Section: Community Medicine

Original Research Article

A STUDY ON ACUTE RESPIRATORY TRACT INFECTIONS AMONG CHILDREN AGED 1-5 YEARS, ATTENDING IN A TERTIARY CARE HOSPITAL

S Baby Shalini[1], K. Sowmya Sudha[2], Y. Bhavani[3], P.Ramesh Babu[2], S. Pravallika[4], P.Bhuvaneswari[2], S. Govindu[5]

[1]1Post Graduate, Department of Community Medicine, ACSR Government Medical College, Nellore, Andhra Pradesh, India.
[2]Associate Professor, Department of Community Medicine, ACSR Government Medical College, Nellore, Andhra Pradesh, India.
[3]Assistant Professor, SVIMS, SPMCW, Tirupathi, Andhra Pradesh, India.
[4]Assistant Professor, Department of Community Medicine, ACSR Government Medical College, Nellore, Andhra Pradesh, India.
[5]Professor & Hod, Department of Community Medicine, ACSR Government Medical College, Nellore, Andhra Pradesh, India.

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Corresponding Author:
Dr. P. Ramesh Babu,
Email: rameshpanabaka@gmail.com

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Abstract

Background: ARI such as pneumonia is one of the most fatal communicable diseases among the children worldwide. They are responsible every year for the deaths of 4.3 million children under 5 years of age worldwide, which represents 21.3% of all deaths in this age group. It is estimated that at least 300 million episodes of ARIs occur India every year, out of which about 30 to 60 million are moderate to severe ARI. As we know the incidence of ARTI is very much higher in under five children. It is vital to conduct more hospital-based studies to know the burden of severe form of pneumonia which contributes to the morbidity and mortality of children below five years of age. The aim is to Study the Frequency of acute respiratory tract infections in last 1 year in children aged 1-5 yrs, attending an immunisation clinic at a tertiary hospital. The objective is to assess socio-demographic factors among study subjects. To determine the frequency of ARI among study subjects. To assess the association between frequency of ARI & risk factors of ARI among study subjects. **Materials and Methods:** Cross–sectional study was done at Immunisation Clinic in ACSR govt medical college Nellore from NOV 2022 to JUNE 2023, Children Age group 1-5 yrs attending an immunisation clinic. Sample size (250) is calculated by assuming the prevalence of ARI among children less than 5 years found to be 41.6% based on previous study. Non probability sampling (convenience sampling method). **Result:** Out of 250 children were enrolled for the study 47.2% males, 52.8% females. 40% 0f children between the age group of 1-2 years. .> than 4 episodes of ARI/year were reported in 60% of children. Factors associated with Increased frequency of ARI seen in mothers who had no formal education 45.8% (p =0.002%), inadequate ventilation 42.4%(p=0.000), usage of biomass fuel 50% (p=0.002), preterm 33.3% (p=0.02), low birth weight 29.2%(p=0.009) children. **Conclusion:** The study concludes that mother's education, inadequate ventilation, usage of biomass fuel, preterm, low birth weight were the major risk factors responsible for ARI in under 5 Children.

INTRODUCTION

Acute respiratory infections (ARI), such as pneumonia, are one of the most fatal communicable diseases affecting children worldwide.[1] The common signs and symptoms of ARI include blocked or runny nose, cough, ear ache or discharge, sore throat, noisy breathing such as wheeze or stridor, and difficult breathing such as chest in-drawing and fast breathing.[2] These infections are responsible for the deaths of 4.3 million children under the age of 5 worldwide, representing 21.3% of all deaths in this age group.[3,4] In India alone, it is estimated that at least 300 million episodes of ARIs occur every year, with 30 to 60 million being moderate to severe.

Hospital records from states with high infant mortality rates indicate that up to 13% of inpatient deaths in paediatric wards are due to ARIs. The proportion of deaths due to ARIs in the community is much higher, as many children die at home.[5] Factors related to the higher prevalence of ARI include lack of maternal education, lack of exclusive

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breastfeeding, poor nutritional status, incomplete immunization, female sex, poor personal hygiene, and overcrowding. An assessment of modifiable risk factors for acute lower respiratory tract infections in children under five has shown a significant association with social class, families with more than two under five children at home, immunization status, family history of respiratory infections, family history of smoking, infants with a history of low birth weight, and the presence of malnutrition.[6,7]

Aim: To Study the Frequency of acute respiratory tract infections in last 1 year in children aged 1-5 yrs, attending an Immunization clinic at a tertiary hospital.

Objectives

1. To assess socio-demographic factors among study subjects.
2. To determine the frequency of ARI among study subjects.
3. To assess the association between frequency of ARI & risk factors of ARI among study subjects.

MATERIALS AND METHODS

This is a cross-sectional study conducted at the Immunisation Clinic in ACSR Government Medical College Nellore, from November 2022 to June 2023. The study aims to investigate the prevalence of acute respiratory infections (ARI) among children aged 1-5 years attending the clinic.

