Original Article

RISK FACTORS IN CHILDREN PRESENTING WITH ACUTE RESPIRATORY INFECTIONS- AN EXPERIENCE AT POF HOSPITAL, WAH CANTT.

Syed Sajid Hussain Shah[*], Tahir Mehmood[*], Faiza Sunbleen[*]
[*]Department of Paediatrics, POF Hospital Wah Cantt Pakistan

ABSTRACT:

BACKGROUND: Acute respiratory infections as pneumonia are one of the leading causes of death in children.

OBJECTIVE: This study had been conducted to assess the risk factors causing acute respiratory infections in children below five years of age among the community presenting with pneumonia.

DESIGN: Observational study.

METHODS: This study was carried out in the Department of Paediatirics, Pakistan Ordnance Factories (POF) Hospital, Wah Cantt from March 2009 till June 2010. All the patients between the ages of three months and five years who were admitted in Paediatric ward of POF Hospital were included in the study. Patients were clerked on a pre-designed proforma.

RESULTS: Out of total of 583 patients, 352 (60.4%) were male and 231 (39.6%) were females. The age range was from 3 months to 60 months with mean age of 19.33and SD 15.69. Mostly patients were under age of twenty months. No pneumonia category patients were 251 (43.1%), 270 (46.3%) patients with pneumonia and severe disease and very severe disease 57 (9.8%) and 5 (0.9%) respectively. Vaccinated patients up to date were 564 (96.7%). Family history of atopy was present in 88 (15.1%), carpets and cockroaches exposure in 129 (22.1%) and passive smoking exposure was present in 162 (27.8%) patients.

CONCLUSION: As acute respiratory infections lead the morbidity and mortality in young children under five years of age and it requires strategies as vaccination to reduce the burden of disease. By assessment of risk factors and controlling them through public health measures may decrease the incidence of ARI.

KEY WORDS: Acute respiratory infections, pneumonia, risk factors.

INTRODUCTION:

Acute respiratory infections (ARI) like pneumonia and bronchiolitis are one of the leading cause of high morbidity and mortality in young children. An estimated 1.9 million children die from ARI worldwide annually, 70% of them in Africa and Southeast Asia and there was reported death of 1·4 million children in 2010 due to ARI, which are huge burden on health care system.[1] It is estimated that out of total 156 million/year of pneumonia, 7–13% cases might progress to severe disease and need admission for hospital care.[2] Respiratory syncytial virus (RSV) related ARI are mostly associated with hospital admission and also risk factor for asthma in childhood.[3] As reported by Child Health Epidemiology Reference Group (CHERG) pneumonia is the leading cause of death in children which lead to start of different programs on global level as Global Action Plan for Pneumonia (GAPP).[4] The goal of GAPP was to promote the expansion and improvement in community case management, the reduction in risk factors for disease and the support for the massive roll–out of vaccination against Haemophilus

Corresponding Author:
Syed Sajid Hussain Shah MBBS, FCPS II
Resident, Department of Paediatrics,
POF Hospital, Wah Cantt Pakistan.
Email: syed_sajid20@yahoo.com

influenzae type b (Hib) and Streptococcus pneumoniae (SP) by countries through support from the GAVI Alliance.[5] These efforts along with social and economic development in third world countries including low and middle–income have lead to substantial decrease in childhood pneumonia morbidity and mortality over the last decade.[6] Risk factors for persistent wheeze and asthma include allergic rhinitis, eczema and atopy, specially when sensitization occurs in early childhood. The strongest risk factors in persistent wheeze appears to be viral respiratory infections, which are common in early childhood and frequently associated with wheezing symptoms and subsequent asthma diagnosis. Despite the high incidence of ARI, there is very little information on the risk factors for these infections. Though ARI in children at start of twentieth century were as frequent as present yet the risk factor pattern may have changed with the living conditions. The risk factors for ARI in our community might not only be closer to those pertinent in poor countries but to Western countries with affluent life style.

This study was conducted as an observational study on large cohort of paediatric patients under 5 years of age who were admitted with ARI with the specific objective to determine distribution of respiratory infections in children and risk factors for acute respiratory tract infections. Special emphasis was on the roles of age, gender and vaccination along with exposure to passive smoking as this study can help to identify risk factors/groups and to understand the potential impact of current and future vaccines.

