# **Original Research Article**

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# Prevalence of acute respiratory infections among children under five years of age attending rural health training centre of Era's Lucknow Medical College and Hospital

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## **ABSTRACT**

**Background:** Every year ARI in young children is responsible for an estimated 3.9 million deaths worldwide. About 90 percent deaths are due to Pneumonia which is usually bacterial in origin. By low-cost interventions such as hand washing, breast feeding, accessibility of rapid and attainable methods of early diagnosis of ARI, can help to reduce its burden. Improving the primary medical care services and developing better methods for early detection, treatment and where possible, prevention of acute respiratory infection is the best strategy to control ARI. The aim of the study was to estimate prevalence of ARI among children under-5 years of age attending Rural Health Training Centre of Era's Lucknow Medical College and Hospital.

**Methods:** The present study was carried out from Nov.2015 to April 2016 covering 305 children below 5 years from RHTC of Era's Lucknow Medical College and Hospital. Children with acute respiratory infection (ARI) having symptoms like cough, running nose, sore throat, nasal congestion or breathing difficulty were included in the study.

**Results:** Out of 305 children under 5 years, 43 (14%) were diagnosed with ARI. The overall prevalence of ARI was 14% with 95%CI (10.20-18.0). According to social class, prevalence of ARI was higher in low socioeconomic class 42.96%. Statistically no significance between social class and prevalence of ARI was seen with Chi sq test: 0.879, t= 0.928. Overcrowding were present in 33% of cases with 95% CI (17.2-48.80). Inadequate ventilation 48% with 95% CI (31.21-64.79), and uses of smoky chullah 49% with 95% CI (31.21-64.79). Prevalence of ARI was more prevalent in children with malnutrition 52.9%. Statistically high association was seen between ARI status and nutritional status, with Chi squre test:18.3, t≤0.001.

**Conclusions:** The study concludes that malnutrition, low socioeconomic status, poor nutritional status, maternal illiteracy, overcrowding, and inadequate ventilation were the major social and demographic risk factors responsible for ARI in under five children. Minimizing these risk factors and by cost effective interventions one can significantly reduce the prevalence of ARI in the rural community.

Keywords: Acute respiratory infections, Malnutrition, Overcrowding, Inadequate ventilation

# **INTRODUCTION**

Every year ARI in young children is responsible for an estimated 3.9 million deaths worldwide. About 90 percent deaths are due to Pneumonia which is usually bacterial in origin. ARI is an important cause of morbidity in the children.<sup>1</sup>

On an average, children below 5 years of age suffer about 5 episodes of ARI per child per year, thus accounting for about 238 million attacks. In India, during the year 2014, about 34.81 million cases of ARI were reported.<sup>1</sup>

Most common organisms known to cause ARI among children include bacteria such as *Staphylococcus aureus*,

Streptococcus pyogenes, Pneumococci, Haemophilus infuenzae and Klebsiella pneumonia. Viruses such as Adeno, Rhino, Corona and Infuenza are also the common etiological agents.<sup>1</sup>

Many risk factors for respiratory tract infections have been distinguish which include not only the climatic conditions but also the poverty, poor nutrition, poor housing conditions, indoor air pollution such as parental smoking, absence of ventilation, overcrowding, industrialization, social cultural values, overuse and misuse of antibiotics, lack of basic health services and lack of awareness.<sup>1</sup>

By low-cost interventions such as hand washing, breast feeding, accessibility of rapid and attainable methods of early diagnosis of ARI, can help to reduce its burden.

Improving the primary medical care services and developing better methods for early detection, treatment and where possible, prevention of acute respiratory infection is the best strategy to control ARI.<sup>1</sup>

## Aim

To estimate prevalence of ARI among children under-5 years of age attending Rural Health Training Centre of Era's Lucknow Medical College and Hospital.

# **METHODS**

# Study population

A cross sectional study was conducted in the Rural Health Training Centre of Era's Lucknow Medical College And Hospital during Nov.2015 to April 2016 covering 305 children below 5 years of age.

# Data collection

Predesigned, pretested questionnaire was used for data collection. The questionnaire included data regarding details of their biosocial characteristics, Housing condition, Anthropometric measurements and Nutritional status. Clinical examination of all children was done.

