

Magnitude of acute respiratory infections in 6 months- 6 years in a rural hospital in B G Nagara: a cross-sectional study

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Abstract

Background: ARI is a major cause for morbidity and mortality in under five children and is responsible for 30-50% of all outpatients and 20-40% of in-patients. The overall incidence may be 5 episodes/child/year accounting for about 238 million attacks. **Objectives:** To study the prevalence of ARI in 6 months- 6 years children in a rural hospital in B G Nagara. **Methods:** A cross-sectional study was conducted for a period of one year in a rural hospital. Symptoms of cough, cold, fever, refusal of feeds and hurried breathing were considered to assess an ARI episode. Respiratory rate >60/minute (<2 month infants), >50(2-12 months) and >40(1-5 years) in a child with cough, cold or fever singly or in combination was considered the criteria for recognition of pneumonia. Other parameters like previous episodes, family history of ARI and immunization status were also taken into account. **Results:** Out of the 145 children with ARI surveyed, 69.7% had LRTI while 30.3% had URTI. 63.4% male children and 36.6% female children had ARI; male: female ratio being 1.7:1. It was more predominant in the age group of 6-12 months (46.2%). Out of the 32 children not breast fed, 75% had LRTI and 25% had URTI. 31.7% of the children had previous episodes of ARI while 11% of the children had positive family history of ARI. **Conclusion:** An understanding of ARI prevalence and the associated risk factors is essential. There is a significant association between ARI and low socioeconomic status, overcrowding, low birth weight, delay in the initiation of breast feeding, lack of exclusive breast feeding, prelacteal feeding, timely given complementary feeding and immunization status. The importance of basic health promotional measures like proper infant feeding practices, proper nutrition, immunization and improvement in the socioeconomic status help in the control and prevention of ARI.

Keywords: ARI, Prevalence, Risk factors, Under-five children

Introduction

Acute respiratory infections are a major cause of morbidity and mortality in children and of particular significance in developing countries like India [1]. ARI is responsible for an estimated 3.9 million deaths worldwide every year [2]. ARI is responsible for 30-50% of all outpatients and 20-40% of in-patients. The overall incidence of acute respiratory infection in the under-5 may be 5 episodes/child/year accounting for about 238 million attacks [2].

In India, in the year 2013, about 31.7 million cases of ARI were reported [3]. Worldwide, about 85-88 % of ARI episodes are Acute Upper Respiratory Infections

(AURI) while the remaining are Acute Lower Respiratory Infections (ALRI)[4,5]. 90% of ARI deaths are due to Pneumonia which is mostly bacterial cause. The incidence of Pneumonia in developed countries is 3-4% while in developing countries is 20-30% [2]. Pneumonia is responsible for about 18% of all under five deaths in India [3].

ARI can be classified into 2 types, based on the site of infection, into Acute upper respiratory tract infection (AURI) that includes common cold, pharyngitis, tonsillitis, sinusitis and otitis media while epiglottitis, laryngitis, croup syndrome (acute laryngo-tracheobronchitis), bronchiolitis and pneumonia are Acute Lower respiratory tract infection (ALRI). The common organisms responsible for causing respiratory

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infections include bacteria and viruses. The most common organism identified is *Streptococcus pneumoniae* accounting for 30-50% of pneumonia cases. The second most common organism is being *Hemophilus influenza* accounting for 10-30% cases.

The other organisms isolated are *Staphylococcus aureus*, *Klebsiella pneumoniae* and *Mycobacterium tuberculosis* [1]. Among viruses, respiratory syncytial virus is the leading cause, identified in 15–40% of cases, followed by influenza A and B, parainfluenza, human metapneumovirus and adenovirus [1,6,7].

Clinical criteria for diagnosis of pneumonia include [1]:

➤ Rapid Respiration

1. Respiratory rate of >60- below 2 months of age
2. >50- 2months- 1 year
3. >40 in 1-5 years

➤ Difficulty in respiration is defined as lower chest indrawing.

