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Original Research Article

The Clinical Profile of Severe Pneumonia and Study if the Role of Risk Factors Associated with Severe Pneumonia in Children Aged between 6 months to 5 Years

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Abstract: In this study 300 cases and 300 controls participated. Among cases 60% (180) were male children and 40% were female children. This was descriptive observational study among controls 59% (177) were males and 41% (123) were females. Children with community acquired pneumonia, between the age groups of 6months to 5years admitted in the hospital were evaluate and treated. Effect of Sociodemographic, nutritional, immunization, environmental factors in the aetiology of pneumonia was evaluated. There was a significant association between immunization and risk of severe pneumonia. There was a significant association between education of parents and risk of severe Pneumonia.A statistically significant association was found between social class and severe pneumonia. A statistically significant association between type of house and severe pneumonia. Overcrowding increases risk of severe pneumonia. There was a significant association between exposure to indoor pollution and severe pneumonia. Parental smoking is significant in causing severe pneumonia. The association was found to be significant and cases having history of low birth weight has higher risk of pneumonia. Children who are given pre lacteal feeds have higher risk of developing pneumonia. There was a statistically significant association between duration of exclusive breast feeds and risk of severe pneumonia. There was a significant association between malnutrition and severe pneumonia.
Keywords: Sever pneumonia, socio demographic factors

INTRODUCTON

Pneumonia has been identified as major forgotten killer of children by UNICEF and WHO.WHO defines pneumonia as an acute disease episode with cough combined with fast breathing with age specific cut off values for increased respiratory rate. It is estimated that approximately 2 million children die each year due to pneumonia in developing countries [1]. Pneumonia alongwithdiarrhea is leading causes of death in India. Respiratory complaints make up the single largest group of disorders about which families seek medical attention and also account for 30 percent of acute medical pediatric admissions to the hospital.

General overview of the childhood pneumonia

Pneumonia has been defined as an inflammatory condition of the lung characterizedbyconsolidation due to exudates in the alveolar spaces. Pneumonia may be classified anatomically into lobar and bronchopneumonia. It has been shown in various studies that etiological agent is bacterial. Atypical organisms include mycolasma, chlamydea, and Pneumocystis carinii causes pneumonia in immunocompromised children.

Clinical features of pneumonia

Acute pneumonia presents with a short history of systemic disturbance. Onset is sudden often with rigors or with vomiting or a convulsion in children. Temperature rises in a few hours to 39 - 40 degrees. Loss of appetite, headache, aching pains in the body and limbs accompany pyrexia. Localized pain of pleural type often develops at an early stage of the illness. Rapid breathing, retractions, cyanosis and grunting,

difficulty in feeding, difficulty in speech are also noticed. Pneumonia may also present rarely as acute abdominal emergency due to referred pain from the pleura. Apical pneumonia may present with meningiomas and convulsions. On examination child has crackles orrhonchi which assist in the diagnosis of pneumonia. Diagnostic tools include x-rays and sputum examination.

Risk factors for pneumonia

Demographic risk factors

In a number of communities based studies boys appear to be more frequently affected than girls. Younger the age risk of developing pneumonia is more.

Socio economic risk factor

Mahalanabis [2] and others found that poor socioeconomic status of parents associate with5 fold increase in risk of pneumonia. Low educational levels in mothers are associated with increased risk of pneumonia hospitalizations and mortality [3-5].

Environmental risk factors

Domestic use of biomass fuels, including wood manure and agricultural waste [6-8]

Nutritional risk factors

Nutritional risk factors associated with pneumonia include birthweight, malnutrition, breast feeding [14] and levels of vitamin A and other micronutrients [9-13].

IMMUNIZATION RISK FACTORS

Childhood immunizations are protective against childhood illness [16]. The conjugate haemophilus influenzae b [Hib] vaccine is associated with reducing H. influenza meningitis. Hib may also be. Responsible for 20to 25 percent of severe pneumonias [18]

Aims and objectives of study

To describe the clinical profile and study of role of risk factors associated with severe pneumonia in under 5years children.

