



RESEARCH ARTICLE

CLINICO-SOCIODEMOGRAPHIC PROFILE OF CHILDREN AGED 1-59 MONTH ADMITTED WITH PNEUMONIA IN A TERTIARY CARE HOSPITAL (A PROSPECTIVE COHORT STUDY)

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ARTICLE INFO

Article History:

Received 10th April, 2021

Received in revised form

06th May, 2021

Accepted 17th June, 2021

Published online 30th July, 2021

Keywords:

Pneumonia, ARI

ABSTRACT

Pneumonia is the major cause of morbidity and mortality among young children. Globally, there are over 1,400 cases of pneumonia per 100,000 children, or 1 case per 71 children every year and is responsible for the lives of over 800,000 children under five every year, including over 153,000 newborns. **Objective:** To identify sociodemographic factors and clinical characteristics of pneumonia in children between 1 month to five years of age. **Materials & Methods:** Hospital based prospective cohort study conducted at tertiary teaching institution in North India. The study period was one year i.e. from September 2019 through August 2020. **Results:** 70 cases (87.1%) were less than 1 year old and was female predominance (61.5%). 72.1% of babies who were less than 2 years old was not exclusively breastfed. Most common symptom was cough (94.3%) followed by fever in 87.1%. History of exposure to smoke was present in 50% of cases. The present study has identified various sociodemographic, nutritional and environmental risk factors for pneumonia which can be reduced by effective education of the community and through appropriate public health measures.

INTRODUCTION

Globally every year around 10.5 million children die before reaching their fifth birthday, approximately 30,000 children dying every day and most of these deaths occur in the developing and underdeveloped countries(1). The five most important causes of under five mortality are ARI (19% of total deaths in under fives), diarrhea (17%), malaria (8%), measles (4%), HIV/AIDS (3%), neonatal conditions (37%) and injuries (3%) (2). Pneumonia is the most serious outcome of acute respiratory infection (ARI) and kills more children than any other infectious disease, claiming the lives of over 800,000 children under five every year, or around 2,200 every day. This includes over 153,000 newborns. Globally, there are over 1,400 cases of pneumonia per 100,000 children, or 1 case per 71 children every year, with the greatest incidence occurring in South Asia (2,500 cases per 100,000 children) and West and Central Africa (1,620 cases per 100,000 children). (3) Despite being the cause of significant morbidity and mortality, Pneumonia is often misdiagnosed, mistreated, and underestimated. The international consultation on control of ARI, December 1991 reported that there are links between environmental factors (such as indoor air pollution, passive smoking, overcrowding) and risk factors in the child (such as LBW, malnutrition, measles, breast feeding, vitamin A deficiency) with ARI.

Poverty (low socio-economic status), poor immunization status, indoor air pollution, overcrowding, malnutrition/ poor nutritional practices, low birth weight, non-exclusive breastfeeding, parental smoking, zinc deficiency, lack of education in the mother, vitamin A deficiency, birth order and outdoor air pollution are the major risk factors for child pneumonia in developing countries (4-9), however majority of these risk factors are amenable to corrective measures(10). Therefore knowledge of these risk factors related to acquisition of ARI will be helpful in prevention through various measures at community level contributing to better growth and development in childhood.

Aim: The aim was to study the sociodemographic determinants, clinical profile, risk factors of pneumonia and to determine the bacterial etiology of pneumonia in children.

METHODS AND MATERIALS

Study Area and Period: The hospital based prospective cohort study was conducted in IGMC Shimla, a tertiary care hospital of northern India for a period of one year i.e. from September 2019 through August 2020.

Source and Study Population: All the children of age between 1 month to 5 years who were confirmed case of pneumonia, were enrolled for the study after approval from IEC with verbal consent of the child's mother /caretaker was obtained.

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Inclusion and Exclusion Criteria

Inclusion criteria

-) Children aged 1-59 months admitted with pneumonia.
-) Qualifying case definition as per the study criteria (WHO classification).
-) Presence of reported fever or documented fever (temperature $>38.0^{\circ}\text{C}$ or $>100.4^{\circ}\text{F}$).
-) Parents willing to give consent.

Exclusion criteria

-) Known asthmatics or those who present with recurrent reactive airway disease.
-) Patient with known underlying chronic diseases (e.g., congenital heart diseases, immunodeficiency disorders, sickle cell anemia etc.)
-) Children who are admitted with some other disease but develop pneumonia during the hospital stay.
-) Children whose parents refuse to participate in the study.