The inclusion criteria for the study are children between the ages of 1 and 5 years whose parents have given consent for their participation. The exclusion criteria are children below the age of 1 year and above the age of 5 years, as well as those with a clinical or confirmed diagnosis of congenital heart disease, pulmonary tuberculosis, cystic fibrosis, immunodeficiency, and any other chronic illness.

The sample size for the study is calculated based on the prevalence of ARI among children under 5 years, which is estimated to be 41.6%, according to a study conducted by Dr. Savitha A. K., Dr. Gopalakrishnan S., and Dr. Umadevi R. from the Department of Community Medicine, Sree Balaji Medical College and Hospital, Chennai, Tamil Nadu, India, published in August 2018. The sample size is calculated using the formula $N = 4Pq/d^2$, where P is the prevalence, q is the complement of P, and d is the allowable error.

The sample size is calculated by the following formula:

$N = 4Pq/d^2$

P = 41.6, q = 100 – P = 58.4, d = 15% of P =6.24

N =4*41.6*58.4/38.9=249.8The sample size is adjusted to 250 for ease of calculation.

Measuring Tools

Semi structured questionnaire

Instrument (Inch tape)

Data Collection: A self-administered questionnaire designed for the study was used as study tool to interview the child's mother. The interview was conducted by the investigator and their responses were recorded in the questionnaire.

They were told that the data was confidential and for research purpose only. Verbal consent was taken from the participants. A total of 250 questionnaires were used for analysis.

Statistical Analysis: Data entered in MS Excel and analysis was done by chi square test using SPSS version 26.

RESULTS

[Table 1] presents the demographic distribution of the 250 participants. The results indicate that 40% of the participants fall within the age range of 12-24 months, 27.6% belong to the age group of 24-36 months, 23.2% belong to the age group of 36-48 months, and 9.2% belong to the age group of 48-60 months. In terms of gender, 47.2% of the participants were male and 52.8% were female. Furthermore, based on the Modified BG Prasad social class classification for May 2022, the majority of the participants belong to the upper class.

[Table 2] illustrates that out of a total of 250 participants, 84% experienced 1-4 episodes of Acute Respiratory Infection (ARI) within the past year, while 16% had more than 4 episodes.

[Table 3] illustrates the correlation between the frequency of Acute Respiratory Infections (ARI) and various risk factors, including birth weight, type of fuel usage, preterm birth, birth order, history of exclusive breast feeding, family history of smoking, immunisation, mother's education, type of family, nutritional status, ventilation, and overcrowding. it Mother's education, Inadequate ventilation, Usage of biomass fuel, Preterm birth, Low birth weight were the major risk factors responsible for Recurrent ARI in under 5 Children.

Table 1: socio –demographic characteristics among study subjects.

Socio-demographic characteristics	No of participants	Percentage (%)
Age group:		
12-24 months	100	40
24-36 months	69	27.6
36-48 months	58	23.2
48-60 months	23	9.2
Gender:		
Male	118	47.2
Female	132	52.8
Socio economic class (Modified BG Prasad –May 2022)		
1 - Upper	113	45.2

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2 - Upper middle	73	29.2
3 - Middle	48	19.2
4 - Lower middle	14	5.6
5 - Lower	2	0.8

Table 2: Frequency of ARI Among study subjects in past 1 year

Frequency of ARI in last one year	No of Participants	Percentage (%)
1- 4 episodes	210	84
> 4 Episodes	40	16

Table 3: Association between Frequency of ARI& Risk factors

Risk factors	Frequency of ARI Episode		Total (n, %)	P value
	<4 episodes (N, %)	>4 episodes (N, %)		
Birth weight <2.5 kg > 2.5kg	34 (70.8) 176 (87.1)	14 (29.2) 26 (12.9)	48 (19.2) 202 (80.8)	0.006(Significant)
Type of fuel LPG Biomass	203 (86) 7 (50)	33 (14) 7 (50%)	236 (94.4) 14 (5.6)	0.000(Significant)
Term Yes No	196 (85.6) 14 (66.6)	33 (14.4) 7 (33.3)	229 (91.6) 21 (8.4)	0.02(significant)
Birth order 1 2 3 4	120 (83.9) 85 (85) 4 (80) 1 (50)	23 (16.1) 15 (15) 1 (20) 1 (50)	143 (57.2) 100(40) 5 (2) 2 (0.8)	0.603
Exclusive breast feeding yes No	200(84.7) 10(71.4)	36(15.3) 4(28.6)	236 (94.4) 14 (5.6)	0.187
Family h/o Smoking Yes No	61(83.6) 149(84.2)	12 (16.4) 28 (15.8)	73 (29.2) 177 (70.8)	0.904
Immunisation Appropriate Not	207 (84.1) 3 (75)	39 (15.9) 1 (25)	246(98.4) 4 (2.6%)	0.621
Mothers education 1- illiterate 2- primary 3 -high school 4- intermediate 5- graduation 6- professional	 13(54.2) 30 (93.8) 64 (84.2) 48 (87.3) 53(86.9) 2 (100)	11(45.8) 2 (6.3) 12 (15.8) 7 (12.7) 8 (13.1) 0 (0)	24 (9.6) 32(12.8) 76 (30.4) 55 (22) 61 (24.4) 2 (0.8)	0.002(significant)
Type of family Nuclear Joint	170(85) 36 (78.3)	30 (15) 10 (21.7)	200(80) 50(20)	0.361
Nutritional status (MUAC) < 12.5 cm - (severe) 12.5 -13.5 cm - (mild-moderate) > 13.5 cm -(satisfactory)	52(85.2) 68(89.5) 89 (79.5)	9 (14.8) 8 (10.5) 23 (20.5)	61 (24.4) 77 (30.8) 112 (44.8)	0.177
Ventilation Adequate Inadequate	191(88) 19(57.6)	26 (12) 14 (42.4)	217 (86.8) 33 (13.2)	0.000(significant)
Overcrowding Present Absent	28(82.4) 182(84.3)	6(17.6) 34 (15.7)	34 (13.6) 216 (86.4)	0.77

