

# Incidence of Acute Respiratory Tract Infections in less than Two Years Children

B. Deeva Kumar<sup>1</sup>, B. Ramesh Kumar<sup>2</sup>

## ABSTRACT

**Introduction:** Acute respiratory infection comprises a group of symptoms and signs referable to respiratory tract, caused by variety of pathogens including bacteria and viruses. So a longitudinal, hospital based study was carried out in tertiary care teaching hospital, in Central Andhra Pradesh, South India among the under two children to estimate the incidence of AURI and ALRI and to study the effect of immunization, nutrition, sanitation, overcrowding, educational status of the mother, contacts in the house and feeding practices associated with it.

**Material and methods:** 650 under two children who attended tertiary care teaching hospital during one year period were studied. In the beginning, the mothers were instructed regarding the symptoms of AURI and ALRI. At every visit the mothers were enquired regarding any episode of ARI occurring in between two subsequent visits.

**Results:** The ARI incidence was 3.33 episodes/child/year and it was seen to significantly decline with increasing age, being maximum in the first year (2.66 episodes/ child/year) and minimum in 20 -24 months (1.59 episodes/child/year) of life. The incidence was higher in the girls (2.18 episodes/child/year) than in the boy (2.06 episodes/ child/ year) but this association was found to be statistically not significant. Statistically significant associations were found with nutritional status and type of infant feeding practices. No such significant association could be established with immunization status, colostrum and pre-lacteal feeding practices and start of supplementary feeding. Maximum incidence was in the month of December (3.49 episodes/child/year) and minimum in May (1.19 episodes/child/year). Of all the ARI episodes, 88.8% were AURI and 11.13% were ALRI. Average duration of ARI was 5.52 days/episode, AURI was 3.36 days/episode and ALRI was 7.68 days/episode. In this study hospital incidence of ARI was 53.54%

**Conclusion:** The results suggested that ARIs are still a major community health problem and steps like improved complete immunization coverage, improved nutritional status and breast feeding can bring down incidence of ARI further.

**Keywords:** ARI, AURI, ALRI, Under Two

Pradesh. In 1996, ARI was estimated to have been the cause of 23.2% of all deaths among infants in rural areas of Andhra Pradesh, second only to mortality due to prematurity. Every year 12 million children are dying in developing countries in the first 5 years of life out of which 19% constitute for respiratory infections<sup>1</sup>. WHO in 1999 estimates that 27% of disability adjusted life year (DALYs) is attributed to ARI. Approximately 20 -25% of ARI deaths occur below 2 months of age and 50-60% occur in infants<sup>2</sup>. Nearly 25% of outpatient visits and 50 of all hospital admissions are due to ARI. ARI is a major priority that needs attention in global strategy on child survival. ARI a major cause of morbidity and mortality in children and are of particular significance in developing countries like India. The database for acute respiratory infections at present is weak and epidemiological information regarding their magnitude in community is scanty.

ARI are responsible 20-30% of deaths amongst under fives. ARI also results in 3-7 attacks of illness per year. It is estimated that about 6, 30,000 under fives die in India due to ARI, mainly due to lower respiratory infections like Pneumonia. It is further estimated that 25% of all ARI related deaths could be prevented by vaccination, especially with measles and DPT. 16 adults suffer with an average 2-4 episodes of cold and children averages 3-8 cold episodes per year.<sup>19</sup> In 1996 cold is associated with 148 million days restricted activity, 20 million days missed works, 22 million days missed school, 45 million days bed ridden. The acute respiratory disease control program was taken up as pilot project in the country in the year 1990. Since 1992-93, the program is being implemented as part of the CSSM program. The standard case management of ARI and prevention of deaths due to pneumonia is now an integral part of RCH program. Peripheral health workers are being trained to recognize and treat pneumonia. Cotrimoxazole is being supplied to the health workers through the CSSM drug kit. The standard case management of ARI and prevention of deaths due to pneumonia is now an integral part of RCH programme. Peripheral health workers are being trained