Patients and methods

300 children suffering from severe or very severe pneumonia as ascertained by WHOM criteria from age 6 months to 5 years are taken as cases. An equal number of age index matched children coming for immunization to the same hospitals without previous history of severe or very severe pneumonia are taken as controls. Thus 300 cases and 300 controls constituted the study population.

Study pattern

The present study is a hospital based descriptive observational study for clinical profile of severe pneumonia and case control study of role of risk factors associated with severe pneumonia in under 5 children. It was carried out over a period of 1 year in Niloufer hospital of child health, Hyderabad.

Sampling procedure

Materials used

- Electronic baby scale (resolution 10 gms, capacity20 kgs)
- Electronic baby scale (resolution 100gms,capacity 120kgs)
- pediatric stethoscope
- Infantometer
- stadiometer
- Digital watch
- Modified kuppuswamy classification of socio economic status.

Inclusion criteria

- Children between 6 months to 5 years of age.

Exclusion criteria

- Children with chronic systemic illness like tuberculosis, bronchial asthma.
- Children with congenital heart disease, congenital malformations like cleft lip, cleft palate
- Children lessthan 6months and more than 5years were excluded from the.

RESULTS

In this study 300 cases and 300 controls in the age group of 6 months to 5 years were studied. Among cases 60% (180) are males and 40% (120) are females. Among controls 59% (177) are male and 41% (123) are female.

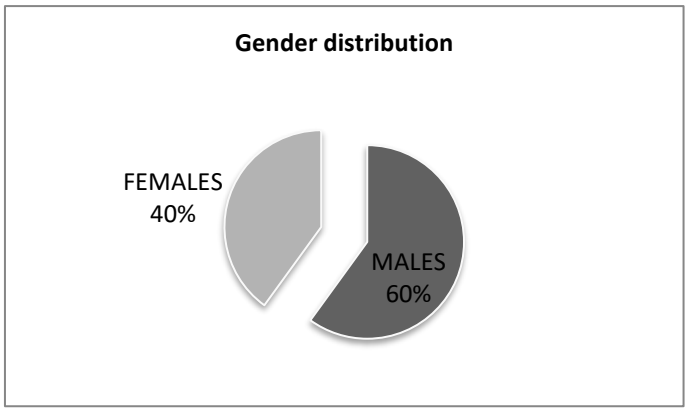

Fig-1: Gender distribution in Pneumonia cases.

Age wise distribution of study population

Out of 300 patients 69% (207) were between 6 to 12 months of age, 21 % (63) were between 13to24 months of age, 10 % [30] were between 24 months to 5 years of age among cases. Among controls 68% (204) were between 6 to 12 months age, 20% (60) were between 13 to 24 months age and 12%(36) between 24 months and 5 years Fig.2.

