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A Study Of The Clinical And Epidemiological Profile Of Acute Respiratory Illness And Their Outcome In Children Between 2 Months To 60 Months In A Tertiary Care Centre.

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Abstract

Background

Acute Respiratory Illness (ARI) is considered one of the major public health problems and it is recognized as the leading cause of mortality and morbidity in many developing countries The greatest problem for developing countries is the mortality from ARI in children less than five years of age. In developing countries, 30% of all patients' consultations and 25% of all pediatric admission are of ARI. A large proportion of ARI presents as pneumonia or bronchiolitis.

Aim of the study: To study the association of various risk factors in ARIAnd their outcome.

Methods: this prospective observational study was performed on 150 children aged 2 months to 5 years admitted at government Karur Medical College Hospital in the Pediatrics Department. A case of ARIs is defined per the ARI control program by WHO as the presence of cough with fast breathing of more than 60 / min in less than 2 months of age, more than 50 / min in 2 months to 12 months of age, and more than 40 / min in 12 months to 5 years of age. The presence of lower chest wall in-drawing was taken as evidence of severe pneumonia. The presence of refusals of feeds, central cyanosis, lethargy, convulsions will be also included.

Results: the prevalence of respiratory infection in the last 9 months among inpatients is 12.2% among males and 11.59% among females and a total incidence of 11.92%.in this study, it was found that 98 cases had pneumonia which was 65% and 40 cases had severe pneumonia accounting for 27%. In this study based on the immunization history, it was found that fully immunized were 54 accounting for 36% and there was a significant occurrence of ari severity and immunization status with a p-value of <0.001. 85 children were underweight as per the iap classification and it accounted for 56% there was a significant association between underweight with grades 3&4 and occurrence of severe pneumonia with a p-value of <0.001. Among the 150 ari cases, 47% were living in households using gas for cooking, and the remaining 53% of households used various biomass fuels. A significant association was found between ari severity and cooking fuel with an a p-value of <0.0001. In this study the major final diagnosis was bronchiolitis, lobar pneumonia accounted for 21.33%. Other noninfectious causes of ARI were mediastinal teratoma, the foreign body which presented with ARI symptoms. Among the ARI cases, 82.6% required oxygen supplementation at any time during the hospital stay and 5.3% required mechanical ventilation. The mortality rate was 1.3%; with 98.66% of cases recovering and getting discharged uneventfully.

Conclusion: the socio-demographic risk factors of significance were parental, incomplete age-appropriate immunization, low socioeconomic status, and overcrowding. The other risk factors of significance were nutritional, like early and late weaning, malnutrition, and anemia. Also, the significant environmental risk

factors found were the use of biomass fuels, among the clinical variables, the signs, and symptoms of ari as per the ari control program were found in almost all cases.

Keywords: Immunisation Status, Severe Pneumonia

Introduction

Acute respiratory infections (ARIs) are a major cause of under 5 mortality and morbidity. About 30-50% of all outpatient and 20-40% of in-patients admission are due to Acute Respiratory Illness. ARIs are classified based on the site of locations in upper respiratory tract infections (URIs) and lower respiratory tract infections (LRIs).[1] The anatomical landmark between the upper and lower airway is at the level of the vocal cords. The upper airways extend from the nose to the vocal cords at the larynx, with the middle ear and paranasal sinuses.[2] The lower airway extends from the lower end of the larynx below the vocal cords from the trachea to the bronchi, bronchioles, and alveoli. Of all the LRIs Bronchiolitis and Pneumonia are common infections in children. The most common cause of Lower Respiratory Tract Infections is viral and Respiratory Synctnital Viruses are responsible for most of the seasonal infections.[3] The next common cause of Viral LRIs is the Parainfluenza virus and Influenza virus. With the introduction of the influenza vaccine, the incidence of infections was effectively prevented. Lower Respiratory infections are the most important morbidity and mortality due to measles but after the introduction of the measles vaccine, they decrease in incidence.[4] Lower Respiratory Infection presents with cough, rapid breathing, and increased respiratory rate. The severity of the disease is indicated by the presence of chest wall retractions, especially in the lower chest.[5] Pneumonia is the inflammation of Lung Parenchyma which is one of the leading causes of Under Five Mortality worldwide. Pneumonia is caused by infection with a microorganism viral or bacterial cause. It has been estimated most community-acquired pneumonia (CAP) is caused by pneumonia especially Streptococcus Pneumonia in under 5 children. Mycoplasma Pneumonia and Chlamydia Pneumonia is the most common organism in children over 5 years. Other bacterial organisms which cause pneumonia are Staphylococcus Aureus and Streptococcus Pyogenes [6]. As per various studies, it is found that Streptococcus Pneumonia, Hemophilus Influenzae, Staphylococcus Aureus are responsible for hospitalization and major cause of mortality.[7] In children with HIV, pneumonia is caused by an atypical organism like Pneumocystis Jiroveci, Atypical Mycobacteria, Salmonella, E.Coli, and Mycobacterium Tuberculosis. The diagnosis of the causative organism of pneumonia is very difficult to determine as the direct culture of lung tissue is not possible as it is an invasive procedure and is not routinely performed. The causative organisms of LRI cannot be by culture from the upper respiratory tract or sputum.[8] Apart from infectious causes, noninfectious causes of Pneumonia are aspiration of food, gastric juice, hydrocarbons, or foreign bodies, radiation pneumonitis, hypersensitivity reaction, the drug can also cause pneumonia. Pneumonia can present with fever, cough, and previous history of URI. The most important clinical sign of pneumonia is tachypnea. As the work of breathing is increased it causes retractions like subcostal, intercostal, suprasternal, with nasal flaring and the use of accessory muscles for respiration. Severe pneumonia can cause cyanosis, lethargy, refusal of feeds, and convulsions, especially in infants.[9]