## INTRODUCTION

Acute respiratory infection is said to cause 19% of all deaths in children younger than 5 years of age and 8.2% of all disability and premature mortality (as measured by disability adjusted life years or DALYs). In developing countries, pneumonia kills 3 million children every year and other acute respiratory infections, principally measles and pertussis kill almost another million children. As in other states, ARI is an important public health problem in Andhra

<sup>1</sup>Associate Professor, <sup>2</sup>Assistant Professor, Department of Pediatrics, Government General Hospital, Guntur Medical College, Guntur, AP, India

**Corresponding author:** Dr. B. Ramesh Kumar, Assistant Professor, Department of Pediatrics, GGH, Guntur, AP, India

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to recognize and treat pneumonia Cotrimoxazole is being supplied to the health workers through the CSSM drug kit. Cotrimoxazole is being supplied to the health workers through the CSSM drug kit.

Study aimed to estimate magnitude of acute respiratory infections in under two years children, to study immunization, nutrition, feeding practices associated with ARI and their influence on it and to reduce the incidence of ARI in the Community based on vide No 2.

To create awareness regarding ARI to the mothers through the ANM, ASHA, and Health Workers, by identifying the early stages of disease through knowing the signs and symptoms and danger signs of ARI by prompt referral to the Health care system and proper immunization, personal sanitation and exclusive breast feeding.

## MATERIAL AND METHODS

This study was conducted in tertiary care teaching hospital in Central Andhra Pradesh, South India. The data was collected from the parents of under two children who attended along with children to tertiary care teaching hospital for a period of one year

### Inclusion Criteria

The under two children

### Exclusion Criteria

Children with congenital heart disease.

Known or suspected immunodeficiency.

### Type of study

This study was a hospital population based longitudinal study conducted over a period of one year

### Data collection

In the initial visit self introduction to the mother and other family members was done and purpose and importance of the study was explained to them. Their oral consent was obtained.

The child's name, age, sex, weight, immunization status, complete medical history up to the present date, feeding practices general physical examination with special reference to nutritional status and systemic examination was recorded in pre-coded proforma. Verification of records like immunization cards were made wherever available.

All mothers were given health education about ARI, nutrition, feeding, danger signs of ARI, availing medical facilities on time and general education on health and hygiene. All mothers were also educated regarding the symptoms of AURI and ALRI (pneumonia, severe pneumonia and very severe pneumonia) as per the WHO guidelines. They were also instructed regarding what constituted an episode of AURI and ALRI. They were also asked to keep all the doctor's prescriptions and hospital discharge cards for later verification. The weight of child was taken by using spring balance (bathroom scale) which is universally accepted and used for field surveys. The weighing scale was standardized with appropriate calibration each time before weighing child. It was frequently checked using standard weights in use. The child was made to stand on the weighing the scale

with feet apart without bending and looking straight ahead, with minimum clothes. The weight was recorded to nearest 100 gms (0.1 kg). If child couldn't stand and was less than 10 kgs lying down weight was measured on Braun's infant scale with careful standardization measures. The weight was measured to nearest 50 gms (0.05 kgs).

A brightly illuminated torch was used for clinical examination of vitamin 'A' deficiency.

## RESULTS

### Categorization of children by age group

In the present study, it was observed that children in the higher age group had significantly lower incidence rate of ARI, AURI and ALRI. Lowest incidence rate of ARI, AURI and ALRI was found in the age group of  $\leq 12$  months (2.36, 1.67 and 0.6 episodes per child per year respectively) while the highest incidence was found in the age group of 13-24 months (3.77, 3.59 and 0.6 episodes per child per year) respectively (Table-1).

### Categorization of children by sex

Out of 650 children 338 are male (52%), female children are 312(48%) male children suffering with ARI 52%, AURI 45.4%, ALRI 2.6%, while female children are suffering with ARI 48%, AURI 43.40%, ALRI 8.60% In this study findings are observed that female children are having more incidence in ALRI, than male children.

### Categorization of ALRI

In the present study out of 650 Cases 348 children were suffering with ARI out of which 39 cases were ALRI (11.2%) remaining 309(88.8) cases are AURI. Out of 39 cases of ALRI 24 Cases are diagnosed as pneumonia and 15 cases are bronchiolitis. No croup and bronchitis are observed under 2 years.