Children under 5 years of age having history of episodes of ARI during last one month was examine for calculating the prevalence of ARI. Socioeconomic status was assessed the basis of Modified BG Prasad's classification according to inflation rate in year 2014-2015.<sup>2</sup>

Gradation of ARI according to severity: Mild ARI: presence of cough or cold (no pneumonia), moderate ARI: fast breathing without chest indrawing. Severe ARI: presence of chest in drawing (severe pneumonia) and signs of very severe disease like convulsions, abnormal sleep, severe malnutrition, wheezing, grunting, nasal flaring etc.

Nutritional status of a child was assessed by measuring mid-arm circumference (>13.5 cm: normal, 12.5-13.5 cm: mild, 110-125 cm: moderate and<110 cm: severely malnourished).<sup>3</sup>

Overcrowding was determined by the number of family members and the availability of rooms in the house (1 room for 2 people, 2 rooms for 3 people etc.)<sup>1</sup>

# Statistical analysis

The data were entered using Statistical Package for the Social Sciences version 17.0 (SPSS Inc.). Test of significance applied was Chi-square test and p<0.05 was taken as statistically significant.

## RESULTS

Total of 305 children were examine, out of which majority were males 167 (54.75%) and females 138 (45.25%) respectively (Table 1). Number of children diagnosed with ARI was 43 (14.10%). The overall prevalence of ARI was 14% with 95% CI (10.20-18.0) (Table 2).

Table 1: Distribution of children according to their gender.

Gender	No.	Percentage (%)
Male	167	54.75
Female	138	45.25
Total	305	100

Table 2: Distribution of ARI among children visiting RHTC during November 2015 to April 2016.

Total of patients	305	95% CI
Patients with ARI	43	-
Prevalance of ARI	14.10%	10.20-18.0

Total number of Males with ARI was 23 (53.49%) and females 20 (46.51%) (Table 3).

Table 3: Sex wise distribution of ari among children.

Gender	No.	Percentage (%)
Male with ARI	23	53.49
Female with ARI	20	46.51
Total	43	100

Maximum number of children with ARI was in between 1-4 yrs (48.85%), followed by age group of 0-1 year (32.55%) (Table 4).

According to social class, prevalence of ARI was higher in low socioeconomic class 42.96% (III -11.85%, IV-14.81%) and V- 16.30 respectively). Statistically no significance between social class and prevalence of ARI was seen with Chi sq test: 0.879, t=0.928 (Table 5).

Table 4: Distribution of ari children according to age and gender.

Age group (years)	Male	Percentage (%)	Female	Percentage (%)	Total No.	Percentage (%)
0-1	8	34.79	6	30	14	32.55
1-4	11	47.81	10	50	21	48.85
4-5	4	17.40	4	20	8	18.6
Total	23	53.49	20	46.51%	43	100

Table 5: Distribution of ARI according to social demographic factors.

Socio-demographic factors	N	Percentage (%)	Z-test	P value
Mother's education of ARI Children				
Illiterate	23	53.48	0.459	0.647
Literate	20	46.52		
Total	43	100		
Distribution of ARI according to social class	N	Percentage (%)	ARI	Percentage (%)
I	26	8.52	3	11.54
II	30	9.84	4	13.33
III	76	24.92	9	11.85
IV	81	26.56	12	14.81
V	92	30.16	15	16.3
Total	305	100	43	14.10%

Chi sq test: 0.879, t= 0.928. No significance between social class and prevalence of ARI.

Table 6: Distribution of ARI according to environmental characteristics (housing condition).

Environmental characteristics	Total ARI (N=43)	Percentage (%)	Confidence interval (CI)
Over crowding			
Present	14	33	0.18-0.46
Absent	29	67	0.53-0.81
Ventillation			
Adequate	22	52	0.36-0.66
Inadequate	21	49	0.33-0.63
Use of domestic fuel			
Smoky chullah	21	49	0.33-0.63
Smokeless chullah	17	39	0.24-0.54
Others	5	12	0.020-0.21

Table 7: Distribution of school children according to their nutritional status (MUAC).