Methods: this prospective observational study was performed on 150 children aged 2 months to 5 years admitted at government Karur Medical College Hospital in the Pediatrics Department. A case of ARIs is defined per the ARI control program by WHO as the presence of cough with fast breathing of more than 60 / min in less than 2 months of age, more than 50 / min in 2 months to 12 months of age, and more than 40 / min in 12 months to 5 years of age. The presence of lower chest wall in-drawing was taken as evidence of severe pneumonia. The presence of refusals of feeds, central cyanosis, lethargy, convulsions will be also included Inclusion criteria: Children admitted with ARI from 2 months to 60 months, Exclusion criteria: Children less than 2 months and more than 60 months, Children with any

underlying chronic respiratory illness as cystic fibrosis, or cardiac illness. Children under the age group of 2 months to 60 months admitted with ARIs during the study period will be enrolled in the study after getting informed consent. A case of ARIs is defined per the ARI control program by WHO as the presence of cough with fast breathing of more than 60 / min in less than 2 months of age, more than 50 / min in 2 months to 12 months of age, and more than 40 / min in 12 months to 5 years of age. The presence of lower chest wall in-drawing was taken as evidence of severe pneumonia. The presence of refusals of feeds, central cyanosis, lethargy, convulsions will be also included. A detailed history and physical examination will be done using a- structured proforma to elicit various potential risk factors and other relevant histories. A detailed history regarding relevant symptoms, like fever, cough, rapid breathing, chest retractions, refusal of feeds, wheezing, will be taken. A history of similar complaints will be taken. A detailed history of exclusive breastfeeding for 6 months, details of weaning and complementary feedings, and immunization will be taken. History of upper respiratory tract infections in the family members in the preceding two weeks will be recorded. Socioeconomic status grading was done according to Modified Kuppuswamy Classification 2018. Nutritional status assessed using IAP classification of malnutrition. A detailed history was taken regarding parental smoking and the type of fuel used for cooking. History of overcrowding based on crowding index is collected. A detailed examination of each child is done and recorded, which includes temperature, respiratory rate, heart rate, chest indrawing, grunting, nasal flaring, crepitation, wheeze, stridor, lethargy. Levels of sensorium, dehydration, sepsis, shock will be looked for. Pallor and signs of vitamin deficiencies will be recorded. Hematological investigations will be done in all cases to know the degree of anemia, and blood counts. Chest X-rays will be taken in relevant cases and other specific investigations if needed will be done as per standard protocol depending on the type of ARIs.Appropriate tables and graphical representations were used to display the data. A Chi-square test was used. A “p” value <0.05 was taken as significant.

Results

Table :1 CLINICAL DIAGNOSIS

CLINICAL DIAGNOSIS	NO OF CASES
No pneumonia	**12**
Pneumonia	**98**
Severe pneumonia	**40**
Total	**150**

Table :1 In this study it was found that 98 cases had pneumonia which was 65% and 40 cases had severe pneumonia accounting for 27%

Table :2 Immunization

Immunisation	Total
Partially	**96**
Fully	**54**
Total	**150**

Table:2 The study showed out of 150 cases fully immunized children were 54 as compared to 96 partially immunized children. In this study based on the immunization history, it was found that fully immunized were 54 accounting for 36% and there was a sign with the occurrence of ARI severity and immunization status with a p-value of <0.001

Table :3 Distribution Of Cases According To Birth Weight And Severity Of Ari

BIRTH WEIGHT	NUMBER	SEVERITY OF ARI		
		No Pneumonia	pneumonia	Severe pneumonia
>2.5KG	39	1	25	13
<2.5KG	94	6	67	21
Not known	17	5	6	6
Total	150	12	98	40

Table :3 This study shows that out of 150 cases the history of LBW was present in 94 cases of which pneumonia and severe pneumonia were 88 cases and there was statistical significance between the severity of ARI severe pneumonia and history of LBW with a p-value of <0.003.

