ORIGINAL ARTICLE

STUDY ON PREVALENCE OF ACUTE RESPIRATORY TRACT INFECTIONS (ARI) IN UNDER FIVE CHILDREN IN LUCKNOW DISTRICT

Abhishek Arun[1], Pratibha Gupta[2], Beena Sachan[3], JP Srivsatava[4]

Authors Affiliation: [1]MD Resident; [2]Associate Professor; [3]Assistant Professor; [4]Professor and Head, Department of Community Medicine, Era's Lucknow Medical College and Hospital, Lucknow
Correspondence: Dr. Abhishek Arun, Email: dr.abhishekarun@gmail.com

ABSTRACT

Background: Childhood ARI/pneumonia is a significant public health problem in India, although robust epidemiological data is not available on its incidence. Mortality due to pneumonia accounts for approximately one-fourth of the total deaths in under five children, in India. Pneumonia affects children irrespective of socioeconomic status; with higher risk among young infants, malnourished children, non-exclusively breastfed children and those with exposure to solid fuel use.

Objectives: To find out the prevalence of ARI in under five children and also determine the socio demographic factors responsible for the same in Lucknow District.

Materials and Methods: It was a cross sectional study which was carried out in 260 under 5 children in urban area and rural area of Lucknow district during April 2013 to September 2013.

Results: The overall prevalence of ARI in children was approximately 23%. Prevalence was higher in boys (36%) than in girls (10%). Children old between 3-5 years less likely suffered from ARI (3%) than children from other age groups. In social class IV and class V, prevalence of ARI was more in rural area (31.4%, 37.1%) as compare to urban area (32%, 16%). A direct correlation was found between immunization status of children and occurrence of ARI along with a significant correlation between timely initiation of breast feeding and decreased occurrence of ARI.

Conclusion: The present study found poor nutritional status, low socio economic class, delay in initiation of breast feeding, prelactal feeding, and immunization status as significant risk factors for Acute Respiratory Infections (ARI) in under fives.

Keywords: ARI, Cross sectional study, Under five children.

INTRODUCTION

Childhood Acute Respiratory Infection (ARI) is the largest cause of morbidity among under-five children across the world. Pneumonia - the most serious presentation - is singly responsible for almost one fifth of total mortality in this vulnerable age group.

Therefore the importance of ARI and pneumonia cannot be over-emphasized. Consequently, global health-care agencies such as the World Health Organization (WHO), United Nations Children's Fund (UNICEF), national and state Governments, as well as international and local agencies involved with aid, academics, and research- have all focused on this area. In India, ARI has been given top priority in all Government programs including the current Reproductive and Child Health Program, Phase-II (RCH-II)[1].

Acute respiratory tract infection is a major cause of morbidity and mortality in developing and also developed countries. ARI is an infection of any part of respiratory tract or any related structures including para nasal sinuses, middle ear and pleural cavity. It includes, a new episode means occurring in an individual who has been free of symptoms for at least 48 hours and also all infections of less than 30 days duration except those of the middle ear where the duration of acute episode is less than 14 days. National family health survey (NFHS -3) revealed that two weeks before the survey 6% of un-

der 5 children had symptoms of an ARI (cough, short and rapid breathing), out of these children 69% were taken to a health facility or health provider for treatment . Average adult has 2-4 episodes per year and a child has 6-8 episodes per year. In rural area, lack of basic health services, lack of awareness, and other associated factors like overcrowding, environmental factors, defects in immune system, overuse and misuse of antibiotics, poverty, absence of ventilation, indoor air pollution are responsible factors[2].

It is estimated that at least 300 million episodes of ARI occur in India every year, out of these about 30 to 60 millions are moderate to severe ARI. While every 6th child in the world is Indian, every 4th child who dies, comes from India[3].

Hence, the present study was conducted to determine the current pattern prevalence and important factors associated with acute lower respiratory tract infections.

OBJECTIVES

The objectives of the study was to find out the prevalence of acute respiratory tract infections in under 5 children; to determine the socio demographic factors responsible for ARI in under 5 children; and to suggest measures to prevent development of acute respiratory tract infections in under 5 children.

MATERIALS AND METHOD

A cross sectional study was carried out in 260 under 5 children in urban area and rural area of Lucknow district during April 2013 to September 2013. Out of 260 studied children, 130 children for Urban and 130 children for Rural areas of Lucknow District were studied in the field practice area of Era's Lucknow medical college and hospital. For sampling, simple random sampling technique was used.