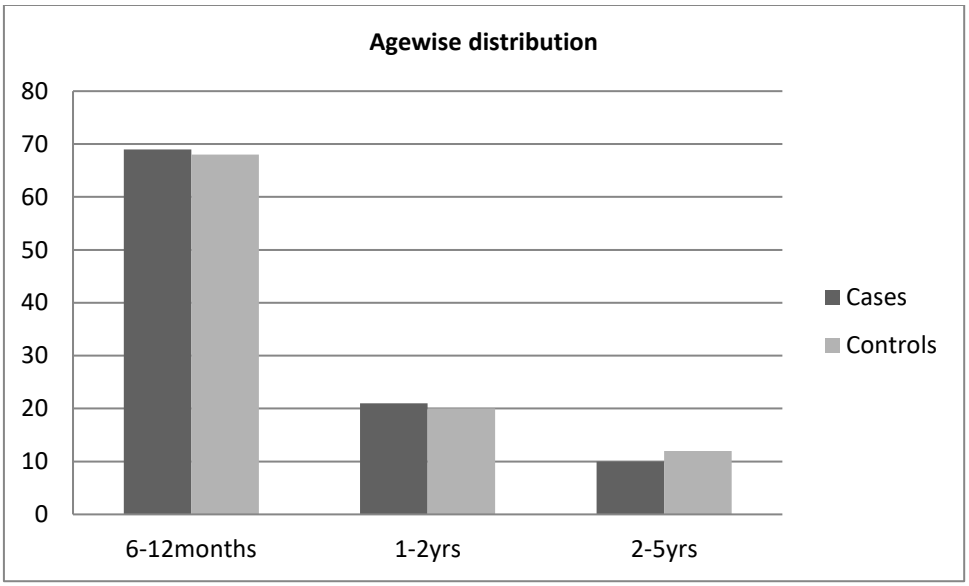

Fig-2: Age wise distribution of Cases and Controls

Percentage of study participants according to clinical profile of Bronchopneumonia

Rapid breathing and chest retractions are seen in 100% (300) cases. Cough and cold is seen in 95% (285) cases. Fever is seen in 90% (270) cases. Refusal of feeds is seen in 50% (150) cases. crepts are seen in 80%(240) cases. Wheezing is seen in 60% (180) cases. Grunting is seen in 10% cases, cyanosis is seen in 5% (15) cases, convulsions are seen in4% (12) cases (Fig.3).

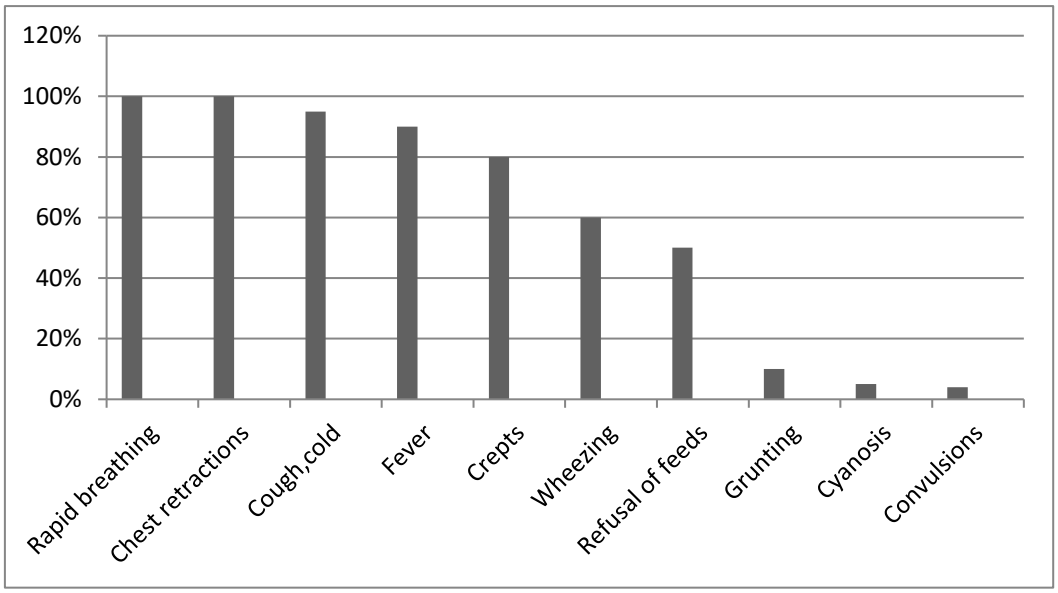

Fig-3: Percentage of study participants according to the risk factors associated with bronchopneumonia

Malnutrition

Among the study participants grade 1malnutrition is seen in 34.4 % (103) cases, grade 2 malnutrition is seen in 23.6 % (71) cases; grade 3 and 4 malnutrition is seen in 5% among cases. Among controls grade 1 malnutrition is seen in 10 %(30) controls, Grade 2 malnutrition is seen in 2% (6) controls and grade 3 and 4 malnutrition is not seen (Fig.4).