MUAC	NO.	ARI	Percentage (%)	Indicators
OVER 135 MM (13.5 cm)	180	14	7.77	Well nourished
125-135 (12.5-13.5 cm)	92	18	19.57	Mild malnutrition
110-125 (11.0-12.5 cm)	33	11	33.33	Moderate malnutrition
<110 (11.0 cm)	0	0	0	Severe malnutrition
Total	305	43		

Chi Sq test:18.3, t≤0.001. High association was seen between ARI status and nutritional status.

According to mother's education of ARI Children, 53.48% of ARI cases was observed in illiterate mothers. Statistically no significance association between mother's education status and prevalence of ARI was observed (Ztest=0.459 and p>0.05) (Table 6).

Overcrowding were present in 33% of cases with 95% CI (17.2-48.80). Inadequate ventilation 48% with 95% CI

(31.21-64.79), and uses of smoky chullah 49% with 95% CI (31.21-64.79), (Table 6).

Prevalence of ARI amongst children without malnutrition (well nourished) was 7.77% and it was more prevalent in children with malnutrition 52.9% (mild malnutrition: 19.57% and 33.33%: moderate malnutrition). Statistically high association was seen between ARI status and

nutritional status, with Chi square test:18.3,  $t \le 0.001$  (Table 7).

## **DISCUSSION**

ARIs are a group of heterogeneous diseases caused by a diverse group of organisms in which the anatomical sites involved consists of the airways from the nostrils, pharynx down to the alveoli. 4.5 The risk factors for ARIs are diverse due to differences in living conditions, social demographic factors and other environmental factors.

In our study total of 305 children were examine, out of which 43 children were diagnosed with ARI. The overall prevalence of ARI was found to be 14% which was similar to study done by Prajapati et al in Gujarat where the prevalence of ARI was found to be 22% and study done by Vinod et al in Gulbarga city found prevalence of ARI to be 27.25%. <sup>6,7</sup> Lower prevalence of ARI then our study was reported by Gupta et al where the prevalence of ARI was 4.5%. <sup>8</sup>

Our findings are in contrast to the findings of the studies conducted by Goel from Meerut, where prevalence of ARI was found to be 52% and Rahman and Rahman from Bangladesh where 58.7% prevalence of ARI was observed. 9,10

In our study, according to sex-wise distribution, males were 54.75% and females 45.25% respectively. Prevalence of ARI in males were 53.49% and females were 46.51%. There was slight predominance of males having ARI and then in females.

Male patients seem to have greater susceptibility to ARI as compared to female patients which is also seen in our study and in studies conducted by Vinod et al, Goel, Kumar and Chhabra et al. <sup>7,9,11,12</sup> On the contrary, Acharya et al in her study revealed similar prevelance of ARI among both the sexes. <sup>13</sup>

According to Mother's education of ARI Children, 53.48% of ARI cases was observed in illiterate mothers but no association in respect to ARI and literacy status of mother was found (p $\geq$ 0.05). Similar results were achieve in studies done by Goel and Deb. 9,14

According to social class, prevalence of ARI was higher in low social class but statistically no significance between social class and prevalence of ARI was seen with Chi sq test: 0.879, t=0.928. A higher prevalence of ARI in low social class was also observed in studies conducted by Goel, Deb and Gupta et al but they found a significant association between ARI and social class. 8,9,14

Overcrowding has a strong association with prevalence of ARI. In our study we observed 33% of ARI cases associated with overcrowding. Different studies conducted by Prajapati et al, Rahman and Rahman, Gupta et al showed similar association. <sup>6,8,10</sup>

The prevalence of ARI increases with use of smoky chullhas. In our study Prevalence of ARI was higher in children of mothers who were using smoky chullhas (49%). Our observation are similar to the studies conducted by Kumar, Sharma, Goel, Prajapati et al and Rahman and Rahman. <sup>6,9,10,11,15</sup>

There was a strong association between nutritional status and prevalence of ARI. In our study we observed significantly higher prevalence of ARI among malnourished children. Similar observations where noted by Vinod et al, Islam, Goel, Prajapati et al and Rahman and Rahman. <sup>6,7,9,10,16</sup>

## **CONCLUSION**

The study concludes that Malnutrition, low socioeconomic status, poor nutritional status, maternal illiteracy, overcrowding, and inadequate ventilation are the leading cause and risk factors responsible for ARI in younger children under five years of age. Drastic reduction in these factors can decrease the burden of ARI and by developing new strategies for removing barriers to accessibility to health care services and increased awareness in communities and cost effective interventions can significantly reduce the prevalence of ARI in the rural community.

