

CLINICAL PROFILE OF ACUTE RESPIRATORY INFECTION (ARI) IN CHILDREN

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Summary

400 children under 5 years of age with acute respiratory infection (ARI) attending paediatric outpatient department of Institute of Post Graduate Medicine & Research were studied prospectively between December 1992 to November 1993. The aim of the study was to find out the clinical spectrum of ARI based on W.H.O guide line and to identify the risk factors that influence the development of ARI in children of the studied group. 58.5% (234) were male and 41.5% (166) female. 94.25% (377) patients were between 2 month- 5 years and 5.75% (23) were less than 2 months of age (Table-1). Among the age group from 2 month to 5 years 59.95% (226) presented with cough & cold (i.e.No pneumonia) & 36.07% (136) with pneumonia, 3.18% (12) with severe pneumonia and 0.8% (3) with very severe disease (Table-3). 52.17% (12) of patients between 0-2 months presented with cough & cold (i.e. no pneumonia), 32.13% (9) with severe pneumonia and 8.70% (2) with very severe disease (Table-2). The important risk factors included poor breast feeding status (86.75%), malnutrition (79.50%), poor economic status (67.5%), and incomplete immunization (19.50%).

Introduction

Acute respiratory infection (ARI) is a leading cause of morbidity and mortality among children throughout the developing world. Millions of children under five years, die and literally billions suffer from acute and chronic morbidity arising from ARI¹. Of the 15 million under 5 children who die each year, acute respiratory tract infection (ARI) and diarrhoea account for 6.5 million (43%) and 5 million (33%) deaths respectively². In rural areas of Bangladesh a child below 5 years age experiences two to three episodes of acute lower respiratory tract infection each year². A prospective study of morbidity pattern showed that ARI accounted for 66% and 48% of all paediatric consultations of the Institute of Post Graduate Medicine and Research and Dhaka Medical College Hospital respectively). Several host and environmental factors increase the risk of respiratory tract infections in children. These are age, sex, low birth weight, nutritional status, feeding pattern, immunization, overcrowding, smoking etc. The present study was done to determine the clinical pattern of ARI and to identify the risk factors that influence the development of ARI in childhood.

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Material and Method

400 children under 5 years of age with acute respiratory infections attending paediatric outpatient department of Institute of Post Graduate Medicine & Research were studied prospectively between December 1992 to November, 1993. Each patient was selected randomly by doctors who were trained on WHO ARI schedule. Patients were examined thoroughly after taking history and their clinical and epidemiological data with reference to risk factors were recorded in preformed questionnaire. ARI cases were classified and managed according to recommendation of WHO ARI schedule³. ARI in infants below 2 month of age, was classified into 1. Very severe diseases (VSD) 2. Severe pneumonia 3. No pneumonia (Cough and cold). The diagnosis of very severe disease was made upon the presence of any one or more of the following danger sign: Stopped feeding well, convulsions, abnormally sleepy or difficult to wake, stridor in calm child, wheezing, fever or low body temperature. Clinical signs of severe pneumonia were severe chest indrawing or fast breathing (60 per minutes or more).

Clinical signs of No pneumonia group : Cough or cold (No severe chest indrawing and no fast breathing and no danger signs were present).

In children of 2 months to 5 years of age, ARI was classified into 1. Very severe disease (VSD) 2. Severe pneumonia 3. Pneumonia and 4. No pneumonia (Cough or cold) groups.

Clinical diagnosis of very severe disease (VSD) were made in presence of any of the following danger signs for 2 months to 5 years group : Not able to drink, convulsion, abnormally sleepy or difficult to wake, stridor in calm child and severe malnutrition.

Clinical sign of severe pneumonia was chest indrawing and no danger sign.

Clinical sign of pneumonia was fast breathing (50 per minute or more in children 2 months to 12 months, 40 per minute or more in child from 12 months to 5 years) and no signs of VSD & severe pneumonia.

Clinical sign of no pneumonia group : only cough and cold (No chest indrawing, no fast breathing and no danger sign of VSD).