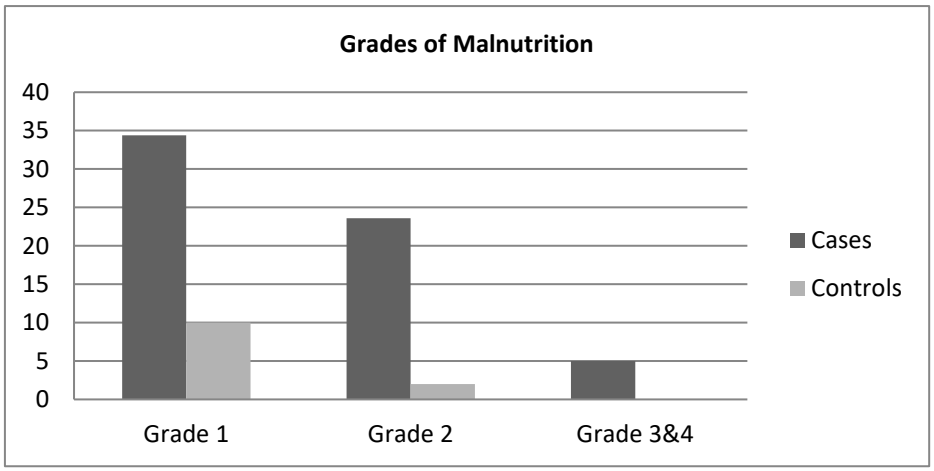

Fig-4: Distribution of grade of malnutrition among cases and controls

Immunization

Among study participants 60 % (180) are completely immunised, 30% (90) are partially immunised, 10 percent are not immunized among cases. Among controls 91% (273) are completely immunized and 6.3% (19) are partially immunized and 1% (3) are not immunized (Fig.5).

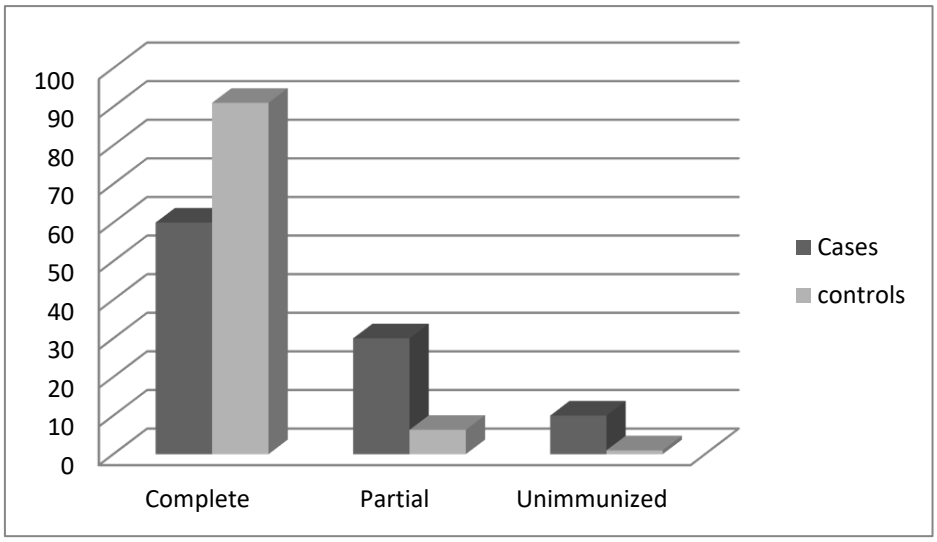

Fig-5: Immunization status

Weaning

Among study participants 40% (120) started weaning in less than 4 months of age, 45 % (135) started Weaning between 4 to 6 months of age and 15 % (45) started weaning after 6 months of age. Among controls 15% (45) started weaning less than 4 months, 75% (225) started weaning between 4 to 6 months, 10% (30) started weaning after 6 months (Fig.6).