Various risk factors identified for ARI are malnutrition, lack of immunization, poor breast feeding practices, overcrowding, low birth weight, exposure to air pollution, young age, vitamin A deficiency, passive smoking, family history of respiratory diseases [6,8].

Management of AURI (No Pneumonia)[9]: Many children with symptoms of cough, cold or fever do not have pneumonia and do not require antibiotics. Majority is caused by viruses and hence antibiotics are not recommended. Symptomatic treatment and home care is sufficient for such cases.

The importance of basic health promotional measures like proper infant feeding practices, proper nutrition, immunization and improvement in the socioeconomic status help in the control and prevention of ARI [10].

Aims and Objectives of the Study: To study about the prevalence of acute respiratory infections (ARI) in 6 months- 6 years children in a rural hospital in B G Nagara.

Materials and Methods

A cross-sectional hospital based study conducted on the children of age group 6 months-6 years with ARTI attending a rural hospital in Karnataka from December 1st 2014- November 30th 2015. The study was approved by the Institutional Ethical Review Committee. A predesigned proforma has aided in the enrollment of children into the study.

All children between 6 months- 6years of age group were included. **Exclusion criteria** included cases with chronic respiratory ailments, any congenital defects in the lung, a known case of Pulmonary Tuberculosis and non consenting parents.

The diagnostic criteria included:

- History of nasal discharge, cough, fever, hurried breathing, chest indrawing, refusal of feeds was used to assess an episode of ARI[9];
- Respiratory rate >60/minute (among <2 month infants), >50 (2-11 months) and >40 (1-5 years) in a child with cough, cold or fever, singly or in combination are the criteria for recognition of pneumonia [9];
- Previous history of ARI episodes, history of ARI in the family members, the immunization status and diet history was also considered.
- Nutritional status was assessed with parameters like weight, height and mid-arm circumference.

Grade of malnutrition was assessed using the Indian Academy of Paediatrics classification [1]. For malnourished children, mid-arm circumference was also measured (>13.5 cm: normal, 12.5-13.5 cm: moderate and <12.5 cm: severely malnourished)[1].

The children with common respiratory symptoms and signs were admitted for further evaluation and treatment. Routine blood investigations were sent like complete blood counts that included Hb, total counts, differential counts, platelet counts, haematocrit values. Absolute Eosinophil Count (AEC) were done for relevant cases. Chest x-ray was done for all cases. Pulmonary function tests were conducted for diagnosed bronchial asthma cases. Oxygen saturation was checked for all cases.

All the cases over a period of one year were included that comprised of 145 children. Data collection was done using a predesigned proforma.

The data collected was transferred to a master chart and the inference made separately. Data was entered in MS Excel and analysed using SPSS version 20. The data was analysed using the statistical test of significance (Chi-square test). Data was presented in the form of percentage, mean and standard deviation, graphs and figures. P value of <0.05 was considered to be statistically significant at 95% confidence interval.

Results

The study included 145 children. And the ARI incidence was calculated according to the number of cases of LRTI and URTI. 101(69.7%) children had LRTI while only 44 (30.3%) children had URTI.

Of the 101 children in the present study, 69 (68.4%) male children and 32 (31.6%) female children had LRTI. The prevalence of URTI was 23 (52.3%) in male children and 21 (47.7%) in female children out of the 44 children studied. In both cases, male children had higher incidence of LRTI and URTI compared to female children.

TABLE 1: Prevalence of ARI among gender.

		Female	Male	Total
ARI	LRTI	32 (31.6%)	69 (68.4%)	101 (100%)
	URTI	21 (47.7%)	23 (52.3%)	44 (100%)
Total		53 (100.0%)	92 (100.0%)	145 (100.0%)

The prevalence studied in different age groups. The higher incidence of respiratory infections was observed in the age group of 6-12 months (67, 46.2%). The mean age is 2.71 years + 2.42.

TABLE 2: Age wise distribution of patients.