A Predesigned, pretested questionnaire was used for data collection. The questionnaire included information regarding details of their parents, housing condition, type of using cooking fuel, anthropometric and clinical examination was also done. House to house survey was done for data collection. History of episodes of ARI during last one month will be enquired for calculating the prevalence of ARI among under five children. Social classification is done on the basis of Modified Prasad's classification revised according to inflation rate in year 2011- 2012.

Respondent was preferably mother of the child, if not available the father of the child or even so any elderly guardian accompanying the child.

Sample size was calculated by the formula:
$n= z^2p.q/d^2$
Where prevalence was taken as 19% per 1000 population[4] and the value of allowable error is 5%. The calculated sample Size was 236 approximated to 260 after adding 10% additional sample considering data loss.

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 indrawing (severe pneumonia) and signs of very severe disease like convulsions, abnormal sleep, severe malnutrition, wheezing, grunting, nasal flaring etc.

Normal Respiratory rates in children	
Age Group	**Respiratory rate (breaths/min)**
▪ 0 - 6 months	30 - 60
▪ 6 months – 1 year	30 - 50
▪ 1 - 3 years	24 - 40
▪ 3 - 5 years	22 - 34
▪ 5 – 12 years	14 - 25
▪ > 12 years	12 - 20

Immunization: The children were divided into 3 categories fully immunized, partially immunized not immunized.

a. **Fully Immunized** – A child who had received all vaccines according to National Immunization Schedule as per his/her age at the time of interview.
b. **Not Fully Immunized** - A child who had not received any or all vaccines according to National Immunization Schedule as per his/her age at the time of interview.

Statistical Analysis Data was presented in terms of proportions and percentages, Analysis was carried out using chi square test & other necessary statistical test as appropriate will be used.

RESULTS

The distribution of children with respect to various characteristics is summarized in Table 1. Of all the children used in the analysis, approximately 20% of them lived in biomass fuel using homes. The male to female children ratio was almost 1.

Table 1: sample distribution and ARI prevalence in less than 5year old children.

Characteristics	Sample	ARI Cases	χ^2, p value
Participants	260 (100)	60 (23)	
Cooking fuel type			
Biomass fuel(wood)	52 (20)	28 (34.6)	57,
Kerosene/charcoal	42 (16.1)	18 (26)	<0.0001
LPG	166 (63.9)	14 (8.4)	
Sex			
Male	140 (53.9)	48 (36)	21.5,
Female	120 (46.1)	12 (10)	<0.001
Child's age			
<6months	39 (15)	09 (23)	19,
6-11months	49 (18.9)	17 (37)	0.001
1 year-23months	70 (26.9)	21 (30)	
2year-35months	42 (16.2)	11 (26)	
3year-5year	60 (23)	02 (3.0)	
Mother's education			
Illiterate	70 (26.9)	15 (21)	10.3,
Primary	140 (53.9)	25 (17)	0.006
Secondary +	50 (19.2)	20 (40)	
Mother's age at child birth			
15-24	99 (38)	22 (22.2)	0.119,
25-34	112 (43)	27 (24.1)	0.942
35-49	49 (19)	11 (22.4)	

Table 2: Distribution of ARI cases according to the social class

Social class	Cases based on severity of ARI			
	Mild(%)	Moderate(%)	Severe(%)	Total(%)
I	07 (38.8)	01 (5.5)	00 (0.0)	08 (44.4)
II	04 (15.3)	02 (7.6)	00 (0.0)	06 (23.0)
III	08 (9.0)	02 (2.2)	00 (0.0)	10 (11.3)
IV	11 (14.2)	03 (3.8)	01 (1.3)	15 (19.4)
V	16 (31.3)	04 (7.8)	01 (1.9)	21 (41.1)
Total	46 (17.7)	12 (4.6)	02 (0.7)	60 (23)

Table 3: Urban and rural comparison of ARI cases according to social class

Social class	Urban (%)	Rural (%)	Total (%)
I	06 (24)	02 (05.8)	08 (13.4)
II	03 (12)	03 (08.6)	06 (10)
III	04 (16)	06 (17.1)	10 (16.6)
IV	04 (16)	11 (31.4)	15 (25)
V	08 (32)	13 (37.1)	21 (35)
Total	25 (100)	35 (100)	60 (100)