In this study, age range was categorised as less than 2 months and 2 months to 5 years. Diseases like Meningitis Encephalitis, Tuberculosis, Bronchial Asthma and Cyanotic heart disease were excluded from the study. Weight of the patient was taken. Nutritional status was assessed and then interpreted according to Gomez classification. According to WHO ARI schedule a child with generalized swelling of the body, anaemia, enlarged liver, thin sparse hair or a child with skin and bone appearance was defined as severe malnutrition case. Each mother was asked in details about birth weight, feeding pattern of child, breast feeding status, immunization, housing condition, overcrowding, smoking in the house and economic condition.

Results

The study included 400 children of ARI. The distribution of age and sex of the study subjects is shown in Table 1. 5.75% (23) children were less than 2 month of age and 94.25% (377) were between 2 months and 5 years of age. 58.50% were male and 41.50% were female child.

Table 2 shows severity of ARI among 23 children below 2 months of age. 52.17% (12) presented with cough and cold (no pneumonia); 32.13% (9) with severe pneumonia and only 8.70% (2) presented with very severe disease.

Table 3 shows severity of ARI among 377 children between 2 months to 5 years of age. 59.95% (226) presented with cough and cold (no pneumonia), 36.07% (136) with pneumonia, 3.18% (12) with severe pneumonia and only 0.8% (3) patients presented with very severe disease.

Table-4. demonstrates nutritional status of ARI patients. 20.50% (82) had normal nutritional status and 79.50% (318) patients suffered from some grade of malnutrition. Degree of malnutrition in various types of ARI has been shown in Table 5. Of the total patients suffering from ARI, 88 (22.00%) had 1st degree malnutrition, 223 (55.75%) 2nd degree malnutrition and 7 (01.75%) had severe degree malnutrition (Gomez classification).

Table 6. demonstrates relation of ARI with breast feeding. 47.50% children rejected colostrum. Only 13.25% children were exclusively breast fed and 79.25% children were partially breastfed. 7.5% children were given only artificial feeding.

Table 7 shows that 71.47% children were given Tinned powder followed by 11.24% with cows milk and 15.27% with rice powder and 2.02% with goat's milk.

Table 8 shows relation of ARI with passive smoking in the house. 59.25% (237) patients had history of passive smoking in the house compared to 40.75%(163) with no smoking in the house. 58% of the children lived in Kacha House and 42% in pucca House (Table 9).

75.25% of the affected children lived in an overcrowded room (Table 10). Among the 50 cases of known birth weight, 84% (42) children had history of low birth weight and 16% (8) normal birth weight (Table-11). Table-12 depicts socio- economic status of studied patients. 67.50% children were from low socio- economic status followed by 27.50% from average and 5% from high socio- economic class. Table 13 shows immunization status of ARI patients. 68.25% patients were completely immunized followed by 19.50% incompletely immunized and 7.25% patient were not immunized at all.

Table - 1
Age and sex distribution of ARI patients

Sex	0- <2 month -		2 month- 5 years		Total No.	Percentage
	No.	%	No.	%		
Male	12	52.17	222	59.68	234	58.50
Female	11	47.83	155	40.32	166	41.50
Total	23(5.75)		377(94.25)		400	100

Table - 2

Severity of ARI (below 2 month of age) N = 23

Sex	No Pneumonia : cough or cold		Severe Pneumonia		Very severe disease	
	No.	%	No.	%	No.	%
Male	8	66.67	3	25.00	1	8.33
Female	4	36.36	6	54.55	1	9.09
Total	12(52.17)		9(32.13)		2(8.70)	

Table - 3

Severity of ARI (2 months- 5 years of age) N = 377

Sex	No Pneumonia : cough or cold		Pneumonia		Severe pneumonia		Very severe disease		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	
Male	132	59.45	84	37.83	6	2.72	0	0	222	58.89	
Female	94	60.65	52	33.55	6	3.87	3	1.93	155	41.11	
Total	226(59.95)		136(36.07)		12(3.18)		3(0.80)		377		100

Table - 4

Nutritional status of ARI patients N = 400

Nutritional status	Number	Percentage
Normal	82	20.50
1st degree PEM	88	22.00
2nd degree PEM	223	55.75
3rd degree PEM	7	1.75
Total	400	100