MATERIAL AND METHODS:

This was an observational study and has been conducted in the Department of Paediatrics, POF hospital, Wah Cantt from March 2009 till June 2010. After approval from hospital ethical committee of POF hospital Wah Cantt patients were enrolled in the study. Parents consent was taken prior to inclusion of patients in study. Patients were taken in consecutive manner. WHO (World Health Organization) criteria for pneumonia were taken for defining pneumonia. It classified according to WHO IMCI (Integrated Management of Childhood Illness) pneumonia classification. WHO definitions for severe pneumonia are cough and difficulty breathing with lower chest wall indrawing and for very severe pneumonia are cough and difficulty breathing with danger signs. These definitions are useful insofar as they are applied at the community level

for guiding the case management and referral of children to a hospital, hence are purposefully highly sensitive and poorly specific for truly life threatening disease

All the children with diagnosis of ARI/pneumonia having abrupt onset of fever, flu, cough and respiratory difficulty were included in the study. Other inclusion criteria were children in between age group of 3 months and 5 years. Exclusion criteria were patient younger than 3 months and more than 5 years, suspected of metabolic disorder foreign body inhalation and presentation with cough and respiratory difficulty. Patients with cardiac anomalies and syndromic features were also excluded from study. Patients were included after taking history and proper examination by resident doctor under supervision. Data was entered on specified proforma using a standardized questionnaire to collect information on risk factors within the item categories of family history of atopy, vaccination status, and exposure to cockroaches, passive smoking exposure, carpets at home, and exposure to animal with fur at home including toys with fur and any history of pollen allergy. Sample size was calculated by who sample size calculator. The studied population was described using frequencies and percentages. Data was analyzed by SPSS 20.0. Chi square test was applied for relation between risk factor and pneumonia. Significant value was taken p value < 0.05.

RESULTS:

In this study initially total of 646 patients were included. Total of 583 patients were taken after dong with audit. Out of 583 patients 352 (60.4%) were male and 231 (39.6%) were females. The age range of patient was in between 3 months and 60 months with mean age of 19.33 months and SD of 15.69. The majority of patients were

under age of twenty months presenting with pneumonia as shown in figure I. Patient were classified according to WHO criteria for pneumonia as shown in table I. Though pneumonia was more in male patients yet the calculated p value between gender and pneumonia was not significant (p value 0.057) (Table II). Out of 583 patient 564 (96.7%) patients were vaccinated up to date and 11 (1.9%) patients were partially vaccinated as they had not completed vaccination up to date. Only 8 (1.4%) patients were not vaccinated. The relationship between the vaccination status and pneumonia severity was significant as p value calculated was 0.043 (significant p value < 0.05) (Table III). Taking family history of atopy as one of risk factor in predisposing factors of pneumonia there were 88 (15.1%) patients who had positive family history of atopy and 495 (84.9%) patients have no family history of atopy as shown in table IV. The relationship between the family history of atopy and pneumonia was also very significant as p value was 0.011 (significant p value < 0.05). As carpets at home and cockroaches are one of significant contributing factor in causation of pneumonia, out of total 583 patients 129 (22.1%) patients were having exposure to carpets and cockroaches at home and relationship in our study in between carpets and cockroaches as risk factor in causation of pneumonia was not significant as p value is 0.717. Other risk factor taken in consideration for pneumonia predisposition was smoking. In the study 162 (27.8%) patients were exposed to passive smoking at home while 421 (72.2%) patients were not exposed to passive smoking (Table V). The p value in relation of smoking exposure to pneumonia risk factor was not significant as it was 0.125. Pollen allergy is one of risk factor for causing pneumonia in children and in this study 73 (12.5%) patients were having history of pollen allergy but the relationship in between pollen allergy and pneumonia was not significant (p value 0.119). Animal with fur are also one of risk factor for pneumonia. In this study 55 (9.4%) patients were exposed to animal with fur like cat, dog at home and the relationship was insignificant (p value 0.760).