Of the 650 children in present study, 272 (41.84%) children were found to be malnourished, over all 175 (26.92%) belonged to Grade-I PEM while only 9 (1.38%) belonged to Grade- IV PEM. Among the 338 boys, 125 (36.98%) children were found to be malnourished, 81 (23.96%) and 0 (0%) belong to Grade-I and Grade-IV PEM. Among the 312 girls, 147 (47.11%) children were found to be malnourished, 94 (30.12%) and 9 (2.88%) belong to Grade-I and Grade-IV PEM. It was observed that the girls were more malnourished than the boys. (Table-2)

### Categorization of children according to immunization status (more than 12 months of age)

In the present study, it was observed that 95.6% children were completely immunized while 4.4% were incompletely immunized. Boys are 50.7%, Females are 44.9%

Age group	No ARI	ARI	Total
0-6 Months	171(26.3%)	161(24.76%)	332(51.07%)
7-12 Months	43(6.61%)	70(10.76%)	113(17.37%)
13-18 Months	46(7.07%)	56(8.61%)	102(15.68%)
19-24 months	42(6.46%)	61(9.38%)	103(15.84%)
Total	302(46.46%)	348(53.54%)	650(100%)

Table-1: Categorization of children by age group

completely immunized. 4.4% were partially immunized (1.3%boys,3.1%girls). Because of effective immunization program implemented in Andhra Pradesh these results were observed.

#### **Categorization of children by prelacteal feeding practice (children<24 months of age)**

In the present study, it was observed that 85.34% (64 out of 75)of children who received prelacteal feeds was suffered with ARI. Out of 75 children 52 are Boys and 23 were Girl babies. This shows high statistical significance.

#### **Categorization of children suffered ARI by contact history**

In this study, there is strong association between history of contact and ARI incidence. Out of 155 patients having contact history 129 (83.23%) of them suffered from ARI Showing a strong association.

#### **Categorization of children having ari on the basis of educational status of the mother**

The study shows higher incidence of ARI cases are observed in mothers who had education up to upper primary(192of 348)as she don't know the signs and symptoms of the disease and has a less health seeking behavior. Severe pneumonia cases were observed in children of illiterate mother's and mother's having only primary education. This may be due to fact that illiterate mother's because of poor socioeconomic

condition and fail to take care of their children when episode is mild. (Table-3)

#### **Categorization of children having ari by the type of the house they live in**

The present study shows increased incidence of ARI in children living in Semi pucca houses (79.29%).

#### **Categorization of children having ARI by the level of sanitation surrounding the house they live in**

The study shows there is an increased incidence of ARI in children lived in poor sanitation surrounding their houses (58.89%).

#### **Categorization of children with ari in relation to over crowding**

Of411 children residing in overcrowded houses, the incidence of ARI is 34.44% when compared to its counterpart.This study shows a strong association with overcrowding and incidence of ARI in children

#### **Categorization of children with ARI in relation to socioeconomic status**

Of the total 650 families 421 families (64.76%) belong to low socioeconomic status and show a high prevalence (71.03%) of ARI in the children. This shows a strong association between socioeconomic status and the incidence of ARI in children.

#### **Presenting symptoms**

In present study most common clinical symptoms of ARI were Fever (92.4%), cough (81.6%), running nose, (69.4%), ear discharge (18.3%) wheeze (10%), and chest pain (5%), chest in drawing (3.75%),and fast breathing(13.6%) (Table-4).

#### **ARI morbidity with relation to season**

In the present study highest incidence was observed in November (48), December (58), January (50), February (48) and lowest in the month of March (15), May (15) and August(14). This shows high significance.

## **DISCUSSION**

The present study was a hospital based longitudinal study of 12 months duration, which was undertaken in tertiary care teaching hospital in Central Andhra Pradesh, South India among the under two children of both sexes and belonging to all strata of socio economic group to assess the magnitude of ARI in the region. Out of the 650 children, 338 (52%) were boys and 312 (48%) were girls. Overall in the present study 41.85% of the children were found to be malnourished. 95.60% of all the children had been found to be completely immunized.

