

Important Risk Factors For Sever Pneumonia in Children

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ABSTRACT

A study of 260 patients with pneumonia, aged 2-60 months over period of 10 months from march 1st to December 31st 2000 was under taken in Al-Khansaa hospital which is a maternity and children hospital in Nineveh province to identify some important risk factors for severe pneumonia cases, were 130 patients admitted to the hospital with sever pneumonia as ascertained by WHO criteria while the controls, were 130 out patients with mild pneumonia. For both cases and controls a full medical history and complete medical examination were done including the body weight, height or length and head circumference compared with national centre for health statistics (NCHS). For each patient, estimation, were undertaken. From this study the important risk factors that emerged as being significant are: young age (less than 6month, male sex, lack of breast feeding, weaning from breast milk, before 6 month of age, low socio-economic state, anemia and malnutrition. Correction of some of these factors can probably reduce morbidity.

Key words: risk factors, severe pneumonia, children

INTRODUCTION

Pneumonia

It is primary infection of the lung parenchyma that is caused by invasion of the lung by an infectious agent or non infectious agent, which evokes an acute inflammatory response that lead to appearance of signs and symptoms of mild, moderate, and severe pneumonia.

Acute respiratory infection is the most common cause of illness and death in children under 5 years of age ⁽¹⁾. Pneumonia represents the most frequent cause of mortality, hospitalization, and medical consultation ⁽²⁾. There are several factors influencing the mortality and microbial an etiology. For infants and children in the developing world this is a leading cause of death ⁽³⁾.

Pathogenesis

Invasion of the lung itself by an infectious lead to an acute inflammatory response that result in neutrophil migration, liberation of inflammatory mediators and oxidative enzymes, leakage of plasma, and loss of surfactant, all of which result in loss of air and solidification of the organ known as consolidation ⁽⁴⁾. If the inflammation spread to the pleural space, resulting in empyema, or it can induce pleuritis with a reactive pleural effusion. less favorable outcomes include necrosis progressing to the formation of lung abscess or to pneumatoceles and organization of the inflammatory response leading to pulmonary fibrosis.

Clinical signs and symptoms:

- fever.
- Cough,
- *Grunting*: it is a useful predictor of lower respiratory tract disease. Intubation of a grunting infant who in respiratory distress eliminates the advantage so mechanical ventilation must be undertaken for these infant ⁽⁴⁾.
- *Chest pain* : older children often complain off diffuse chest or abdominal pain.
- Tachypnoea : increased respiratory rate is one of the earliest and best clinical signs predicating illness severity tachypnoea means a resting respiratory rate greater than 60 breaths per minute for infants younger then 2

months of age, 50 breaths per minute for infants from 2-12 months old, and 40 breaths per minute for children 1-5 years and older⁽⁴⁾.

- Retraction
- Cyanosis and failure to feed may identify children with increased risk of dying signs pointing to bacterial pneumonia are elevation of the neutrophil count, depression of the white cell count in the presence of severe disease, iliac or other abdominal signs, high fever and circulatory collapse⁽⁵⁾. In such instances antibiotics are indicated.

Diagnosis

- Chest radiographs

Early inflammatory changes of bacterial pneumonia and even severe inflammatory changes of the pulmonary interstitium may not be evident on chest radiography. However, the radiograph that demonstrates lobar consolidation should be repeated in 4-6 weeks to document resolution of the infection.⁽⁴⁾

- Laboratory test

Children who have pneumococcal pneumonia frequently have elevated WBC count greater than 20,000/mm³. In patients with severe illness and bacterial pneumonia a total WBC count may be less than 5,000⁽⁵⁾.

C-reactive protein and other surface reactants, as well as sedimentation rate, are elevated in instances of bacterial infection and may have a role in differentiating between viral and bacterial causes of pneumonia.

Blood cultures should be obtained in infants and children who have high fever, who appear ill, or who require hospitalization. Demonstration of bacterial antigens in urine by latex agglutination or serologic rise of specific antibody in blood may be of interest⁽⁴⁾.