DISCUSSION:

Though ARIs are one of leading cause of morbidity and mortality in paediatric patients under five years of age, yet are substantial burden on health services and major cause of hospital admission worldwide. The annual rate of hospital admission and the risk factors contribution in admission to hospital are unknown. One of the earliest attempts at estimating the global burden of communicable diseases was provided by Cockburn and Assaad in the early 1970s.[7]

Early childhood pneumonia is one of risk factor for asthma and impaired airway function in adulthood as it may be major risk factor for adult chronic obstructive pulmonary disease.[8]

In one study done by Bezerra PGM et al[9] showed that Respiratory syncytial virus associated with more severe disease, specifically more severe cases of bronchiolitis and Mycoplasma pneumoniae is associated with more severe cases of pneumonia in children admitted to hospital with pneumonia. The first study regarding the burden of severe pneumonia according to the WHO's definition and risk factors role was done by Rudan et al.[2] This study has been done to assess the role of risk factors in causation of ARI leading to admission.

In one study done by Marcos LG et al[10] showed that pneumonia and recurrent wheeze are strongly associated to each other and infant eczema is one of the most consistent risk factor of pneumonia as in our study about 15.1% patients with pneumonia requiring admission had family history of atopy and history of pollen allergy was present in 12.5% patients. Hypoxemia is one of the key predictor of morbidity and mortality in children presenting with severe acute respiratory tract infection as every year about 1.5 million children admitted with sever pneumonia require oxygen treatment.[11] In one systemic analysis done by Nair H et al[10] showed that the incidence of admission for sever ARI are more in children with age less than one year, while in our study it is also highlighted that the incidence of ARI leading to hospital admission was more in patients age less than twenty months. Regarding sex

distribution Nair H et al[12] study showed that ARI was more common in male population and our is study results are consistent with their findings as it showed that 60.4% patients admitted due to ARI were males. Their study also took into consideration regarding the classification of pneumonia as one third of patients admitted with ARI were having severe disease while in our study about 10% patients were admitted with severe disease.

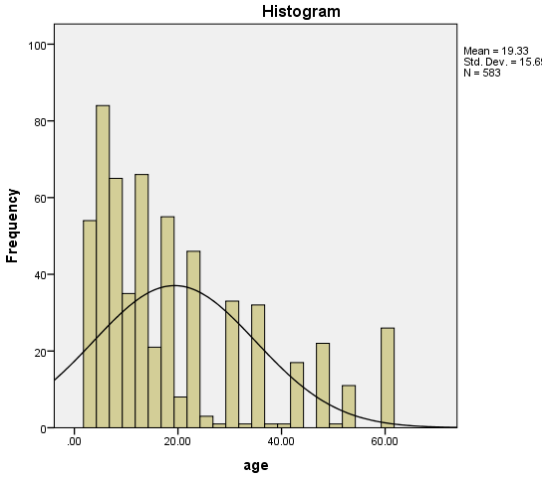

Figure I: Age Distribution

Table I: WHO pneumonia frequency

WHO pneumonia	Frequency	Percent
No pneumonia	251	43.1
Pneumonia	270	46.3
Severe pneumonia	57	9.8
Very severe disease	5	0.9
Total	583	100.0

Table II: Cross table WHO pneumonia and gender

WHO pneumonia	Gender		Total
	Male	Female	
No pneumonia	141	110	251
Pneumonia	175	95	270
Severe pneumonia	35	22	57
Very severe disease	1	4	5
Total	352	231	583

Table III : Cross table WHO pneumonia and vaccination status

WHO pneumonia	vaccination			Total
	complete vaccination	unvaccinated	partial vaccination	
No pneumonia	243	4	4	251
Pneumonia	262	2	6	270
Severe pneumonia	55	2	0	57
Very severe disease	4	0	1	5
Total	564	8	11	583

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13.032[a]	6	.043
Likelihood Ratio	7.977	6	.240
N of Valid Cases	583		

a. 8 cells (66.7%) have expected count less than 5. The minimum expected count is .07.