Grade of PEM	Boys		Girls		Total	
	N	%	N	%	N	%
Normal	213	32.76	165	25.38	378	58.15
I	81	12.46	94	14.46	175	26.92
II	33	5.07	34	5.23	67	10.30
III	11	1.69	10	1.53	21	3.22
IV	0	0	9	1.38	9	1.38
Total	338	52	312	48	650	100

**Table-2:** Categorization of children by nutritional status (based on iap classification of pem)

	NO ARI		ARI		Total	
	N	%	N	%	N	%
Education						
Illiterate	35	40.69	51	59.31	86	100
Primary	29	31.18	64	68.82	93	100
Upper primary	39	33.91	76	62.19	115	100
High school	118	55.14	96	24.86	214	100
Intermediate	67	52.75	60	47.25	127	100
Degree	5	83	1	17	6	100
Professional	9	100	0	0	9	100
Total	302	46.46	348	53.54	650	100

**Table-3:** Categorization of children having ari on the basis of educational status of the mother

Sl No	Symptoms	Percentage	Sl No	Symptoms	Percentage
1	Fever	92.4%	7	Chest in drawing	3.75%
2	Cough	81.6%	8	Fast breathing	13.6%
3	Running nose	69.4%	9	Abnormally sleepy	0%
4	Ear discharge	18.3%	10	Cyanosis	0%
5	Wheeze	10.0%	11	Stridor	0%
6	Chest pain	5.0%	12	Convulsions	0%

**Table-4:** Presenting symptoms of ari in ari cases

### Total episodes rate

The hospital based study in India have observed that under five children of urban areas suffer from 5-9 episodes per child per year where as in rural areas it is 1-3 episodes per child per year. In the present study, total number of ARI episodes was 1720 with an incidence of 2.641 episodes per child per year, while AURI and ALRI were 1.88 and 0.6 episodes per child per year respectively. Higher incidence rate was observed in the studies conducted by Chhabra P et al<sup>3</sup>. Agarwal DK et al<sup>4</sup> and Vijaya Kumar<sup>5</sup>, probably because these studies were carried out at the time when ARI control program was not implemented in our country. The lower incidence rate of ARI was observed in a study by Shah Hemangini Kishore conducted in rural Goa among under five children which was found to be 1.3 episodes per child per year because of the effective implementation of the ARI control program and good birth weight<sup>6</sup>. In a study conducted by Chhabra P. et al<sup>3</sup>. observed the incidence rate of AURI and ALRI as 2.20 and 0.30 episodes per child per year which was higher when compared with present study.

### Age and ARI

In the present study, it was observed that children in the higher age group had significantly lower incidence rate of ARI, AURI and ALRI. Highest incidence rate of ARI, AURI and ALRI was found in the age group of <12 months (2.36, 1.67 and 0.21 episodes per child per year respectively) while the lowest incidence was found in the age group of <13-24 months (3.77, 3.59 and 0.38 episodes per child per year) respectively. Similar observation was made by Chhabra P et al,<sup>3</sup> who observed higher incidence rate of ARI in the first 2 years of life (3.0 and 3.1 episodes per child per year respectively) and lowest in the age group of 49-60 months (1.8 episodes per child per year). The highest and lowest incidence rate of ALRI was in the age group of 1-12 months (0.5 episodes per child per year) and 49-60 months (0.1 episodes per child). Shah Hemangini Kishore (1995) observed 1.7 episodes of ARI per child per year among infants and 1.0 episodes per child per year among the children 2- 3 years of age<sup>6</sup>. In contrast Vijay Kumar (1987) observed lowest incidence of ARI during infancy (2.20 episodes per child per year) reaching a peak in children 2-3 years of age (4.47 episodes per child per year).<sup>5</sup>