DISCUSSION

In our study, a total of 250 study subjects participated, with 47.2% being males and 52.8% being females. Among them, 40% belonged to the age group of 12-24 months, while 27.6% belonged to the age group of 24-36 months. The majority of the participants (45.2%) belonged to the upper class. Additionally, 80% of the participants were from nuclear families, while 20% were from joint families. Regarding the association between the frequency of Acute Respiratory Infections (ARI) and risk factors, it was found that children with low birth weight had an increased frequency of ARI (29.2%). A statistically significant association was observed between low birth weight and increased frequency of ARI, as determined by the chi-square test (p=0.006). A comparable correlation was also identified in a study conducted by Mahesh B. Tondare et al.[12]

Furthermore, it was found that children whose mothers used biomass fuel had a higher frequency of ARI (50%). A statistically significant association was observed between the type of fuel usage and frequency of ARI, as determined by the chi-square test (p=0.000). The utilization of biomass fuel was

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found to have a significant link with ARI in a study conducted by Azad et al in Kolkata in 2018.[10]

Children with preterm birth had an increased frequency of ARI (33.3%), compared to children with term birth (14%). A statistically significant association was observed between preterm birth and frequency of ARI, as determined by the chi-square test (p=0.024).

Regarding birth order, it was found that children of the 4th order had an increased frequency of ARI (50%), but there was no statistically significant association between birth order and increased frequency of ARI. Similarly, In a study conducted by Mitra NK in a community setting, it was found that 43% of individuals affected by ARTI had a birth order more than 2.[14]

Exclusive breastfeeding did not show a statistically significant association, but the frequency of ARI was higher in non-exclusively breastfed infants compared to exclusively breastfed infants. Studies conducted by Mathew J L et al have identified a correlation between inadequate breast-feeding practices and the occurrence of acute respiratory infections (ARI).[13]

Children with a history of exposure to cigarette smoke had an increased frequency of ARI (16.4%) compared to those without exposure (15.8%). Exposure to passive smoke has also been proven to play a role in the occurrence of severe cases of acute respiratory infections (ARI). This finding has been supported by the research conducted by Ujunwa FA and Ezeonu CT.[15]

In our study, one child who did not receive appropriate immunization showed a 25% occurrence of ARI, compared to immunized children (15.9%). Which is consistent with the study done by Arun et al.[10]

According to the mothers' education, there was a 45.8% increased frequency of ARI in children whose mothers had no formal education. A statistically significant association was observed between mothers' educational status and frequency of ARI, as determined by the chi-square test (p=0.002). According to studies conducted by Syed Abid Asghar et al., a significant 53.8% of ARI cases were observed in mothers who were illiterate.[9]

The prevalence of acute respiratory infections (ARI) in children with severe malnutrition was found to be 24.4%, and no statistically significant association was observed. ARI has been found to have a significant correlation with malnutrition in studies conducted by Savitha M R et al.[16]

Children living in inadequate ventilation had a 42.4% increase in the frequency of ARI. A significant association was observed between inadequate ventilation and ARI frequency, with a p-value of 0.000 obtained from a Chi Square Test. Asghar et al.'s study revealed that inadequate ventilation was observed in 48% of cases, with a 95% CI of 31.21-64.79.[9]

There was no observed correlation between overcrowding and an increase in the frequency of ARI in our study. However, a study conducted by Prajapati et al. found that 33% of ARI cases were associated with overcrowding.[11]

Ethical considerations: No interventions or investigations were conducted, resulting in no financial burden being imposed on the participants. Prior to data collection, all mothers/caregivers will receive a briefing on the study's objectives. Informed consent was obtained. The information was exclusively gathered through a questionnaire provided to the caregivers of the children involved in the study.

CONCLUSION

A study has determined that the primary risk factors contributing to the recurrence of Acute Respiratory Infections (ARI) in children under the age of 5 are the level of education of the mother, insufficient ventilation, the use of biomass fuel, preterm birth, and low birth weight.

Recommendation: Raising awareness regarding the risk factors associated with Acute Respiratory Infections (ARI) and enhancing housing conditions, as well as improving antenatal services, will greatly contribute to the reduction of morbidity in children under the age of five.

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