Table IV: Cross table WHO pneumonia and atopy

WHO pneumonia	Atopy History		Total
	yes	no	
No pneumonia	34	217	251
Pneumonia	38	232	270
Severe pneumonia	13	44	57
Very severe disease	3	2	5
Total	88	495	583

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	11.202[a]	3	.011
Likelihood Ratio	8.328	3	.040
N of Valid Cases	583		

a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is .75.

Table V: Cross table WHO pneumonia and smoking

WHO pneumonia	Smoking		Total
	yes	no	
No pneumonia	60	191	251
Pneumonia	78	192	270
Severe pneumonia	22	35	57
Very severe disease	2	3	5
Total	162	421	583

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.740[a]	3	.125
Likelihood Ratio	5.560	3	.135
N of Valid Cases	583		

a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is 1.39.

In one study by Kusel MMH et al[13] showed that severe viral respiratory infections in infancy along with early atopy are risk factors for persistent wheeze and asthma in childhood. Other factor for the asthma prevalence later life was concurrent fever along with ARL. In our study the pollen allergy was present in 12.5% of patients admitted for pneumonia and these patients may be predisposed for childhood asthma later on. Passive smoking is a risk factor for ARI especially bronchiolitis.[14] In our study 27.8% patients admitted with pneumonia were having passive smoking exposure. In one study Koch A et al[15] studied the risk factors of ARI in children and their assessment concluded that for upper respiratory tract infections attending a child-care center, bedroom sharing with adults are major risk factors while risk factors for lower respiratory tract infection include male sex, attending a child-care center, passive smoking exposure and bedroom sharing with children aged 0–5 years. In comparison our study focused on the risk factors for ARI leading hospital admission and in our study boys are more prone for ARI leading to admission as compare to girls and also the exposure to passive smoking in one of risk factor in ARI leading to hospital admission as in our studied population 27.8% patient were having positive history of exposure to passive smoking.

The 7-valent pneumococcal conjugate vaccine (PCV) is highly effective for reducing pediatric hospitalizations due to consolidated pneumonia[16] particularly under two years of age[17] while in our study 96.7% requiring admission with pneumonia were vaccinated up to date and only 1.4% patients were not vaccinated. The very young children are very much prone for hospitalization due to community-acquired pneumonia[18] especially under two years of age as in our study also the most of patient requiring admission were under two years of age. Hollm-Delgado MG et al[19]

did one study regarding effect of vaccination on pneumonia and it showed that BCG-vaccinated children had a lower risk of suspected acute lower respiratory infection and protection was amplified when children were vaccinated against diphtheria tetanus-pertussis (DTP).

One systemic review done by Rudan I et al[20] regarding the epidemiology and etiology of childhood pneumonia and the the model was based on the prevalence of the main risk factors as malnutrition, low birth weight, non–exclusive breastfeeding in the first four months, solid fuel use and crowding and the review showed that there is a reduction of

about 25% in cases of pneumonia over the decade before year 2010 and reductions in the prevalence of risk factors has been observed. While we did this study considering the risk factors as vaccination status, family history of atopy, exposure to carpets and cockroaches, passive smoking exposure, history of pollen allergy and having exposure to animals with fur. In one study by Monlezun DJ et al[21] showed that serum 25-hydroxyvitamin D (25OHD) levels are inversely associated with ARI. Regarding role of probiotics in management of ARI, one study by King S et al[22] showed that probiotics reduce the duration of illness in otherwise healthy children and adults. This study got limitations as majority of patients were vaccinated up to date, so most probable cause was viral etiology but due to non availability of viral diagnostic methods in public hospitals, cause could not be established.

CONCLUSION:

ARIs are the leading cause of both morbidity and mortality for young children after early infancy and it requires strategies to reduce the burden of disease. This study showed significant relationship between vaccination status and pneumonia along with atopy as risk factor. ARI in children can inform efforts for the implementation of childhood vaccinations to reduce ARI incidence and hospitalization rates. Also considering atopy as risk factor as it predisposes for future childhood asthma.

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SR #	AUTHOR NAME	CONTRIBUTION
1	Dr. Syed Sajid Hussain Shah	Article Writing Data Collection Data Analysis Online Research Biostatistics
2	DR. Tahir Mehmood	Data Collection Online Search
3	Dr. Faiza Sunbleen	Data Collection Biostatistics