Majority of the children were 12-23 months old. The children were predominantly from urban and rural field practice areas Department of Community Medicine, Era's Lucknow Medical College and Hospital. About half of the children were born to mothers between 25-34 years old and were from low living standard households. The overall prevalence of ARI in children was approximately 23%. Prevalence in children from homes cooking on biomass fuels and from homes using kerosene or charcoal was higher among children from biomass fuels using homes. Prevalence was higher in boys (36%) than in girls (10%). Children old between 3-5 years less likely suffered from ARI (3%) than children from other age groups.

Children whose mothers have attained education recorded higher ARI prevalence than those born to mothers without education. ARI prevalence did not vary much with mother's age at child birth.

According to social class, prevalence of ARI was higher in Upper class (in class I - 44.4%) followed by class V 41.1%, and class II- 23% respectively. (Table-2).

In social class IV and class V, prevalence of ARI was more in rural area (31.4%, 37.1%) as compare to urban area (32%, 16%).(Table-3).

Significant correlation was found between timely initiation of breast feeding and decreased occurrence of ARI. Occurrence of ARI was lowest in mothers who initiated breast feeding immediately (16.5%) or within 24 hours (22%) as compared to initiated breast feeding on 3rd day or beyond it (33.3%). (Table 4)

Direct correlation was found between immunization status of children and occurrence of ARI. It was least in children who were fully immunized (12.5%) as compared to unimmunized children (26%). This difference was statistically significant (x^2= 36.15, p<0.001). Occurrence of ARI was more in those children who are not taking vitamin A prophylaxis (24.1%) as compare to taking vitamin A prophylaxis (20.7%).

Table 4: Distribution of cases of ARI according to initiation of breast feeding

Initiation of breast feeding	Severity of ARI				Children with no ARI (%)	Total (%)
	Mild (%)	Moderate (%)	Severe (%)	Total (%)		
Immediate	19 (15.7)	01 (0.8)	00 (00)	20 (16.5)	101 (83.4)	121 (100)
1st day	10 (20)	01 (02)	00 (00)	11 (22)	39 (78)	50 (100)
2nd day	07 (17.5)	02 (05)	01 (2.5)	10 (25)	30 (75)	40 (100)
3rd day	06 (22.2)	02 (7.4)	01 (3.7)	09 (33.3)	18 (66.6)	27 (100)
After 3rd day	04 (18.1)	06 (27.2)	00 (00)	10 (45.4)	12 (54.5)	22 (100)
Total	46 (17.7)	12 (4.6)	02 (0.7)	60 (23.1)	200 (76.9)	260 (100)

Table 5: Distribution of cases of ARI according to immunization status

Immunization status	Severity of ARI				Children with no ARI (%)	Total (%)
	Mild (%)	Moderate (%)	Severe (%)	Total (%)		
Fully immunized	11 (9.8)	03 (3.0)	0 (0.0)	14 (12.5)	98 (87.5)	112 (100)
Partially immunized	15 (20.8)	04 (7.7)	01 (1.4)	20 (27.7)	52 (72.2)	72 (100)
Non immunized	20 (26.3)	05 (6.5)	01 (2.0)	26 (34.2)	50 (65.7)	76 (100)
Total	46 (17.7)	12 (4.6)	02 (0.7)	60 (23.1)	200 (76.9)	260 (100)

Table 6: Distribution of ARI according to the nutritional status

Nutritional status	Severity of ARI				Children with no ARI (%)	Total (%)
	Mild (%)	Moderate (%)	Severe (%)	Total (%)		
Normal	18 (13.8)	06 (4.6)	01 (0.7)	25 (19.3)	105 (80.7)	130 (100)
Grade I	10 (20.8)	02 (4.1)	01 (2.0)	13 (27.1)	35 (72.9)	48 (100)
Grade II	06 (14.2)	05 (11.9)	01 (2.3)	12 (28.5)	30 (71.5)	42 (100)
Grade III	05 (20.0)	01 (4.0)	01 (4.0)	07 (28)	18 (72.0)	25 (100)
Grade IV	01 (6.6)	02 (1.33)	00 (00)	03 (20)	12 (80.0)	15 (100)
Total	40 (15.4)	16 (6.15)	04 (1.5)	60 (23.1)	200 (76.9)	260 (100)