METHODOLOGY

After enrollment complete demographic data regarding age, sex and weight was obtained. A detailed history of relevant symptoms was taken. History of immunization, breast feeding and weaning was elicited from parents/ informant and verified by checking the records wherever available. History of respiratory infections in the family members in the preceding 2 weeks, history of smoking by family members and details of cooking fuel used was recorded. A detailed examination in each child was done. Respiratory rate was measured for one minute when the child was quiet by looking at the abdominal movement or lower chest wall. Height and weight were recorded. Data thus collected was recorded in a pretested and prestructured proforma designed for the study.

Statistical analysis: All the data collected using study tool was entered in Microsoft excel sheet. Categorical variables were expressed as percentages and continuous variables were expressed as mean \pm SD. Statistical analysis were performed using Epi-Info statistical software by applying relevant statistical test. P value of <0.05 was taken as significant.

RESULTS

Socio demographic characteristics of the cases: Total of 70 children and mothers/care givers pair were included in the study. Of the 70 cases enrolled 43 (61.5%) were females and 61 (87.1%) were of age less than 1 year. 58 (82.9%) cases were having normal birth weight. (Table 1)

Table 1. Sociodemographic characteristics of enrolled cases

Variable		Number (n=70)	Percentage
SEX	Male	27	38.5
	Female	43	61.5
AGE GROUP	< 1 YEAR	61	87.1
	25-36 MONTHS	2	2.9
	37-48 MONTHS	7	10
BIRTH WEIGHT	>2.5Kg	58	82.9
	<2.5Kg	12	17.1

Environmental Characteristics of the cases: Among the total 70 cases, 26 (37.1%) were exposed to respiratory infection at home with history of ill sibling at home. Respondent of 26 (37.1%) cases gave history of antibiotic use at home before admission. 35 (50%) cases were having exposure to smoke in any form and out of them 25 (35.71%) were exposed to smoke due to biomass fuel used for cooking at home and rest 10 (14.2%) were exposed to smoking in family (Table 2)

Table 2. Environmental characteristics of enrolled cases

	PRESENT	%
ILL SIBLINGS AT HOME	26	37.1
ANTIBIOTIC USE BEFORE ADMISSION	26	37.1
TOBACCO SMOKE EXPOSURE	10	14.2
CHULLHA SMOKE	25	35.71

Symptoms: The most common symptom in the studied population was cough present in 66 (94.3%) of children, followed by fever in 61 (87.1%) of the subjects. Fast breathing and inability to drink was reported in 51 (72.9%) and 41 (58.6%) children respectively. Only 4 (5.7%) had abnormal body movement at presentation along with fever and fast breathing (Table 3)

Table 3. Symptoms present in the study subjects

SYMPTOMS	PRESENT	%
Cough	66	94.3
Fever	61	87.1
Fast Breathing	51	72.9
Inability To Drink	41	58.6
Lethargy	39	55.7
Noisy Breathing	31	44.3
Persistent Vomiting	7	10
Abnormal Body Movements	4	5.7

Isolation of pathogens: After initial stabilization, all the subjects underwent phlebotomy for haematological evaluation and blood culture as per the standard protocol before initiation of antibiotics. Of total 70 patient, Non albicans candida was the most common isolated organism in blood culture in 4 (5.7%) infants (two age less than 2.5 months and one each of 7 months and 48 months of age). Staph aureus was isolated in 3 (4.2%) aged between 2-12 months and NLF in 2 (2.9%) subjects who were 11 month and 42 month. Klebsiella was isolated in 2 (2.9%) subjects who were 32 month and 48 month.

DISCUSSION

Age is an important predictor of morbidity and mortality in these patient suffering from pneumonia in the paediatric age group. In the present study, majority of enrolled patient were less than 1 year (87.1%), which is in agreement with retrospective study done by Reddaiah VP et al (10) (63.2%) and another study by Sehgal V et al (11) (52.2%). Higher prevalence of pneumonia in our study can be attributed to the fact that we enrolled children of age group from 1 month to 5 years while Reddaiah VP and Sehgal V enrolled subjects of age between 0-5 years and 2 weeks to 5 years respectively. Of the total study subject, 61.5% were females and remaining 38.5% were males. Female:male ratio of 1.59:1. Which is in disagreement with study done by Sehgal V et al where male was the predominant sex. Divyarani D C et al., (12) in a similar study in children between age 0-5 years, observed 62.6% were males and 37.4% were females (ratio 1.67:1).