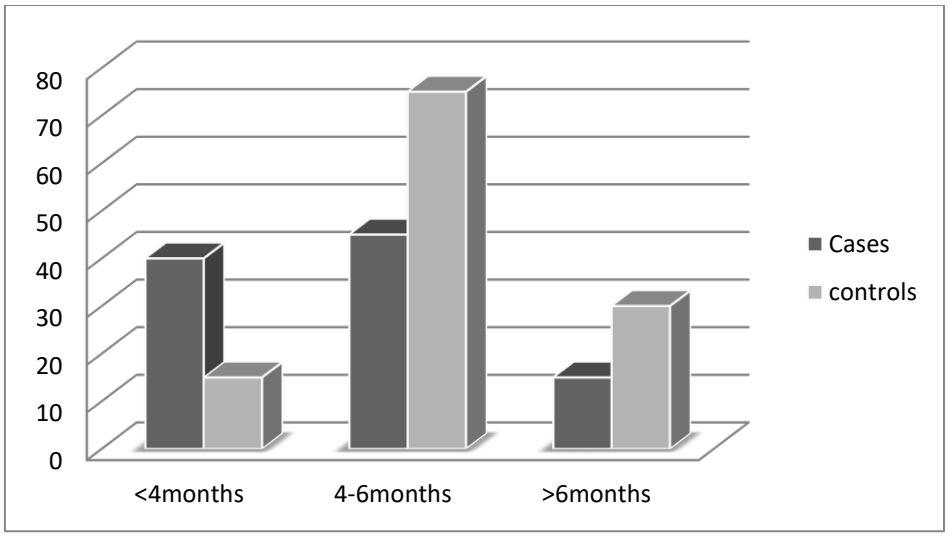

Fig-6: Distribution of starting of Weaning

Occupation of parents

Among parents of study population 59.5 % (179) are daily wage workers and 40.5% (121) are others.

Education of parents

Among study population, 70% (210) parents are illiterates and 30% are literates.

Socio economic status:

Among study population 60 % belong to low socio economic status according to kuppuswamy classification and 40 % belong to medium socio economic status.

TYPE OF HOUSE

Among study population18 percent people are living in kacha houses, 45 % are living in semi pucca houses,15 % are living in pucca houses.

Parental smoking

Among parents of study population 70% are smokers, 30% are non-smokers

Birth weight

Among study population 33 % are low birth weight with less than 2.5 kg weight and67 % with more than 2.5 kg weight.

Type of floor

Among study population 15.9% are using mud floors, 14.1% are using cowdung. Floors, 70% are using cement floors.

Pre lacteal feeds

Among study population pre lacteal feeds are given in 30 percent cases, not given in70% cases

Over crowding

Among study population overcrowding is seen in 42.9 cases.

Indoor pollution

Among study population indoor pollution is seen in 30%cases and 10% cases.

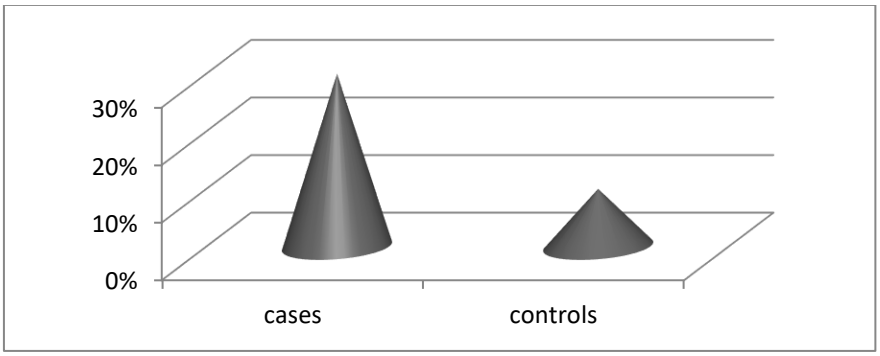

Fig-7: **Indoor pollution in cases & controls**

Table-1

VARIABLES		CASES	CONTROLS	P VALUE
		%	%	
SEX	M	60	59	
	F	40	41	
AGE	6-12MONTHS	69	68	
	1-2YRS	21	20	
	2-5YRS	10	12	
MALNUTRITION	GRADE 1	34.4	10	<0.001
	GRADE 2	23.6	2	
	GRADE 3&4	5	0	
IMMUNIZATION	COMPLETE	60	91	<0.001
	PARTIAL	30	6.3	
	UNIMMUNIZED	10	1	
BIRTH WT	<2.5KG	33	24.1	<0.002
	>2.5KG	67	75.1	
PRELACTEAL FEEDS	GIVEN	30	13	<0.001
	NOT GIVEN	70	87	
WEANING	<4MONTHS	40	15	<0.001
	4-6MONTHS	45	75	
	>6MONTHS	15	10	
PARENTS SMOKING	PRESENT	70	15	<0.001