Table:4 Distribution Of Cases According To Nutritional Status And Ari Severity

Underweight	No Pneumonia	pneumonia	severe pneumonia	Total
Normal	8	52	5	65
Grade 1&2	1	18	15	34
Grade 3&4	3	28	20	51
Total	12	98	40	150

Table:4 In this study out of 150 children 85 children were underweight as per the IAP classification and it accounted for 56% there was a significant association between underweight with grades 3&4 and occurrence of severe pneumonia with a p-value of <0.001

Table:5 Distribution of Cases According to Feeding Pattern and severity of ARI

Exclusive Breastfeeding	Severity of ARI			Total
	No Pneumonia	Pneumonia	Severe Pneumonia	
NO	**7**	**56**	**38**	**101**
YES	**5**	**42**	**2**	**49**

Total	12	**98**	**40**	**150**

Table:5 Breastfeeding practices had an association with the severity of ARI and it was observed that the severity of pneumonia in children with breastfeeding for less than 6 months was significant with a p-value of <0.0001. The percentage of breastfeeding < 6 months was 67.33% Chi-square test, P-value :< 0.0001

Table:6 Distribution of Cases According to overcrowding and severity of ARI

Overcrowding	No Pneumonia	Pneumonia	Severe Pneumonia	Total
Present	8	58	33	99
Absent	4	40	7	51
Total	12	98	40	151

Table:6 Overcrowding had a sign with the severity of ARI in children with a p-value of 0.032

Table:7 Smoking in the family

Smoking History	No Pneumonia	pneumonia	Severe pneumonia	Total
Present	7	49	31	87
Absent	5	49	9	63
Total	12	98	40	150

Table:7 Among the 150 ARI cases, 58% were living in households with at least one smoker family member. A significant association was found between smoking in the family and ARI severity with a p-value of <0.012. Distribution of Cases According to smoking in the family and the severity of ARI

table:8 Distribution of Cases According to usage of fuel for cooking and severity of ARI

Fuel	**No Pneumonia**	**Pneumonia**	**severe pneumonia**	**Total**
Gas	5	56	8	71
Kerosene	4	32	18	54
Other	3	10	14	27
Total	12	98	40	150

Among the 150 ARI cases, 47% were living in households using gas for cooking, and the remaining 53% of households used various biomass fuels. A significant association was found between ARI severity and cooking fuel with a p-value of <0.0001Chi square test, P-value 0.0001

Table 9 Final Diagnosis

FIN DIAG	Frequency	Percent
LOBAR PNEUMONIA	32	21.3%
BRONCHIOLITIS	59	39.33%
WALRI	27	18%
BRONCHOPNEUMONIA	5	3.3%
EMPYEMA THORACIS	1	0.66%
TUBERCULOSIS	2	1.3%
MILIARY TB	1	0.66%
CROUP	7	4.6%
MEDIASTINAL TERATOMA	1	0.66%
FOREIGN BODY	2	1.3%
ACUTE OTITIS MEDIA	2	1.3%
Total	150	100%

Table:9 In this study the major final diagnosis was bronchiolitis, lobar pneumonia accounted for 21.33%. Other noninfectious causes of ARI were mediastinal teratoma, the foreign body which presented with ARI symptoms.

Table:10 Presenting Complaints

Symptoms and Sign	**Frequency**	**Percentage**
Fever	135	90%
Cough	126	84%
Breathlessness	110	73.3%
Running nose	108	72%
Vomiting / diarrhoea	57	38%
Chest in drawing	102	68%
Refusal of feeds	40	26%
Convulsions	7	4.6%

Table:10 Fever was the major symptom in 135 cases, the cough was present in 126 cases, chest indrawing was in 102 cases, 40 children had refused feeds, and convulsions in 7 cases.

Table:11 Outcome

	Cases	Oxygen supplementation	Ventilation	Death
No Pneumonia	12	2	-	-
Pneumonia	98	84	2	1
Severe Pneumonia	40	38	6	1
Total	150	124	8	2

Table:11 Among the ARI cases, 82.6% required oxygen supplementation at any time during the hospital stay, and 5.3% required mechanical ventilation. The mortality rate was 1.3%; with 98.66% of cases recovering and getting discharged uneventfully.