Table 4. Organisms isolated on blood culture in study subjects

Blood Culture organism found	AGE			Total
	1-2 months	2-12 months	1-5 years	
NON ALBICANS CANDIDA	0	4 (100%)	0	4(100%)
STAPH AUREUS	0	3 (100%)	0	3 (100%)
KLEBSIELLA PNEUMONIA	0	0	2(100%)	2(100%)
NON LACTOSE FERMENTOR ORGANISM	0	1 (50%)	1 (50%)	2(100%)
CONTAMINANTS	0	3(100%)	0	3(100%)
NO GROWTH	14 (25%)	36 (64.28%)	6 (10.71%)	56 (100%)

In our study, 12 (17.1%) of cases were Low Birth Weight (LBW) at birth, whereas 58 (82.95%) infants were weighing more than 2500 gram at birth which is in contrast to very higher rate of LBW developing pneumonia. Divyarani DC et al., (12) in a similar study, reported 84% of cases were LBW at birth in their study. Which could be possibly due to the age distribution of study subjects which was 1 month to 5 years in our study, whereas in the study of Divyarani DC et al., the age group of the studied subjects from was birth to 60 months (12). In our study, cough, fever, and fast breathing were present in 66 (94.3%), 61 (87.1%) and 51 (72.9%) respectively, inability to take food or refusal to food was seen in 41 (58.6%) cases. Yaguo Ide LE et al., (13) reported cough in 75.9%, fever in 70.7%, fast breathing in 53%, respiratory distress in 83.6% of pneumonia cases which is almost similar to our study. Ahmad Al Najjar S et al., (14) reported fever in 87.4%, tachypnea in 73.5% and cough in 98% cases of pneumonia which is also similar to our observations. In the present study, blood culture was positive in 11(15.7%) specimen, Non albicans candida was grown in 4 (5.7%), Klebsiella pneumoniae in 2 (1.4%) cases, Staphylococcus aureus in 3 and NLF were isolated in 2 (2.9%) cases. Mudhusudhan K et al., (15) in their study, observed blood culture positive in 23.63% cases with predominance of Staphylococcus aureus. Banstola A et al., (16) in their descriptive study found Streptococcus pneumoniae in 15.8% cases, Haemophilus influenzae type b (Hib) in 9.2%, Respiratory Syncytial Virus (RSV) in 12.6%, Influenzae A in 7.5%, Parainfluenzae type 3 in 4.0% and Influenzae B in 3.5% which is higher than our study. Viral isolation method could not be adopted in our setting because of lack of PCR facility as well as inaffordability of most of the parents.

In our study, 35 (50%) of cases had history of exposure to firewood cooking. In a study by Champatiray J et al, 31 (21.98%) cases were exposed to firewood cooking and 14 (9.92%) were exposed to passive smoking, but in 68.08% of studied subjects there was no exposure to smoking (17). In a study by Hemagiri et al, 87 (32.2%) of cases had history of exposure of parental smoking (18). Majority of parents provided history of smoking which do have direct impact on childhood clinical pneumonia in the community in developing country (19). In our study, 26 (37.1%) of cases had ill siblings at home (<2 week) while in a study by Hemagiri among 270 cases, 39 (14.4%) were exposed to respiratory infection in family members within in the past 2 weeks (18).

Conclusion and Recommendations

The present study identifies use of biomass as fuel for cooking, presence of tobacco smoke, prelacteal feeding and lack of exclusive breast feeding for 4-6 months as risk factors for pneumonia in under five children. We recommend the following instructions for the prevention of pneumonia in children.

Infant at age group 2-12 month to receive appropriate care and intervention (exclusive breast feed and vaccination)

- J) Parents should also be educated about the ill effects of smoking and biomass fuel as it is a well known and important risk factor for pneumonia through alteration of host defence host system mechanism.
- J) Educating parents regarding harmful effects of biomass fuel and better and safe alternative i.e. LPG which is being distributed by Government of India under Ujjwala Yojna at free of cost to BPL families.
- J) Co-residency with ill sibling and history of antibiotic use. These determinants are preventable with no or minimal cost. Therefore, we recommend appropriate and adequate health education regarding pneumonia prevention and control.

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