	ABSENT	30	85	
SOCIOECONOMIC STATUS	CLASS 1	3	5.6	<0.001
	CLASS 2	10	14.4	
	CLASS 3	14.4	24.4	
	CLASS 4	32.2	22.6	
	CLASS 5	40.4	33	
EDUCATION	ILLITERATE	70	79	<0.01
	LITERATE	30	21	
OCCUPATION	DAILY WAGES	59.5	38.5	<0.01
	OTHERS	40.5	61.5	
OVERCROWDING	PRESENT	43	27	<0.05
	ABSENT	57	73	
TYPE OF HOUSE	KACHA	18	45	<0.001
	SEMI PUCCA	45	28	
	PUCCA	15	35	
INDOOR POLLUTION	PRESENT	30	10	<0.001
	ABSENT	70	90	
TYPE OF FLOOR	MUD	15.9	10	<.0.05
	COW DUNG	14.1	9.6	
	CEMENT	70	79	

DISCUSSION

Pneumonia in children under 5 years is a leading cause of mortality in India and other developing countries, identifying clinical profile and riskfactorsfor severe childhood pneumonia that are amenable to intervention is of public health importance. This study identified several risk factors that can be affected by appropriate public health activities. Risk factors identified include malnutrition, poor socioeconomic status, and environmental factors. The present study is a hospital based case control study carried out in Niloufer Hospital for women and child health aimed at describing the clinical profile and study of role of risk factors associated with severe pneumonia in 6months to 5 yrs. old children.

In the present study severe pneumonia is more common among infants but there is no statistical significance. In a study by concha *et al*. [21, 22] it was reported that age less than one year is a risk factor for respiratory morbidity. Shah *et al* [23]. Have also reported that incidence rates for ARI are higher in younger children. In a study by Thamar KY *et al* [24]. It was shown that early infancy less than 2 months of age has a highly significant association with severe ARI. This might be due to the fact that young children immunity is not well developed, and also because of the narrow airways, relatively short bronchial tree and incomplete development of lungs.

More number of male children was affected by severe pneumonia than females; similar results were obtained by Thamar ky *et al* [22]. In a study conducted in Sri Lanka, male sex was a significant risk factor for ALRTI and also in a study conducted in Nigeria; it was observed that incidence was higher in boys than girls. However in the present study there was no statistically significant association and possibility of gender bias in seeking care cannot be ruled out which may have led to male preponderance.

There was a statistically significant association between immunization and risk of severe pneumonia. [23] Children who were completely immunized for age were less likely to get the disease compared to children who are partially immunized or unimmunized for age [O.R 3.9]. Similar results were reported by Broor S *et al* [23],Thamer ky [22] and Savitha. [20]This is because immunization against measles and pertussis may prevent infections that can lead to pneumonia as a complication, and also probably because mothers utilizing immunization services are better aware of health care facilities and probably seek early consultations for illness in their children which probably avoids severe illness. A statistically significant association was found between social class and severe pneumonia. The odds ratio was1.4 for highest versus middle income group and 2.8 for highest versus lowest income group. This shows that risk of severe pneumonia worsens as the socio economic status worsens. In a study by Rahman MM *et al* [24], poverty

was significantly associated with occurrence of pneumonia. Biswas *et al*. [25] revealed per capital income is significantly associated with occurrence of ARI.

There was no significant association between type of house, type of floor and severe pneumonia. Similar results were obtained by Broor S *et al*. But studies conducted by Sikolia *et al*. and Savitha *et al*. have shown a significant association between housing conditions and respiratory infections.