Culture of nasopharyngeal secretions of viruses and use of immunofluorescence studies for viral antigens should be obtained when therapy with anti viral agents such as ribavirin or amantadine is being considered or to identify epidemics of viral disease⁽⁴⁾.

AIM OF THE STUDY

The aim of this study is to:

- 1- Identify important risk factors associated with incidence of severe pneumonia in children aged two months – five years.
- 2- To decrease the morbidity from severe pneumonia.
- 3- To decrease the mortality from severe pneumonia

Patients and methods

- study of 260 patients with pneumonia aged between 2-60 months was conducted in Al-khansaa hospital which is a maternity and children hospital in Nineveh province over a period of 10 months (from 1st March 2000 to 31st of December 2000)
- The patients were grouped into 130 patients with severe pneumonia cases and 130 patients with mild pneumonia (controls) this grouping was according to the WHO clinical classification for acute respiratory infection (ARI) was used for cases and Controls, viz
 - 1- “no pneumonia” when a patient had cough but neither chest indrawing nor fast breathing.
 - 2- (pneumonia) when a patient had fast breathing so breathing per minute or more in children aged 2-12 months 40 breaths per minute or more in children 13-60 months as well but no chest retraction;
 - 3- “Severe Pneumonia” when a patient had fast breathing and chest retraction
 - 4- very severe pneumonia when in addition to Severe pneumonia the child had one or more of the following: inability to drink, convulsions, abnormal sleepiness or difficulty in working, stridor when calm, whizzing when calm, and severe under nutrition⁽³⁾.

The diagnosis is based on clinical and radiological finding of the chest.

Both groups were compared for possible important risk factors for severe pneumonia and information was taken about their: age, sex, eating (bottle, breast), weaning from breast feeding before 6-month age, level of education for mother and father, occupation of mother and family income. A thorough clinical examination was made on all patients of both groups and their weight, length or height and head circumference were measured accurately and compared with National Center of Health Statistics.

Each patient was send for chest radiographs, and hemoglobin level, 10 mg/dl considered significant. Our patient with severe pneumonia (cases) were admitted to the hospital while those with mild pneumonia (control) were taken from outpatient department and follow-up for their symptoms for 5 days was done.

Patients with congenital heart disease, asthma, foreign body aspiration, chemical pneumonia, and other serious illness which would mimic the symptoms of sever pneumonia were excluded as they have markedly different clinical characteristic risk factors and etiologies for pneumonia.

Data was analyzed using Chi-Square test and P-value considering value of < 0.05 significant.

RESULTS

From results of the study found the following results:

- ❖ Age: the maximum risk being in infants under months and severe pneumonia was observed less frequently in children with increasing age and mild pneumonia was seen in children avers 6 years as shown in (Table1).

Table1: Distribution of age group for cases and controls

Age group(month)	No. of cases	No. of controls	X2	P-value
2-6	32	10	25	0.0001
7-12	50	35		
13-24	22	33		
25-60	26	52		
Total no.	130	130		

- ❖ Sex: male sex predispose to severe pneumonia more than females, as shown in (Table2).

Table 2: Significance of sex difference for cases and controls

Risk factor	Exposure category	Cases	Controls	X2	P
Sex	male	79	50	12.9	0.0001
	female	51	80		

- ❖ Feeding: bottle feeder is at increased risk of severe pneumonia than breast feeder, as shown in (Table 3).

Table 3: Significant difference between breast and bottle feeding

Risk factor	Exposure category	Cases	Controls	X2	P
Feeding	Breast	49	84	18.9	0.0001
	Bottle	81	46		

- ❖ Weaning: weaning from breast milk before 6 months appear as a significant risk factor and (47) patients have their weaning before 6 months, as shown in (table 4).

Table 4: Risk of weaning from breast milk before 6 months for cases and controls

Risk factor	Exposure category	Cases	Controls	X2	P
weaning	Before 6m	47	24	10.2	0.001
	After 6m	83	106		

- ❖ Level of education: low level of maternal and paternal education constitute a significant risk factor for sever pneumonia, as shown in (Table 5).

- ❖ Mother occupation: it did not affect the severity of the disease, as shown in (Table 5).
- ❖ Family income: 75% of our patient have limited family income (less than 90 dollars/ month), as shown in (table 5).