### Limitations

There are a few limitations which need to be taken care of while considering the findings of this study. Small sample size. No investigations such as x-ray, etc., were not done due to lack of resources. Diagnosis was made only by clinical examination. There could be a chance of under-enumeration, since episodes that may have occurred in between the monthly visits may not have been reported by mothers.

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# **REFERENCES**

- 1. Park K. Parks textbook of preventive and social medicine. India: Bhanot Publishers; 2017.
- 2. Mangal A, Kumar V, Panesar S, Talwar R, Raut D, Singh S. Updated BG Prasad socioeconomic classi cation, 2014: A commentary. Indian J Public Health 2015;59:42-4.

- 3. Kliegman R, Stanton B, St. Geme JW, Schor NF, Behrman RE. Nelson textbook of pediatrics (Edition 20), Phialdelphia, PA: Elsevier; 2016.
- Johnson AW. Acute Respiratory Infections. In Paediatrics and Child Health in Tropical Region, In: Azubuike JC, Nkanginieme KEO, editors. 2nd ed. Owerri African Educational Services. 2007: 396-425.
- 5. Ide LEY, Onyenegecha TAU. Burden of Acute Respiratory Tract Infections as Seen in University of Port Harcourt Teaching Hospital Nigeria. J US-China Med Sci. 2015;12:158-62.
- Prajapati B, Talsania N, Sonaliya KN. A Study on Prevalence of Acute Respiratory Tract Infections (ARI). In: Under Five Children in Urban and Rural Communities of Ahmedabad District, Gujarat. National J Community Med. 2011;2:255-9.
- 7. Ramani VK, Pattankar J, Puttahonnappa SK. Acute Respiratory Infections among Under-Five Age Group Children at Urban Slums of Gulbarga City: A Longitudinal Study. J Clin Diagnos Res. 2016;10(5):LC08-LC13.
- 8. Gupta RK, Kumar A, Singh P. Factor analysis of acute respiratory infections among under-fives in Delhi slums, Indian Pediatr. 1999;36:1144-9.
- 9. Goel K, Ahmad S, Agarwal G, Goel P, Kumar V. A Cross Sectional Study on Prevalence of Acute Respiratory Infection (ARI) in under-five Children of Meerut District, India. J community Med Health Educ. 2012;2:176.
- 10. Rahman MM, Rahman AM. Prevalence of acute respiratory tract infection and its risk factors in under-five children. Bangladesh Med Res Counc Bull. 1997;23:47-50.

- 11. Kumar SG, Majumdar A, Kumar V, Naik BN, Selvaraj K, Balajee K. Prevalence of acute respiratory infection among under-five children in urban and rural areas of Puducherry, India. J Natural Sci Biol Med. 2015;6(1):3-6.
- 12. Chhabra P, Garg S, Mittal SK, Satyanarayan L, Mehra M, Sharma N. Magnitude of acute respiratory infections in under-fives. Indian Paediatr. 1993;30:1315-8.
- 13. Acharya D, Prasanna K, Nair S, Rao RS. Acute respiratory infections in children: a community based longitudinal study in south India. Indian J Public Health. 2003;47:7–13.
- 14. Deb SK. Acute respiratory disease survey in Tripura in case of under five children. J Indian Med Assoc. 1998;96(4):111-6.
- 15. Sharma D, Kuppusamy K, Bhoorasamy A. Prevelance of acute respiratory infections( ari) and their determinants in under five children in urban and rural areas of Kancheepuram district, South India. Ann Trop Med Public Health. 2013;6:513-8.
- 16. Islam F, Sarma R, Debroy A, Kar S, Pal R. Profiling Acute Respiratory Tract Infections in Children from Assam, India. J Global Infect Dis. 2013;5(1):8-14.

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