Discussion

In developing countries like India ARI especially pneumonia is one of the leading causes of morbidity and mortality. There are many risk factors associated with the development of ARI which is generally preventive. The government of India has taken many strategies in preventing ARI like the ARI control program, Immunization.[10]This study was conducted to know the incidence, clinical profile, and risk association of ARI in tertiary care hospitals for children aged 2months to 60 months and analysis the drawback, help in using the available resource.[11] ARI is the commonest cause of morbidity and mortality among children under 5 years of age, especially in developing countries. In our study, 36% of children were fully immunized. And 64% were not fully immunized. There is a significant influence of immunization on the severity of ARI with a P value of .001. [12] Various studies by N. Bennani Mechita et.al reported similar findings with the incidence of pneumonia being more in unimmunized populations. Birth weight Cases with a history of low birth weight constituted 63% of our study.[13] This was similar to the study by Nilanjan MK et al (17.2%). However, Savitha et al[53] showed only 9% of ARI cases had low birth weight. The low birth weight baby has poor pulmonary function and low immunity, which makes it more liable to have a respiratory infection. And if such a baby does not receive proper care and nutrition early on, it may persist well beyond the neonatal period. [14] In our study, a total of 85 children had underweight as per the IAP classification. There was a strong influence on nutritional status and severity of ARI with a p-value 0f<0.0001. Also, among the 2 deaths, both cases were had grades 3 and 4 underweight. Among the total admitted 67.33% of children had a history of absence of exclusive breastfeeding. There was a significant influence on the absence of exclusive breastfeeding and the occurrence of severe pneumonia is more common in the group with a p-value of <0.0001.[15] Exclusive breastfeeding for the first 4 months of life not only protects against severe ARI but also protects against the development of asthma and other allergic disorders.[16] Environmental tobacco smoke is an indoor pollutant that reduces local defense mechanisms and predisposes children to ARI. Passive smoking can also induce allergic reactions and irritate infantile respiratory tracts, thereby facilitating the spread of infection to the lower respiratory tract. In the present study family history of smoking was seen in 63% of cases.[17] Similar findings were reported by Savitha MR, et al (32.8%) The majority of the cases in our study (53%) lived in houses where biomass fuels like firewood, cow dung, kerosene were used as fuel for

cooking, which is similar to the (71.2%)in their study. The majority of the patients were admitted with fever, cough, and breathlessness as their main complaints (90%, 84%, and 73.3% respectively).[18] The other common complaints were chest drawing in 68% and runny nose in 72% of patients. Refusal of feeds was present in 26% of cases and was the commonest criterion for classifying as severe pneumonia. Vomiting and diarrhea were observed in 38% of cases. [19] Convulsions were present in 4.6% of cases. Of the 150 cases included in the study, 8% were classified as no pneumonia, 65% as pneumonia, and 27% as severe pneumonia according to the ARI Control Program guidelines. Of these cases, the final diagnoses were as follows: 39.33% were diagnosed as bronchiolitis, 321.3% as lobar pneumonia, 3.3% as bronchopneumonia, 27% as WALRI (wheeze associated lower respiratory infection), 4.6% as acute laryngotracheobronchitis (croup) and .66% as empyema thoracis. Of the 150 cases studied, 84% required oxygen supplementation at any time during the hospital stay. Among those cases graded severe pneumonia and higher, 97.6% required oxygen supplementation. Mechanical ventilation was required in 1.3% of cases, all classified as severe pneumonia. There was one death among the 100 cases, and the other 99 recovered and were discharged uneventfully.[20]

Conclusion

The present study identified various risk factors associated with ARI. The socio-demographic risk factors of significance were parental, incomplete age-appropriate immunization, low socioeconomic status, and overcrowding. The other risk factors of significance were nutritional, like early and late weaning, malnutrition, and anemia. Also, the significant environmental risk factors found were the use of biomass fuels, Among the clinical variables, the signs and symptoms of ARI as per the WHO ARI Control Programme were found in almost all cases. Health education for the community regarding healthcare practices and harmful effects of biomass fuel usage and overcrowding and the importance of proper ventilation in homes. Effective utilization of under-fives clinics to ensure availability of proper nutrition to combat malnutrition and anemia, and up-to-date immunization to under-5 children. Ensure adequate breastfeeding. Effective implementation of the existing national health programs to improve the health status of under-five children.

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