		Frequency	Percent
Age groups	6-12 months	67	46.2
	13-24 months	24	16.6
	25-36 months	20	13.8
	37-48 months	9	6.2
	49-60 months	16	11.0
	61-72 months	9	6.2
	Total	145	100.0

TABLE 3: Distribution of patients with LRTI and URTI in relation to the immunization status

		LRTI	URTI	Total
Immunization Status	Complete immunization	78 (67.8%)	37 (32.2%)	115 (100%)
	Non immunized	5 (62.5%)	3 (37.5%)	8 (100%)
	Partial immunized	18 (81.8%)	4 (18.2%)	22 (100%)
Total		101 (100.0%)	44 (100.0%)	145 (100.0%)

It was observed that 78 (67.8%) children having LRTI and 37 (32.3%) of URTI cases were completely immunized. 18 (81.8%) LRTI children and 4 (18.2%) URTI children were partially immunized. While 5 (62.5%) LRTI children and 3

(37.5%) URTI children were not immunized. In this study, 46 children (31.7%) were found to be malnourished. Of which, 31 (21.4%) children belonged to Grade 1. 13 children (9.0%) children belonged to Grade 2 while only 2 (1.4%) belonged to Grade 4. 67 children (46.2%) had normal nutritional status while in 32 children (22.1%) the malnutrition status could not be assessed as they were below 1 year of age.

TABLE 4: Distribution of malnutrition among ARI.

		Frequency	Percent
Malnutrition Status	Not Required	32	22.1
	Grade 1	31	21.4
	Grade 2	13	9.0
	Grade 4	2	1.4
	Normal	67	46.2
	Total	145	100.0

Of the 145 children in the present study, 113 children were exclusively breast fed of which, 77 (68.1%) children had LRTI while 36 (31.9%) had URTI. 32 children were not exclusively breast fed. Among them 24 (75%) had LRTI while 8 (25%) had URTI.

Of the 145 children in the present study, 46 children had history of previous episodes of ARI while 99 had no previous history of ARI episodes. 36 (78.3%) children with a positive previous history had LRTI while 10 (21.7%) children had URTI. 31.7% of the children had previous episodes of ARI. Of the 145 children in the present study, only 16 children had a positive family history of ARI while 129 children had no relation to family history. Among the 16 children, 15 (93.7%) children had LRTI while 1 (6.3%) children had URTI. 11% of the children had positive family history of ARI.

TABLE 5: Distribution of children in relation to exclusive breast feeding, previous episodes and positive family history

Risk factors	Total	LRTI	URT I
Not Exclusively Breast fed	32	24 (75%)	8 (25%)
Positive Previous History Of ARI	46 (31.7%)	36 (78.3%)	10 (21.7%)
Positive Family History Of ARI	16 (11%)	15 (93.7%)	1 (6.3%)

Discussion

The present study is a cross-sectional study that included 145 children, among which 92 (63.4%) were male children while 53 (36.6%) were female children. The male : female ratio being 1.7:1.

ARI Incidence: In the present study, 69.7% children (101) had LRTI while 30.3% children had URTI. Similar incidence was reported by Singh and Nayar [11] who observed the highest prevalence of LRTI (0.07 episodes/child/year). While Chabra et al and Zaman et al observed a higher incidence of AURI than ALRI [12,13].

The higher incidence could be due to the environmental factors and over crowding.

ARI and Gender: In our study, 63.3% male children had ARI while 36.6% female children had ARI.

68.4% male children had LRTI and 52.3% male children had URTI, while 31.6% female children had LRTI and 47.7% female children had URTI.

In both cases, male children had higher incidence of ARI (LRTI and URTI) compared to female children.

This could be compared with studies done by Rahman and Rahman et al who observed 14.9% incidence in male children and 14.4% incidence in female children [14]. Anand Krishnan et al observed that boys had higher hospitalization rate due to ARI than girls [15]. While studies by Chabra et al and Islam et al observed the ARI incidence to be higher in girls than boys [12,16]. The probable reason could be that boys are more susceptible for the infection than girls because they are more exposed to the cross infections.