### Sex and ARI

In the present study, girls and boys having equal incidence of ARI. Boys had 2.65, 1.86 and 0.56 episodes of ARI, AURI and ALRI per child per year respectively, while girls had 2.64, 1.91 and 0.51 episodes of ARI, AURI and ALRI per child per year respectively. However this difference was not found to be significant statistically. Chhabra P et al<sup>3</sup> in community based study of ARI observed higher incidence rate of ARI among the girls. Incidence rate of AURI in the boys and girls was 2.1 and 2.2 episodes per child per year while ALRI was 0.3 and 0.4 episodes per child per year respectively. Reddaih V. P. and Kapoor S. K. in their study found that there was higher incidence of ALRI among the boys (0.32 episodes per child per year) when compared to

the girls (0.27 episodes per child per year).<sup>7</sup>

### Nutritional status and ARI

In the present study, children with normal nutritional status had significantly lower incidence rate of ARI when compared to the malnourished children. Children with normal nutritional status had 1.65 episodes per child per year when compared to Grade -I, II, III and IV PEM who had 2.4,3.5,4.19, and 4.33 episodes per child per year respectively. This difference observed was found to be statistically significant. Similar results were found in the study conducted by Singh and Nayar who observed that ARI morbidity in well nourished children was 3.34 episodes per child per year where as moderate to severe malnourished children had 4.14 episodes per child per year.<sup>8</sup> Similar results were also observed in the study conducted by Shah Hemangni Kishore and Tupsi. T. E. et al<sup>6</sup> Ragavan Vijay K. et al in his study observed that children who had mild xerophthalmia had increased risk of ARI<sup>9</sup>

### Immunization status and ARI

In the present study, completely immunized children had lower incidence rate of ARI when compare to other children. But this difference was not found to be statistically significant. Hortal M. et. al<sup>10</sup>. (19985-87) observed that low immunization rate did not increase risk of ARI. In contrast, Agarwal D.K. et. al. observed statistically significant association between immunization status and ARI where immunized children had lower incidence of ARI<sup>4</sup>.

### Infant feeding practices and ARI

In the present study, it was observed that children who had received prelacteal feeds and not received colostrum had a higher incidence rate of ARI (3.30 episodes per child per year) when compared to the children who had received colostrum but were not given prelacteal feeds (2.42 episodes per child per year). Children who received breastfeeding had lower incidence of ARI (2.03 episodes per child per year) when compare to children who receive mixed feeding (2.35 episodes per child per year) and artificial feeding (5.08 episodes per child per year). ARI incidence increased in children when they started to receive supplementary feeding. In the study conducted by Chhabra P. et al<sup>3</sup> and Kumar V. et al<sup>5</sup> observed that infants who received breast feeding had significantly lower incidence rate of ARI.

### Seasonal variation and ARI

In the present study, it was observed that highest incidence of ARI was found in the winter season (November-February) with a peak in December. This was found to be statistically significant. Similar results were also obtained in the study conducted by Reddaih V.P and Kapoor S.K.<sup>7</sup>

### Socioeconomic status and ARI

Of the total 650 families 421 families (64.76%) belong to low socioeconomic status and show a high prevalence (71.03%) of ARI in the children. This shows a strong association between socioeconomic status and the incidence of ARI in children. Similar results were observed by Walia BN et al.<sup>11</sup> Low socio economic status was a significant socio

demographic risk factor causing ARI in children, in study by Savitha M.R (2005). In study by Mitra NK (1997) risk ratio analysis showed that Low socio economic class (Rs1000/-month) was significantly associated with increasing number and severity of ARI episodes.<sup>12</sup>

#### Duration and severity of ARI

In the present study, 88.8% of ARI episodes were AURI and 11.2% were ALRI Mean duration of AURI was 3.36 days while that of ALRI was 7.68 days. Reddaih V.P. and Kapoor<sup>7</sup> observed that mean duration of pneumonia was 5.45±1.95 days. Chhabra P. et. al<sup>3</sup> observed that 87.5% of all episodes of ARI were AURI and remaining 12.5% were ALRI.

#### CONCLUSION

Regular and complete immunization coverage has shown lower ARI incidence. Better nutritional status in these children also seems to have reduced the ARI incidence. Breast fed children had a lower incidence of ARI. Hence, there is a need to make efforts to improve and sustain the proper immunization coverage, give importance to nutritional status of children and encourage the mothers to practice exclusive breastfeeding for at least two years.

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