In the present study there is a statistically significant association between overcrowding and severe pneumonia with an odds ratio of 2.Overcrowding may increase the probability of transmission of infection among family members. Similar results were obtained in a study in Bangladesh and India and studies conducted by CG victoria *et al*. Indoor air pollution because of use of biomass fuels for cooking was found to be a significant risk factor with odds of 2.49.Biomass fuels [wood, crop residues, animal dung] coal and other media [kerosene] are predominant contributors to indoor air pollution. These are burnt in simple stoves with incomplete combustion generating a lot of toxic products that adversely affect specific and nonspecificlocal defences of respiratory tract. The risk is highest for mothers and children due to their longer indoor stay. Added to this, 12 percent cases did not have separate kitchen and cooking was done in living places, leading to bulk of emissions being released into the living area. In a systematic review and metanalysis done by Mukesh *et al.*, it has been shown that in young children is increased by exposure to unprocessed solid fuels by a factor of 1.8.similar studies conducted by Bruce N *et al* [26,27] and smith KR have shown the same result.

Environmental tobacco smoke is another indoor pollutant that reduces local defense mechanisms and predisposes children to respiratory illness. In the present study history of smoking was not significantly associated with severe pneumonia. This may be because, majority of smokers are fathers and exposure of children due to smoking by fathers may be limited because of relatively greater time spent by the father outside the house. Children with a low birth weight appeared to have more risk of pneumonia with an odd ratio of 1.5.This result is in agreement with Taylor *et al.* [28] and Chan *et al* [29]. This might be due to poor pulmonary function and low immunity in low birth weight babies which makes them more liable to ARI especially in its severe form.

The administration of pre lacteal feeds and lack of exclusive breast feeding for 6 months were independent risk factors for severe pneumonia. Similar results were found in other studies. In a study on ALRI specific mortality relative to breastfed infants, those also received artificial milk had a risk of 1.6 and non-breast fed in fantsa risk of 3.674.Among children hospitalized with pneumonia in Rwanda, breast feeding was associated with 50 percent reduction in case fatality. Presence of malnutrition was significantly associated with ALRI in the present study similar to other studies. A study in New Delhi revealed severe malnutrition as a predictor of mortality in ALRI in fewer than 5yrs children. Overall malnutrition is associated with a two or three fold increase in mortality from ALRI.

In the present study, incomplete immunization for age, low educational levels of parents, low socio economic status, overcrowding and use of biomass fuels, low birth weight, lack of breast feeding for 4 to 6 months and malnutrition were found to be independent risk factors for severe pneumonia . Rapid breathing and chest retractions are seen in 100% (300) cases. Cough and cold is seen in 95% (285) cases. Fever is seen in 90% (270) cases. Refusal of feeds is seen in50% (150) cases. Crepts are seen in 80% (240) cases. Wheezing is seen in 60% (180) cases. Grunting is seen in 10% cases, cyanosis is seen in 5% (15) cases, convulsions are seen in4% (12) cases.

CONCLUSIONS AND RECOMMONDATIONS

The present study identifies young age, incomplete immunization for age, low education levels of parents, low socioeconomic status of parents, overcrowding, pre lacteal feeds, and low birth weight, lack of exclusive breast feeding for 4 to 6 months, and malnutrition as significant risk factors for severe pneumonia in children aged 6 months to 5 years.
Information on risk factors, along with feasibility and cost considerations, is essential for guiding preventive strategies against severe respiratory infections in children.

Socio economic factors represent the ultimate determinants of a large proportion of the burden of severe ARIs, but interventions against factors such as low income levels or low educational levels fall outside the scope of health sector. Available epidemiological evidence, however, should be used to support the political struggle against inequality.

Possible effective interventions for reducing respiratory morbidity and mortality due to environmental factors include anti-smoking campaigns, and improved biomass-burning stoves, as well as birth spacing and improved housing to reduce crowding.

Regarding nutritional factors, low birth weight, malnutrition, and lack of breast feeding constitute independent risk factors for pneumonia and interventions include efficient antenatal care, promotion of breast feeding, and appropriate MCH and family welfare services. It should be noted that most of above interventions have other beneficial effects in addition to their impact on respiratory infections among young children. Further work is needed to establish the cost effectiveness of possible interventions, taking into account their multiple benefits.

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