ARI and Age: Our study showed 46.2% children of the age group 6-12 months with the highest incidence of ARI and lowest in the age group of 37-48 months and 61-72 months (6.2%). The highest incidence in relation to ARI control programme was observed in the age group of 13-72 months and least among 6 months. This could be compared with a study done by Islam et al who observed the incidence to be 26.2% and more common among infants and females [16]. Chabra et al and Mathew J L et al showed the highest incidence among infants less than 2 months [12,17]. Tambe MP et al observed a higher incidence in the age group of 6 months-2 years [18]. Vanthanopas K et al observed the highest ARI incidence among 6-11 months and lowest among 48-59 months [19].

Since the breast fed children are protective against some viral or bacterial agents due to maternal antibodies in the first 6 months of life. Concurrent initiation of weaning may predispose nutritional deficiencies and subsequent susceptibility to most infections, including ARI. The high ARI incidence found in children of 2-3 year age group may be due to their greater exposure to environmental factors.

ARI and Immunization Status: In the present study, 20.7% children were either partially immunized or not immunized. In such children LRTI was more common than URTI. Immunization status was inappropriate in male children than female children.

Studies that have shown association between immunization status and ARI were done by Savitha M R et al [20], Mathew J L et al [17], Broor S et al [21] and Prajapati B et al [22].

ARI and Malnutrition: 31.7% children were found to be malnourished. 21.4% had Grade 1 malnutrition, 9% had Grade 2 and 1.4% had Grade 4 malnutrition. The malnutrition was more common among LRTI children than URTI.

Similar studies done by Savitha M R et al have shown a strong association of ARI with malnutrition [20]. Meanwhile Broor S et al studied an association of ARI with severe malnutrition [21].

Thymolymphatic depletion can happen in malnourished children. This causes defective cell mediated immunity which leads to severe gram negative infections and sepsis.

ARI and Exclusive Breast Feeding: In the present study, 32 children were not exclusively breast fed. Among them 24 (75%) had LRTI while 8 (25%) had URTI. Among the 32 children who were not breast fed, 26 (81.3%) were male children while 6 (18.7%) were female children. Association of ARI with lack of proper breast feeding practices were observed by studies done by Mathew J L et al [17], Savitha M R et al [20], Broor S et al [21], Prajapati B et al [22], Kaushik P V et al [23] and Rohit B et al [24].

ARI and Previous Episodes: In the present study, 46 (31.7%) children had history of previous episodes of ARI. 36 (78.3%) children with a positive previous history had LRTI while 10 (21.7%) children had URTI.

A study done in Meerut district by Kaushik P V et al showed 42.25% incidence of ARI in children with a previous episode of ARI [23].

Among other literature reviewed, not many have considered this variable.

ARI and Family History: Of the 145 children in this study, 16 (11.0%) children had a positive family history. Among the 16 children, 15 (93.7%) children had LRTI while 1 (6.3%) children had URTI. Similar results have been observed by Broor S et al and Leeder S R et al [21,25]. In a study by Biswas et al [26], Nafstad P et al [27] and Peat J K et al [28], an association of ARI with parenteral smoking habit has been observed.

Children tend to stay in close contact with the family members, which makes them more vulnerable to contract communicable diseases.

Limitations

- Not all the risk factors associated with ARI could be assessed.
- Follow up was not proper in the admitted children.
- Exclusive breast feeding was not followed by the mother and early weaning was done.

Conclusion

- Breast fed children have a lower incidence of ARI.
- Better nutritional status reduce the ARI incidence.
- Regular and complete immunization lower the ARI incidence.
- Family history of ARI can predispose to the disease in children.
- There has been a relation to previous episodes of ARI found in this study.

Increased global awareness regarding ARI has culminated in the initiation of a standard strategy of case identification using simple clinical signs and symptoms, and empiric antibiotic treatment and this approach has been organized by the WHO [29].

Thus community organizations must promote and make efforts to improve the nutritional status, encourage mothers for proper breast feeding practices and give complete immunization in children.

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