probably attributed to early seeking of medical advice. [14, 15, 16]

Children admitted with respiratory symptoms, and definite clinical signs included in this study, in this study, total 12.1% of the admitted patients had LRTIs. Munagala VK et al. reported that LRTI disorders in children accounted for 9.76% of the total of 375 children enrolled [16]. Bikash Gairola et al. reported that LRTI disorders in children accounted for 11.16%, and URTI accounted for 88.84% of total ARI [17] and it was reported to be 27% by Sharma D, Kuppaswamy K [18]. The incidence appears to be high in our study. When compared with other studies. Probably because of the criteria for selection of cases, definitive clinical signs on examination.

The most common age group in this study was 6 months to 2 years followed by 2 to 5 year. Whereas China AS et al reported 2 months to 1 year as common age group in their study. [19] Similarly Varhanophas et al reported 1 to 5 year as most common age group in their study. [20] The most common presenting symptom varied with different age group, below 6 months infants mostly presented with hurried breathing followed by not feeding well and fever. However, in the age group between 6 months and 2-year, fever, hurried breathing and cough was observed and between 2 year and 5 years, fever and cough were predominant. This is comparable with other studies where Kabra et al, Kumar et al showed cough and fever as predominant symptom. [21, 22] Other study done in Nepal by Rijal P et al reported fever and cough as predominant symptom. [23] In the present study, a higher incidence of LRTIs were found in the age group 1 – 4 years, while broncho pneumonia less than 2 years of age.

Around 50 – 60% of children are malnourished by the age of 2 years (National Family Health Survey). Malnutrition was mentioned to be 54.3% by Yellanthoor et al study [24]. In this study, nutrition played a significant role as predisposing factor for RTIs as 75.5% of children undernourished. Grade-I observed in 43.9%, Grade-II in 15.6%, and 10.1% of children had grade-III and 5.5% had grade IV protein-energy malnutrition.

A recent study conducted in India reported that 64.5% children were anemic; this was 62% in this study [25]. Ramakrishnan et al. found 74% of the cases anemic, while only 33% of the controls were anemic, which included children from 9 months to 16 years was showing maximum incidence in the children below six years [26,27]. No significant drug resistance was reported in this study, However similar findings were available in the literature.

Conclusion:

Maximum incidence of LRTIs were detected between the age group of 1 – 4 years, malnutrition was an associated factor.

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