PEM = Protein Energy Malnutrition
According to Gomez classification

Table - 5

Severity of ARI with Protein Energy Malnutrition (PEM)

	No Pneumonia	Pneumonia	Severe Pneumonia	V.S. Disease	Total	%
Normal	50(21.01)	22(16.18)	8(38.10)	2(40.00)	82	20.50
1st degree PEM	50(21.01)	37(27.21)	1(4.76)	0	88	22.00
2nd degree PEM	138(57.88)	77(56.61)	6(28.57)	2(40.00)	223	55.75
3rd degree PEM	0	0	6(28.57)	1(20.00)	7	01.75
	238(100)	136(100)	21(100)	5(100)	400	100

* (Percentage are in parenthesis)

Table-6
Relation of ARI with breast feeding

Feeding pattern	Number of cases	Percentage
Colostrum		
Not rejected	210	52.50
Rejected	190	47.50
Exclusive breast feeding	53	13.25
Partial breast feeding (breast feeding + artificial feeding)	317	79.25
Only artificial feeding	30	7.50

Table-7
Type of artificial feeding

Type of food given	Number	Percentage
Cow's milk	39	11.24
Goat's milk	7	2.02
Rice powder	53	15.27
Tinned powder	248	71.47
Total	347	100

Table-8
Relation of ARI with passive smoking in the house

	Passive smoking in the house				Total
	Yes	%	No.	%	
No pneumonia (Cough or cold)	133	55.88	105	44.12	238
Pneumonia	47	63.97	49	36.03	136
Severe Pneumonia	13	61.90	8	38.10	21
Very severe disease	4	80.00	1	20.00	5
Total	237 (59.25)		163(40.75)		400 (100)

Table-9
Relation of ARI with housing condition of patient

Severity of ARI	housing condition				
	Pacca		Katcha		
	No.	%	No.	%	
No Pneumonia : (Cough or cold)	95	38.92	143	80.08	
Pneumonia	62	45.59	74	54.41	
Severe Pneumonia	9	42.86	74	57.14	
Very severe disease	2	40.00	3	60.00	
Total	168(42.00)		232(58.00)		

Table-10
Relation of ARI with overcrowding in the house

Severity of ARI	Overcrowding		Not Overcrowding	
	No.	%	No.	%
No Pneumonia : (Cough or cold)	180	75.63	58	24.37
Pneumonia	100	73.53	36	26.47
Severe Pneumonia	17	80.95	4	19.05
Very severe disease	4	80.00	1	20.00
Total	301(75.25) 98(24.75)			

* Overcrowding = 4 Or >4 member/single room

* Not Overcrowding = <4 member/single room

Table-11
Relation of ARI with birth weight. (Number of known birth wt) = 50

Birth weight (known)	Number	Percentage
Normal birth weight (From 2.5 kg. . .and above)	8	16
Low birth weight (Less than 2.5 Kg.)	42	84
Total	50	100

Table-12
Economic status of ARI patients

Economic status	Number	Percentage
Low income group	270	67.50
Average income group	110	27.50
High income group	20	5.00

According to monthly income

Low income group	< Tk. 3000/-
Average income group	Tk. 3000-5000/-
High income group	> Tk. 5000/-

Table-13
Immunization status of ARI patients

	Number	Percentage
Complete (Six EPI diseases)	273	68.25
Incomplete	78	19.50
Unimmunized	29	7.25
Not yet required	20	5.00
Total	400	100

Discussion

Acute respiratory infections (ARI) is an important cause of mortality and morbidity in the developing countries. Attendance of ARI cases in outdoor accounts about one third of the total patients attending out patient department (OPD). WHO studies showed that children with ARI attending the out patient department were 25.50%, 39.30%, 41.80%, 35.00%, 34.00% in Ethiopia, Baghdad, Brazil, London, Herston (Australia) respectively⁴.