Table 5: Influence of socio-economic state on risk of sever pneumonia

Risk factor	Exposure category	Cases	Controls	X2	P
Family income	limited	98	50	36.1	0.0001
	unlimited	32	80		
Mother education	Illiterate	27	12		0.0001
	Primary school	38	11		
	Secondary school	48	49		
	University	17	58	62.3	
Father education	Illiterate	27	12		0.0001
	Primary school	38	11		
	Secondary school	48	49		
	University	17	58	43.1	
Mother occupation	Employed	53	42		0.157
	Not employed	77	88	2.01	

- ❖ Anemia: it constitute a significant risk factor for severe pneumonia and (79) patients have their hemoglobin below 10mg/dl, as shown in (Table 6).

Table 6: Significant risk of anemia for sever pneumonia

Risk factor	Exposure category	Cases	Controls	X2	P
Anemia	10<Hb	79	36	28.8	0.0001
	10>Hb	51	94		

- ❖ Malnutrition: we found that malnutrition is the most important risk factor for sever pneumonia for both males and females as shown in (Table 7).

Table 7: Significant risk of malnutrition for sever pneumonia

Risk factor	Exposure category	Cases	Controls	X2	P
Malnutrition	malnourished	53	82	13	0.0001
	Normal	77	48		

DISCUSSION

The present study in an effort in the direction of identifying the important risk factors for severe pneumonia. Risk factors for pneumonia identified by other investigators, though not being exactly comparable, have been used for comparison. Demographic, features: The present study shows that infants less than 6 months of age are more prone to develop severe pneumonia and the risk of developing severe infection decrease with increasing age and this goes with the results of other investigators^(3,4,6,7) this may be due to narrower air ways and immaturity of respiratory defense mechanisms and immune system in young infants. like other studies^(5,8) males are more prone to severe pneumonia but this is against the results of shah⁽³⁾ and sooner study⁽⁹⁾.

Lack of breast feeding: The study indicated that breast feeding has an important protective factor and this was proved by other results^(3,10,11,12) human milk contains bacterial and Viral antibodies including relatively high concentration of secretory IgA antibodies⁽⁵⁾. Macrophages normally present in human colostrum and milk may be able to synthesize complement, lysozymes and lactoferrin.

Weaning before 6 months of age: It was found to be important risk factor especially in infants less than 6 months and this is found also in shah study m because the young infant m with its immature respiratory defense mechanisms requires this additional protection of antibodies macrophages and microbial attachment preventing factors in breast milk.

Low socio-economic level: Constitutes important risk factor and like other studies^(3,5,7,13) the protective effect of parental education against severe pneumonia may be due to better health awareness and health care practices. poor family income constitute a major problem that lead to malnutrition and deterioration of health care practices.

Anemia:

It has significant risk in our study and other studies^(3,14) Iron deficiency anemia adversely affect cell-mediated immunity, also neutropenia may occur with state of nutritional deficiency of vitamin B12 and folic acid⁽⁵⁾

Malnutrition: Constitute a significant risk factor in our study and this was proved by other studies^(3,6,9,10,13,15,16) this is explained by immunologic insufficiency which is common in malnutrition and is demonstrated by total lymphocytes count less than 1500 per mm³ vitamin A deficiency lead to impaired resistance to infection and zinc deficiency leads to depression of immune competence⁽⁵⁾, copper deficiency produce ant neutrophil antibody. patients with malnutrition may also have significant depletion of components and functional activity of complement⁽⁵⁾.

Recommendation:

Actions directed against the above important risk factors may help the major cause of deaths of children younger than 5 years.

Based on our study m it is important to improve general health of children and there is an urgent need to reduce the level of malnutrition as apriority by improving of nutritional status for infants and children, and early detection of anemia with proper treatment. Encouraging breast feeding especially during the first 6 month of age. and raise the mother improving socioeconomic condition of the family and early recognition and intervention may prevent death and complications.

Pay more attention to the health educational programs and this can be achieved through TV. Programs educational leaflet, lecturesets.

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