Table 7: Distribution of ARI cases according to nutritional status and urban-rural comparison

Nutritional status	ARI cases		
	Urban (%)	Rural (%)	Total (%)
Normal	11 (44)	19 (54.2)	30 (50)
Grade 1	6 (24)	10 (28.5)	16 (26.6)
Grade 2	4 (16)	3 (8.5)	07 (11.6)
Grade 3	3 (12)	1 (2.8)	04 (6.6)
Grade 4	1 (04)	2 (6.0)	03 (5.0)
Total	25 (100)	35 (100)	60 (100)

Nutritional status of child has direct bearing on children's susceptibility to ARI. Prevalence of ARI amongst children who had no malnutrition was lowest (19.3%), while it was more in Grade-I to IV malnutrition. (Table 6,7).

DISCUSSION

Out of 260 studied children, 60 children were having ARI infection during the study. Overall prevalence of ARI was found to be 23.0%. Our finding are compare with the study done by Sikolia D N[4], Ram Kishore Gupta[5] and Rahman MM[6].

According to social class, prevalence of ARI was higher in low social class. The present study found a significant association between ARI and social class ($p < 0.001$).Various studies like by Deb SK[7], Ram Kishore Gupta[5], Nilanjan Kumar Mitra[8], M.R.Savitha[9] and Biswas A[10] found similar association. According to area, Prevalence of ARI was lower in urban area (19.2%) as compare to rural area (26.8%). Similar observations were seen in study done by Deb SK[7].

The present study found no association between ARI and literacy status of mothers ($p > 0.05$). Similar findings observed in study done by Nilanjan Kumar Mitra[8].

Smoky chullhas contributed to higher prevalence of ARI. It was higher in children of mothers who were using smoky chullhas. Our finding are compare with the study done by Rahman MM[7], Nilanjan kumar Mitra[8], Wafula EM[12], Berman[11], M.R.Savitha[9] and Biswas A[10] .

There was a strong correlation between nutritional status and occurrence of ARI observations indicate that nutritional status of child has direct bearing on his susceptibility to ARI. The present study found a significant association between ARI and nutritional status ($p < 0.001$). Similar observations where noted by Deb SK[7] , Nilanjan kumar Mitra[8], Biswas A[10],M.R.Savitha[9], Fonseca W[13] and Pandey A[14].

There is positive correlation between timely initiation of breast feeding and decreased occurence of ARI. Occurrence of ARI was lowest in mothers who initiated breast feeding immediately (16.5%) or within 24 hours (22%) as compared to initiated breast feeding on 3rd day or beyond it (33.3%). Our findings are comparable with the studies done by Sudha Yadav[4] and Nafstad P[15].

A significant association was found between ARI and prelactal feeding. Occurrence of ARI was more in those children who started prelactal feeding (29.3%) as compare to (16.3%) not started prelactal feeding. Similar finding was observed in study carried out by Biswas A[10], Deb SK[7] and M.R.Savitha[9].

The child when fully immunized is protected against various respiratory infections like diphtheria, pertussis and also complications of measles. As these children are not fully immunized they are at risk of development of these infections. A significant association was found between ARI and Immunization. It was least in children who were fully immunized (12.5%) as compared to unimmunized children (26%). Our finding are compare with the study done by Deb SK[7], M.R.Savitha[9] and Fonseca W[16], Nilanjan kumar Mitra[8], S.singhi[17].

CONCLUSION

The present study found poor nutritional status, low socio economic class, delay in initiation of breast feeding, prelactal feeding, and immunization status as significant risk factors for Acute Respiratory Infections (ARI) in under fives. The study strongly favours the importance of basic health promotional measures like proper infant feeding practices, proper nutrition of the child in prevention and control of ARI. Health education can change health care seeking behavior and attitude of parents and other family members to take care of the children suffering with ARI in the home itself for preventing pneumonia death. Strengthening of RCH-2 or IMNCI programme, raising female literacy level will go a long way in prevention of morbidity amongst children. Reorientation of health workers in peripheral area i.e Anganwadi, Subcentres and PHCs regarding identification, management and timely referral cases of ARI and strong supervision, monitoring and evaluation of RCH services specifically ARI component will help bring down the morbidity and mortality in children of under five in cases of ARI.

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