In the present study 58.5% patients were male. This is consistent with study by Vathanophas et al (1990) who found slightly higher incidence of ARI among boys of all age groups between 1 and 59 months⁵. Van Volkerburgh and Forst in a study reported higher rates of ARI in boys⁶. In this study 94.25% patients were between 2 months and 5 years of age (Table-1). Vathanophas et al in a study found largest proportion (>60%) of ARI cases between 1 and 3 years old⁵. Studies regarding clinical spectrum of ARI based on recent WHO guideline are lacking in Bangladesh. In this study based on recent WHO guideline for standard case management of ARI 52.17% patients in the age group below 2 months and 59.95% patients between 2 months and 5 years presented with no pneumonia (cough and cold), 32.13% patients of the age group below 2 months presented with severe pneumonia. Khan M. R. et al in a study found increased incidence (62.5%) and severity of ARI in children below 1 year age⁷. Johns Spika et al (1989) in a study in Teknaf area of southern Bangladesh also found highest number of severe ARI cases with increased case fatality in children less than 5 months old⁸. Number of cases of very severe disease (i. e. very severe pneumonia) were not significant since the study was carried out on patients attending outpatient department.

Defective cellular immune response, low IgA, lysozyme and complement level. Intracellular bactericidal and chemotactic defect of the granulocyte in association with multiple deficiency states predispose the malnourished child to increased respiratory infection^{8,10}. In this study 79.50% patients had some degree of malnutrition (Table-5). A Costarican study showed that pneumonia occurred 19 times more frequently in malnourished children compared to normal control¹¹. Other studies showed that acute respiratory infections were more in malnourished children^{10,12,13}. In this study 55.75% patient presented with 2nd degree PEM (Table-4,5). Breast feeding protects children against various infection due to its antinfective property¹⁴. In this study 79.25% children had history of partial breast feeding i.e breast feeding and artificial feeding (Table-6). The risk of acute respiratory infections is higher in bottle fed infants as compared to breastfed ones has been shown in various studies^{12,13,15}.

In this study 5.25% patients had history of passive smoking in the house. This is consistent with study by Moula et al¹⁶. Rasul, et al¹² that passive smoking increases the incidence of ARI in children. Association between passive smoking and acute respiratory infections was first suggested by Colley et al¹⁷. They showed 2-2.5 time increased risk of pneumonia in children whose parents smoke. Overcrowding in the house was found to be intimately related to high incidence of ARI¹⁸. 75.25% of the children in this study lived in an overcrowded room (Table-10). In a study Gardner et al (1985) found similar finding and observed higher incidence of ARI in

infants living in overcrowded house¹⁹. Low birth weight babies are more prone to ARI. Plo et al²⁰ have hypothesized that low birth weight may be an important risk factor for acute respiratory infection. In this study, birth weight was known in only 50(12.5%) children. Among them 84% were of low birth weight (Table-11). Datta et al(1987)²¹ in a study in India found that low birth weight infants (<250 gm) experienced same respiratory illness attack rate as normal birth weight infants in the first year of life (4.65 VS 4.56 episodes) but had higher case fatality rate (24.6 vs 3.2 per 100 episodes of moderate or severe respiratory illness)²¹. Victoria et al (1989) found increased mortality from ARI in LBW babies²². Father's income was an important factors associated with the occurrence of ARI. This study shows 67.50% children from lower income family compared to only 5% from high socio- economic status family (Table 12). That the risk of acquiring ARI was more among lower economic status family as compared from higher income group has been shown in other studies^{5, 6, 18}.

Immunization against measles, diphtheria and pertussis would help prevent a significant, proportion of ARI associated mortality and morbidity. In this study 19.5% children were incompletely immunized and 7.25% unimmunized which has significant association with ARI.

Conclusion

Control of ARI is a major national and international challenge as we approach the year 2000. Most of the ARI cases can be effectively managed in the out patient department if WHO—guided standard ARI case management schedule is followed. This will reduce the number of hospital admission of ARI cases and subsequently reduce the ARI associated mortality. It is obvious that a malnourished child, a child of LBW from poor socio- economic status living in overcrowded house, often exposed to passive smoking and who is not breastfed are more at risk of life threatening ARI. If these risk factors can be overcome, mortality and morbidity from ARI can be curtailed.

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